'Fish Diseases – Who Cares and Who Cures? A comparative Study of Professionalization and Division of Work in the Health of Farmed Fish in Norway and Scotland.

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DEDICATION

This work is dedicated to my family and friends, who always continuously supported me in reaching this personal goal. They understood when I spent hours on writing and accepted all the days of absence. Especially, I want to thank my mother Anna Værøy Kjæmpenes and my deceased father Karl Kjæmpenes, who motivated me to pursuit a university education. But also their role as pioneers in fish farming has been important to me. They opened my eyes to an interesting field of study. I thank my family at Værlandet and my family from Alta, who has all supported me throughout the process. Finally, I wish to give special thanks to my two wonderful daughters, Anna and Oda, and my patient and understanding partner Jonny Bellika. Once again I thank them all for their support, help, and encouragement, and I know that they are very happy to know that I have finally managed to finish this work.

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SUMMARY

Why have Norway and Scotland involved different knowledge-based occupations in statutory fish health work? Why have Norwegian and Scottish professionalization processes taken different trajectories? These are the initial research questions for the thesis, which is an empirical analysis of professionalization processes in fish health, a new work field created by a quickly expanding fish farming industry. The industry has been accompanied by fish diseases which again have created a demand for research, professional advice and regulation. The analytical focus, the framework for the study, builds on a five-actor model. This model is based on, and follows closely, a four-actor model developed by Burrage, M, Jarausch, K. and Siegriest, H. (1990). The five actors outlined in the model are; the users, the state, the practicing professionals, other professions and knowledge-based groups and universities/advanced training institutions. The assumption is that actors in a work field involve at different times depending on their interests, resources and strategies. The interaction between the actors, as well as the national context and the dynamics surrounding the field influence the outcome, e.g. if professionalization processes take place.

Empirically I analyze and compare professionalization of the Norwegian and the Scottish fish health work field. Early fish disease legislation is common for both countries, but the countries have taken different trajectories in their institutional arrangements and the role of professions in fish health. In Norway, a new profession, the aquamedicine biologist, is formed. The Norwegian fish health work field is shared between vets and aquamedicine biologists and both professions carry out statutory fish health work, diagnostic work and treatment of diseased fish. In Scotland (GB), on the other hand, an institution, the Fish Health Inspectorate (FHI) is responsible for statutory fish health work. Fish health inspectors employed by the FHI carry out the statutory field work. However, although the vets as a profession is not involved in statutory fish health work, only vets can prescribe medicine for fish. Therefore, vets are involved in the treatment of fish.

The actors' interests in the field revealed by following the resources and strategies of each actor. Owner structure, institutional belonging (fishery or agriculture sector), fish health regulation, and involved universities have proved to be important for the understanding of the countries' trajectories. The new Norwegian profession, aquamedicine biologist, has been shaped by a combination of these features and the role of the universities has been decisive for the professionalization. In Scotland, where no professionalization of the fish health work

field has taken place, an early diseases of fish act (1937) did not involve the veterinary profession and microbiologists took responsibility for statutory fish health work. It is, however, not a single event that is decisive for whether professionalization happens or not, it is the historical shaping of a matrix of structures and social relations. By bringing in time, place and sequences, interrelationships between actors can be unveiled. Individual actors may play an important role in the development of a new profession or institution, but the interrelationships between the actors define the space of action.

The question about fish health relates to a global discussion about the world's future demand for fish. The Food Agriculture Organization (UN) believes that aquaculture is the key to meet this demand. Statutory fish health work will become a key issue for future development of the aquaculture industry. Do professions have a future role in the protection of the societies' interest in an industry that might be dominated by multinational companies?

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LIST OF ABBREVIATIONS

AVF	Akvaveterinærenes forening (Norwegian Aquaculture Veterinary Association)
BVA	British Veterinary Association
CEC	Crown Estate Commissioner
CEFAS	Centre for Environment, Fisheries & Aquaculture Science (England)
CVO	Chief Veterinary Officer (UK)
DAFS	The Department of Agriculture and Fisheries for Scotland
DAFS	Department of Agriculture and Fisheries for Scotland
DEFRA	The Department of Environment, Food and Rural Affairs (UK)
DETR	Department of Environment, Transport & the Regions (UK)
DNV	Den norske veterinærforening (Norwegian Veterinary Association).
EEA	European Economic Area
FAO	The Food and Agriculture Organization (UN)
FAO	Food and Agriculture Organization (UN)
FHI	Fish Health Inspectorate
FHI	Fish Health Inspectorate
FHL	Fiskeri- og havbruksnæringens landsforening (the Norwegian Seafood Federation)
FHL	Fiskeri- og og havbruksnæringens landsforening (Norwegian Seafood Federation)
FOS	Fiskeoppdretternes Salgslag AL (Norwegian Fish Farmers Sales Organisation)
FOS	Fiskeoppdretternes Salgslag AL (Norwegian Fish Farmers Sales Organization)
FRS	Fishery Research Services
FSBI	Fisheries Society of the British Isles
FVE	Federation of Veterinarians of Europe
FVS	Fish Veterinary Society
GB	Great Britain (England, Scotland and Wales)
HIDB	Highlands and Islands Development Board
HIDP	Highlands and Ilands Development Board
IMR	Institute of Marine Research (Havforskningsinsituttet)
ISA	Infectious Salmon Anaemia
ISA	Infectious salmon anaemia

MAFF	Ministry of Agriculture, Fisheries and Food
MAFF	Ministry of Agriculture, Fisheries and Food (now Department for Environment, Food and Rural Affairs, DEFRA)
MSS	Marine Scotland Science
MSS	Marine Scotland Science
NAVF	Norges almenvitenskapelige forskningsråd
NFF	Norske Fiskeoppdretteres forening (Norwegian Fish Farming Association)
NFF	Norske Fiskeoppdretteres Forening (Norwegian Fish Farming Association)
NFFR	Norwegian Council of Fishery Research (Norges Fiskeriforskningsråd)
NFH	Norges Fiskerihøgskole (Norwegian College of Fishery Science)
NFH	Norges Fiskerihøgskole (Norwegian College of Fishery Science)
NFR	Norges forskningsråd (Research Council of Norway)
NFU	National Farmers Union
NFU	National Farmers Union
NFUS	National Farmers Union for Scotland
NFUS	National Farmers Union for Scotland
NHO	Næringslivets hovedorganisasjon (Confederation of Norwegian Enterprise)
NHO	Næringslivets hovedorganisasjon (Confederation of Norwegian Business and Industry)
NJFF	Norsk jeger og fiskerforbund (Norwegian Association of Hunters and Anglers)
NLH	Norges landbrukshøgskole (The Norwegian Agricultural University).
NLH	Norges landbrukshøgskole (since 2005, UMB)
NLVF	Norway Agricultural Research Council (Norsk landbruksvitenskaplige forskningsråd)
NMP	New Public Management
NOU	Norges offentlige utredninger (Official Norwegian Reports)
NVH	Norgs veterinærhøgskole (The Norwegian School of Veterinary science)
NVI	Veterinærinstituttet (Norwegian Veterinary Institute)
RCVS	The Royal College of Veterinary Surgeons
SEERAD	Scottish Executive Environment and Rural Affairs Department
SFFA	Scottish Fish Farming Association
SFFA	Scottish Fish Farming Association
SFFA	Scottish Fish Farming Association
SGMD	Scottish Government Marine Directorate

SIC	Shetland Islands Council
SIC	Shetland Islands Council
SOAEFD	Scottish Office Agriculture Environment and Fisheries Department
SOAFD	Scottish Office Agriculture and Fishery Department
SQS	Scottish Quality Salmon
SSB	The Scottish Salmon Marketing Board
SSB	Scottish Salmon Marketing Board
SSFA	Shetland Salmon Farmers Association
SSFA	Shetland Salmon Farmers Association
SSGA	The Scottish Salmon Growers Association
SSGA	Scottish Salmon Growers Association
SSPO	Scottish Salmon Producers' Organisation
SSPO	Scottish Salmon Producers' Organisation
UMB	Universitetet for miljø- og biovitenskap (Norwegian University of Life Sciences)

CHAPTER 1: INTRODUCTION

In 2005, the Norwegian marine scientific community at the University of Bergen and the University of Tromsø celebrated the end of a 15-year long struggle to be allowed to prescribe medicine for fish. The outcome of the struggle has been a new profession, namely aquamedicine biologists (Universitetet i Bergen, 2005). In addition to medical doctors, dentists, and vets, aquamedicine biologists in Norway have gained the right to prescribe medicinal products. The important event leading to this outcome was an amendment to EU Directive 2001/82/EC[1] allowing member countries to decide whether a professional person is qualified to prescribe veterinary medicinal products or not. Under the earlier directive, only vets were qualified. The amendment was the result of negotiations between the Norwegian Government and the EU, during which scientific staff at Norwegian universities together with fish health biologists[2] had played significant roles. Central to the formation of this new profession has been the salmon farming industry's rapid and successful growth and with it also the need to monitor fish diseases.

Although the new profession in fish health has been established in Norway, the profession does not exist in Scotland, England and Wales (GB)[3]. Scotland, the second largest producer of salmon in Europe and the largest in the UK,[4] is the only country within the EU

[1] Directive 2004/28/EC of the European Parliament and of the Council of 31 March 2004 amending Directive 2001/82/EC on the Community code relating to veterinary medicinal products. *Official Journal of the European Union*, L136, Vol. 47, pp. 0058–0084. http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2004:136:SOM:en:HTML (accessed 29 August 2012).

[2] The formal Norwegian title is *fiskehelsebiolog*, and the English title is aquamedicine biologists. The University of Bergen, University of Tromsø, and Veterinary Division of the Norwegian Ministry of Agriculture agreed in 2004 to use the title aquamedicine biologists as an English title in order to distinguish it from the established title fish health biologist. In English-speaking countries the title fish health biologist is used in reference to biologists engaged in work related to fish health (Killie, 2007). In this thesis, the title fish health biologist and aquamedicine biologist are treated as synonymous.

[3] Great Britain (GB) is the term used for the island containing the contiguous nations of England, Scotland and Wales. United Kingdom (UK) is the term used for England, Scotland and Wales together with the province of Northern Ireland (University of Edinburgh, School of Geoscience, n.d.).

[4] Approximately 90% of the UK fish farming industry is based in Scotland, particularly in the Highlands and Islands. This is the reason why I use findings from Scotland. When it comes to the veterinary profession, however, it is necessary to include the UK because veterinary legislation applies to the UK as a whole.

that does not engage veterinary surgeons in the surveillance and management of disease control. In the GB fish health inspectors' act as veterinary inspectors in accordance with current legislation related to fish health,[5] and no other professions or branches of scientists have claimed any exclusive right to control the field of fish health work.

In Norway, the veterinary profession had an early involvement in statutory work related to fish health (Kjæmpenes, 1988), while in the UK the veterinary profession has not been involved in statutory fish health work. This raises questions such as: *Why have Norwegian and Scotland involved different knowledge-based occupations in statutory fish health work? Why have Norwegian and Scottish professionalization processes taken different trajectories?* These are the starting questions for my study of professionalization processes and the division of expert work in a new and fast expanding aquaculture industry. The analytical focus is on professionalization processes in the field of fish health, but the assumption is that by focusing on how occupational groups find their place within this new industry the study could contribute unique data on the social division of expert work in society.

The professionalization processes have taken place at a time when the public sectors in Scotland and Norway are facing more control by public providers and demands for more efficiency and greater competition. The division of knowledge-based work in the fish health field also takes place within an industry that worldwide has developed rapidly in the last 50 years, and it continues to grow more rapidly than other sectors producing animal food (FAO, 2009). The potential of the aquaculture industry as a source of the world's food supply is high, but a main challenge facing all types of aquaculture is to develop sustainable production. Control of diseases is one major issue in aquaculture and will continue to be a challenge for future aquaculture development. Both infectious and non-infectious (environmental, nutritional and genetics) diseases are a problem. For example, infectious diseases have the potential to threaten whole industries (Owens, 2003) as was the case for the salmon farming industry in Chile when hit by the infectious salmon anaemia (ISA) virus in 2007 and 2008 (IntraFish, 2012).

[5] Fish health inspectors are employed by Marine Scotland Science's (MSS), Fish Health Inspectorate (FHI) (Marine Scotland, 2012).

1.1 The aquaculture industry – the world's blue revolution?

Today, modern aquaculture development in many countries involves input by farmers, investment concerns, equipment manufacturers, service suppliers, scientists, and governments. The aquaculture concept is broad and covers a diverse set of species. The Food and Agriculture Organization's (FAO) *Glossary of Aquaculture* defines aquaculture as 'The farming of aquatic organisms in inland and coastal areas, involving intervention in the rearing process to enhance production and the individual or corporate ownership of the stock being cultivated' (FAO, n.d.). Two essential factors combined distinguish aquaculture[6] from capture fishing: interventions to enhance stock and ownership of stock (Lucas, 2003, p. 2). In aquaculture there has been relatively little genetic selection compared to highly selected plants and animals in agriculture. Among the few fish species considered to be domesticated are the common carp, Atlantic salmon, rainbow trout, tilapia species, and channel catfish. Their breeding is based on brood stocks that have been subject to intense genetic selection (Lucas, 2003, pp. 2–3). Sector aquaculture is complex, comprised of sub-sectors such as breeding, hatchery, and nursery operations, as well as grow-out and marketing, and it is interdependent with a wide range of associated industries such as feeds, fertilizers, medication, and equipment (Pullin and Sumaila, 2005, p. 93).

The contribution of aquaculture to the total production of capture fisheries and aquaculture continues to grow; it rose from 34.5% in 2006 to 36.9% in 2008. Production from the aquaculture industry is mostly destined for human consumption, and in 2008 aquaculture accounted for 45.7% of the world's fish food production for human consumption. It is, however, expected that although aquaculture production will continue to grow on a world basis, the rate of increase in most regions will slow in the coming decade (FAO, 2010, pp. 18–20).

'FAO believes that responsible aquaculture is the key to meeting the world's growing demand for fish while simultaneously reducing pressure on wild fish stocks' (FAO, 2007). In line with this, it is said that aquaculture is a blue revolution that will match the green revolution in agriculture (Lucas, 2003). New technologies, new breeds, and newly

[6] Aquaculture and fish farming are frequently used terms describing the process of large-scale husbandry or rearing of aquatic organisms for commercial purposes. Lucas and Southgate (2003) use the term fish farming in the sense of aquaculture of, for example, fish, crustaceans, and molluscs, but not plants. In this thesis I follow Lucas and Southgate's use of the term since Atlantic salmon dominate the Norwegian and Scottish Aquaculture Industry.

domesticated species of fish offer great hope for the future. However, the aquaculture industry's on-going boom is a challenge, especially in terms of environmental and sustainability issues, and the growing competition between aquaculture, poultry farming, and livestock for fish oil used in feed (FAO, 2007).

1.2 Aquaculture development in Norway and Scotland

In Norway and Scotland the farming of Atlantic salmon dominates the fish farming industry. Western Europe produces 55.6% of the world's farmed salmonids. Norway, Europe's biggest producer of salmon, has five times the production level of Scotland. According to Norwegian figures, the first hand value of salmon was historically high in 2009 and reached NOK 20 billion, which was NOK 4.9 billion more than in 2008 (Statistics Norway, 2011). The UK was the world's second largest producer until the year 2000, when it was surpassed by Chile. The total production of Atlantic salmon in Scotland during 2009 was 144,247 tonnes, an increase of 15,641 tonnes (12%) on the 2008 production. The Norwegian and Scottish aquaculture industries are young compared to other industries. In Norway in the 1970s and in Scotland in the 1980s, the salmon farming output was significant. The countries' owner structure had different points of departures, which have since influenced the social context for actors in the field.

Whereas in Norway the industry was from the beginning dominated by small-scale businesses owned by families or founders (pioneers), the Scottish industry was established with help from foreign actors (Liabø , Nystøyl, Pettersen, Vang, and Veggeland, 2007). A few multinationals have dominated the salmon grow-out industry in Scotland since it started in the 1970s (Alteren, 2000). In Norway, since the enactment of the first temporary licensing act in 1973 (Fiskeoppdrettsloven av 1973) the Norwegian 'licensing system has been used by the state to regulate entrants into the business, localization and capacity of each plant' (Hallenstvedt, Hersough, and Holm cited in Alteren 2000, p. 8). The 1973 Act also restricted horizontal integration, with the result that most businesses in Norway were single-site operations, whereas in Scotland there were no restrictions on the size of salmon farming either at business level or at site level, and producers could expand within the constraints imposed by local planning regulations (Shaw and Gabbot, 1990).

In the 1970s and 1980s, Norwegian pioneers took the first important steps in knowledge development; they learned from each other and the industry was dominated by small businesses. In 1991, due to liberalization resulting from the amendment of the Fish

Farming Act of 1985 (Fiskeoppdrettsloven av 1985), the Norwegian fish farming industry saw a change in owner structure, from a situation where small-scale businesses had dominated to an owner structure consisting of both small-scale and large-scale businesses (Berge, 2002). At the turn of 2000, the industry moved through amalgamations and strategic buying towards an owner structure dominated by large-scale businesses (Effektiv og bærekraftig arealbruk i havbruksnæringen, areal til begjær, 2011).

The UK salmon production is almost entirely located in Scotland. In the 1980s, Scottish businesses were free to expand and since then a few multinationals have dominated the salmon grow-out industry (Alteren, 2000). The total number of grow-out farms declined throughout the 1990s, and according to the Alteren (2000) the tendency is towards an increasing concentration per producing site. In 2010 the overall production of salmon was dominated by nine companies, which between them accounted for over 95% of the salmon production in Scotland (Scottish Fish Farm Production Survey 2010). In both Scotland and Norway the tendency is increasing concentration of ownership, but this is much more the case in Scotland than Norway. The volume of salmon produced also differs between the two countries (Table 1).

Table 1 Annual production of Atlantic salmon in Norway and Scotland, 1988, 1998, 2008 and 2010

Annual production of Atlantic Salmon (tonnes)	1988	1998	2008	2010
Norway	88,371	360,806	737,694	927,876
Scotland	17,951	110,784	128,606	154,164

Sources: Scottish Fish Farm Annual production Survey, 2007, Scottish Fish Farm Production Survey 2009, Scottish Fish Farm Production Survey 2010, Statistics Norway, December 2011 Facts Norwegian fish farming in Norway 1989.

It is also worth noting that Norway and Scotland are subject to different EU regulations.[7] In 1977, the EU imposed control and import duties on Norwegian salmon entering the EU market (Alteren, 2000). In July 1997 a salmon agreement between Norway and the EU was introduced that lasted until May 2003. The agreement established a minimum import price scheme, and Scotland benefitted from these regulations as it was producing primarily for the domestic market (UK) and the EU. During these six years in which the agreement was in place the Scottish fish farms did not face tariffs in the EU, unlike Norwegian exporters (Alteren, 2000).

At national level, Scotland's regulations governing fish farming have differed from Norway's, especially those concerning the regulation of ownership, but also specification of property rights regarding different requirements for starting a fish farm. In Scotland, the Crown Estate Commissioner (CEC) owns approximately half of the foreshore and most of the seabed around the coast. Anyone wishing to attach a farm cage to the seabed should obtain a lease from the CEC. As a landlord, the CEC has been able to control the development of the salmon farming industry in Scotland, and this development has taken place without a functioning statutory body responsible for the planning of marine salmon fish farming. The size of Scottish salmon farms has not been limited under existing regulations, whereas salmon farmers in Norway have faced regulations on farm size and ownership (Alteren, 2000).

However, of most importance for my analysis in this thesis is that, with regard to fish health, diseases of fish acts entered into force relatively early – in 1968, in Norway and in 1937 in the UK. In the UK, the fish disease legislation was an attempt to control fish diseases in salmon rivers. The Norwegian Diseases of Fish Act of 1968 (Fiskesjukdomslova av 1968) was directed towards the need to control diseases in pond farming. The legislation is the starting point of the research presented in this thesis. Different national characteristics in fish

[7] The European Free Trade Association (EFTA) states: 'The Agreement on the European Economic Area which entered into force on 1 January 1994, brings together the 27 EU Member States and the three EEA EFTA States – Iceland, Liechtenstein and Norway – in a single market, referred to as the "Internal Market". The EEA Agreement provides for the inclusion of EU legislation covering the four freedoms – the free movement of goods, services, persons and capital – throughout the 30 EEA States' (EFTA, 2012, a)). The EEA Agreement does not cover the common agricultural and fisheries policies, although it contains provisions on various aspects of trade in agricultural and fish products. However, it does provide provisions for various related aspects such as the following: Agricultural products – preferential trade, Fishery products, Food safety – food and veterinary matters, organic production and plants (EFTA, 2012, b)).

health regulations and regulations governing ownership and the size of the industry constitute the context examined, and I focus on how the national institutional dynamics surrounding the field of fish health produce either a novel profession, such as aquamedicine biologists in Norway, or a greater role for scientists, such as those working in Scotland.

1.3 Fish health – a promising new field of expertise

Successful aquaculture development depends on scientific and technological knowledge, as well as knowledge of social, economic, environmental, and political contexts. The control of fish health is only one of several knowledge fields. Matthew Landau (1992, p. 3) considers the aquaculture industry to be a blend of fisheries biology, agriculture, limnology, oceanography, chemistry, animal and plant physiology, physics, engineering, law, and businesses. Owens (2003, p. 199) states: 'Diseases include both infectious and non-infectious (environmental, nutritional and genetics) problems. The non-infectious disease are solely due to management practices and are often limited to particular farms, However, infectious diseases, for instance, have a potential to threaten whole industries.' According to Adams (2010, p. 6), the control of disease is 'complex and relies heavily on a combination of pathogen detection, disease diagnosis, treatment, prevention and general health management. Rapid disease diagnosis and vaccination play a crucial part in this.'

In particular, high densities are a challenge in fish disease work (Owens, 2003), since the control of disease is dependent on natural environmental conditions. This is the case for salmon farming, where production takes place in sea cages. Chile's bad experiences concerning diseases, such as the outbreaks of infectious salmon anaemia (ISA) in 2008, is an example of the challenges faced in attempts to control fish diseases under such conditions. Chile experienced a backlash in 2009 and 2010 that left it ranked below Scotland in world salmon production (Globefish, Salmon, November 2009).

Fish diseases are issues that have to be dealt with on both national and international levels. The combination of a rapidly expanding fish farming industry and its need to control fish diseases has aroused the interest of educational institutions, professions, and knowledge-based occupations in the field. Governments have understood the need to regulate the field. Again, Chile's fish health situation can be used as an example, as Chilean fish health regulations have turned out to be the most important move in order to recover the country's Atlantic salmon farming industry. Prior to the introduction of the regulations, insufficient fish

health management had limited the ability of Chile's Government to cope with the rapid growth.

Aquaculture has the potential to be a source of food production in most regions of the world, but increasingly the industry needs to take into consideration environmental and health circumstances, in addition to social, political, and economic circumstances (Rana, 2007, p. iii). There is interdependency between all phases of fish farming, from hatcheries, to on-growers farms[8], and to purchasing and marketing. Fish health is influenced at all of the phases, as well as by how they interrelate. Even the purchase phase needs a health certificate *i*ssued by a competent authority.

1.4. Norway and Scotland – fish disease legislation

Early legislation governing fish diseases, supported by fish disease research, was an important contribution to the success of the aquaculture industry in Norway and Scotland. However, the two countries have taken different paths in their institutional arrangements and the role of professions in fish health.

As mentioned above, Scotland and Norway introduced early legal requirements for their respective governments to be notified of suspected cases of certain diseases in fish. In Norway, the Diseases of Fish Act 1968 (Fiskesjukdomslova av 1968) was the first act to regulate the aquaculture industry. Fish biologists, representatives of pond fish farmers, and veterinary institutions had called for the Government to investigate ways to prevent the spread of fish diseases, and to implement legislation.

In Scotland, the Diseases of Fish Act of 1937 (Diseases of Fish Act, 10th of June 1937) was enacted because there was a need to control the spread of disease, specifically furunculosis[9] in salmon and trout rivers. In 1929, the Furunculosis Committee was appointed by the Ministry of Agriculture and Fisheries (UK).

[8] The operation of the salmon farming industry can be understood in stages: broodstock farms, hatcheries, smolt production, on-growing farms, purchasers (Shaw and Gabbot, 1990). The period in seawater is known as the on-growing phase, in which the fish grow to become fish weighing several kilos (Meridian Salmon Group, u.d.)

[9] In 1894 two German observers, Emmerich and Weibel were the first to describe furunculosis. Furunculosis is caused by the bacterium *Aeromonas salmonicida* subsp. *salmonicida***.** The bacterium is found worldwide, with the exception of Australia, and may cause serious diseases in wild and farmed fish (Poppe and Mo, 1992).

'to investigate the origin, predisposing causes and mode of dissemination of furunculosis and similar infectious diseases among salmon, trout and other fresh-water fish in England and Scotland, and to conduct experiments with a view to ascertaining methods of combating the diseases, and to report the results of their proceedings' (Mackie, Arkwright, Pryce-Tannat, Mottram, Douglas Johnston, Menzies, 1930, p 4,).

The committee emphasized in its three reports the necessity for control of importations and movements of live salmon, trout, and other freshwater fish (Mackie et al., 1930; 1933; 1935). Pond farming is mentioned by the Committee, but the main focus was on the protection of salmon, trout, and freshwater fish in rivers. I return to the legislation processes in detail in Chapter 4. The years in which the Norwegian (1968) and the GB (1937) Diseases of fish Acts came into force are used as the starting point for the case study presented in my research.

Today, under the European Economic Area (EEA) Agreement that entered in force on January 1, 1994 (Agreement on the European Economic Area,1994), Norway is required to adopt most EU legislation relating to food safety (including veterinary legislation). Diseases that have to be notified are categorized under List I, II, or III, according to EU Directive 91/67/EEC (EU Directive 91/67/EEC, 1991).[10] List I diseases are exotic to the European Community and have the potential for significant economic impact in aquaculture, List II are non-exotic diseases and present in some parts of the European Community, List III are other notifiable diseases that are present in parts of the European Country (Fish Health Inspectorate, n.d.). Other notifiable diseases are controlled through national programmes approved by the EU.

1.5 Fish health –involved professions and knowledge-based occupations

Only in Norway has a new profession, aquamedicine biologists, established. This raises the need for a comparative study. Why did a profession similar to classical professions such as

[10] EU Directive 91/67/EEC was amended by the Council Directive 2006/88/EC of 24 October 2006 on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (*Official Journal of the European Union* L 328/14).

medicine and law[11] evolve in Norway and not in Scotland or elsewhere in the UK? To date, no studies of this professionalization of fish health have been conducted, with the exception of one that I published in the late 1980s (Kjæmpenes, 1988). In that study, I examine the first phase of the professionalization process in the field of fish health in Norway. In 1988 it was difficult to foresee that the professionalization of fish health biologists would be successful. At the time, the veterinary profession had a strong position within the Norwegian Ministry of Agriculture, which also had responsibility for fish disease legislation. New courses in fish health studies had not yet been established, although they were planned, and the Universities in Bergen and in Tromsø had not yet sought the right to prescribe medicine for their graduates. There was heated discussion but these had not yet risen to direct confrontation (Kjæmpenes, 1988).

The Norwegian case shows that the fish health field and knowledge-producing institutions is an interesting field of study for knowledge-based occupations in Norway. During the preparation of this thesis I had the privilege of following the Norwegian professionalization processes and division of work from its beginnings in the 1980s.

By contrast, the Scottish case shows another path in the division of work, where fish health inspectors are employed to carry out fieldwork and scientists employed at Marine Scotland Science's Marine Laboratory, located in Aberdeen, provide diagnostic services and expert advice to the Government.

Since many of my readers are not familiar with the fish health field a brief account of what fish health work may consist of is probably needed . However, a thorough presentation of the field of fish health work would need a more in depth study on micro level. This is not the goal of this work. Fish health work depends on national context and the role and interests of involved actors. Fish health work is, as mentioned above, influenced by all phases of fish farming from hatcheries, on-growers farms to purchase and marketing.

In Norway fish vets and aquamedicine biologists have many responsibilities. Some of them are regulated in the Veterinarians and Other Animal Health Personnel Act of June 15,

[11] Evetts (2006b, p. 526) argues that the Anglo-American overemphasis on medicine and law as the archetypal professional group has not of little help in the discourse on professionalism: 'One consequence has been that the Anglo-American social scientists have developed a distorted view of the power of a limited number of occupational groups to influence states, demand and retain regulatory power from those states, and control (through monopoly practices) the markets for their knowledge, and services. In general, then, a focus on (previously) powerful occupational groups has deflected attention away from analysis of occupations that generally have been less successful in using the discourse in their own interest (such as engineers and teachers).'

2001 (Dyrehelsepersonelloven av 2001).They have to ensure farmed fish is kept healthy and they diagnose, prescribe treatment and prescribe medication when fish have diseases. Aquamedicine biologist and veterinarians take samples, analyse and verify that rules and laws are followed. They may also carry out inspections on behalf of the state, work for such authority, or they may be employed in fish farming enterprises. They can also work with nutrition, fish processing, researching diseases and parasites and produce vaccines and other medicines for fish.

Just like a veterinarian is responsible for animal health and welfare in the on land, aquamedicine biologists and veterinarians are responsible for fish and other aquatic organisms. They prevent, detect and treat disease in order to increase production and reduce mortality in fish farms (Studenttorget, u.d.).

In Scotland the veterinary profession has similar tasks as the Norwegian professions except for statutory work according to the Diseases of fish act of 1937 (83). The Diseases of Fish Act1983 (Diseases of fish act of 1983) amended the 1937 Act.[12]They treat and medicate fish under their care according to the Medicine Act of 1968 (Medicines Act of 25th October 1968) and impose controls upon the sale and use of medical production of all kinds, for the treatment of either humans or animals, including fish (Howart, 1990). In Scotland statutory work is the responsibility of the Fish Health Inspectorate. Fish Health Inspectors 'require access to inspect all the facilities on the site as well as checking the mortality records, movement records, transport records, medicines records, the site Biosecurity Measures Plan, the results of animal health surveillance carried out by (or on behalf of) the business, collect details of the stocks on site and checking that the registration/authorisations details held by Marine Scotland are correct. 'FHI investigates reports of unexplained mortalities, take samples and diagnose the cause where possible' (Fish Health Inspectorate (u.d.) Retrieved August 27, 2012).

1.6 Research approach

To understand the development trajectories of fish health work in the two case countries' industries, I conducted both a cross-national study and a historical sociological study. By using a historical sociological model, I aim to explain the process of professionalization and how divisions of work are influenced by actors and their interrelationships. The aim is to

[12] Legislation enacted after 2005 are not considered in this work.

provide insight into why the two countries have taken different paths in the division of work in the fish health and to highlight the importance of applying other professions and knowledge-based groups as a fifth distinctive actor.

1.7 Structure of the thesis

Using the two research question listed at the beginning of this chapter as a starting point I performed a detailed case study analysis. In Chapter 2, I place the study within a profession theory tradition. I expand Burrage, Jarausch, and Siegrist's (1990) four-actor model to a five-actor model (users, the state, practising professionals, other professions or occupational groups, and the universities), and use the new model to identify the actors involved in the fish health field and their interests, resources, and strategies. In addition, I use Abbot's (1988) jurisdiction claim approach. The empirical chapters each deal with one of the actors. In Chapter 3, I describe characteristics of the users of services, namely the aquaculture industry (fish farmers) in the two cases. However, I do not focus on consumers as users. Chapter 4 focuses on the state's role in the work field, whereas in Chapter 5 the focus is on the role of the practising professions and other professions and occupational groups. In Chapter 6, I examine the role of the universities and training institutions. The main empirical findings and theoretical implications are summarized in Chapter 7, where I also present a concluding discussion on the broader implications of my findings in relation to debates on professional theories.

CHAPTER 2: THEORY AND METHOD; PROFESSIONAL THEORIES AND COMAPARITIVE ANALYSIS

The aim in this theoretical chapter is to combine micro- and macro-approaches in a theoretical framework that enables comparisons to be made of professionalization and institutionalization processes of professions in the field of fish health in Norway and Scotland. In order to understand public initiative I follow the lines of the research tradition that focus on historical institutional processes (Jacobsen, 1964; Erichsen, 1996). Professional theorists (Abbot, 1988; Erichsen, 1990; Halvorsen, 1994) have pointed out that institutions can turn similar ideas into different practices. National variations can be understood by placing them in institutional arrangements through which ideas are implemented. Different kinds of state-profession relationships that incorporate the complexity of state, expert groups, and knowledge need to be identified. Burrage et al.'s (1990) four-actor model has been a source of inspiration in this regard. Their model takes into consideration both historical contexts and wider divisions of work[13] in society, and can also be used to identify interrelationships between actors. I return to the model later in this chapter, but first I present a short review of classical theorists. During my over 20-year long interest in the division of work in the fish health field, starting with my work for a master's degree (Kjæmpenes, 1988), I have followed theoretical approaches in theories of professions. Theorists from different stages in the history of the sociology of professions have inspired and challenged my approach to the division of work in fish health.

Studies of professions have focused on two main questions, one seeing professionalization as part of a wider division of work in society and one focusing on the role professions play in different spheres of social life (T.J. Johnson, 1972). According to T.J. Johnson in the 1960s and 1970s professional theorists' focus on the micro-level tended to narrow down original problems in order to handle them, and this in turn resulted in large-scale problems being neglected. The challenge for professional theory has been to develop a theoretical framework that is able to incorporate both macro- and micro-level perspectives on professions and professionalization. For example, in the last 15 years there has been a growing interest, especially among management and organizational theorists, in the

[13] The terms labor and work are historical terms that are used synonymously. I use the term work, the term division of labor is used when I refer to authors using this term.

organizational dimensions of experts' work. However, the studies have paid less attention to the wider role of occupations as collective groups outside organizations, with the exception of a special issue of *Current Sociology* titled *Reconnecting Professional Occupations and Professional Organizations* (Muzio and Kirkpatrick, 2011).

The changing international context for professions is another challenge. Kuhlman and Saks (2008, p. 2) states that "[New] theoretical approaches and in-depth research that moves beyond medical governance and macro-level analysis of data are therefore needed to examine the changing international governance of healthcare." It must be added that this need is not only valid for medical governance but also for the animal and fish health governance.

Halvorsen (1995) has called attention to another important question in the sociology of profession; whether or not professions are distinguished by the "sector" within where they operate or if they are part of a larger system. Halvorsen states that by combining Abbot (1988) and the historical/sociological approach sectors will have a crucial explanatory power when you want to look at how professions establish forms of collective action, identities and practices. But it is, according to Halvorsen (1995), important to also consider that the foundation of modern society's reflexive character, which in a systematic way set up knowledge as a critical value for resolving problems, can not only be reduced to aspects of interest in the structure of various subsystems (sectors). Saks (2003) is also engaged in the same challenge when he criticizes current neo-Weberian studies of the sociology of profession in the Anglo-American setting and states that '...the main weakness of such studies is that most authors concerned have established boundaries around their work. In this respect, whilst neo-Weberian approach has many theoretical advantages in analysing the nature and role of professions, in practice its proponents have not sufficiently situated such groups within the wider occupational division of labour' (Saks, 2003, p. 13).

Although theoretical approaches are divided into stages, it should be mentioned that they are not mutually exclusive, and with today's rethinking of professions there are not only new combinations of classical approaches developing but also approaches that challenge the whole idea of focusing on professions.

2.1 The sociology of professions – stages and research questions

The history of the sociology of profession is often divided into stages. The first stage, when researchers attempted to identify traits and the role of professions in society, lasted until the

late 1960s. In this first stage, the taxonomic approach held that professions possess unique characteristics, such as high levels of skill and an altruistic sense of service that set them apart from other occupations. Alexander M. Carr-Saunders and Paul A. Wilson's (1933) pioneering work on professions represents a taxonomic approach. Many researchers were inspired by their descriptive study of 22 professions, and while some researchers limited their work to describing the characteristics of professions, others included broader structures and historical processes in their studies (Fauske, 2008). The publications by Greenwood (1957), Barber (1963), Millerson (1964), Moore (1970), and Pavalko (1971) were, according to Fauske (2008), often used as standard references in the taxonomic approach. The authors listed characteristics held to be unique to professions, but they did not agree on what combination of characteristics was essential to a profession and it became difficult to separate professions from occupational groups.

The study of professionalization processes was the answer to this challenge, and Caplow (1954), Barber (1963), and Wilensky (1964) developed more general models of professionalization (Fauske, 2008). During this stage, the structural functionalists were preoccupied with the characteristics of professions and applied them to occupations that were clearly identifiable as professions. It was taken for granted that professions have a special place in society (Torstendal, 1990). However, it is worth to emphasize, that the structural functionalist Talcott Parson, was a foremost representative for the macro oriented sociology of profession. He saw professions as important elements in modern sociology (Fauske, 2008).

In Norway, in the 1960s and 1970s few researchers linked themselves directly to theoretical debates concerning the sociology of professions, with the exception of Ulf Torgersen (1972) who published a book on the sociology of profession titled *Profesjonssosiologi.* His definition of profession treats a profession not as a type of occupation but as a relation between occupations and an academic education, and he uses medical doctors as an example of a profession. Torgersen's work was inspired by Millerson's (1964) taxonomic approach.

In the second stage of the history of the sociology of professions, from c.1970 to 1990, Hughes (1993) was, according to Fauske (2008), an inspiring source, with his attention to professions' monopoly of work, their power and interrelationships with the state, and with themselves and their clients. The professions' monopoly of work was interpreted not only as the result of occupations possessing expert knowledge and skills but also as a result of a successful battle for privileges and market protection (Fauske, 2008).

Freidson (1970) participated in the developments through his study of the medical professions, whereby he contributed to a new orientation in the studies of professions, arguing that medical doctors had autonomy beyond their professional authority – an autonomy that gave them social and political power that was not always concurrent with the public's interests. Freidson also took an interest in the concept of profession and he claimed that the difficulty in finding a general concept was due to the assumption that it was possible to define 'profession' without considering time and place. The attempts to find a general concept underestimated that the occupations had roots in industrial countries with strong influences from Anglo-Saxon institutions (Fauske, 2008).

Also Terrence J. Johnson (1972) represented a departure from the universalizing theories that viewed professionalization as stages through which all occupations must pass in order to become a profession when he suggested a typology of different institutional forms of occupational control.[14] In his opinion institutionalized forms of control of occupations are only to be understood historically through an analysis of the power of specific groups to control occupational activities (T.J. Johnson, 1972). He developed a triangle model for analysing the interaction between professions, users, and the state. A decade later, T.J. Johnson (1972) elaborated his state-profession perspective and attacked the way sociologists conventionally had conceptualized the relationship between the state and the professions.

In particular, he was concerned that the relationship had been moulded by the concepts of state intervention and professional autonomy and the assumption that there is a simple, inverse relationship between the two – the more 'intervention', the less 'autonomy'. State intervention and professional autonomy should not be seen as antithetical concepts because as time passes both the state and professions will attain autonomy in a field. Following T. Johnson, both Larson (1977) and Abbot (1988) emphasize the processual nature of the social construction of expertise (T. Johnson, 1995). Larson views professionalization primarily as the construction of a market in professional commodities or services. Abbot identifies professionalism as a system of competitive occupational relations centring on jurisdictional claims and disputes and this system must be studied in an historical sociological perspective.

In the third stage of the history of the sociology of professions, from the 1990s onwards, researchers began to 'reassess the significance of professionalism and its positive (as well as negative) contributions for clients and practitioners, as well as for social systems' (Evetts, 2006a, 136). In this stage, elements from different research traditions have been

[14] Independently of Johnson, Rüeschemeyer (1983) suggested a similar typology (Erichsen, 1990:28).

combined in an overall understanding of professions. Halvorsen (1995) has named this third stage as the historical/sociological stage. According to Halvorsen, Andrew Abbots paves the way for the historical sociological reorientation when he seeks to disregard the limits of the earlier stages by introducing a focus on work rather than structure. For Abbot, the central phenomenon of professional life is the link between a profession and its work, a link that he calls jurisdiction (Abbot, 1988, p. 20), and by doing so he unites the macro- and micro-level research traditions. In Halvorsen's (1995) opinion, this split between levels of analysis follows the split between the Anglo-American and Continental approaches to studies of professions. Whereas studies from the USA have not focused on how legislative and political processes influence authorization and normative value-setting processes, this has for example been a dominating approach in French research on professions (Halvorsen, 1995, p. 38).

The new studies of the relationship between state and professions provide a more systematic and sophisticated view of professions. T. Johnson (1995) suggests that Foucault's concept of governmentality can be useful for capturing the relationship between state and professions. Foucault views the state as an ensemble of institutions, procedures, tactics, calculations, knowledge, and technologies, which together compromise the particular form that government has taken (T. Johnson 1995). According to this view, expertise became increasingly institutionalized in its professional form as it became part of the process of governing and crucial to the development of such an ensemble. The modern professions emerged as part of the apparatus that the state constitutes and the state, as the particular form that government has taken in the modern world, includes expertise such as the professions (T. Johnson 1995). Thus, according to T. Johnson, the viewing expertise as part of governing, eliminates the profession-state duality. He argues that in order to extricate ourselves from the distorting consequences of the state-profession dualism, we must first rid our thinking of the concept of the state as a preconstituted, calculating subject. T. Johnson (1995) views Larson's (1977) and Abbot's (1988) emphasis on the processual nature of the social construction of expertise is a move further in the direction of eliminating the state-profession dualism.

In the 1980s scholarly work on professions moved towards developing theoretical analyses that could accommodate historical and comparative evidence. According to Erichsen (1995), Burrage et al. (1990) took part in this proliferation through their development of the four-actor model for comparative analysis. Erichsen (1990) herself has made a comparative study of the dental profession in Norway and Britain. In her study, Erichsen establishes a professionalization approach that conceptualizes distinct types of professionalization. By embodying different relationships between the state and hierarchies of occupations, each type

is seen as linked to the shaping of public policy in differing ways. With her comparative approach and focus on the interaction between historical processes of occupational structuration and public policy formation, she has contributed to the historical sociological reorientation and comparative research on professions.

2.2 New directions in the sociology of professions?

Evetts (2006a, p. 136) tells that in the 1990s researchers began to 'reassess the significance of professionalism and its positive (as well as negative) contributions for clients and practitioners'. Current and contemporary research questions include reappraisal and reassessment of professionalism as a normative value and a move away from market closure as the dominant paradigm. This return and reappraisal is, according to Evetts, a more balanced assessment of professionalism as a normative value: '[t]hus, in addition to protecting their own market position through controlling the licence to practise and protecting elite positions, professionalism might also represent a distinctive f form of decentralized occupational control or "moral occupational community" that could be of importance for the civil society' (Evetts, 2006a, p. 136). In her short note about new directions in the sociology of professional groups Evetts (2006a, p. 140) summarizes that 'in contemporary, advanced societies we seem to be witnessing the development of two different and contrasting forms of professionalism in knowledge-based service sector work: organizational and occupational professionalism.'

According to Evetts, organizational professionalism is a discourse that managers in work organizations control and use, and the appeal to professionalism is an effective mechanism of social control at micro- and macro-levels. Such control is achieved by the way managers, supervisors, and employers of users construct and use the discourse of professionalism, and it is used to bring about occupational change and rationalization as well as to discipline workers in the conduct of their work (Evetts, 2006a, p. 140). By contrast, occupational professionalism is a more traditional, historical form of professionalism and involves a discourse constructed within professional groups themselves. According to Evetts (2006a, p. 141), this discourse involves 'discretionary decision-making in complex cases, collegial authority, the occupational control of the work and is based on trust in the practitioner by both clients and employers'. In her opinion the important comparative research question becomes one of how and in what ways the discourse on professionalism is being used as an instrument of occupational change and social control.

The anthology *Rethinking Professional Governance*, edited by Ellen Kuhlmann and

Mike Saks, focuses on governance of health care and sets out to highlight new international directions and the significance of national contexts for the changing health workforce on the basis of complex sets of cultural and institutional regulatory patterns (Kuhlmann and Saks, 2008b). In the introductory chapter Kuhlmann and Saks call for attention to the new health policies, in which the central goals are tighter regulations and new forms of professional development. The health policy reform is based on a model developed in Anglo-American health systems. In bringing together research from a wide range of continental European countries, including the UK, Canada, and Australia, *Rethinking Professional Governance* highlights different arenas of governance and the various players involved in the policy process (Kuhlmann and Saks, 2008b). Although, none of the studies in the book makes cross-national comparisons, the different contributions clarify the significance of national regulation frameworks for professions. There has been a trend in the field of profession research to collect differing independent national approaches in anthologies and then to compare them in order to grasp new tendencies for professions and professionalization (e.g. Eriksen and Jørgensen, 2005; Larsen and Hedegaard Hein, 2007; Oligati, Orzack, and Saks, 1998; Svensson and Evetts, 2003[15]). In the special Issue of *Current Sociology* published in July 2009, however, the comparative analysis of professional groups was taken as a principle objective by Bourgeault, Benoit, and Hirschkorn (2009). In their review of the comparative literature on professional groups, Bourgeault et al. emphasize the utilization of a novel methodological approach, the decentred method. Unlike the comparative methods described above, their method uses

> [a] decentred technique that brings together a team of two or more researchers from strategic geographical locations that are chosen because the scholarly literature indicates they have significant variability in the issue being addressed. Each of these 'local experts' draws upon largely existing data – either qualitative (including historical) or quantitative – on their case country and, if appropriate or necessary, collect additional data to collaborate the preliminary findings.' (Bourgeault et al., 2009, p. 482)

With regard to Kuhlmann and Saks (2008a), Bourgeault state in their summary of the findings that new health policies can lead to new strategies on the part of health professions:

[15] In the anthology edited by Svensson and Evetts, Rita Shepers' comparison of the medical profession in Belgium and the Netherlands is an exception.

> Recent increases in managerial control and the participation of service users, however, means that the classic exclusionary tactics of the professions are no longer appropriate in healthcare. One important area where transformation can be observed 'in action' is in the establishment of more integrated and collaborative caring systems. (Kuhlmann and Saks, 2008a) p. 5)

In response to this challenge, there are signs that multidisciplinary care models and teamwork approaches are used. A key question, according to Kuhlmann and Saks, is whether a new professionalism based on social inclusion is in the making, and if so how much of the development relates to the system which professions are embedded (Kuhlmann and Saks, 2008a). Further, they state that 'there is lack of knowledge as to whether the emergence of new professional groups and their inclusion in regulatory bodies actually challenges existing patterns of professionalism and fosters more inclusive professional projects, particularly with increasing provider competition and new forms of assessment' (Kuhlmann and Saks, 2008a), p. 6). Kuhlmann and Saks also comment on the remaking of the state-profession-citizen relationships and emphasize that new health policies have important implications for the relationships. The relationships are becoming more open to change because demand-led health care services mean greater competition and public control of providers and consequently it may transform professional self-regulation. Further, Kuhlmann and Saks, 2008a), p. 5) state:

> Another consequence is that new professional groups are emerging and increasingly enter the health political stage, although often not as equal partners. This opens up a new arena in the governance of health professions, highlighting the significance of professionalization and interprofessional relationships.

The rethinking of professions found in new research literature indicates that there are still many questions to be asked about professions and professionalization processes. The two directions (organizational professionalism and occupational professionalism) are not mutually exclusive, nor do they exclude the possibility of using earlier research on professions. New directions in research on professions combine perspectives from different stages in the history of profession theory. A common challenge for all directions is the new policy reforms that aim to steer public activities with economic incentives inspired by New Public Management (NMP). Professions in sectors other than public health are challenged. Despite having a common system of thoughts (management thoughts), the reforms take different direction in

the national contexts in which they are implemented: 'Internationally, new health policies generally aim to provide increased efficiency in the provision and delivery of services and greater responsiveness to user demands' (Kuhlmann and Saks, 2008a), p. 4). Do these changes mean the decline of professions or a revitalization of the health profession's role in society?

According to Kuhlmann (2006, p. 182), changes in institutional regulations and health policies are accompanied by changes and resources and strategies for building trust: 'Trust built up in interaction between professionals and between providers and users is supplemented and extended with assessment and control'. These new developments raise the question of whether new managerial regulations are simply a substitute for trust (Mechanic, referred to in Kuhlmann, 2006). A number of countries, however, report a decline in trust in social institutions (Delhey and Newton cited in Kuhlmann, 2006) and an increase in trust in doctors. In other words, decline in trust in institutions is concurrent with a high level of trust in doctors (Kuhlmann, 2006). The high level of trust in doctors indicates that their profession is able to enhance its social role in society, despite new models for governance being adopted.

Evetts (2006b, p. 526) states that '[p]rofessionalism and trust are now being reconnected mainly as a result of renewed interest in risk and of the consequences of decline in trust between practitioners/workers and their clients in contemporary divisions of labour.' She asks what consequences this will have for research in the field of sociology of professional groups when professionalism is interpreted as a discourse of occupational change and control, and whether this interpretation can help researchers in the field to readdress the issue of trust and professionalism. Further, Evetts (2006b, p. 527) states:

> Perhaps the most important effect is to link the field of professional groups more closely with the sociologies of work, occupations and organizations. The similarities of professional and other kinds of service or knowledge work become more apparent rather than trying to assert and maintain the distinctiveness of special, generic category of professional work.

The theoretical discussion about professions role in society has different labels; for example, new professionals (Duyvendak, Knijn, and Kemern 2006; Larsen and Hein, 2007), reinventing professions (Kuhlmann, 2006), changes in professions' identity (Eriksen and Jørgensen, 2005),[16] and the 'third logic', which is taken from the title of a book by Freidson (2001). The discussion makes it clear that the professions will not cease, but as Kuhlmann

[16] Title in Danish: *Professionsidentitet i forandring*.

(2004, p. 84) states, it is necessary to cope with complex sets of multitiered processes of restructuration and reformation[17] and a diversification of concepts.

According to Kuhlmann (2004), the intensified dialogue between Anglo-American, Continental, and feminist researchers concerning theories of professions, organizational approaches, and research in health care, could represent the beginning of a new direction in profession theory.

2.3 Professions in the Scandinavian (welfare) state

In Scandinavia and Continental Europe the state, particularly the welfare state, has a more dominating role than in the Anglo-American context and consequently includes different terms for professionalization processes (Dahl cited in Eriksen and Jørgensen, 2005, p. 37). The interrelationships between the development of professions and the development of the welfare state have been close. In the 1980s and 1990s the Scandinavian welfare states experienced a financial crisis (Kuhnle cited in Dahl and Eriksen, 2005, p. 8). A supposed need for change was linked to globalization and the altered demographic profile of the Scandinavian population (Andersen cited in Eriksen and Jørgensen 2005, p. 8). Scandinavian welfare state theory approaches are facing new challenges in order to grasp these changes. It may be possible that profession theory studies in Scandinavia, as a parallel to demand for change in welfare state research, have to move away from the close state-profession relationships and open up to new types of professions and professionalization processes. Professions in a modern society are closely interrelated with that society's institutionalization processes (Halvorsen, 1994). Presumably, a consequence of this argument is that, if a state's institution changes, it will be followed by changes in the interrelations between state and professions.

According to Erichsen (1990), one essential step – if one takes as a starting point that professional development relates in systematic ways to particular national experiences – is to identify a multiprocess concept rather than a single-process concept of professionalization in order to apply professional theory to the analyses of cross-national variations in public policies. Professionalization in a multiprocess perspective implies the recognition of fundamentally different types of occupational development. Hence, an occupational activity would be constituted differently in different social contexts (Erichsen, 1990, p. 28). Ellen

[17] Kuhlmann refers to health professions.

Kuhlmann (2004) adopts the same reasoning in her article 'Postmodern times for professions: The fall of the "ideal Professional" and its challenge to theory'. She proposes that there is a need for 'a more flexible view that takes into account the social context and different patterns of professions, professionalization and professionalism' (Kuhlmann, 2004, p. 71).

In the 1980s and early 1990s the two dominating contrasts in the theory of professions were the practitioner-led processes found in, for example, England and the United States, and in the state-led Continental models (Erichsen, 1995). In the former case, the professions are seen as pressure groups (the pressure group perspective), where the historical establishment of the profession to a large degree is seen as shaped by the market. In the second case, the professions are seen as a product of the state (the state-led perspective) (Erichsen, 1995; 1996). According to Erichsen (1996), there have been few attempts to place Scandinavia in relation to these two traditions. Based on the presence of the Scandinavian welfare state model, she asks whether there is a Scandinavian model for professions or whether it is possible or even fruitful to separate a distinctive Scandinavian profession model. Erichsen mentions some contributions that have tried to place Scandinavia within these traditions: Rolf Thorstendahl (1985) has compared Swedish and British engineers; Tor Halvorsen (1994) has compared technical occupations in Europe; and Erichsen (1990) herself has compared the Norwegian and British dentistry profession. Few studies of professions in the 1990s attempted to compare professions in Scandinavia with those in countries where professionalization has been led by 'lobbying professions [within a] pressure-group perspective' (Erichsen, 1996, p 81).

In profession theory a debated question concerns convergence between the Continental and Anglo-Saxon sociology of professions. According to Svensson and Evetts (2003) professions on the Continental European societies (particularly Germany and Scandinavian countries) have had historical reasons for different concepts, theories and analyses of professions.

> The Continental functional proximity between state government bureaucracies, public state universities and professions created a minority of free professions ("freie Berufe" and "professions liberals"), and favoured sociology of class and organisation on the disadvantage of sociology of professions (Burrage, 1990). The Anglo-American less centralised state governments, private or at least relatively independent universities and free professions, on the other hand, created a majority of market-related professions and elaborated sociology of professions, which had strong impact worldwide (Svennsson and Evetts, 2003, p.5).

A common challenge in Europe is the new policy reforms inspired by New Public Management. All public sectors, not just public health, are facing new policy reforms. Svensson and Evetts (2003, p 5) assert that 'new public management, managerialism, entrepreneurialism, marketization, and more explicit and integrated professional work organizations' make Anglo-American sociology of professions also more applicable in Continental societies. The convergence between Continental and Anglo-American societies has taken place during the last three decades. The power of the state has with the new policy reforms been 'reduced by cutting taxes and social insurance and by deregulating business and industry. Market forces were proposed to substitute for state regulation' (Svennsson and Evetts, 2003, p.7).

Svennsson and Evetts argue that comparative studies might contribute to knowledge about this convergence between Continental and Anglo-American societies. New policy reforms also takes place in the Scandinavian Welfare states and follow the changes on the continent where we according to Svennsson and Evetts (2003) see a move away from the close state-profession relationships. This will probably open for new types of professions and professionalization processes. According to Svennsson and Evetts (2003) there is a need for comparative studies on the management in professional work organisations and the prevailing ideology and quest for professionalism (see also section 2.2.) about new direction in the sociology of professions.

2.4 Profession as a theoretical concept

The concept of professions has been problematic, concept as shown by several contributions to professional theories (Brante, 1988; Evetts, 2006a; Halvorsen, 1994; Ludvigsen, 1993; Burrage et. al, 1990). Burrage et al. (1990, p. 204) state:

> Both the meanings of the term, and the occupations, that might be described as professions, have changed over time, and a number of professions have energetically propagated their own definition of what they are, what they are doing and what it is that entitles them to be called a profession.

Rüeschemeyer (1983) has pointed out that professional theories need to become more historical and more comparative in order to develop further (Rüeschemeyer cited in Halvorsen, 1994). Halvorsen (1994) claims that in the process becoming a useful analytic tool

for comparative studies concept itself had to be discussed. He asks whether it is possible to use the concept in other contexts than the one it was developed for. Professional theorists have been concerned with finding a definition of professions that works across nations and cultures. Although there have been proposals to reject the concept of 'profession' (Brante, 1988; Fores, Glover, and Lawrence 1991), there seems to be an agreement that either a definition of 'professions' is needed (Burrage and Thorstendahl, 1990; Halvorsen, 1994) or that it is possible to have a pragmatic view, such as Evetts (2006a) has, of the definitional questions of professions. She argues that most researchers have accepted definitional uncertainty (Evetts 2006a, p. 133).

Halvorsen (1994) is also pragmatic about the definitional question and believes that in order to analyse processes of professionalization one needs a phenomenological and/or descriptive definition of professions, where traits are expressed because they are part of claims expressed by members of the professions themselves and because they are involved in different institutional value-setting processes. Halvorsen suggests that the following definition provided by Conze and Kocka is a useful starting point for a representative ideal definition of professions that answer the problems raised in the debate on the concept of professions:[18]

> Professions mean a largely non-manual, full time occupation whose practise presupposes specialised, systematic and scholarly training. Access depends upon passing certain examinations, which entitles to titles and diplomas, thereby sanctioning its role in the division of labour. [Professions] tend to demand a monopoly of services as well as freedom from control by others such as laymen, the state, etc. Based upon competence, professional ethics and the special importance of their work for society and common weal, the profession claims specific material rewards and higher social prestige. (Conze and Kocka cited in Burrage et al. 1990, pp. 203–204)

Burrage et al. state that although Conze and Kocka's formulation is not very elegant it has the makings of a definition that works satisfactory:

> It distinguishes between the characteristics that describe professional occupations and the demands and claims that they make, and provides clear criteria for recognising both, and they are criteria that can be operational and measured. (Burrage et al., 1990, p. 205)

[18] Burrage et al. (1990, pp. 203–204) use as an example Conze and Kocka's suggestion, which is both institutional and political.

To have a concept that helps to recognize both the characteristics of professions and the demands and claims the professions make are necessary in order to compare cases. Conze and Kocka's definition is broad and therefore possible to use both to distinguish professionals and to study professionalization processes. The concept may serve as a checklist for comparative analysts and it ensures awareness of shifts in meaning. According to Halvorsen (1994, p. 104) the distinguishing characteristics of the definition include both the interplay and tension between professions and the relations within which the professions find themselves.

The focus on definitional integrity continues to have its supporters, such as Sculli (Sculli cited in Evetts, 2006a). As already mentioned above, Evetts (2006a) approaches the definition debate in a more pragmatic way and considers that most researchers have accepted the definitional uncertainty. The attempt at definitional precision is, according to Evetts (2006a, p. 134), 'now regarded as a time-wasting diversion in that it did nothing to assist understanding of power of particular occupational groups or the contemporary appeal of the discourse of professionalism in all occupations'. New directions in the analysis of professions focus on the discourse of professionalism as a mechanism of the control of work. These new directions do not mean that professions as a definitional term is abolished. Rather, as Halvorsen (1994) points out, it necessary to have a concept that brings awareness to the interrelationships between professions and other actors in professionalization processes.

2.5 The claim of jurisdiction

Abbot (1988) gives in the *The System of Professions*, provides an alternative theory. Abbot states that the central problem with the current concept of professionalization is its focus on structure rather than work. According to Abbot, the central phenomenon of professional life is the link between a profession and its work, a link which he calls jurisdiction (Abbot, 1988, p. 20). 'Diagnosis, treatment, inference, and academic work provide the cultural machinery of jurisdiction…In claiming jurisdiction, a profession asks society to recognize its cognitive structure through exclusive rights; jurisdiction has not only a cognitive structure'(Abbot, 1988, p.59).[19] Jurisdictional claims can, according to Abbot (1988, be put forth in public,

[19] 'These claimed rights may include absolute monopoly of practice and of public payments, rights of self-discipline and of unconstrained employment, control of professional training, of recruitment, and of licensing, to mention only a few' (Abbot, 1988, p 59).

legal, and workplace arenas. Thus, in Abbot's perspective, analysing professionalization means to analyse how changes concerning professional work are linked to changes in interprofessional relations. Professions develop when jurisdiction is lacking or new jurisdiction is established, and professions are continuously engaged in making claims and counterclaims for jurisdiction over existing, emergent, and vacant areas (Abbot, 1988).

In Abbot's opinion, the foundations of interprofessional competition are laid in the act of professional work itself. Jurisdictional disputes will often be conflicts about definition of tasks or the construction of problems. Two kinds of properties render problems alike: some are objective, due to natural or technological imperatives, whereas others are subjective, imposed by a culture's present and past; it is often difficult to distinguish between the two.[20] Abbot argues that professions sometimes use their abstract knowledge to reduce the work of competitors to a version of their own, and that this is a basic mechanism of interprofessional competition. It is the objective qualities of a task that resist such reconstructions. The objective and subjective qualities of a problem become a question of what are given facts, and what is open for reinterpretation (Abbot, 1988, pp. 36–37).

Following Abbot, the claim of full and final jurisdiction is only one of at least five other possible settlements for a jurisdictional dispute. Professions can settle a jurisdictional conflict through the subordination of one to the other (hierarchy). They can form a final division of labour that splits the jurisdiction into two interdependent parts, and occasionally they can share a jurisdictional area without a division of labour. It is also possible to allow one profession to have advisory control of certain aspects of the work. Lastly, professions can divide their jurisdiction not according to work content, but according to the nature of clients (Abbot, 1988). According to Halvorsen (1994), by introducing the concept of jurisdiction, Abbot shifts the focus from the single occupation to the relations between occupations and to the relations between levels such as workplace, organization, and society.

[20] To demonstrate the difficulty, Abbot (1988, 1988, p. 36) uses an example of a broken thumb: '[W]e think that fixing a broken thumb is "closer" to curing fever than it is to building a bridge, because of the common object of the first two tasks, the human body. But in purely theoretical terms, broken bones are close to bridges because both involve the science of mechanics.'

2.6 Analysis of professions and occupations within a historical institutional model

Today, theoretical discussions do not call for completely new approaches to the study of professions and professionalization, but rather new directions. However, what is common to several theorists is the recognition of how the discourse of professionalism is used as an instrument of occupational change and control (Evetts, 2006). Whether the result of this discourse is a stronger profession, a new profession, or deprofessionalization is probably influenced by the national context and should be studied empirically. The purpose of the historical/sociological orientation was to present a frame for further development of the analysis of professions that included both comparative and historical evidence without losing the valuable sociological knowledge that had already been built up. Further, with such an open approach it is easy to adjust the analytical framework to the new and relevant theoretical directions. Earlier traditions studying professions have focused on the development within each profession, whereas the historical/sociological orientation emphasizes that the task should be to place professionalization processes in a wider structural, political, and moral tradition (Halvorsen, 1995).

However, this does not imply a change from a micro- to macro-level of analysis. As Abbot (1988) suggests, the analysis should include how professional work is linked with changes in interprofessional relations. According to T. Johnson (1995) by focusing on the political processes of jurisdictional claims, Abbot comes close to breaking the duality between state and professions. However, in Abbot's perspective the state remains conceptualized as a preconstituted reactive agent rather than an emergent property of the system. The state becomes an environmental factor in the system of professions made up of the legislature, namely the courts and the administrative planning structure (Abbot, 1988; T. Johnson, 1995). According to T. Johnson, the government in Abbot's analysis is 'typical latecomers on the scene, uninvolved in the formation of public opinion or the work-site formation of occupational jurisdiction' (T.Johnson, 1995, p 18). Therefore, it is necessary to frame an analysis that includes governments and administrators as participating equally with the professions and occupational groups (T.Johnson, 1995).

Burrage et al.'s (1990) actor framework for studying professions includes government and administration as participating actors in a work field. The actor framework is an outcome of work within the Swedish Collegium for Advanced Study in the Social Sciences

(SCASSS).[21] Burrage et al. (1990) have attempted to map some parameters and identify some key actors that may facilitate their use in comparative analysis. T.J. Johnson's triangle model (1972) for analysing the interaction between professions, users, and the state is expanded to a four-actor model by separating practising members of the profession from the specialists in the production and reproduction of professional knowledge (from universities or other forms of advanced training institutions). Following Burrage et al., practitioners and professors and other academics have different kinds of investments in the knowledge base of the profession and their relationship is, like that between the other actors, a variable one. Any historical or comparative analysis should be sensitive to such variations over time, whether between professions or between countries. By using their four-actor model, Burrage et al. (1990, p. 218) are working towards a general theory of the professions:

> If one could identify the interests, resources and strategies of each of the four actors in a number of professions, in a number of countries, and how their interaction has changed over time, we would be able to advance general propositions about professionalization and be on our way to a general theory of the professions.

As showed in the introduction to this chapter on theory, although a general theory of the professions has not been developed, professions as a phenomenon are still challenging the research field.

In their four-actor framework, Burrage et al. (1990, p. 207) identify some key actors that still may facilitate the comparison of professions and occupational groups cross-nationally:[22]

> [A]ny satisfactory analysis of the professions requires a clear identification of the groups and organizations whose actions determine the form and the success or failure of professionalization.

[21] SCASSS coordinated the historical/sociological renewal work done at the end of the 1980s. Rolf Torstendahl, Director of SCASSS, initiated a book project that resulted in the following publications in 1990: Torstendahl and Burrage (eds.) *The Formation of Professions: Knowledge, State and Strategy*, and Burrage and Torstendahl (eds.) *Profession in Theory and History: Rethinking the Study of the Professions*.

[22] The model is based on Conze and Kocka's definition of professions (Conze and Kocka cited in Burrage et al., 1990).

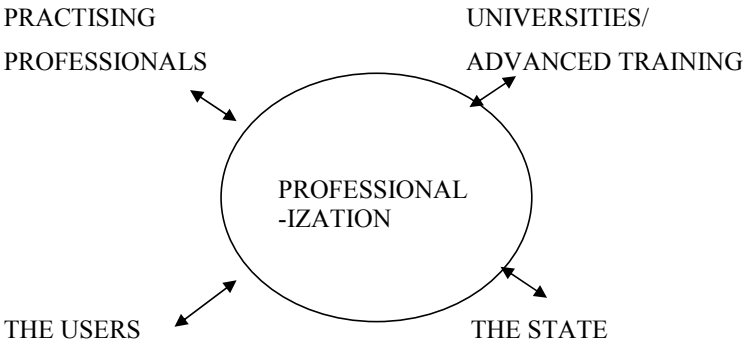
Their key actors are the practising professionals, the states, the users, and the professors or other academics (i.e. in universities). The framework is intended to be used in explorations of the interrelationships between these actors: first, by providing an initial checklist of the resources at their disposal, and second, it may assist the identification of sequences or phases in the relationships between the actors and attempts to identify typical patterns of development (Burrage et al., 1990, p. 218).

Burrage et al. could have followed Abbot's (1988) suggestions and added other professions as a fifth actor, but they disregard possibility, arguing that all professions involve a relationship of some kind between their four actors, but it is by no means certain that this entails a relationship of comparable significance and continuity with neighbouring and competing professions (Burrage et al. 1990, p. 207). However, in my opinion, in studies of new work fields for occupational groups the question concerning divisions of work between different groups is crucial. Burrage et al. (1990) do not want to add other professions as a fifth actor, but it is possible to use Abbot's work on jurisdiction as a way to include other professions as a fifth actor. According to Abbot (1988), professionalization is a process that is pursued by the interrelations between professions. In the system of professions, the activities of each profession fall under various types of jurisdiction. Vacant jurisdiction occurs when no professions have any interests in the work field or professions in the field do not manage to provide necessary service or lose their grip (Abbot, 1988).

According to Abbot, interrelations between professions are determined by the way they control their knowledge and skills. One way to accomplish control of knowledge and skills within a profession can be through the control of abstract knowledge. Practical skills develop from abstract systems of knowledge and control of a given occupation lies in the control of abstractions that generate practical techniques. Accordingly, such techniques may be delegated to other workers. For Abbot (1988), abstraction is the quality that sets interprofessional competition apart from competition among occupations in general.
With his focus on the control of skills and knowledge in order to develop jurisdiction in a field, Abbot provides a useful supplement to the historical/institutional actor model. However, actor model provides the possibility to reveal the interrelations between the actors (other than professions) in the field. In the following, I use Burrage et al.'s (1990, pp. 207–218) four-actor model as a starting point. The model is a useful tool to help systematize empirical data related to actors considered to be important in any professionalization process. However, the question of who is most important should be considered in the context in which they occur. In

the following I give a short review of the characteristics Burrage et al.'s (1990) describe as important to take into consideration when analysing professionalization processes.

Figure 1 Burrage et al. 's (1990) four-actor model for comparative analyses of professionalization processes



2.6.1 The practising professionals

According to Burrage et al. (1990, pp. 207–208), practising members' basic aim is to control entry to their profession and the practice of it, and to protect and enhance corporate interests:

> However, in order to pursue these goals and to realize them, they require the cooperation of the other actors, of the state, of universities and of their users, and we may reasonably assume that they endeavour to obtain this cooperation at minimum cost to their autonomy.

Practising professionals' major resources are their organization, ideology, and what Burrage et al. call proximity and persistence. Professions develop different kinds of organizations depending on contexts. Burrage et al. (1990) distinguish four major ideal types of organizations:

1. The discussion circle, learned society, or academies that gave primary emphasis to the knowledge base of the profession. The assumption is that these organizations share the same goals as universities.
2. Organizations that 'seek to represent and lobby on behalf of the profession and to obtain some legislative relief or support (Burrage et al. 1990, p.208). Such organizations primarily are oriented towards the state.
3. Organizations that 'negotiate on behalf of their members and are barely distinguishable from trade unions'(Burrage et al. 1990, p.208). However, they are primarily concerned with protecting members having to deal with organized users of professional services.
4. Organizations that 'seek to regulate the members of the profession, the examining, certifying, or qualifying associations or as Millerson called them the "qualifying" association (Burrage et al. 1990, p.208). They are either state-sponsored or voluntary, and are concerned with practitioners.

Burrage et al. (1990, p. 208) argue that the four types of organizations may be combined in a variety of ways, and the goals of the associations may shift and provoke conflicts within the profession, which in turn may result in fractions within their association or in the form of rival, competing forms of associations. Conflicts are assumed to rise 'between "generalists" and "specialists", between elite and ordinary practitioners, between those in the capital and those in the provinces, and between those in different work settings' (Burrage et al. 1990, p.208).

The goals and types of organisation are not only influenced by practitioners'' interest but are also influences to some degree by the demands and pressures of the other three actors (Burrage et al., 1990). The four types of organization described above are held together by a common ideology. According to Ludvigsen (1998) at least one of the groups will take an active part in to the professionalization process. However, professionalization may only be achieved through support from the external actors.

'Ideology might well have preceded organization as a practitioner resource, since a profession might be said to begin to exist when those who perform the same kind of work recognize their kinship' (Burrage et al. 1990, p. 209). Burrage et al. argue further that professional ideology not only inspires practice and constrains practitioners but also justifies privilege via public service to central social values. If it is desirable to distinguish professionalization from related phenomena, it is essential to identify a specific 'professional' component in these actions, based upon a separate ideology that dictates strategies that are distinguishable from the activity of other groups.

Organization and ideology are resources that professions share with many other kinds of interest or pressure groups. What distinguishes professions from other groups is what Burrage et al. (1990) label persistence and proximity. Persistence refers to the remarkable uniformity and consistency in the goals of the profession. While state institutions and state policies have changed, the goals of the professions have remained more or less constant. However, the strategies for attaining them may have changed. The mechanism of this continuity is caused by the professions' ability to socialize their new members formally or informally. Proximity refers to the fact that practitioners always are interested in and involved in their professional services. State and pressure groups may intermittently be interested in the provision of one or other professional service. Hence, there may be room for disagreement about the role of the knowledge base of professions, but there can be no doubt about the professions' knowledge of the intricacies of professional practice. Any attempt to change and control professional behaviour by instituting new rules and procedures should be negotiated with residential procedural experts, the practitioners who will implement changes (Burrage et al. 1990).

2.6.2 The state as actor

Burrage et al. (1990, p. 210) argue that states 'are both regulators of professional life and instruments of professional advancement. The power, wealth, and prestige of any profession depend largely on the politics of the state in which they exist' (Burrage et a. 1990, p. 210). As pointed out by several authors (Abbot, 1988; Erichsen, 1990, T.J. Johnson, 1972; T. Johnson, 1995), in early discussions the state was seen as a facilitator for the establishment of professional self-government. The 'emergence of the professions was seen as a consequence of the development of capitalism and partly because of the peculiar conditions under which many professions emerged in late-nineteenth-century Britain' (Burrage et. al. 1990, p.210). In some analyses the professions tend therefore to work with a basic variable of high and low stateness and then use other familiar labels devised for some other purposes, such as those used to describe states' political institutions, e.g. absolutism, authoritarian, fascist, or communist (Burrage et al., 1990). It is according to Burrage et al. (1990) not certain that such labels will be fruitfully applied on the relationship between states and professions.

In recent years far more attention has been paid to the role of the state, although much work still remains to be done in this regard. T. Johnson (1995), as mentioned earlier in this chapter suggests for example that the concept governmentality can be useful in analysis of

state – profession relations. Burrage et al. (1990, p.211) are specific in their approach and identify some of the different kinds of state interests in the professions as follows. First, new states have aimed to establish their authority and have had a particular interest in legal institutions and the legal profession, and in public health and the medical professions. Second, states have had a strategic interest in the professions, such as the military professions, e.g. military engineering. 'Third, states have had a political interest in the forms of government and collective actions of the professions' Burrage et al. (1990, p 211). Fourth, states have had a fiscal, and hence electoral, interest in professions. The fiscal interest is a relatively modern one and the concern originates from state involvement in professional services. As third-party payers, the contemporary states have interests in legal, medical, teaching, and social work professions. Such interests need to be related to state policies towards professions (Burrage et al., 1990, p. 212).

In most cases, studies of state policy towards professions have tended to concentrate on significant changes in the relationships, including when the changes become public policies. Burrage et al. (1990, p 212) are of the opinion that it is difficult to draw conclusions on significant changes without knowing 'more about the continuous, covert relationships and the links between the executive agencies of the state and professions that precede or follow public legislative and judicial decisions'. Therefore it is relevant to study the relationships between state and professions continuously and not just when certain events of significance occur. This approach to studying relationships between state and professions is in line with Thelen (2004), who in her approach to institutions emphasizes the need to study institutional change that evolves over time. This does not mean that events are of minor importance, but they have to be seen in connection with the way social regimes open up for an understanding of strategic action by actors. Further, according to Abrams (1994), events can be understood as moments of becoming at which action and structure meet.

It may also be possible to add a fifth state interest, namely states' need to have social order in a rapidly developing global economy. The question now asked in profession theory is: Why do states create professions, or at least permit professions to flourish? According to Evetts (2006a, p. 137), this question has 'resulted in a renewed interest in the historical evidence about parallel processes of the creation of modern nation-states in the second half of the 19th century and of modern professionalism in the same period'. In studies of relationships between state and professions in the 21st century, Dingwall and King (cited in Evetts, 2006a, p. 137) consider how professionalism might make a normative and valuable

contribution with regard to the growing need for social order in the global economy and in international markets.

2.6.3 The users of professional services

Following Burrage et al. (1990, p. 123) an analysis of the variation in users' resources and how they have changed over time should be in focus in any respected historical or comparative analysis of the profession. They distinguish some major types of users that establish different relationships with the professions (pp. 123–124):

1. The individual fee-for-service client (or patient) is usually associated with an elite circle and their relations to professions are distinguished by a patronage relationship. The professions organize themselves in order to free themselves from the patron-client relationship and individual clients have few resources to deploy against the organized professional practitioners. Their only resources are their fees, their gossip 'since word-of-mouth publicity may be an additional sanction or reward for professional behaviour' (Burrage et al., 1990, p. 213), or they may have sought compensation in the courts. Such resources can only be used to sanction or control individual members of the profession. The individual fee-for-service client is the ideal user of professional services. The period dominated by fee-for-service clients (mid-19th century) was associated with the golden age of professional organization and professions that developed in this period became characterized by their type of clients.
2. User organizations to satisfy mass demands for medical care were organized by private third-party payers in the late 19th century, such as friendly societies and trade unions. This is a type of organization that few professions had to face (except for the medical profession and American lawyers and accountants). 'Judging by the experience of the French, German and British medical profession, this kind of user imposed one of the harshest, most punitive regimes that the medical practitioners have ever had to endure' (Burrage et al., 1990, p 214).
3. During the late 19th century the state took over as a third type of user as it became the dominant third-party payer, and in some cases this resulted in more professional autonomy.
4. The fourth kind of user is the private employer. In most countries, private employers have been the majority users of engineering services. 'The resources at the disposal of employers are considerable, since they determine the entire income of the employed professional' (Burrage et al., 1990, p. 214) and a professional career often imply advancement up a managerial ladder. 'To counter employer demands and to trey to defend their autonomy and status, professionals may rely on collective organization, or their ideology, which an employer may or may not respect' (Burrage et al., 1990, p. 214). For engineers climbing the 'managerial

ladder' have meant an exit from the profession. Burrage et al. (1990) states in more general terms that it may be that the profession's power depend on that 'their members commonly anticipate that their work as a member of a particular profession is lifelong, terminal' (Burrage et al. 1990, p. 214). Strong professions, Burrage et al. (1990) suggests have no alternative career outside the profession, no exit.

5. The public employer as user may have the resources of the private employers at its disposal, as well as 'those normally monopolized by the state, namely legal and penal sanctions' (Burrage et al. 1990, p 214). The state invariably uses all these resources, and in cases where the state employs professionals to provide services for its citizens, politicization of the employer-professional relationship is likely. Professionals employed to serve the public are distinctive because they have both clients and employers. Hence, they use large resources to contain professional autonomy because they may face both organized clients and their public employer. The outcomes of confrontations between states, professions, and users 'have varied greatly according to profession, time, and country' (Burrage et al. 1990, p.215) and therefore comparative studies of profession have been of importance. In turn, it is important for comparative studies of professions to identify the impact of shifts from one kind of user to another.

In terms of the changes in contexts that have occurred since the 1990s, the professions have faced a number of challenges arising from economic constraints, developing technologies, and new modes of citizenship (Kuhlmann and Saks 2008a). In the public sector there has been tighter regulation of service providers (especially in the health care sector), with improved participation by service users. Consideration around the safety of the public has also been a part of the development of the social citizenship. This shift from a supply-led state profession to a more demand-led state profession, and profession-user relationships (Kuhlman and Saks, 2008a) imply that in an analysis of a modern profession the 'citizen user' needs to be incorporated in the approach.

2.6.4 Universities and other forms of training institutions

According to Burrage et al.'s actor model the universities' major 'resources are the knowledge on which professions may depend and the status that their degrees provides' (Burrage et al. 1990, p. 215). In some countries, the formation of training institutions has been part of the emergence of the professions, and frequently a distinction is not made between universities and practitioners as actors. In others, such as England and the early (first half of

the twentieth century) United States, the organization of practitioners and professional training institutions has been quite separate. The role of knowledge in the development of the professions remains an area of disagreement. The Burrage et al.'s (1990) framework directs attention to the balance of power between professors and practitioners, and who controls and transmits the knowledge required for admission to a given profession. In the long term there has been a trend towards university-based professional training. Even the English professions moved in this direction, albeit slowly in the second half of the 20th century (Burrage et al. 1990, p. 216). Due to professors' different career paths and their different roles and expectations, there are different sources of disagreements and conflicts with respect to the development of knowledge between professors and practitioners. 'Practitioners seem to want a stable knowledgebase, each cohort of graduates acting as though the knowledge acquired during their training will constitute a secure base for practice during their entire careers. Such expectations has been hopelessly inaccurate and the universities have developed entirely new specialities, which have substantial impact in intra-professional status relationship" (Burrage et al. 1990, pp. 216-217).

Professors and practitioners have different kinds of investment in the knowledge base of their respective professions. Professors are interested in publicity concerning internal disputes, whereas practitioners avoid public airings. The two groups also differ in their attitudes towards the ideology and ethics of their professions. For professors ideology and ethics are intellectual constructs which they analyse. They have often contributed to the rational examination and discretion of practitioners' behaviour. Professors similarly have little direct interest in the jurisdictional concern of a practitioner. 'From the practitioners' point of view, they are therefore somewhat unreliable allies, often providing ammunition to their enemies and sowing the seeds of doubt in the minds of those who are shortly to enter the profession' (Burrage et al. p. 217). In Burrage et al.'s opinion, in common with the other three groups of actors, the relationships between practitioners and professors is a variable one, and any historical and comparative analysis should be sensitive to such variations over time and between countries (Burrage et al., 1990, pp. 215–218).

Although the university and educational system produces knowledge, early professional theorists did not discuss the concept of professional knowledge. They included professional knowledge without questioning the concept in itself. For example, Carr-Saunders and Wilson (1933) and Wilensky (1964) view the process that turns knowledge into science as part of the steps in a professionalization process. Brante (1988) states that in contrast to other occupations, professions often are described as groups that systematically apply

scientifically based and certified knowledge to specific problems. However, professional theories have become more sensitive to the knowledge phenomenon. Freidson (1988) claims that the application of knowledge – which he views as a social event – is analytically distinct from knowledge itself. Erichsen (1990) argues that professional knowledge cannot be separated from its use. She supports this argument by showing how Norway and Britain transformed knowledge regarding preventive measures available to dentists via international dental journals and academic conferences: knowledge that might have been identical at the abstract level was turned into preventive programmes in very different contexts. She states that it is by scrutinizing national arrangements such as those in dental care that it is possible to approach an understanding of how professional knowledge is transformed into professional practice.

In line with Erichsen, Halvorsen (1995) points out that the historical/sociological model does not approach the professions' self-understanding in a proper manner. According to the model, other professions are not independent actors but are interrelated with the four actors (users, state, profession, universities). According to Halvorsen, if knowledge is accepted in a definition of professions it will necessary to link knowledge and knowledge-in-use in order to grasp how knowledge is a part of the professions. All aspects of fields of knowledge should be seen in relation to other systematized forms of knowledge involved in the division of work. The professions confront one another epistemologically. Knowledge is developed during continuous disputes with alternative forms of knowledge. What determines whether a form of knowledge will survive as professions' solutions to problems is the trust established by professions or potential professions in relation to clients in particular and society in general. Therefore, according to Halvorsen, it necessary for other professions either directly or indirectly to participate as actors in order to understand the manner in which power is mediated as knowledge. Halvorsen is of the opinion that due to the inadequate manner in which knowledge is treated the historical/sociological model does not open up sufficiently for mediation between the determining factors e.g. strategies, resources, and organization) and the universal distinguishing definitions, and hence also for relations with other professions.

2.6.5 Interrelationships between actors

The framework presented above is not a substitute for historical and sociological analyses of professions. According to Burrage et al. (1990), their model does not explain how and why practitioners, civil servants, users, and professors interacted in the past to shape modern

professions. It may therefore be fruitful to explore the interrelationships between the aforementioned actors, first by providing an initial checklist of the resources at their disposal, and second by identifying sequences or phases in the relationships between these actors and attempting to identify typical patterns of development (Burrage et al., 1990, p. 207). Further, a useful analytical tool may be to specify distinctive features of professions and professionalization in different countries. This would also be a way of avoiding 'the structural reductionism that sees professions as products of macro-processes such as modernization' (Burrage et al, p. 218). This leaves open the question of how events external to the professional domain may have affected a given social structure and political system (e.g. war, revolution, and economic depression) and hence interactions between the four groups of actors. Burrage et al. (1990, p. 218-219) argue that 'the framework provides a mean of classifying and comparing different kinds of professions on the basis of the relative importance of the actors in their organization'. Ludvigsen (1998) argues that the advantage of this actor model is that by considering the professions as heterogeneous categories it is possible to separate the profession in subgroups that may have different relations with the state.

The professions' knowledge bases are important for interrelationships between actors, and given profession will seek to establish confidence by establishing valuation criteria for their knowledge or solutions. According to Halvorsen (1995) it is through the valuation processes connected to the characteristics of the actors in the model that a 'qualification room' is created, in which professional identity is expressed. The interplay between actors in the model, jurisdictional conflicts, and relations of trust indicate that a profession's qualification room is socially constructed. By definition, professional qualifications exist because we have confidence in them and they require a form of occupational stability and a way to handle vocational experience as qualifications. However, since qualification processes are a social process, the process to develop such qualifications always becomes interwoven with and part of a number of social processes. According to Halvorsen, through detailed analysis of jurisdiction conflicts it is possible to gain knowledge about the social construction of professions that is very closely connected to qualifications and capacity, and also to perform comparative studies of structures in which socially constructed professions takes part and change (Halvorsen, 1995).

2.7 Methodology

All comparisons necessitate a theoretical point of departure that determines what types of items of interest to compare (Ågotnes cited in Froestad, 1995). Theories can serve as guidance for a study and for the collection of relevant data (Yin, 2009). At the time when, in the early 1990s, I started my research for this thesis, Burrage et al. had recently developed their 'historical-sociological' actor model for studying professions (Burrage et al. 1990, p. 29). The model they had developed had been built on the historical institutional field within the sociology of professions. I had already used T.J. Johnson's (1972) historical institutional triangle model for analysing the interaction between professions, users, and the state in the Norwegian fish farming industry (Kjæmpenes, 1988), and was familiar with an actor approach to the study of professions. Burrage et al.'s model was an inspiring starting point of departure for my research. The model is intended to be used to map some parameters and identify some key actors that may facilitate comparative analysis across occupations and countries. It is however, the unveiling of interrelationships between actors that constitutes this model's main contribution (Froestad, 1995, 35).

The phenomenon that I analyse here, namely professionalization and the division of work in the Norwegian and Scottish fields of fish health field, varies according to the national settings. I explain the different paths that the two countries have taken by using case-oriented methods together with a five-actor in order to generate data that can be used in comparative analyses across both countries and other occupations and professions. Through an analysis of the fish health field, I aim to contribute to the debate on the social divisions of knowledge-based work in society. The choice of a historical-sociological model and the desire to understand the complex social phenomena that the division of work raises have influenced my decision to use qualitative research methods.

2.7.1 Case comparison method

According to Yin (2009), case study research includes both single and multiple case studies. In the fields of political science and public administration the comparative case method is used as a distinctive form of multiple case studies. However, Yin does not distinguish between the two approaches and states that they are variants of case study design (Yin, 2009). Ragin (1987), who represents the political science field, addresses specific methodological issues in comparative sociology and political science and states that what distinguish

comparativists and non-comparativists is that 'macro-social units are central to the practice of comparative social science because they are an essential ingredient of the explanation comparativists offer' (Ragin, 1987, p. 7). In other words, comparative sociology can be defined through its objectives and comparativists should operationalize compared macro-social units. According to Ragin (1987, p. 6), 'Most comparativists, especially those who are qualitatively oriented, also seek to interpret specific experiences and trajectories of specific countries (or categories of countries).' Comparative sociology analyses on micro- and meso-level, but anchors the theoretical conclusions at the macro-level (Froestad, 1995, p. 31). On a macro-level, my aim here is to present insights into how narratives of interactions and struggles between actors in a new scientific field can contribute to the social debate on the professionalization of occupational groups.

The method used in case studies is relevant for comparativists. Case studies refer to research that investigates in considerable depth either one case or a number of cases (Hammersley and Gomm, 2000). Ragin states that '[t]he goals of case-oriented investigation often are both historically interpretive and causally analytic' (Ragin, 1987, p. 35). In case-oriented methods investigators consider their cases as whole entities, not as collections of variables. Case-oriented methods also stimulate rich dialogue between ideas and evidence (Ragin, 1987). The interest in causal complexes produces a specific outcome that in turn encourages investigators to view cases as a whole. Further, a case as an entity is characterized by social, cultural, and political conditions (Halvorsen, 1994). In the social sciences literature, most case studies are descriptions that are complex, holistic, and involve a myriad of variables, and 'data are likely to be gathered at least partly by personalistic observation; and a writing style that is informal, perhaps narrative, possibly with verbatim quotation, illustration and even allusion and metaphor' (Stake, 2000, p. 24).

I have used an inductive and exploratory design in my research, a design often used when researchers seek to gain knowledge in fields where there is little prior knowledge. According to Yin (2009, p. 28) such a research design does not necessarily need a proposition, but '[e]very exploration, however, should still have some purpose. Instead of propositions, the design for an exploratory study should state this purpose as well as the criteria by which an exploration will be judged successful.'

Further, Yin (2009) states that the use of theory is an essential part of the design phase in case studies and the purpose can be either to develop or test theory. I argue that I see the actor model as a promising way of studying professionalization processes. However, Burrage et al. (1990) are very clear that their model is just a starting point, and therefore it has to be

developed further. This openness in the model for adjustment of a priori theoretical assumptions serves to stimulate dialogue between theory and empirical findings and is a premise for a research process that seeks to bind together micro- and macro-levels by using generalizations informed by time, place, and sequences (Froestad, 1995, p. 33). The historical-sociological approach also requires an attempt to account for specific historical outcomes (Ragin, 1987). However, according to Abrams (1994, p. 195), by examining historical details the challenge in such an approach is to grasp not its concreteness within the chronology of events, but rather their significance as markers of transition. The purpose of using such an approach in this research through dialog between theory and empirical findings to analyse professionalization processes in the fish health field.

2.7.2 Aspects of the research method

The theory behind my research is that professional development relates in systematic ways to particular national experiences. Accordingly, the research approach had to account for specific historical outcomes that are significant for institutional arrangements and divisions of work in the fish health field. Norway and Scotland share some similarities: the aquaculture industry is a new industry, it has had economic success, and knowledge is needed about fish diseases and fish health. Further, both countries have a long tradition of fishery research and they both passed fish disease Acts relatively early. However, the contrasts between the two countries are readily apparent, such as owner structure in the industry, governmental involvement, institutionalization of responsibility for notifiable fish diseases, and division of work in the fish health field. I return to these similarities and particularities throughout the thesis..

In the 1980s I studied vets' and fish scientist's interests in the Norwegian fish farming industry. At the time the struggle between veterinary and marine scientists concerning new scientific and practical knowledge in fish health had just started. Only a few social science and economic studies had been conducted on the aquaculture industry,[23] and data collection had been done in a context where very few subjects wanted to speak openly about the conflict between vets and fish scientists. [24] I became curious as to whether or not there was a similar

[23] In an earlier publication (Kjæmpenes, 1988) I refer to the following published social science research: Bjørndal and Salvanes (1985), Bringsvor and Gerhardsen (1980), Brox (1986), Hallenstvedt, Hersoug, and Holm (1985). However, none of this research studies discuss the fish health field.

[24] Kjæmpenes (1988)

development regarding professionalization and the division of fish health work in other countries with an expanding aquaculture industry, and wanted to continue my research on professions and professionalization in this field and carry out a comparative study.

In remaining part of this section I will comment on the research process used in the preparation of this thesis and the considerations related to data collection. The research study is a protracted study and the collection of empirical information has been made over a long period of time. The first interviews were conducted in 1990 and the last one in 2008. Although the study was originally planned to be finished in the mid-1990s, I was unable to complete it within the scholarship period. However, I was aware that I had unique data, since no other researchers within the sociology of profession had shown an interest in the professionalization of the fish health field, possibly due to lack of awareness of the field. The long period of time over which I have spent in and out of this research field has been a source of both strength and weakness. The strength lies the unique possibility to follow an establishment of a profession as it happened. My interviews date from the time before the Norwegian fish health profession was established (Kjæmpenes, 1988). In retrospect, involved actors in the 1980s were able to talk more openly about the conflict in that period and through their narratives new information has been brought to the fore. A weakness has been the risk of 'drowning' in information and losing sight of the research goal. A further challenge of becoming so familiar with a particular research field is that the researcher does not recognize when detailed information might be a significant indicator of transition. However, in my case the theoretical model used as a starting point also served to help me to remain focused on relevant events and the related details.

A combination of types of sources was used in the research: interviews; public documents; articles in newspapers and journals such as the *British Veterinary Record*, the *Scottish Farming Leader*, *Salmon Farming*, the *Fish Veterinary Journal* (UK), *Norsk Veterinærtidsskrift*, and *Fiskehelse*; annual reports; and secondary literature such as social science studies of the aquaculture industry. In cases where interviewees are quoted, the persons concerned are listed in References section, together with information on the length of the interviews.

From 1990s onwards several research studies started to look at the aquaculture industry, and these proved to be highly valuable sources during my own research. During the 2000s, the availability of governmental documents, statistics, and organizational information was facilitated by information sourced from the Internet. However, to date less social science research literature has focused on Scottish aquaculture compared to Norwegian aquaculture. Therefore, interviews proved to be an important source of information in the former case.

I interviewed central informants from public services, universities and research institutions, and fish farmer organizations and professions. The informants were chosen because they either had or had had a central role in the field of fish health. Important criteria when selecting them as informants were their connections to the field, either because of their function in an organization, a Ministry, or a Directorate, or because of their role in knowledge development at universities or other research and training institutions.

I made four field visits to Scotland (1 month in 1990, 5 months in 1991, 14 days in 1993, and 7 days in 2000). In total, I conducted 34 interviews in Scotland. I interviewed one informant four times (1990, 1991, 1993, and 2000), one informant three times (1991, 1993, and 2000), and one informant two times (1991 and 1993). During one interview, two informants were present. The reason for interviewing some informants more than one time was their central position (held over time) in the fish health field. Although few of the interviews are quoted directly, all interview materials have been an important source in helping me to understand the Scottish fish health context. The interviews provided background material and information that enabled me to broaden my understanding of the field to the extent that it was easier to find written sources.

The familiarity of the Norwegian fish health field was an advantage in the search for relevant documents. Access to primary and secondary sources resulted in the use of fewer interviews. I conducted interviews in 1991 (three interviews), 1993 (three interviews), 2000 (one interview), 2001 (two interviews), and in 2008 (one interview) – in total, 10 interviews. One informant was interviewed two times (2000 and 2008).

The choice of time period was influenced by three events: the enactment of fish disease legislation, the beginning of the salmon farming industry, and the establishment of a new profession and/or settlement concerning division of work. The events did not occur in the same time period in the two case studies. The Norwegian case covered the time period from the 1960s to mid-2000s, while information collected on the Scottish case related to the period from the 1920s to mid-2000s. The Norwegian case follows the professionalization process of the aquamedicine biologists until their status was on a level equal to that of the vets in the fish health field. The Scottish case covers the period from the 1920s to mid-2005, with emphasis on the period from the 1930 to the 1960s, when most of the structure that exists today was laid. I examined page by page the *Veterinary Record* published in the periods August 1927–1934, 1937–1938, 1965–1993 (up to Vol. 9), 1998, 1999 (July to August), and 2000 (January to November) to ensure that I had accounted for events of importance for the division of work in the fish health field.

The interviews were semi-structured and focused on the subject of fish health. All

interviews lasted between one and two hours. I tape recorded all interviews with the exception of three. All interviewees agreed that I could quote them by name. I tried to ensure that the conversations concentrated on public fish health policy, public fish health administration, knowledge about fish diseases, and division of work in the fish health field.

In this thesis I try to balance between the different interests, yet there is a possibility that some are not represented. My intention in the following chapters is to prove that analysing the sources using an actor- model contributes valid knowledge about professionalization and the division of work in society.

2.8 The actor model as an analytical tool for identifying actors and interrelationships between actors in work related to fish health

My study mainly focuses on occupational professionalism and I discuss the development and professionalization of a new work field established by the aquaculture industry. For the industry, knowledge about fish health and fish health services provided by competent professionals is a main issue.

According to Hammel, Stephen, Bricknell, Evensen, and Bustos (2009, p. 20) there is no consensus on the definition of the preferred health status of fish:

> The majority of fish health research and policy deals with infectious diseases, most often at the level of individual fish. A previous review of 10 issues of two prominent fish health journals found that in 194 articles, 28% dealt with the pathological response of a fish to an infection, 27% dealt with aspects of microbiology, 12% were concerned with treatment of individual fish, and 9 % were concerned with the transmission and epidemiology of infectious diseases (Stephen and Thorburn, 2004). None dealt with the effects of diseases on population or ecosystems…The pre-occupation with diseases in fish health policy and research could lead us to conclude that the definition of fish health revolves around the presence or absence of diseases as opposed to a more comprehensive definition that consider elements such as age structure, productivity, sustainability and social value. Although virtually all fish health policies deal with infectious and parasitic disease, stakeholders vary in how they ultimately wish to measure fish health.[25]

[25] The Salmon Aquaculture Dialogue (a forum where a variety of stakeholders meets to discuss the environmental and social impacts of salmon farming) commissioned the *Working Group Report on Salmon Diseases* (published in 2009). The Salmon Aquaculture Dialogue is a multi-stakeholder, multinational group that

For a practitioner, fish disease work involves regular health-checks of stock on the fish farm. The practitioner advises and assists in compliance with the regulations, carries out inspections and testing of fish and shellfish farms and provides advice and diagnostic services. It debated, how to define preferred health status of fish (Hammel et. al., 2009), what tasks that are part of a government's responsibility and what knowledge-based groups that have competence to do what.

The varying extent of how and why the actors involved in fish health is important for the outcome of the professionalization processes and division of work. In claiming jurisdiction, a profession asks society to recognize its cognitive structure through exclusive rights (Abbot, 1988). Hence, in jurisdictional disputes, professions confront one another epistemologically, and in such disputes universities and research institutions have a significant role. In Burrage et al.'s actor model (1990) universities and training institutions provide both knowledge and training on which professions are dependent. According to Halvorsen (1995), however, the model's approach to knowledge and the link between knowledge production and knowledge in use is not sufficient. Rather, the role of universities will be determined by the interrelationships between users, the state, the profession, and occupational groups, as well as users' and societies' trust in the profession. In Scandinavia and Continental Europe the state has had a more dominant role than in Anglo-American contexts, but with the introduction of new policy reforms in the UK in the 1980s and Norway in the late 1990s the interrelationships between state and profession may change. The interesting question in this study is whether or not this change influences the role of the actors' interrelationships, and whether there are significant national differences in policy impact on the professionalization processes due to this change (Kuhlmann and Saks, 2008).

The control of fish diseases is the most important factor for the development of aquaculture industries worldwide. Knowledge about this field gives countries advantages in the global market, but the health problems have to be solved in national contexts. By using Burrage et al.'s (1990) actor model and its focus on the interrelationships between actors, I

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was initiated by the World Wildlife Fund in 2004. Participants include salmon producers and other members of the market chain, NGOs, researchers, retailers, and government officials from major salmon producing countries. Current members of the working group on salmon diseases are L. Hammel (Atlantic Veterinary College, University of Prince Edward Island, Canada), C. Stephen (Centre for Coastal Health, University of Calgary, USA), I. Bricknell (School of Marine Sciences, University of Maine, USA), Ø. Evensen (Norwegian School of Veterinary Medicine, Oslo, Norway), and P. Bustos (ADL Diagnostic Chile Ltd, Chile).

aim to identify the discontinuity and continuity as well as the changes in professionalization processes of fish health work in Norway and the UK (specifically Scotland).

According to Halvorsen (1995) it is in the interdisciplinary meeting point (crossing between professionals) that knowledge can readily develop. Fish health is one such interdisciplinary field, and vets, microbiologists, and marine scientists from different educational institutions became involved in the field in Norway and Scotland relatively early. The aquaculture industry called for stronger control of fish health and public regulation of fish health matters and with this also the need for professions, knowledge-based occupations, and institutions that could take care of statutory duties and services to the users. The two compared countries represent the two traditions in the state-profession relationships, Norway with a tradition of close state-profession relationship (continental) and Scotland with a more practitioner-led relationship between professions and the state (Anglo-American).

As a rapidly expanding industry, aquaculture is expected to undergo a 'blue revolution' that will transform the productivity of the ocean and other aquatic environments with new technology (Lucas cited in Lucas and Southgate, 2003, p. 5). Therefore, disease issues are a matter of concern that extends beyond the industry's primary interests in gaining profit. It is not clear what kind of actors are involved in fish health work or what interests and resources they may have at their disposal that could influence relationships (Burrage et al. 1990). Moreover, these will change over time and will differ between countries.

The actor perspective is based on the theory of professions and presents four actors with varying interests in professions and professionalization processes. The way the actors become involved in the establishment of a new profession in the Norwegian and Scottish fish health field needs to be examined empirically. The actor model can assist in the identification of sequences or phases in the relationships between the actors and researchers' attempts to identify typical patterns of development (Burrage et al., 1990). Whereas Burrage et al. have four actors in their model, I argue that in order to scrutinize professionalization processes a fifth actor needs to be added, namely other professions and occupational groups. The suggested inclusion of a fifth actor is inspired by Abbot (1988) and by introducing the concept of jurisdiction I shift the focus on individual occupations to the relationships between occupations. In line with Abbot (1988), Muzio, Kirkpatrick, and Kipping (2011) have also suggested extending Burrage et al.'s (1990) actor model with a fifth actor, which they call other (competing) professions and employing organizations. They studied the professionalization of management consultants and argue that the 'interests of employing organizations might also depart significantly from the individual practitioners who they

employ and the associations that represent them' (Muzio et al., 2011, p. 811). By including employing organization, Muzio et al. combine in an interesting way the two new directions in the sociology of professions: organizational professionalism (the role of employing organizations) and occupational professionalism (Evetts, 2006a; Muzio et al. 2011). There are fish farming companies employing their own veterinarians/aquamedicine biologists or scientists. I do not focus on the employing organization as a separate actor in this thesis, but rather include it in the user concept.

The fifth actor in my work is other professions and occupational groups, and I incorporate the fifth actor in Figure 2 and 3. By using a five-actor model combined with a historical-sociological theoretical approach, I aim is to explore to what extent the actors resources and strategies and their interrelationships can contribute to explain the professionalization of the fish health field.

According to Burrage et al. (1990) actors' involvement in the work field varies according to time, resources, and issues on the agenda. These factors need to be identified in order to explore professionalization processes and the division of work. Time is a factor in itself and the emphasis on time periods varies in the two cases because in the unveiling of the interrelationships between actors certain events are found to be of significance for the professionalization processes. I consider the outbreaks of the disease Furunculosis in the salmon rivers in England, Wales, and Scotland in the 1920s, and the outbreaks of Furunculosis and Egtvedt disease **(**Viral haemorrhagic septicaemia **(**VHS)) in Norwegian fish farms in the 1960s to be significant for the time period under study. In both countries, that was the first time that involved actors considered fish diseases to be an issue that had to be dealt with by their respective governments. The time period for my study was chosen following an analysis of public documents and acts, such as *Om lov om tiltak mot sykdommer hos ferskvannsfisk*[26] (Ot.prp. nr. 41 (1967-68)) and *Fiskeoppdrett*[27](NOU 1977:39), Report of the Furunculosiscommittee (Mackie et.al. 1930) and the diseases of Fish Act of 1937 (UK). In other words, it was not the beginning of the fish farming industry that was decisive in the choice of time period but rather the time when fish diseases became an issue of governments' attention.

In the case of Scotland and elsewhere in the UK the starting point for the case study is when the Secretaries of State for Scotland and the Ministry of Agriculture and Fisheries

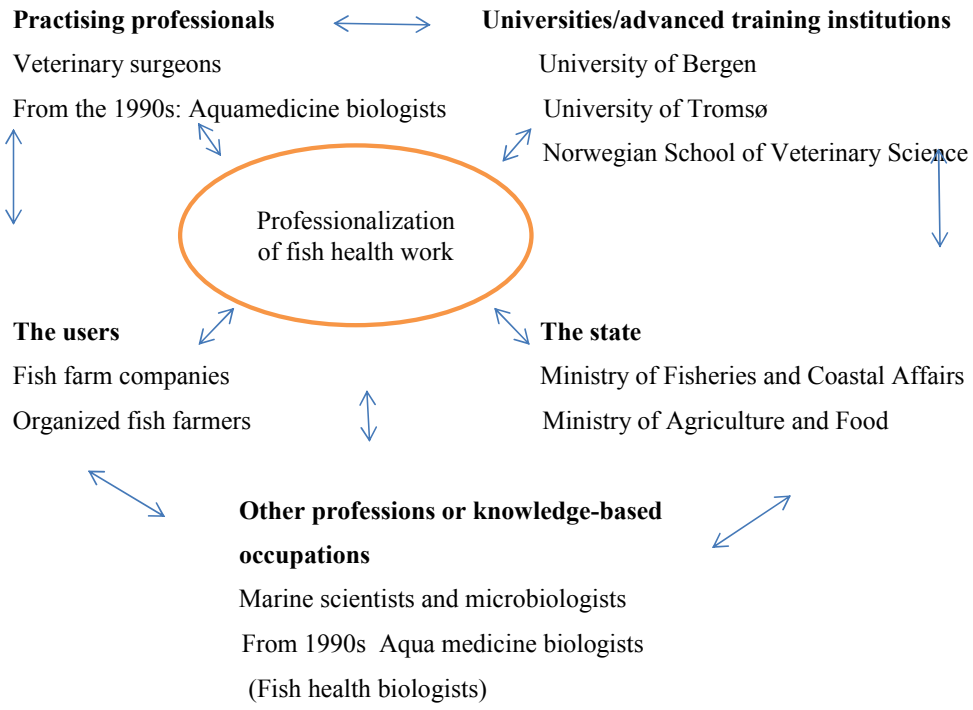
[26] The Norwegian bill on measures against diseases in freshwater fish.

[27]Fish farming

appointed a committee to investigate the disease furunculosis. In Norway, in February 1967, an expert committee was set up by the Ministry of Agriculture (today the Ministry of Agriculture and Food) to investigate ways of preventing the spread of fish diseases. Both countries appointed expert committees, but the difference was that in Scotland the initiative was not connected to fish farming whereas in Norway the fish farming industry has just started its development and was causing problems. A further difference was that Scotland used scientists (microbiologists) as experts on the committees, while Norway used both veterinary surgeons and scientists.

Model 2.2 shows the actors presumed to have a strategic interest in processes of professionalization of the aquaculture medicine biologist in Norway. Two administrative sectors are involved in this field: the agriculture and the fishery sectors, with their affiliated institutions. The agriculture sector has educating its own professions for more than 100 years longer than the fishery sector, and although the fishery sector has the Institute of Marine Research (Havforskningsinstituttet) dating back to the mid-19th century, it was not until the 1970s that it attempted to institutionalize a client-oriented profession and a set of institutions at the service level of the sector similar to those in the agriculture sector (Gornitzka, 2003). The fish health field (in focus in this thesis) draws on knowledge from both agriculture and the fishery industry. Consequently, the field consists of a mixture of relationships that change over time and that might have significance for the understanding of the professionalization processes. Time, place and sequences for when and how the actors involve in the professionalization process will be presented in the empirical chapters. I examine these aspects in more detail in the following chapters.

Figure 2 **Actors involved in the professionalization processes in the Norwegian fish health field**



Traditionally, Norway has had a history of close state- veterinary profession relationships (Kjæmpenes, 1988). If the relationship between state and professions is weakened, new possibilities might open for actors such as universities to become involved in professionalization processes.

The Scottish fish health field introduced in Figure 3 is based on the same principals as the Norwegian model (Figure 2). Comparison of the two models reveals that many of the same actors are present in the field, but the striking difference is that Scotland does not have professions involved in statutory fish disease control. Instead, such control is the responsibility of fish health inspectors employed by the Fish Health Inspectorate. This difference in the division of work and institutional responsibility in the field inspired me to analyse professionalization and the division of fish health work in Norway compared to Scotland. What factors have facilitated professionalization of the Norwegian fish health field?

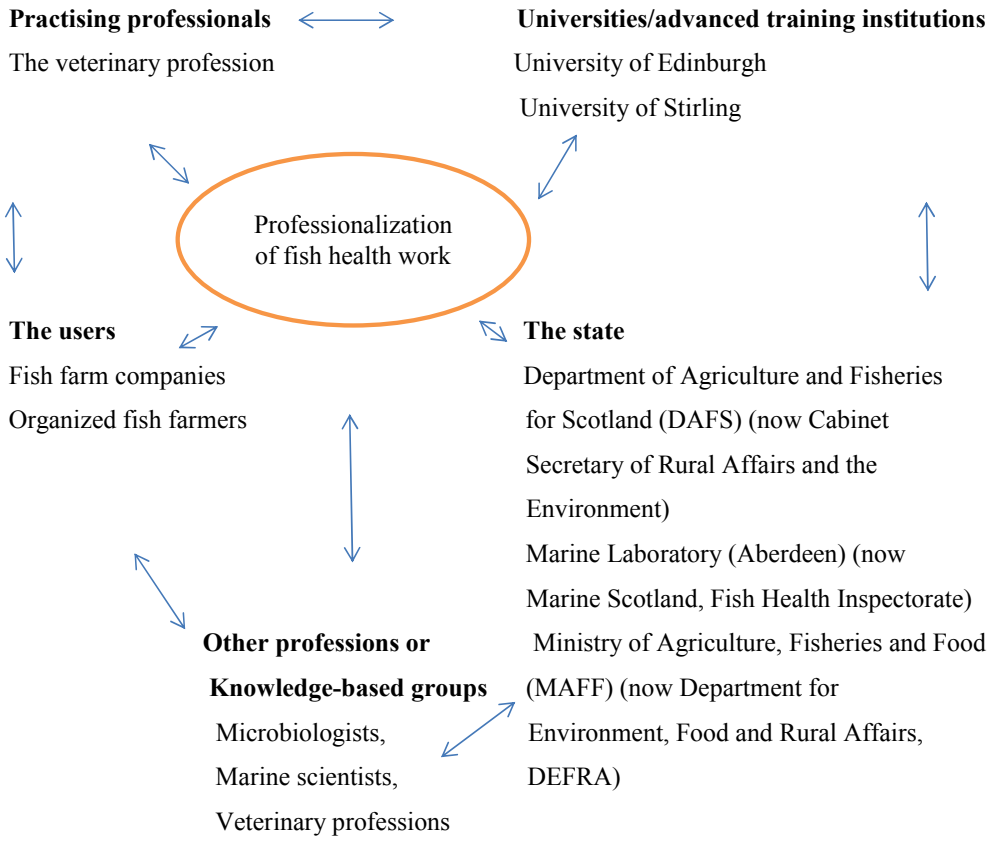
Why have not the veterinary profession or any other relevant knowledge-based occupation aspired towards professionalization of the Scottish fish health field?

According to T. Johnson (1995, p. 17) professions develop when jurisdictions become vacant or new jurisdictions are established: 'Experts are continuously engaged in making claims and counterclaims for jurisdiction over existing, emergent and vacant areas of expertise.' With the enactments of the Diseases of Fish Acts in the two case countries, fish health has been established as new jurisdiction and a vacant area for knowledge groups to involve.

Typically, social studies of professionalization have focused on fully-fledged professions at the expense of occupational groups with a less developed structure' (Saks, 1998, p. 155). Initially, the fish health field was not an established field, or at least it was not a core field of any professions in either Norway or Scotland. By the time Norwegian marine scientists and microbiologist began to take an interest in the new field, the veterinary profession were already involved (Figure 2). When members of the veterinary professions wanted to be involved in fish health work in Scotland, fish health inspectors employed by the Marine Laboratory in Aberdeen were already working in the field. Figure 2.3 shows members of the veterinary profession as practising professionals because even though they do not carry out monitoring work in accordance with fish health legislation, they do have a role in treatment of fish diseases through prescribing medicines. However, in Figure 3 the veterinary profession also comes under 'Other professions and occupational groups' because they are not completely involved in the field of jurisdiction. Fish health inspectors are appointed by the Marine Laboratory in Aberdeen to act as veterinary inspectors. However, they are not a recognized profession, thus they are placed as a fifth actor.

The Marine Laboratory's main objective is to prevent the introduction and spread of serious diseases in fish and shellfish in Scotland. They do not treat fish, but have a role in monitoring work. It is the relationships between the knowledge-based groups and their resources and interests in fish health work that I aim to reveal by using the actor model developed from Burrage et al.'s four-actor model.

Figure 3 **Actors involved in the professionalization processes in the Scottish fish health field**



These two models are the starting point for the empirical analysis. The role of the actors will be analysed more closely in the following chapters. Institutional changes, reorganisation and renaming of institutions will be dealt with when necessary for the understanding of the interrelationships between actors in the fish health work field.

CHAPTER 3: FISH FARMING INDUSTRY IN NORWAY AND SCOTLAND – THE USERS

In this chapter I address aspects of the fish farming industry that bring a broader understanding of fish health work and fish health policy and how they relate to the professionalization of the fish health field, but I do not give a detailed description of the development of the Norwegian and Scottish fish farming industry. Fish farmers are users of professional services, and the resources at fish farmers' disposal have changed parallel to the growth of the industry and the changes in ownership structure. Diseases and the control of diseases in food production, whether animal or fish based, always have an aspect of common interest for society. Therefore, there is potential for interest conflicts between production and/or profit interests and community interests, such as food safety, fish welfare, the protection of wild fish and environmental interests. However, this work does not focus on consumers as users. I have in line with Burrage et al.'s actor model concentrated on collecting information on the fish farmers/fish farming industry as user.

The users of fish health services are significant actors in the field of fish health work, and their influence on this professional domain varies according to the type of user and the different kinds of relationships they establish with other actors (Burrage et al., 1990). In this chapter, I scrutinize the users' interests, resources, and strategies in the field of fish health work field, and thereafter I examine who they have allied themselves with in order to influence fish health policy. I cover a period of 45 years, subdivided into four periods: 1960–1970, 1970–1980, 1980–1990, and 1990–2005 (see Table 3). The year 2005 marked the time when Norwegian aquaculturemedicine biologists achieved status as a profession with exclusive right to write prescriptions for aquatic animals, with the exception of marine mammals. While in Scotland there was no significant changes in the division of work between knowledge based occupations.

The fish farming industries in Norway and Scotland are relatively new industries, having lasted c.50 years in Norway and c.40 years in Scotland, and their development has been simultaneously dependent on developments in scientific and technological knowledge. Users take part in processes of evaluating knowledge and thereby the social construction of professions. Thus, it is important for comparative studies to identify the shift from one kind of user to another (Burrage et al., 1990). There are several different types of users of professional services: individual-fee-for service users, organized users, the state, and private

employers, and Burrage et al. (1990) state that it is important to identify the impact of the shift from one kind of user to another in comparative studies of professions.

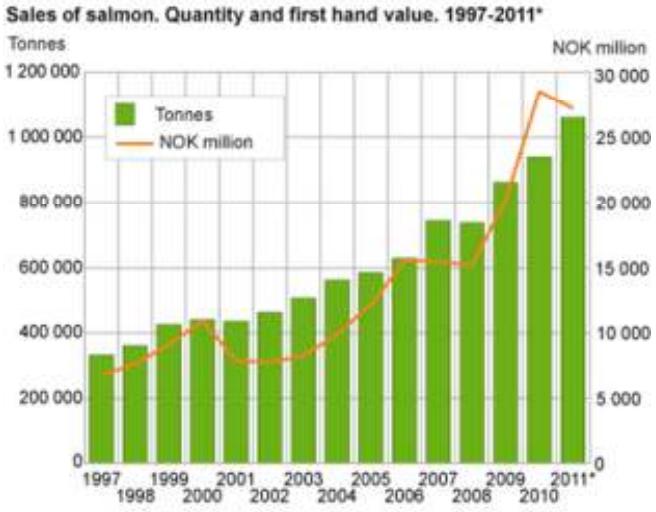
According to Halvorsen (1995), if knowledge is accepted as a definitional minimum in the definition of professions, it is necessary to associate the relationships between knowledge and actors' use of knowledge. Knowledge is developed in a continuous struggle for alternative forms of knowledge. Over time, the form of knowledge that survives as 'professional solutions' is determined by the confidence (trust) that potential professions and professions can impart to clients (users) and the community (Halvorsen, 1995, p. 80). This raises the following questions: Who is the best providers of professional care and cure in the fish health field? Whom do they trust?

I aim to highlight the types of user's interests (type of organizations), resources, and strategies (alliances) over a length of time, as well as their interest in and influence on the professionalization processes in the fish health field, by scrutinizing factors such as the development of the fish farming industry (owner structure), organization of fish farmers, and demand for expert knowledge.

3.1 The case of Norway

The Norwegian salmon and trout farming industry developed more rapidly in the 1960s and the 1970s than even the greatest optimists could have predicted. In 1971, the salmon and trout production was 531 tonnes, representing a total value of NOK 11 million(NOU 1985:22). In 2005, the total sales value of reared salmon and trout was NOK 13,435,196 million, and the total production in tonnes was 645,387. By 2010, the first-hand value for salmon and trout had increased to NOK 30,241,294 million (28,511,990 salmon and 1,729,304 trout) and the production in tonnes was 994,113 (939,575 tonnes salmon and 54,538 tonnes trout) (Statistics Norway. 2012). The numbers for the period 1997–2010 are shown in Figure 4, which shows that the salmon farming industry is still a fast developing industry.

Figure 4 Norwegian salmon statistics



Source: Statistics Norway, 2012

The salmon farming industry represents a new field of growth and expansion for public administration, and agriculture, fisheries, and technical-industrial sectors have made efforts to impose their political ideals on the organization of the industry (Aarseth, 1997).

Due to increased problems of diseases among fish during the 1980s, it became clear that knowledge about fish diseases was a critical factor for the further development of the aquaculture industry, not only for the commonly farmed species, namely salmon and trout, but also for new species. Diseases resulted in loss of fish, increased expenses, and decreased income. In the 1990s, concern was focused on the welfare of fish and attention to the correlation between health status and the welfare of fish.

The state, through the veterinary authorities responsibility for Diseases of Fish Act of 1968 (Fiskesjukdomslova av 1968), became early involved in fish diseases. However, there was lack of government commitment towards fish diseases in the 1980s. The veterinary authorities lacked funding for research and veterinarians with competence in fish diseases, and they had also taken a wrong direction in the race to solve the problem of 'Hitra disease' (Vibrio salmonicida), a serious disease threatening the industry in the 1980s. Scientists from marine institutions in Bergen and Tromsø made the breakthrough in developing a vaccine that saved the industry from heavy losses. With this knowledge breakthrough, they placed

themselves as central actors in the fish health field, and fish farmers recognized the effects of the vaccines that they could develop for the industry. In Chapter 6, I provide more information on the knowledge dispute concerning 'Hitra disease', in order to discuss the context in which the dispute about what causes the fish disease occurred, and why knowledge about the development of the industry is necessary.

3.1.1 From idea to primary industry

Fish husbandry has been practised for thousands of years. In Europe, artificial fertilization and fish hatching have been done for centuries to restock rivers and lakes. Stephen Ludvig Jacobi, a German landowner's son, built the first trout hatchery in 1741, but few were interested and his methods were forgotten. A century later, artificial hatching was reinvented in France and the methods were adopted throughout Europe (NOU 1977:39). This marked the start of the revolution in intensive fish farming. In Norway, the idea of cultivating freshwater fish in sea water was imported from Denmark. In 1855, the state appointed customs officer M.G. Hetting as the first freshwater fish inspector. His mission was to promote artificial hatching in fresh water and examine the state of freshwater fisheries. Professor Rasch at the University (in Oslo) was greatly interested in farming salmonids and both he and Hetting made the first attempts at farming of freshwater fish in seawater. Their experiments did not fulfil their expectations as the harvests were too small and the operation was unprofitable (NOU 1977:39, p. 43).

After the cultivation methods were imported from Denmark, several hatcheries were established with the purpose of restocking rivers. Several fish farms were also established in the 1860s to 1880s, but few of them survived. The import of the first American rainbow trout to Germany in 1880, which was fast growing and easy to farm, stimulated further developments in fish farming (Didriksen, 1990, p. 10; NOU 1977:39, p. 44; Osland, 1990, p. 13). Traditionally, rainbow trout had been reared in freshwater. In Norway, knowledge about rearing fish in seawater was developed on an individual basis, and with little awareness of others with similar problems. Typical problems were associated with fodder, seawater tolerance, and diseases.

The comparatively large farm for rainbow trout was built in 1910, on Jæren, on the south-west coast of Norway, but it did not succeed. Shortly later, in 1912, Cato All from Sunnmøre, on the north-west coast, received government funding for his rainbow trout farm in seawater, but he lost too many fish and abandoned the farm (NOU 1977:39, p. 44).

Between 1920 and 1950 there was little farming activity, but throughout the period work related to hatching and restocking rivers continued. In the 1950s the idea of fish husbandry was presented again and this time the interest grew, ultimately into today's fish farming industry. The development and accumulation of knowledge was thus successful. During the period from the 1950s to the 1970s the platform of the industry was established, and many pioneers had invested both skills and money, although not all of them had succeeded in establishing themselves as fish farmers. For individual farmers, the price of developing the industry was high. Nevertheless, Norway was to become the leading technology developer for Atlantic salmon culture, while Denmark led in terms of progress with farming rainbow trout. In the 1960s, fish farming became the sole source of income for some farmers, but most combined fish farming with other jobs. By the 1970s, the farming of Atlantic salmon and rainbow trout had become established as an important industry

3.1.2 From idea to implementation

Developments in technology regarding farming salmon and trout in seawater, such as better net-pen technology, improved feeding and breeding technology, and the development of effective vaccines, have always placed Norway in an advantageous position. However, in the 1960s salmon farming proved particularly disappointing due to the complex life cycle of Atlantic salmon. It was not until the early 1970s that fish farmers reported their first successes, and these successes had started with small operators.

The history of knowledge development in fish farming in Norway started with pioneers. Interviews published in a book by Erna Osland (Osland, 1990) inform about the pioneer period, and how and when fish farming started. Evidently, the idea and inspiration came from Denmark, England, and Scotland (Osland, 1990). According to Didriksen (1990), Denmark and the USA were the main sources for inspiration. In the 1950s and 1960s, Norwegian fish farmers' knowledge about rearing fish was based on individual strategies. There was no common identity among the fish farmers and they did not air common problems (Aarseth, 1997, p. 38). The knowledge development process is best described through individual narratives[28] One such story was told by brothers Olav Vik and Karstein O. Vik from Sykkulven, who describe how they were met with a lot of interest from abroad (Osland, 1990). In Norway, few believed that the work carried out by the Viks could give any results or

[28] Such narratives that can be read in Osland (1990) and Didriksen (1990).

that farming salmon and trout in seawater had any future. However, in the early 1960s, the Viks made contact with salmon expert Professor Jones, from the University of Liverpool, who invited them to visit the Salmon Research Group at Cambridge to speak about their experiences. There, they met representatives from Unilever[29] (Osland, 1990), and the meeting resulted in an agreement to exchange knowledge. However, shortly after, Unilever employed nine biologists and did not allow anyone on their site, and thereby failed to fulfil their part of the agreement to exchange knowledge. Nevertheless, the Viks were satisfied with the economic support they received from Unilever, as it helped them to continue with their work at a time when it was difficult to find such help elsewhere (Osland, 1990, p. 82). Thus, there were exchanges, or rather exports from Norway, of knowledge about farming salmon and trout in sea pens to a large salmon farming company in Scotland. Unilever was also in contact with a fish farm business located near Bergen, which later was named Mowi under the ownership of Hydro (Didriksen, 1990, p. 26).

The role of the Norwegian brothers Vik in the technology development of salmon farming is acknowledged worldwide. For example, in 2003, Yves Bastien, Commissioner for Aquaculture Development in Canada, commented on the role of the brothers in a speech given at *Conference on Marine Aquaculture Effects on the West Coast and Alaska Fishing Industry*:

> What has become known as the beginning of modern salmon farming began in the 1960s when two Norwegians, the Vik brothers, attempted to grow out some Atlantic salmon in pens constructed of wooden walkways on floats from which fishing nets were suspended. Something that you may not be aware of is that the Vik brothers were fishermen. Atlantic salmon stocks had declined in Norway as a result of hydroelectric developments of its rivers. The Vik brothers experimented with salmon farming because they saw it as a way to deal with the situation and they persisted where others had failed. They succeeded because they believed that salmon farming could be made to work. (Bastien, 2003, pp.5-6)

Some of the facts presented by Bastien were incorrect. The Vik brothers did not have a background in fishing. Rather, they had inherited a farm, and Olav was a gardener and Karstein was an architect. They had planned to make fish farming into a living (Osland, 1990). Further, Bastien shows that he was not aware of the contact between the Vik brothers and Unilever:

[29] A multinational food and detergent company.

> At about the same time in Scotland, the multinational food and detergent company, Unilever, was also experimenting with salmon farming but for a different reason. The western coastline of Scotland was an economic disaster area and Unilever's chairman, a keen sport angler who had a house near Loch Ailort, on the west coast, felt that salmon farming could bring prosperity to the area. Since he was the boss, he made it happen. The result was Marine Harvest, the biggest fish farming company in the world. (Bastien, 2003, p. 6).

The contact between the Vik brothers and Unilever is important for understanding the early technological developments in both Norway's and Scotland's history of salmon farming. However, an interesting fact given in Yves Bastien's speech was that Unilever's Chairman was a keen sport angler. As I show in Chapter four, the interest in sport fishing initiated the first research on furunculosis in Scotland, in the 1920s.[30]

Before the introduction of net pens, fish farms were found in a variety of locations, including in fresh water, in river systems, and on land. The change from trout to salmon farming also marked a change towards a new market. While trout mainly had been produced for a domestic market, salmon were already established as a high-value commodity. According to Aarseth (1997), common technology create a more unified identification than had previously not existed, thereby rendering farmers' experiences useful to other farmers. The innovation of net pens on seabeds in 1969 represented a uniting factor between the farmers in Norway. Net pens were 'core technology' that was cheap, clean, and effective (Aarseth, 1997, p. 38).[31] With this new innovation fish farming moved into marine water, a field 'belonging' to institutions within the fishery sector.

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[30] Interrelations between sport angling and fish farming occurred also in Norway, but later than in Scotland. For example, in the 1990s, there were increased concerns in Norway about the spread of diseases and sea lice from farmed to wild salmon. The Wild Salmon Committee's report (NOU 1999:9) advocates concerns for several hundred thousand salmon escapes from fish farms. Escaped fish with salmon lice are regarded by authorities as the biggest environmental problem connected with fish farming. The Committee's chairman was Georg Fr. Rieber-Mohn, a well-known lawyer and Supreme Court judge, who was also a sport angler. The committee proposed using the Nature Conservation Act of 1970 (amended in 1995) to protect a whole watercourse due to consideration for the life in the river. They also proposed using the Planning and Building Act of 1985 more actively in community planning in order to protect biological diversity (NOU 1999:9, p. 290). In the 1990s, sport anglers became an active interest group by showing concern for the situation of wild salmon. Currently, salmon farming is regarded as a threat to the environment.

[31] The net pens are net bags attached to a floating device and moored on the sea floor. Fresh water flows through the pens at the same speed as the general current, and offal diffuses to the surrounding water (Aarseth, 1997, p. 71).

What can be concluded from the information presented above is that the demand for a fish health service was forwarded by individual farmers in the early 1960s.

3.1.3 Establishment of the Norwegian Fish Farmers Association and the Norwegian fish farmers sales organization (Fiskeoppdretternes Salgslag AL (FOS))

From the 1970s the fish farming industry grew rapidly , and with it the need for organized co-operation. The Norwegian Fish Farming Association (Norske Fiskeoppdretternes Forening (NFF)) was established in 1970, and was the first national association to represent fish farmers. Prior to the establishment of the NFF, there had been three geographically limited fish farmers associations in the 1960s. The pioneers of the industry, who together with det Kgl.Selskap for Norges Vel[32] initiated the establishment of the NFF, had recognized the need for an association that could speak for all fish farmers. Especially, they saw the need for an interest group that could work for further governmental involvement in the industry, in matters such as research, funding, and a state veterinary service. The NFF wanted to establish a sales organization for farmed fish. However, the process was not without conflict, and especially fish farmers that also exported produce did not want a sales organization based on a model similar to those of traditional fishermen's organizations (Berge, 2002; Osland, 1990). Despite opposition, in 1978, the Norwegian Fish Farmers Sales Organisation (Fiskeoppdretternes Salgslag AL (FOS)) was established. Its main function was to regulate the first sales of salmon and trout by Norwegian salmon farmers, to co-ordinate the production and maintenance of quality, and to promote Norwegian salmon and trout (Shaw and Gabbot, 1990).

FOS had the monopoly on regulating the first sales of salmon and trout by fish farmers, which meant that all Norwegian fish farmers had to be members. The funding of FOS was guaranteed by a levy drawn equally from farmers and from purchasers, and in total FOS received 2.5% of total sales revenues (Shaw and Gabbot, 1990). According to Shaw and Gabbot (1990), the close connection between FOS and the NFF placed fish farmers in a good position to negotiate with the state. They were not dependent on the Norwegian Government for all decisions concerning their interests because they had been delegated authority to deal with first sales of salmon and trout. Further, as shown in the case of the Frisk Fisk project (see

[32] Det Kgl.Selskap for Norges Vel (also known as Norges Vel) is an organization closely linked to agriculture and works on promoting farmers' welfare interests.

Section 3.1.9), the NFF and FOS used some of their resources to fund research projects on fish diseases. The industry emphasized the need for cooperation with research institutions within the field of fish disease (Møller, 1995), and in that respect the NFF was actively involved not only in knowledge development but also in the division of work between research institutions.

In the 1970s, two central political lines of conflict were dominant. First, there was the definition discourse on whether fish farming should be defined as agriculture or fishery. This discourse finds its parallel within the research context, where veterinarians place emphasis on their experience from agriculture and of animal diseases, and fish biologists emphasize their knowledge derived from marine science. Both specialist groups underline their experience as decisive for the understanding of fish diseases. Second, there is the discourse whether fish farming should be a subsidiary source of income or an independent primary industry.

Regulation of fish farming in the 1970s was seen in connection with regional policy. According to Berge (2002, pp. 169–172), the NFF's work in the 1970s was influenced by the two political discourses, and the NFF used them pragmatically in different settings. In the period 1970–2005, the Fish Farming Act of 1973 (Fiskeoppdrettsloven av 1973) was amended several times 1981 (Fiskeoppdrettsloven av 1981), 1985 (Fiskeoppdrettsloven av 1985), 1991 (liberalisation of ownership regulation), 2005 (Akvakulturloven av 2005)[33] and NFF was active in trying to influence the political discourse. The NFF emphasized the connection to farming in discourses on sales organization, and argued that fish farming was related to animal production whereas in discourses about connection to public administration, the NFF argued that fish farming was connected to fishery. Berge (2002) states that the political compromise in the 1970s that constituted the public administration of the fish farming industry should be placed in the historical context in which the discourses took place.

In the 1970s there were political agreements that fish farming should be an industry, placed in the districts, and owned by the fish farmers themselves. These ideas found their way into the Fish Farming Act of 1973 (Fiskeoppdrettsloven av 1973). In the 1980s, the pressure to gain entry to the promising new industry increased.

[33] Lov av 17. juni 2005 nr.7 om akvakultur (Akvakulturloven av 2005 (the Aquaculture Act)) replaced the Fish Fiskeoppdrettsloven av1985 (Fish Farming Act) and Havbeiteloven av 2000 (the Sea-Ranching Act). In Ot.prp. nr. 61 (2004-2005) Om Lov om akvakultur (akvakulturloven), the Government changed the public focus from who owns the enterprise to how it is managed.

3.1.4 Reorganization of the fish farming industry – the fall of the regional model

In 1991, changes in the regulation of ownership opened up for a reorganization of the fish farming industry and large corporations gained entry. This change was caused by the problems the industry met with overproduction and difficulties selling the salmon. Excess production was put into cold store to wait for price stabilization, but the giant freezing project collapsed, bringing the Norwegian fish farming industry to its knees. Without backing from the farmers, government, or the banks, FOS had no other choice but to file for bankruptcy.

The sales monopoly was dissolved and with that the minimum price was abolished *Norsk Fiskeoppdrett*, 1991, No. 17, p. 8). One consequence of the abolishment was that the principle of local ownership and one license per person was removed (Aarseth, 1997). The feelings about FOS's bankruptcy were strong. Andreas Blom, former chairman of the NFF, said in an interview that all they had built up during the course of 12 to 15 years was ruined. He commented: 'the fish farmers do not have any trust in the central organization of the NFF, and it is our regional organizations (*fylkeslag*) that must co-ordinate their work and influence governmental decisions' (*Norsk Fiskeoppdrett*, 1991, No. 17, p. 14).

The fish farmers gave their support for free sales techniques at a meeting on 10 December 1991. By contrast, the NFF, which worked for re-establishment of the sales monopoly, received no support from the fish farmers (*Norsk Fiskeoppdrett*, 1992, No. 1, p. 14). The future for the NFF as an organization was very uncertain, but at their Annual General Meeting the members voted 244 against 40 that the NFF should continue as a national interest organization for fish farmers. Mowi and Sea Farm, two large salmon producers with several salmon farms, decided to withdraw their NFF membership, because they felt that the new policy would not take care of larger producers' interests (*Norsk Fiskeoppdrett*, 1992, No. 4, p. 8).

In 1994, the NFF joined the Norwegian Seafood Federation (Fiskeri- og havbruksnæringens landsforening (FHL)), associated with the Confederation of Norwegian Business and Industry (Næringslivets hovedorganisasjon, NHO), and became a branch association called FHL Aquaculture (FHL Bransjegruppe Havbruk). According to Berge (2002), this cooperation between producers and exporters represented something new in the context of fisheries. After FOS's bankruptcy, the NFF had to look for new organizational solutions and although not unproblematic, joining the FHL became the solution.[34] In its

[34] For a more detailed review of this process, see Berge (2002, pp. 353–361).

attempts to appeal to both large-scale and small-scale members, the NFF became paralysed, and according to Berge this resulted in a situation where initiatives towards the Government attending to the regulation policy had poor conditions (Berge, 2002). Aarseth (1997, p. 150) states that '[b]y amendments to the Aquaculture Act, commercial interests that were external to the typical fisheries and coastal industries were allowed easier access to ownership of production facilities'. At this point in time, the type of user of professional services had changed. Also, interests external to the fishery sector became involved in the industry to a larger degree.

Despite sales problems at the beginning of the 1990s, Norway kept its position as the world's largest salmon producer. An increase in salmon production resulted in favourable economic growth in salmon farming up until 1995 (Berge, 2002, p. 348). Liabø points to the fact that vaccines and better farming localities are the most decisive factors for the development of salmon production in Norway (Liabø cited in Berge, 2002, p. 348).
To sum up: In the 1970s, fish farmers became united in their interests, and the establishment of FOS placed them in a good position to negotiate with the state. Funding from FOS gave the industry resources to finance research on issues of importance for the industry. As I show in Section 3.1., in the 1980s the challenges related to diseases were a major concern for the industry, but there were no disputes about the interest organization and attention could therefore be paid to, for example, solving health issues. In the early 1990s the industry faced problems in the markets, and in the 1990s as a whole the interest organization was faced with a crisis and had to reorganize due to market problems. In addition, due to the amendments to the Aquaculture Act of 1985 (Fiskeoppdrettsloven av 1985), new commercial interests were given easier access to ownership of fish farms.

3.1.5 Owner structure and regional localizing of fish farms

To date, the Norwegian fish farming industry has been structured as small businesses.[35] Traditional specialization in farms for on-growing dominated the period 1960–1990. Governmental policy was designed to disperse technology and ownership to rural communities by setting size limits (Shaw and Gabbot, 1990, p. 28). The first Fish Farming

[35] Berge and Bjarnar (1998) subdivide on-growing farms into small businesses (1 license), middle-sized businesses (2–4 licenses), and large-scale businesses (5 or more licenses). In some statistics from the Directorate of Fisheries, holders of 1–5 licenses are considered small-scale businesses, whereas holders of 5 or more licenses are large scale-businesses (including multinational concerns).

Act, passed in 1973, regulated the establishment of new fish farms and also their size, and only a few operators were allowed to produce larger tonnage. New acts have since replaced the first, but the main idea regarding small-scale farms has been preserved. In the 1990s, the structure of the industry changed due to the crisis caused by the market situation. Public deregulation of the industry through changes in the summer of 1991 of the Fish Farming Act of 1985 (Fiskeoppdrettsloven av 1985) and the dissolving of the Norwegian sales monopoly (held by FOS) in November of the same year, gave opportunities for larger businesses to become established. From June 1991 to June 1993 the number of businesses with interests in more than one fish farm increased by 46%. In 1996, 20 businesses controlled over 32% of all licenses (263), and by 1998 the number had increased to 47% (Berge and Bjarnar, 1998, pp. 18–19). However, prior to 1991 it was not unusual for companies to have owner interests in more than three fish farms, but these companies had been large for a long time and can be readily identified. They included Mowi (later Hydro Seafood); in 2000 Nutreco acquired Hydro Seafood (now Marine Harvest); (Stolt) Sea Farm (merged with Marine Harvest in 2005); and Torissen (Berge & Bjarnar, 1998, pp. 17–18).

According to the Norwegian Directorate of Fisheries,[36] at the end of 1998, the breakdown of fish farm licenses by number of companies as follows, with standard license covering 12,000 m^3:

- 1 company had 90–100 licenses.
- 4 companies had 10–30 licenses.
- 20 companies had 5–10 licenses.
- 216 companies had fewer than 5 licenses.

During the 1990s the Norwegian fish farming industry saw a change in owner structure. Berge (2002) finds that the industry has experienced a development in the owner structure, from a relatively homogeneous structure where small-scale businesses have dominated, to a heterogeneous structure consisting of both small- and large-scale businesses, as well as specialized and integrated businesses. At the end of the 1990s small scale (i.e. they had fewer than five licenses) is however still numerically the largest kind of owner..

In 1985, Sea Farm A/S was the first business to be listed on the Oslo Stock Exchange and Sea Farm was also the largest foreign investor with interests in the USA, Canada,

[36] Norwegian Directorate of Fisheries/NFF/statistics (undated).

England, Scotland, Spain, France, and Greece (*Norsk Fiskeoppdrett*, 1985, Nos. 7–8, p. 40). At the end of 2000, several fish farming businesses were listed on the Oslo Stock Exchange. Norwegian companies had easy access to capital in 2005 and 2006 and the Oslo Stock Exchange is a large stock exchange for aquaculture companies on the global market (Liabø et al., 2007, p. 103). According to Liabø et al. (2007), the following different types of ownership existed in fish farming in 2006:

- Stock exchange 45%
- Industrial diversified 5%
- Undiversified 50%[37]

Table 2 below shows that there is a concentration of companies engaged in Norwegian salmon and trout farming. The reduction in numbers of companies from 467 in 1999 to 171 in 2010 is remarkable. Late in the 2000s the tendency was for large-scale and stock exchange companies to dominate the Norwegian aquaculture industry.

Table 2 Number of companies and licences with grow-out production of Atlantic salmon, rainbow trout, and trout in Norway, 1999–2010

Year	Companies	Licences
1999	467	799
2000	296	817
2001	273	822
2002	288	850
2003	278	870
2004	262	926
2005	248	923
2006	226	909
2007	201	929
2008	186	922
2009	182	990*
2010	171	994

* In 2009 the Norwegian Government announced 65 new licenses for salmon and trout in addition to 5 organic aquaculture licenses (Fiskeridirektoratet, 2009)
Source: Directorate of Fisheries 2011, (updated per 01.12.2011).

Since the first Fish Farming Act in 1973, governmental policy has been designed to disperse technology and ownership to rural communities and small businesses. This has been

[37] Companies listed on the stock exchange are either listed themselves or listed under a parent company. 'Industrial diversified' refers to fish farming companies that also diversify into other activities. 'Undiversified' refers to companies that have fish farming as their only activity.

possible because Norway's coastline has favourable topographic and climatic conditions for aquaculture. The allocation of licenses was not very restrictive until the autumn of 1977, when the Norwegian Government ceased allocating licences pending a new fish farming act. The new law was enacted in 1981, and priority was given to districts with poor industries. During the industry's early stage in the 1960s, c.60% of the fish farms were located on the west coast of Norway (Berge, 2002, p. 37). In the county of Trøndelag, the number of fish farms increased in the 1970s. The county of Nordland lagged behind in the early 1980s, but increased its share towards the mid-1980s. The counties of Troms and Finnmark lacked behind and did not become involved in fish farming until the end of the 1980s, as these regions were considered too cold for salmon and trout farming (Jacobsen et al., 2003, p. 3).

Many of the fish farm pioneers were located on the West Coast and some of them contacted researchers working at the Institute of Marine research in Bergen for advice about fish and fish farming. For example, marine scientist Dag Møller was contacted by the pioneer Erling Osland from the county of Sogn og Fjordane (Osland, 1990).

In 1972, the Norwegian College of Fishery Science (Norges Fiskerihøgskole, NFH) was established in Tromsø, in Northern Norway, in order to strengthen the fishery sector's scientific fundament. As a consequence of the Government's interest in stimulating fish farming in Northern Norway in the 1980s, the marine science milieu in Tromsø became involved in aquaculture.

The fact that the industry was initially dominated by small-scale companies and that the location of fish farms on the west coast and later in Northern Norway placed small fish farmers close to marine research institutions, meant that individual farmers could contact marine researchers directly. The Norwegian Veterinary Institute (Veterinærinstituttet, NVI) was located in Oslo, and although the state veterinary service had laboratories in several regional locations, the main competence in fish diseases was situated in Oslo, far away from the pioneers.

3.1.6 Disease – a critical factor

In the 1960s, pioneers of fish farming claimed that received little support from the governmental agencies, and they were met with little interest from politicians. Moreover, with

the exception of a few scientists,[38] they had little help from research scientists or governmental research institutions. A further problem was the lack of official veterinary involvement in fish farming. Osland (1990) quotes a description of the situation in the mid-1960s, citing Reidar Eggesbø, Chairman of Møre og Romsdals Damfisklag, who informed about the association's work and how he as a chairman, together with one of the fish farmers, had tried to persuade the Government to become more involved in veterinary services for fish and research. Except for a few initiatives from Minister Wøhni,[39] there were few or no measures taken:

> Together with Kåre Skutevik, I went several times to Oslo to talk with the authorities in order to get them to believe in fish farming. We were asking for a veterinary service and research. Einar Whøni became involved, but little out of it. (Eggesbø cited in Osland, 1990, p. 171; my translation)[40]

During this period, fish farmers in Norway had few resources at their disposal and few public services available. They met scepticism from scientists, public administration, politicians, and neighbours. As individual actors, they contacted individual scientists and veterinarians for help. The responsibility for fish diseases had already been institutionalized by the Government through the enactment of the Diseases of Fish Act of 1968 (Fiskesjukdomslova av 1968), administered by the Ministry of Agriculture. Under the Act, the veterinary service had responsibility for monitoring fish diseases, and therefore the veterinary profession had to be involved in the field of fish diseases. However, veterinary authorities did not give priority to fish health in the 1960s and 1970s (Kjæmpenes, 1988, p. 79). As a consequence of his scientific interest in fish diseases, veterinarian Tore Håstein, from Oslo, took care of the veterinary authorities' formal responsibilities, but most fish farmers simply had to trust their own skills and ideas.

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11 Osland (1990) mentions Tore Håstein from the Norwegian Veterinary Institute, Harald Skjervold from Norges Landbrukshøgskole (Norwegian Agriculture College, today UMB), Emmy Egedius and Dag Møller from the Marine Research Institute (Havforskningsinstituttet).

[39] Einar Wøhni was Minister of Agriculture from 1960 to 1963.

[40] '*Saman med Kåre Skutvik var eg også fleire gonger i Oslo og snakka med myndigheitene for å få dei til å tru på oppdrett. Det var veterinærstell og forskning og slikt vi var ute etter. Einar Wøhni gjorde nok ein del, men det kom lite ut av det.*' (Eggesbø cited in Osland, 1990, p. 171)

3.1.7 Norwegian Fish Farmers Association stresses the need for more veterinary services for fish farms

The Norwegian Fish Farmers Association (NFF) was in the 1980s strongly critical of the veterinary authorities' failure to organize a veterinary service that could handle the fast expanding fish farming industry. In the early 1980s, the fish farmers applied to the authorities for more veterinary involvement. According to the fish farmers, the veterinary service had been insufficient. The NFF's annual meeting in 1981 pointed out that the Ministry and the Veterinary Authorities were responsible for a satisfying veterinary involvement in the fish farming industry. The NFF wanted the Ministry to give this work high priority and, in cooperation with fish farmer organizations, formulate a plan for future veterinary services in fish farming . At the annual meeting, a request was made for better research coordination between the Institute of Marine Research (Havforskingsinstiuttet) in Bergen and the Norwegian Veterinary Institute (*Norsk Fiskeoppdrett*, No. 4, 1981, p.6-9). Three years later, in a meeting between the NFF and FOS the poor provision of public veterinary services with regard to fish farming and the lack of plans for its escalation were again pointed out (*Norsk Fiskeoppdrett*, 1983, No. 6). One cause of concern for the NFF was the use of antibiotics, which in 1987 were close to 50,000 kg active substances (Figure 5).

During the 1980s the criticism of the public veterinary service intensified as a result of increases in disease problems. In 1983, Sivert Grøntvedt, chairman of FOS, commented on the situation of the fish veterinary service and argued that there was no doubt that the service was the Government's responsibility. However, the fish veterinary service had reached a status quo, whereas the aquaculture industry had duplicated its production every year:

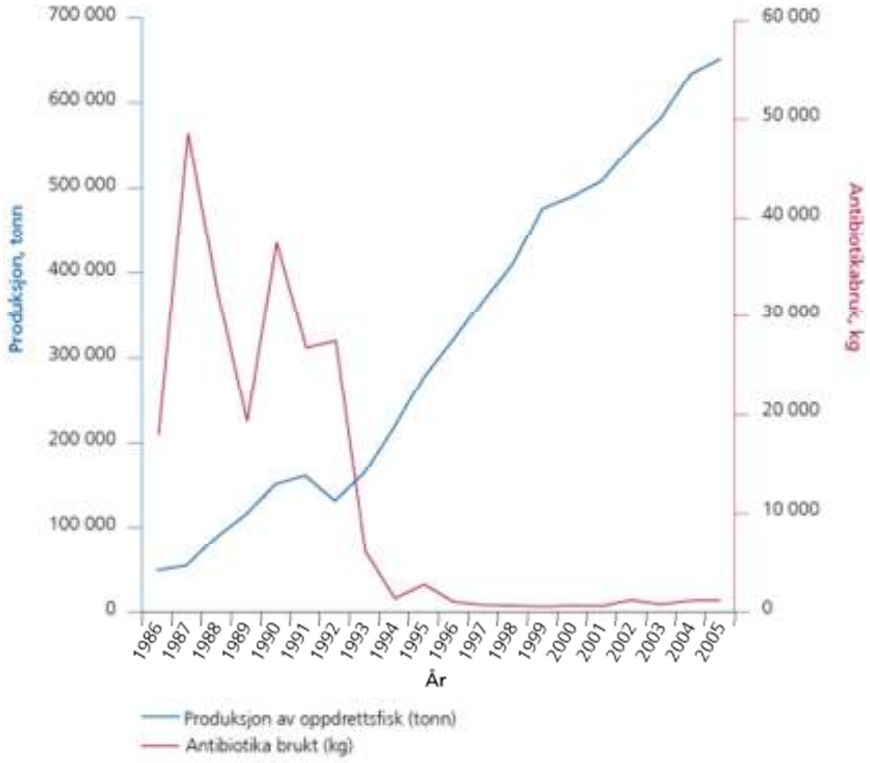
> We are amongst the few industries not receiving public subsidies. Parliament decided that the veterinary service was to be placed under the Ministry of Agriculture. It is obvious that it is the Government's responsibility to develop the veterinary service. The veterinary service has been at a standstill, whereas the industry has redoubled itself every year. (Sivert Grøntvedt, interview in *Norsk Fiskeoppdrett*, 1983, No. 11, p. 3; my translation)

In some situations, the fish farmers felt that the veterinary service gave priority to small animal farmers instead of their fish farming enterprises, which had a production 20–30 times higher than the farmer (*Norsk Fiskeoppdrett*, 1984, No. 9, p. 50). Some fish farmers engaged their own fish veterinarians, but this approach was debated within the fish farming

industry regarding whether it should be a public or private concern. In 1984, the chairman of the Møre og Romsdal regional Fish Farming Organization (Møre og Romsdal Fiskeoppdretterlag) Marius Eikremsvik said that he advised fish farmers not to engage fish veterinarians because it should be a governmental responsibility (*Norsk Fiskeoppdrett*, 1984, No. 10, p. 5). Svein Vik-Mo, who in 1984 represented the fish farmers as a member of a committee mandated to consider the fish veterinary service in the future, stated that diseases had caused the fish farming industry expenses of approximately NOK 100 million in 1983. Compared to animal farming, that would have been equal to the value of 40,000 cows. Vik-Mo was certain that if this had been the situation in agricultural farming the Agriculture Committee (Landbrukskomiteen) would have held continuous meetings. He was of the opinion that there should be no doubt that the Ministry of Agriculture and regional veterinary officers were responsible for maintaining a fish veterinary service (*Norsk Fiskeoppdrett*, 1984, No. 10, p. 9). The fish farmers demanded that the veterinary authorities should give more priority to fish health work, and also requested more coordination of scientific research on fish disease between veterinary and agriculture research institutions on the one side, and fish scientists and fishery research institutions on the other side (Kjæmpenes, 1988, p. 44). In 1984, FOS granted NOK 2 million to strengthen the veterinary service for fish farmers (*Norsk Fiskeoppdrett*, 1985, No. 10, p. 13).

The graphs in Figure 5 show the use of antibiotics in fish farming and production of farmed fish in the period 1986–2005. The use of antibiotics in the mid-1980s was formidable. However, there was a change in the early 1990s, when the use of antibiotics was reduced to a minimum. The universities' and research institutions' efforts to develop knowledge about fish disease yielded highly significant results for fish health. Yet, despite this, the industry's worries were not over. Simultaneously with the increased control of diseases, the industry experienced a fall in demand for salmon on the market.

Figure 5 **Fish farming and the use of antibiotics (*Source:* Tall og fakta 2007, Legemiddelindustriforeningen, p. 80)**



Kilder: Fiskeridirektoratet,
Folkehelseinstituttet, Statistisk sentralbyrå

3.1.8 The interlinkage of overproduction and disease problems

From 1960 to 1990 the fish farming industry generally expanded. However, after 1986, smolt producers faced a falling demand. 1988 was the first year with overproduction of smolt. The combination of liberal smolt licensing that resulted in overproduction of smolt, a fairly high share of newcomers in the industry, expanding of maximum volume per fish farm from 8000 m^2 to 12,000 m^2, and more intense slaughtering to avoid the worrying spread of fish diseases resulted in increased production and ultimately the bankruptcy of FOS in 1991 (Berge, 2002).

In the early 1980s, fish farmers suffered great losses due to 'Hitra disease' (Vibrio salmonicida). The losses were reduced in the late 1980s by the successful introduction of a vaccine. The development of the vaccine was an event that rendered the lack of cooperation between researchers from the fishery and agriculture sides visible to the public.

In 1984 smolt infected with furunculosis were imported from Scotland. The fish farmers themselves had taken the initiative to import the smolt. The outbreak of furunculosis resulted severe losses to the farmers concerned, with the result that several of them appealed to the Supreme Court for compensation from the Government. At the end of the1980s and beginning of the 1990s, major outbreaks of furunculosis affected the whole industry and were one of the largest threats thus far encountered by the industry. In 1990 the use of antibiotics was almost 40 tonnes, mainly due to efforts to limit the outbreaks of furunculosis. A furunculosis vaccine was introduced in the early 1990s and thereafter the outbreaks were reduced drastically (Evensen, Ø., Breck, O., Hjeltnes, B., Nilsen, F., Schrøder, M.B. and Håstein, T. 2004).

In 1985, the NFF took the question of imports seriously, due to the experience of infected smolt imported to Nord-Trøndelag in 1984. The NFF considered imposing an import ban on smolt, but decided against this mainly due to shortages of smolt, especially in North of Norway (*Norsk Fiskeoppdrett*, 1985, No. 12, p 85). This decision was proved disastrous, as more smolt infected with furunculosis were imported from Scotland in 1985. In my opinion, the combination of lack of smolt and the experience of imports of diseased smolt from Scotland are factors that explain the liberalization of the smolt license policy, which in turn led to overproduction of smolt in the early 1990s. Thus, it was a combination of overproduction of smolt, control of diseases, increased production, and market problems that led to the bankruptcy of the FOS, and knowledge about diseases and the need to control the import of diseases played a major, albeit unintended role.

3.1.9 The research programme Frisk Fisk – a unique cooperation between public research councils and the fishing industry

Due to the lack of public research funding for fish disease research, the NFF and FOS contacted the Research Council of Norway (Norges forskningsråd, NFR) in 1983 regarding the possibility of establishing a research programme on diseases in salmon and trout farms. The motivating factor behind this initiative was the new 'Hitra disease' (Vibrio salmonicida). The NFF and FOS granted NOK 2 million per year for a period of three years to conduct the

research project Frisk Fisk. The industry wanted the money to be channelled through the The Norwegian Council of Fishery Research (Norsk Fiskeriforskningsråd (NFFR)) and the Norwegian Agriculture Science Council (Norsk landbruksvitenskaplige forskningsråd (NLVF)). The industry emphasized the need for cooperation with research institutions within the field of fish disease. Initially, the research councils had little experience of cooperating on projects together with industry. The research programme developed cooperation between three different spheres: veterinary education, agricultural education, and scientific communities in universities. The reorganization of the research programme in 1988 and the establishment of a new executive committee in 1990 weakened the contact with the industry. The bankruptcy of FOS in 1991 had a huge impact on the programme because the industry lost an institution that had provided capital for common purposes such as the Frisk Fisk research programme (Møller, 1995).

The Frisk Fisk project marked a change in fish farmers' involvement in the field of fish disease. From 1980 onwards, the fish farmers were active in persuading researchers from fishery and agricultural research institutions to collaborate. The industry's involvement can be seen in relation to increased disease problems and lack of veterinary capacity to cope with the problems (Kjæmpenes, 1988, p. 45). According to Aalvik (1995), infectious salmon anaemia (ISA) caused losses estimated at approximately NOK 400 million in 1991. The Frisk Fisk project, the increased disease problems, and the veterinary authorities' lack of capability to meet the demand for knowledge about fish diseases, all created a dynamic situation that made it possible for new actors to become involved. Another important characteristic of the situation was that the fish farmers wanted several knowledge-based occupations to be involved in fish disease research. Their aim was an open research field, and it was in this context that the universities in Bergen and Tromsø established of a new fish health study.

After 1990 the industry had to cope with the organizational turbulence and the industry's initiative to encourage veterinary marine science institutions to cooperate got less attention. The NFF lacked strength in their negotiations with the Government and lost its ability to influence the new regulation policy that opened up for commercial interests external to the typical fisheries and costal industries. FOS was dissolved and its support to the Frisk Fisk project ceased. The Norwegian Council of Fishery Research (NFFR) took over responsibility and the Frisk Fisk project changed from being collaborative project between the industry and the research councils, to being a Research Council programme (Møller, 1995, p. 12). The direct involvement of the fish farming industry was weakening by FOS's bankruptcy.

3.1.10 The Norwegian Fish farming industry – interests, resources and strategies

Until the 1970s, Norwegian fish farmers were individual actors with few resources, and only had contact with researchers on an individual basis. There was no common strategy regarding the type of knowledge-based occupations they wanted to engage with. From the 1970s onwards, the fish farmers established user organizations and its own sales organization (FOS), with delegated authority to deal with first sales of salmon and trout. Through FOS, the fish farmers gained an independent role and were in a good position to negotiate with the state (Shaw and Gabbot, 1990). The production of salmon expanded successfully and FOS gained increased income from the sales revenues, which could be invested in handling issues concerning fish farming, such as fish health. Between the 1980s and 1990s the industry was concerned with disease problems and took an active role in putting pressure on research institutions to cooperate and also welcomed the initiative to establish education in fish health.

In the early 1990s fish farmers faced severe market problems and their sales organization (FOS) was dissolved. Thereafter, together with other exporters, they established a new interest organization. From 1991 to 1993 the fish farmers association suffered economic problems and had to find new ways to secure income for the organization; a new revenue-based table for service fees and membership dues proved to be the solution. For the most part, the industry had control over the problems with the disease furunculosis and ILA, and also in 1994 the losses caused by diseases was minimal (Tande, T. 2000). Table 3 gives an overview of the variations in the users' resources over a 40-year period, during which the industry's production grew from 500 tonnes in 1970 to 64,5387 tonnes in 2005.

Through the use of a five-actor model inspired by Burrage et al.'s (1990) actor model, I have described features of the users of professional services and identified interests, resources, and strategies over a period of time that directly or indirectly are considered to have influenced the professionalization and division of work in the field of Norwegian fish health work. The change from individual actors to organized actors led to a change in allies from individuals to institutional levels and FOS (the fish farmers' sales organisation),thereby giving them a unique position towards the state but also possibility for income that would enable them to finance research projects in fish health (such as the Frisk Fisk project). Since their establishment, the NFF and FOS have been important consultant parties for the state. However, although Norwegian fish farmers were active in influencing the fish health field,

they did not favour any of the scientists. It was not until the 1980s, that the users became the most active actors in the field. In the 1980s, the NFF and FOS took the initiative to persuade veterinary scientists and marine scientists to cooperate in order to combat the massive disease problems caused by 'Hitra disease' and furunculosis. The users criticized the veterinary authorities for not organizing a veterinary service that could handle the fast expanding industry. Hence, when the universities established courses in fish health they were supported by the NFF and FOS.

Table 3 Norwegian fish farmers: type of users and their interests, resources and strategies over time that directly or indirectly influences the division of work in the fish health field.

	1960-1970	1970-1980	1980 -1990	1990-2005
Type of users	Small family owned companies dominates, a few large companies	→	→	Change in ownerstructure; moves towards heterogeneous owner structure consisting of both small scale and large scale. From 2000 onwards large-scale owners dominates the industry.
Associations	Individual pioneers, no common identity	NFF and FOS established. Strong position towards the state. Dominated by small scale farmers dominates		Reorganisation. Bankruptcy of FOS. NFF lost influence on the new regulation policy. Commercial interest external to typical fisheries and costal industries gains easier access to the industry. 1994: NFF joins the Norwegian Seafood Federation and becomes FHL Aquaculture.
Resources (economy)	Fish farm low economical profitability	Growing economic success	Expanding industry. But 1986 the first serious price reduction. 1989 price-reduction and fish disease problems.	Expanding industry 1991 -1992: decline In 1993 production but production started to rise In 1995 the

				industry's profitability sank due to overproduction. Vaccines and better locations had improved production costs.
Disease problems	Few	Few, but growing concern	Serious diseases problems Early 1980s: 'Hitra disease', and late 1980s furunculosis and ILA	Serious disease problems first part of the period. Continuing growth
Strategies: With whom do fish farmers ally? How do they ally?	Contact with individual researcher Urge the need for research coordination between fields of discipline from the agriculture, fishery and industry	One main goal for the new Fish Farmers organization was to work for more governmental involvement in the State veterinary service. Contact with state institutions , through formal representation	Active influencing political discourses Cooperate with actors from both veterinary and marine science institutions. Funding research projects on fish diseases (Demanding cooperation between researcher from veterinary and marine science institutions. Supports an fish health education Involves directly in the knowledge dispute between veterinary scientists and marine scientists- ('Hitradisease')	Weakened contact with the state Large multinational companies leaves NFF (i.e.Mowi and Sea Farm) Marketing and sales issues given priority. Less focus on fish health knowledge development.

3.2 The case of Scotland

The Scottish salmon and trout farming industry has a short history of c.30 years. However, it was first in the 1830 that Atlantic salmon eggs were fertilized and raised in hatchery tanks. The import of the rainbow trout to Scotland in the 1890s gave further stimulus to the development of a farming industry. However, the pace slackened in the early half of the 1900s until the veritable explosion of interest in the mid-1960s (House of Commons Agriculture Committee, 1990b); *Scottish Farming Leader*, 1978, August, p. 50). Inspired by Norwegian success at rearing salmon and trout in seawater, it was realized that the numerous sea lochs on the west coast of Scotland had considerable advantages for salmon farming. Several firms developed experimental cage farm facilities in the lochs in the 1970s, and following their immediate success most of the favourable sea loch sites was utilized (Maitland, 1986). Today, active salmon production sites are is concentrated on the west coast and on the Western Isles, Orkney Islands, and Shetland Islands (Figure 6).

Although the Scottish salmon industry is not as large as the Norwegian industry, its growth has increased rapidly. In 1980 the annual production of Scottish salmon was 600 tonnes, in 1986 it was 10.337 tonnes, in 2000 it was 128,959 tonnes, and in 2007 it was 129,930 tonnes (Table 4). The production levels fell during the period 2003–2005, but in 2006 there was a small increase. In 2010 the production increased to 154,164 tonnes (Seafood International, 1989, p. 23; Fisheries Research Services, 2004; 2007; 2010).

Table 4 Annual production of Scottish salmon tonnes(1986-2010)[41]

Year	Tonnes	Year	Tonnes
1986	10,337	1998	110,784
1987	12,721	1999	126,686
1988	17,951	2000	128,959
1989	28,553	2001	138,519
1990	32,351	2002	144,589
1991	40,593	2003	169,736
1992	36,101	2004	158,099
1993	48,691	2005	129,588
1994	64,066	2006	131,847
1995	70,060	2007	129,930
1996	83,121	2008	128,606
1997	99,197	2009	144,247
		2010	154,164
1996	83,121	2008	128,606
1997	99,197	2009	144,247
		2010	154,164

Source: Annual Production Survey (1999; 2010)

[41] Scottish fish farm annual production survey does not include first hand value of salmon.

Figure 6 **The distribution of active salmon production sites in Scotland, 2010 (*Source:* Fisheries Research Services, 2010)**

Marine Harvest Ltd, a subsidiary of Unilever established in 1965, played a critical role in the Scottish salmon farming industry. Since then, a few multinationals have dominated the salmon grow-out industry (Alteren, 2000, p. 12). In the early 1990s, the three largest firms accounted for over 50% of the output. There are also many small companies producing less than 200 tonnes per annum (Marine Harvest produced over 10,000 tonnes per annum) (Shaw, n.d.).

In 2003 the industry was highly concentrated, with almost half of the output coming from foreign-owned firms, and 15 companies are accounting for 70% of Scottish production.

The trend towards greater concentration had mainly arisen through increased merger activity (Scottish Executive, 2003).[42]

Although in the 1960s Scotland had large companies with access to knowledge experts and research, the fish farming industry did not manage to replicate the Norwegian industry's successful development in the 1960s and 1970s, and instead fell behind. It was not until the late 1970s, when most of the initial technical and husbandry problems had been solved, that other companies were encouraged to invest in the industry (van der Schans, 1996).

3.2.1 The role of the Crown Estate Commissioners (CEC) in development of the Scottish fish farming industry

Similar to the Norwegian fish farming industry, the Scottish industry had to find its place or develop a new space within the existing institutional arrangements. In 1991, an official expert adviser in fish farming stated the following about the industry's development: 'It was a new opportunity that opened up and it grew in its own space ... it has not really affected or been affected by other industries' (D. Gerves, Highland and Islands Enterprise, interview, 1991).

Although the industry grew within its own space, some institutional arrangements and structures affected interrelations between actors involved in the industry and the fish health field. The regulations governing the salmon farming industry in Scotland differ from those in Norway, and this difference is partly explained by the role of the Crown Estate, as owner of most of the seabed around the coastline of Scotland. Unlike in Norway, the Scottish Government was not involved in the regulation of the ownership structure, and therefore the main role of the Department of Agriculture and Fisheries for Scotland (DAFS) was to register leases for disease control purposes, in accordance with the Diseases of Fish Act of 1937 (83). DAFS's responsibility in the fish farming industry was the fish health field; this was in contrast to the Norwegian Ministry of Fisheries, which was heavily involved in regulating fish farming but not in fish health. In Norway, the Ministry of Agriculture's Veterinary Division (Veterinæravdelingen) had responsibility for fish diseases under the Diseases of Fish Act of 1968. Thus, the Scottish Government's lack of involvement in other areas than the fish health

[42] In 1996 foreign-owned companies produced 47% of profits from salmon farming in Scotland. In 2000, approximately two-thirds of the Scottish salmon farms were owned by foreign companies and Norwegian actors owned c.50% of these companies (Liabø et al., 2007, p. 53).

field and the role of the Crown Estate in leasing seabeds influenced the development of the industry.

In 1980s, the industry faced major problems related to diseases due to furunculosis and parasitic infestations by lice. It is estimated that the two diseases accounted for approximately 40% of the losses from smolt transfer to harvest (Heen et al. 1993).

The role of the Crown Estate, headed by the Crown Estate Commissioners (CEC), in the leasing of seabeds was a matter of concern for fish farmers in the 1970s and 1980s, The large companies seemed to be more satisfied with the CEC than the small fish farmers, many of the individually owned farms. The Crown Estate manages all property in the UK owned by the Crown, other than the private property of the Queen. Its involvement in fish farming is due to the fact that the CEC manages the territorial seabed around the UK and most of the foreshore area between high- and low-water mark. Anyone wishing to attach a farm cage to the seabed must obtain a lease from the CEC. Although fish farmers have to deal with many authorities, agencies, and interest groups[43] in order to obtain and operate a lease, the CEC has played an important role in the development of the fish farming industry and in the overall planning of the industry. The CEC states in its development strategy and area guidelines that the present control system operated by the Crown Estate and other authorities aims at an appropriate balance between development and conservation (Crown Estate, 1989a). Contrary to the assumption that Scottish salmon farming has been dominated by large-scale companies from the start: The CEC states that in 1989[44] over 80% of their leases were held by small, local companies, partnerships, or individuals, and that a comparatively small number were held by large national and foreign firms, although the latter may account for a higher proportion of total production (Crown Estate, 1989 a), p. 14).

The role of the CEC was subject to a lot of criticism in the 1980s. Although it profited from the industry through the leasing of seabeds, it did not give anything in return. A House of Commons Agriculture Committee report on fish farming was very critical of the role of the CEC:

[43] Controlling authorities in 1989 were the Crown Estate, Department of Transport, regional and district councils, river purification boards, Department of Agriculture and Fisheries for Scotland, Highlands & Islands Development Board, advisory agencies, the Health & Safety Executive, Nature Conservancy Council, Countryside Commission for Scotland, Fishermen's Association, Royal Yachting Association, Scottish Salmon Growers' Association, Association of Scottish Shellfish Growers, and the National Farmers Union of Scotland (Crown Estate, 1989b).

> That a single landlord should be able in a de fact position to control the development of marine farming is obviously controversial. Most of our witnesses clearly felt that the CEC is an inappropriate body to be acting as a planning authority. Its neutrality, accountability and competence have been questioned: we recognize the strength of feeling behind these criticisms. Support for the CEC has come from larger producer interests, who consider the Commissioners have acted positively and encouraged the development of the Industry. (House of Commons, 1990a, p. xii)

The CEC had a profit of GBP 373,000 from the industry in the period 1989–1990, and the House of Commons Agriculture Committee quotes a witness who asked: 'How can the Commissioners be regarded as independent arbiters if they have a commercial interest in the outcome of their decisions?' (House of Commons, 1990a, p. xiii).

Considerable concern was voiced to the Agriculture Committee about the suitability of CEC to hold a development control function in the fish farming industry. This concern had come from government agencies, planning authorities, environmental and other affected interests, and the fish farming industry itself. Regarding the revenue that the CEC received from fish farming, one witness stated:

> [A]t the same time, the Crown enjoys a monopoly and there are no alternative suppliers. Most larger fish farmers can afford rents the Crown Estate levies, but those operating at the margin, notably shellfish producers resent the imposing of such charges. (House of Commons, 1990a, p. xiii)

Unlike Norway, which in the 1970s developed a governmental fish farming policy that regulated the number of licenses and the ownership structure, Scotland did not have an overall fish farming policy and the CEC, as landlord, controlled the leasing of seabeds. The CEC do not need to cooperate closely with other governmental bodies. The charges that the CEC demands in the 1970s was similar to those a landowner would charge a farmer for the use of agricultural land.

Van der Schans (1996) discusses the development of the marine salmon farming industry in coastal waters around Scotland and points to the fact that the production of salmon increased from 600 tons in 1980 to 40,000 tons in 1991. The production was based at 365 sites distributed widely along the coasts of Strathclyde, in the Highlands, and in the Hebrides, Orkney and Shetland Islands. According to van der Schans, Scotland has introduced a

comprehensive system of planning,[45] but the planning control does not extend beyond the low-water mark, which is managed by the Crown Estate (van der Schans, 1996, p. 144). The CEC has no formal responsibility for the planning of fish farming. According to van der Schans, the Scottish and UK Government departments responsible for Scottish affairs encouraged the CEC to take on a voluntary planning role in marine fish farming. Under pressure from fish farmers, local planning authorities and voluntary bodies concerned with wildlife, the CEC took on more responsibility in the 1990s.

The CEC's rental income and the consequences of the CEC's lack of planning in their role as leasers of seabeds were highly debated in the 1980s. In December 1986, the CEC announced a six-month moratorium on seabed rentals to allow more time for discussion. The new rental imposed by the Commissioners was due to come into force on 1 January 1987, but there was resistance to the proposal from farming interests and local authorities. Marshall Halliday, convenor of the Scottish National Farmers Union's (NFU) fish farming committee responded as follows:

> There is a real need for more time to resolve a number of outstanding details of the rent package and the relationship between the Crown Estate Commissioners as landlords and marine fish farmers as their tenants. (*West Highland Free Press*, 1986, 26 December)

When the NFU, a strong representative body recognized by government, used the word tenants it indicates the temperature in the debate regarding the role of the CEC in the fish farming industry. The CEC had been criticized for collecting rents from local fish farmers in Scotland without plans to plough the money back into the local area. Highland and Regional Councillor Michael Foxley attacked the CEC for spending millions on a project in London when no cash was making its way back to the Highlands in forms of roads and piers (*Obay Times*, 1986, 26 December). Scottish Crofters Union president Frank Rennie said,

> We are looking for a limitation of fish farming units which will favour local people and restrict the big boys coming in. You are getting people coming from Norway and Finland with bags of cash because government restrictions in their own countries limit the scale of their operations. (*West Highland Free Press*, 1986, 26 December)

[45] 'Under the Town and Country Planning (Scotland) Act 1972, local planning authorities are responsible for drawing up development plans that help in deciding whether to permit proposals to go ahead.' (van der Schans, 1996, p. 145)

The *West Highland Free Press* cites Ted Needham, a fish farmer and leading authority on Scottish fish farming, who wrote the following in an issue of the magazine *Fish Farmer*:

> [T]hat he was surprised at first by 'the equanimity with which the Crown Estate deal in fish farming rentals had been accepted in some quarters' – among the big companies. The penny has now dropped, writes Dr. Needham, 'I deduce that in exchange for rental payments that may exceed £1000,000 per annum for the larger companies, they are being offered protection against incomers. Once in a site, they and they alone will be able to exploit a whole sea loch to its full potential. Small and local interests will not stand a chance'. ... after repeated telephone calls and solicitors' letters, he learned that 'the Crown Estate had decided, because of the risk of water-borne disease that Loch Nevis, a huge sea loch of over 10 miles in length, should only be let to one interest.' Dr. Needham claims the Crown Estate office admitted they had made the decision without consulting any of the experts at DASFS, the University of Stirling or Scottish Marine Biological Association … He surmises that hey 'have been persuaded to adopt the one-loch, one-company principle as part of the deal involving the outrageous rental settlement. (*West Highland Free Press*, 1987, 16 January)

The CEC met with severe criticism from local authorities, environmental interests, fishers, and fish farming organizations regarding 'their exclusive right to decide what developments requiring access to sea-bed can and cannot take place' (*West Highland Free Press*, 1992, 22 May) and the amount of rent that fish farmers had to pay.

The role of the CEC was different on Shetland. Salmon farming developed later in Shetland than on the Scottish mainland. In 1982, a Norwegian company overcame the lack of freshwater streams to support hatcheries by using a well boat, and through the use of the technology smolt could be imported from the Scottish mainland. This development marked the start of a successful salmon farming industry in Shetland. The coastal waters were regulated under the Zetland Country Council Act of 1974 (Zetland Country Council Act of 1974), not by the CEC. The 1974 Act gave the Shetland Islands Council (SIC) unique power to regulate developments in its coastal waters. Anyone wishing to undertake offshore developments had to obtain a Works Licence from SIC. SIC took the opportunity to establish an industry that is locally owned, and in the 1990s the ownership of many salmon farms in Shetland was shared by local people (van der Schans, 1996). Shetland salmon farmers have closer connections to fishermen's and fish producer's associations than farmers on the

Scottish mainland, and this may explain why they have established their own association. More recently, however, Shetland has followed the national trend of large multinational companies buying up small ones. In spring 2011, over 90% of the industry on Shetland was in the hands of foreign operators (Robertson, J. 2011).

It is also worth mentioning that in Scotland there were early controversies regarding wildlife and countryside conservation. In 1987 the Scottish Wildlife and Countryside Link was formed in order to counterbalance the rapid expansion of the industry (van der Schans, 1996, p. 158); among important issues was the role the CEC in leasing seabeds in vulnerable sea lochs. Unlike Scotland, the Norwegian Government has been active in the process of establishing a planning and regulation system. Although the ownership structure in Scotland has not been an issue for the government, there were advocates that considered that the CEC's role in leasing seabeds favoured the large companies.

3.2.2 Ownership structure: large companies' role in the development of the Scottish salmon farming industry

In early 1970s there was little cooperation between fish farms in Scotland, but as the industry developed more companies were formed and they often engaged individuals that had gained experience as employees of the pioneers (*West Highland Free Press*, 1987, 20 February). One of the pioneers was the multinational company Marine Harvest, founded in Lochailort by Unilever in 1965; this followed Unilever's development of farming methods at a research facility there. In the mid-1960s Marine Harvest invested 'considerably sums trying to overcome problems of nutrition, breeding, disease and equipment design' (van der Schans, 1996, p. 144). Further, as already mentioned earlier in this Chapter (see Section 3.1.2), Unilever was in contact with the Vik brothers, and in exchange for knowledge they provided financial help to the brothers. According to Berge (2002), there were plans to create a new company in partnership with the brothers Vik (who owned Nor-laks) and Unilever.

Unilever may have been willing to get a majority stake in that company. Moreover, the brothers were in need of risk capital. The brothers received the capital and Unilever acquired the knowledge they were after, but nothing came of the acquisition. In other words, industrial interests were represented among the pioneers in Scotland (Berge, 2002). According to Berge (1992), there is good evidence that, despite some small farms, the Scottish fish farming industry was from the beginning largely driven by large companies, whereas in Norway the

industry was driven by single entrepreneurs and private persons. Scottish salmon production was from outset dominated by capital and ownership outside communities and regions (Berge, 2002) (Table 5).

Table 5 Number of companies and sites engaged in Scottish salmon production, 2000–2010

Year	Number of companies			Number of sites		
	Producing	Non-producing	Total	Producing	Non-producing	Total
2000	68	22	90	163	183	346
2001	81	6	87	238	82	320
2002	73	11	84	197	131	328
2003	63	18	81	201	125	326
2004	57	12	69	193	122	315
2005	40	10	50	166	112	278
2006	32	12	44	157	95	252
2007	28	10	38	158	89	247
2008	26	9	35	139	118	257
2009	25	6	31	104	150	254
2010	20	10	30	140	109	249

Source: Fisheries Research Services (2010)

According to Liabø et al. (2007, p. 106), in 2006 the Scottish salmon farming's ownership profile was divided into the following categories:

- Stock exchange 85%
- Industrial diversified 10%
- Undiversified 5%

The type of Scottish ownership in 2006 was very different from Norwegian ownership, where 45% of the companies was listed on the stock exchange. In addition, Norwegian companies were strongly represented through Cermaq[46] and the Marine Harvest group. In 2006, there were 32 companies operating in Scotland and 226 companies in Norway. In 2010 there were 20 companies producing in Scotland (and 10 non-producing companies) and 171 in Norway (Table 5 and 6). Clearly, there was a tendency for large companies taking over in both countries.

Table 6 Number of Scottish salmon farm sites shown in relation to their production grouping and percentage share of production, 1995–2004

Production grouping (tonnes)	0	1–50	51–100	101–200	201-500	501–1000	> 1000	Total Sites	Total Tonnes
1995	162	24	23	37	68	32	13	359	70,060
1996	125	20	28	49	66	25	21	334	83,121
1997	120	21	22	41	63	43	28	338	99,197
1998	130	32	16	31	66	39	29	343	110,784[47]

[46] 'Cermaq has operations in Chile, Canada, Scotland, Vietnam and Norway. The company is listed on the Oslo Stock Exchange (OSE), Norway, and the head office is located in Oslo. Fish farming and fish feed production are the major business areas' (Cermaq, n.d)

[47] For the year 1998, the total tonnage was 11,784 in the production survey for 2004 and 110,784 in the production survey for 1999. Compared with other years, it is assumed that 110,784 is the correct total.

1999	158	21	17	21	53	42	39	351	126,686
2000	183	8	20	15	40	40	40	346	128.959
2001	148	9	4	28	41	39	51	320	138,519
2002	131	10	10	25	50	51	51	328	144,589
2003	125	6	14	13	53	45	70	326	169,736
2004	122	10	7	25	41	55	55	315	158,099

Source: Scottish Fish Farms Annual Production Survey (1999; 2004; 2005)

In the period 2008–2010 overall production was dominated by nine companies, which again underlines the dominance of large companies in Scotland. The dominance is explained by the licensing system in Scotland, as there have not been any restrictions on farm size or multiple ownerships of farms. Although small companies existed from the outset, their percentage of the total production has been small and is decreasing.

3.2.3. National Farmers Union (NFU) Fish Farming Committee, Scottish Salmon Growers Association (SSGA), and Shetland Salmon Farmers Association

In common with Norway, there have been several reorganizations of the users' organizations in Scotland and Shetland. The Scottish Fish Farming Association (SFFA) was formed in 1971. In 1976, the National Farmers Union Scotland (NFUS)[48] included fish farming one of its special interests. A 'six-man report' on the structure and reorganization of the NFUS, proposed in 1976 that by including fish farmers it should be possible to combine the interests of fish farmers and the Union. In addition, the NFUS recognized that the inclusion could be of interest to substantial numbers of their existing members, many of whom had ideal natural conditions on their holdings. A further argument was that fish farming was considered a form

[48] The National Farmers Union Scotland (NFUS) was formed in 1913 and represented farmers, crofters, growers, and other supporters in Scottish agriculture.

of production from natural resources and closely parallel to traditional farming and likely to grow in importance in the years ahead (*Scottish Farming Leader*, 1976, November).

In 1977 the SFFA decided to seek formal affiliation with the NFUS. The SSFA was short of funds and had received promises from the Highlands and Islands Development Board for GBP 7500 over the next three years to cover the costs to the NFUS serving a fish farming section the first years. The SSFA's aim was that by the end of the three-year period they would be able to become a fully self-financing part of the NFUS. The union agreed to act as the secretariat for the fish farmers and for the Scottish Trout and Salmon Farmers Co-operative starting from 1 April 1977. In 1977 the SFFA had 31 of c.71 fish farming interests as members and hoped to include everyone due to its affiliation with the NFUS. An executive committee was set up from the existing 31 members, with E. Needham as the chairperson. According to the *Scottish Farming Leader*, over the years the SFFA had great difficulty achieving Government recognition and the kind of relationship with Departments that NFUS had enjoyed (*Scottish Farming Leader*, 1977, April, p. 36).

In 1982, the Scottish Salmon Growers Association (SSGA) was established as one of two main bodies representing Scottish salmon farmers in the 1980s. The SSGAthrough their affiliation with the NFUS and the Shetland Salmon Farmers Association (SSFA)(formed in 1985) were the two main bodies representing Scottish salmon farmers in the 1980s. The SSGA represented salmon farmers from mainland Scotland, the Orkney Islands, the Western Isles, and also Shetland up until 1985.

All of the SSGA's activities were funded by a levy on the bought smolt. In 1982, 61% of farmers were members, and in 1989, 78% were members. At first, the association was run voluntarily by salmon farmers (Shaw and Gabbot, 1990, p. 115) with the help of NFUS, but 1988 the SSGA established an office in Perth and employed professionals to work for them.

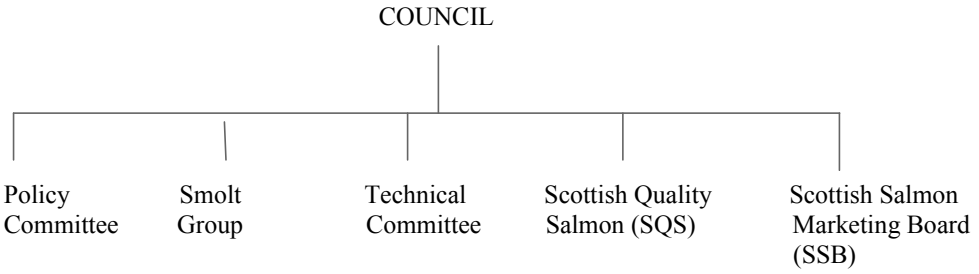
When the SSGA was formed in 1982, the Shetland salmon farmers were members, but in 1985 they broke away and formed their own association, the Shetland Salmon Farmers' Association (SSFA) (Shaw and Gabbot, 1990, p. 116). In 1988 the Scottish Salmon Board was established in an attempt to bring the two organizations back together for the purposes of consumer promotion. The Shetland Farmers Association retained the right to carry out its own trade promotion activities but in 1989 it withdrew completely from the Board (Shaw and Gabbot, 1990, p. 116). According to Shaw, there are many reasons behind the Shetland salmon farmers' desire to have a separate identity:

> The first is cultural in that the Shetland Islands have a strong sense of cohesion and do not readily identify with the mainland of Scotland. The second is that the development of the Shetland industry is much more closely linked with the Shetland fishing industry, of which many farmers were either former members or with which they have strong business links. Finally, they believe they can create a separate identity at trade level which will enable them to obtain premium prices for their salmon. (Shaw and Gabbot, 1990, p. 121)

Also, the Shetland Islands Council's (SIC) regulating role made it possible to have a local policy on ownership structure and many fish farms were owned by locals with close connections to fisheries. To verify connection, the Shetland Farmers Association was renamed Shetland Aquaculture in the autumn of 2005. Members agreed that they would like their association to adopt an identity that reflected the range of different farmed fish being produced in Shetland and to encompass all aspects of the industry, including feed companies, hatcheries, and sales companies.

In 1990 the SSGA had over 10 members, ranging from small one-person salmon farming businesses to large public companies. In an information brochure to recruit new members (Scottish Salmon Growers Association Ltd, n.d.),[49] the SGGA clearly considered themselves as the united voice of the Scottish Salmon Farming industry. Their aim was to take action on behalf of their members to defend and promote their interests. The main thrust of representation occurred with the government, the EEC, public authorities, Crown Estates, statutory organizations, conservation bodies, the general public, and media. The SGGA was grouped into several committees and companies, each charged with specific functions.

Figure 7 The Scottish Salmon Growers Association – organizational structure



[49] The undated brochure was published either in 1990or 1991.

The SSGA's Policy Committee acts in a formative way when discussing and analysing broad issues relating to political, administrative, and commercial subjects that are not covered by the Scottish Salmon Marketing Board (SSB) or Scottish Quality Salmon (SQS). The SSB is recognized by the Highland and Islands Development Board (HIDB), as the industry's promotional body and receives supportive funding each year. In 1986 the SSGA, Food from Britain, and the Scottish Development Agency announced an inspection scheme operated by the SQS to maintain the quality of Scottish salmon (*Eurofish Report*, 1986, March). The Technical Committee has a wide remit, and is divided into the following subgroups: Environment and Conservation, Health and Husbandry, Quality, and Freshwater and Training. A wide range of concerns are addressed and projects funded through the Technical Committee. Much of the emphasis in the late 1980s was on disease constraints, but environmental issues and training were also addressed (Scottish Salmon Growers Association Ltd, n.d.).

In 1990, the Technical Committee provided GBP 270,733 in funding to research projects which were grouped under the following subjects: fish health (35%), sea lice (31.3%), husbandry (12,5%), the environment (19%), and others (2.2%) (Scottish Salmon Growers Association,1990). In the late 1990s the SSGA started to consider the possibility of affiliating with the NFUS. The SGGA and NFUS had not managed to reach an agreement on the political representation of the industry. The NFUS had a sole voice and represented all three fish farming sectors in Scotland (salmon, trout, and shellfish) in political matters specifically concerning salmon (*Eurofish Report*, 1989, 2 March). In January 1990 an agreement was reached whereby the Scottish NFU would represent the political aims of the Scotland salmon growers. There was also to be regular liaison between the chief executive of the SSGA and the chief executive of the Scottish NFU (*Press & Journal*, 1990, 9 February).

In January 2006 the Scottish salmon industry interests were integrated into a new national representative body, the enhanced Scottish Salmon Producers Organisation (SSPO). The SSPO, with the producers of 95% of the tonnage of Scottish salmon production (including Shetland salmon farmers) among its membership, represents the industry in political, regulatory, and technical issues in Scotland, the UK, EU, and internationally (Scottish Salmon Producers Organisation, 2012).

The SSGA had power as an interest group, but did not have the same independency as the Norwegian fish farmers had up until 1991 through their monopoly on first sale (FOS) and receipt of sales revenues that they could use on research projects. The SSGA had to influence decision-making processes by giving advice, acting as a pressure group, and using the voice

of the NFU in political representations. Similar to the Norwegian Fish Farmers Association, the SSGA funded research projects on diseases, but due to a smaller industry in Scotland than in Norway the association spent comparatively less. In 1990 the SSGA spent GBP 270,733 on research projects. The SSPO continues to participate in and support a wide range of on-going research activities in the fish health field in collaboration with academic institutions, industry, and regulators (Scottish Salmon Producers Organisation, 2012).

3.2.4 The SSGA's desire for more governmental involvement in fish disease research

James Buchanan, Technical Director of the SSGA, said in an interview in 1990 that the SSGA funded a variety of research projects (James Buchanan, interview, 1 April 1990). Some of the research institutions that he mentioned are the Institute of Aquaculture in Stirling, the Marine Laboratory (Aberdeen), the Tory Marine laboratory in Aberdeen, Glasgow University, Herriot Watt University, and Aberdeen University (James Buchanan, interview, 1 April 1990). The only institution that involved veterinary research was the Institute of Aquaculture, but the institute also included other scientists (biologists and immunologists) in its research team. In 1990 the industry needed vaccines and Buchanan said that in 1990 the SGGA's two most important projects were the development of vaccines for furunculosis and a vaccine for sea lice, and in this regard the association was cooperating with both the Department of Agriculture and Fisheries for Scotland (DAFS) and the Institute of Aquaculture (James Buchanan, interview, 1 April 1990).

James Buchanan also said that in order to accelerate the progress in vaccine development there was a need to engage commercial companies in vaccine production and to persuade academics to share their knowledge with commercial representatives. According to Buchanan, the difference between the number of scientists involved in fish disease research in Scotland and Norway was striking: 'Maybe, we should go to Norway in April and see how their Frisk Fisk project is going on. I mean, you have 200 full-time scientists working on fish-health. We have 20, no less' (James Buchanan, interview, 1 April 1990).

In an interview in 1991, also William Crowe, Chief Executive of the SSGA, commented on the difference between Norway and the UK regarding funding for research and the lack of governmental funding:

> [O]ur demand for money that's going into research and development in Britain is, compared with Norway, very, very small. I mean, we – our Government – were criticized by the House of Commons Committee last year, that looked at this and said that Norway was putting more or less five times the amount of money into research and development in Norway through government research stations than we were getting here. (William Crowe, interview 15 January 1991)

During interviews with Buchanan (1 April 1990) and William Crowe (interview 15 January 1991 and 26 March 1993), neither of the interviewees expressed any dissatisfaction with the Marine Laboratory's role in the fish health service. On the contrary, they were very clear that both veterinarians and scientists were needed in order to face the challenges that the industry met in the fish disease field. It was not the fish health service that was the SSGA's concern, but rather fish disease research funding for knowledge development. William Crowe expressed his opinion very clearly and made visible the industry's need for more governmental involvement in research:

> Well we have found some [expertise] in Aberdeen, some at Glasgow University, Nottingham University, Portsmouth ... we've had to go all over to find the immunologists or the biochemists who have been able to identify things like antigens or whatever is the protein causing the problem in furunculosis. You know, let's go back and identify it again. So you don't go to vets for that, you end up going back to the professional scientists wherever they are, whichever university they are in … and they tend to be in universities, although we have our own government laboratory here. (William Crowe, interview 15 January 1991)

However, the SSGA had concerns about the lack of contact between the government institutions responsible for agriculture and for fisheries representing the UK in Brussels. In Brussels, marketing issues are taken care of by the Fishery Directorate, whereas fish health issues are administered by the Agriculture Directorate (European Commission) William Crowe said:

> [S]o you get this mismatch again and I am prepared to say it's a separation here, because of the agriculture people talking to the Agriculture Directorate in Brussels about fish diseases and they don't necessary know anything about them, except where they have consulted the Marine Laboratory. (William Crowe, interview 15 January 1991)

Clearly, the SSGA was concerned about the fact that Scottish Government's use of expert occupations does not match with the EU's administration experts, namely veterinarians. Although in Scotland there has not been a great debate on whether aquaculture is agriculture or fishery, the Scottish industry is affected by other EU members' definition of what aquaculture is and what experts should be involved.

3.2.5 Summary: the case of Scotland

The Scottish salmon farming industry has been dominated by large companies from the start. The Scottish Government was not involved in regulating the owner structure, and the CEC's role in leasing seabeds has influenced both the structure of the industry and its knowledge development. The industry established its first user organization in 1971, but had no direct links with the government, and in 1976 the organization affiliated with the NFUS to secure political representation for fish farmers. The SSGA (formed in 1982) funded research on fish diseases and many of their projects involved financing research done by the Institute of Aquaculture. There seems to have been no direct public criticism of the fish disease legislation work done by the scientists at the Marine Laboratory in Aberdeen. Disease problems occurred in the late 1980s (furunculosis), but the Scottish fish farmers' main concern in the beginning of the 1990s was the Norwegian overproduction of salmon. In Scotland, the users of fish health expert services are mainly large companies, although also some small companies make use of the services. Table 7 gives an overview of types of users and their interests and strategies over a period of 45 years, which influenced their relationship with other actors in the fish health field.

Table 7 The Scottish fish farmer's types of users and their interests, resources and strategies over time towards knowledge-based occupations in the fish health field.

	1960-1970	1970-1980	1980 -1990	1990-2005
Type of users	A few large companies dominates the production Small companies has a low percentage of the production	→	Large companies dominates	Large companies dominates

Associations		1971 SFFA The first association for main Scotland and Shetland 1976 The NFUS's fish farming Committee established (SFFA affiliated with NFU)	1982 SSGA formed 1985 Shetland Farms Association formed 1990 NFU/SGGA agreement (NFU promotes and represent the political aims of the SGGA). The role of the CEC main issue	2006 Scottish Salmon Producers Organisation established SSPO represent the political aims of the Scotland Salmon growers
Resources	Large companies with own experts	Large companies with own experts Network to Norwegian knowledge through owner structure		
Disease problems	Few	Few	Furunculosis a severe problem in the latter part of the 1980s.	1998-199 outbreaks of Infectious salmon anaemia (ISA) Sea lice a severe problem
Strategies	Companies have **own experts**	Working for **political representation.** **Funds research**. Use experts from the Marine lab. Aberdeen and the Institute of Aquaculture.	SSGA funds research on fish health. Institute of Aquaculture dominates Large companies **hires their own fish veterinarians** educated at the University of Stirling	Supports research activities in collaboration with academic institutions, industry and regulators

CHAPTER 4: THE STATE AS ACTOR

In early theories of professions, the relationship between states and professions has been seen as a dualism, and state intervention and professional autonomy as antithetical concepts (T.L. Johnson, 1995). Studies from the second stage of the theory of professions represented a departure from this dualistic view. Inspired by Foucault's governmentality concept, T.L. Johnson (1995, p. 21) states that 'one cannot understand what is happening to the professions today if we frame our questions around the issues of autonomy and intervention'. Further, he states:

> The concept of the state that emerges from this discussion includes then, that multiplicity of regulatory mechanisms and instrumentalities that give effect to government. This state itself emerges out of a complex interplay of political activities including struggle for occupational jurisdiction … The professions, then, are involved in the constitution of the objects of politics, in the identification of new social problems, the construction of the means or instrumentalities for solving them, as well as in staffing the organisation created to cope with them. The professions become, in this view, socio-technical devices through which the means and even ends of government are articulated. (T. Johnson, 1995, p. 23)

One way to study empirically this interplay of political activities suggested by T.L. Johnson (1995) is to use Burrage et al.'s actor model that takes into consideration the interrelationships between actors. They see states as 'both regulators of professional life and instruments of professional advancement' (Burrage et al., 1990, p. 210). In line with this, Kuhlmann and Saks (2008a) claim that an approach to 'governance as different sets of practices and regulatory mechanisms ... provides the connecting link between changing policies and changing profession.' According to Kuhlmann and Saks (2008, p. 4), '[i]nternationally, new health policies generally aim to provide increased efficiency in the provision and delivery of services and greater responsiveness to user demands.' An effect of this is that the relationships (between state and professions, and between state and users) are becoming more open to change, As a consequence, new professional groups are emerging. In health care systems opportunity structures are shaped by national regulatory framework, and Kuhlmann and Saks (2008, p. 5) state that there 'may be significant national differences in policy impact on both the medical and other health professions.'

In this chapter, I move from the above theoretical considerations to the empirical field of fish health work. Burrage et al. (1990) identifies some of the different kind of state interests in the professions, but since many of their examples are from 1980s and earlier, the interests that they outline are vague and difficult to apply to a professionalization processes currently taking place. However, their important contribution is the way they regard states as actors and the way they focus on the interrelationships between actors. From this perspective it is necessary to study the relationships between states and other actors continuously and not just when certain events of significance occur. In order to find a starting point for my study, I focused on the processes relating to the enactment of the Norwegian and Scottish fish diseases acts, and hence I base my approach on a certain events. However, I aimed to (1) identify any state interests in the policy field, (2) explore how the state, viewed as an ensemble of institutions, has over time had different interests in professions and occupational groups in the field of fish health, (3) reveal why such interests may influence the professionalization of an occupational group, and (4) identify how such interests are formed by a particular national context.

The starting point for my study was the regulatory framework, and in this chapter I investigate various acts regulating the fish health field, with special focus on how governmental institutions have struggled for administrative responsibility for the fish health field

4.1 The case of Norway

The threat of imported infectious fish diseases led the Norwegian Government on 6 December 1968 to pass an act relating to measures to combat diseases in freshwater fish[50] (hereafter called the Diseases of Fish Act of 1968), as the first act regulating the fish farming industry. The act included freshwater fish, freshwater crayfish, and anadromus species.[51] Under the act, the Ministry of Agriculture (Landbruksdepartementet; as from 2004 the Ministry of Agriculture and Food, Landbruks- og matdepartementet) was given administrative responsibility for fish health policy. The 1968 regulation of the fish health field is thus the starting point of my account of the Norwegian state's role in the fish health work field.

[50] Lov av 6.des. 1968 om tiltak mot sjukdommer hos ferskvannsfisk.

[51] Anadromous fish are born in fresh water, migrate to the ocean to grow into adults, and then return to fresh water to spawn. Anadromous species include Atlantic salmon, rainbow trout, and sea trout.

However, in the 1960s it was not clear which Ministry should play the principal role in relation to the health of aquaculture animals, as no distinct fish health policy or fish farming policy existed at that time. In order to understand discourses on management responsibility, it is important to include the division between understandings fish farming as part of the fishing industry and as part of agriculture. The two main ministries involved in fish farming from the outset are the Ministry of Agriculture and the Ministry of Fisheries. Under the Diseases of Fish Act of 1968, the Veterinary Department (Veterinæravdelingen) of the Ministry of Agriculture was given responsibility for diseases in freshwater fish.

The fish health field has not been a main issue in the history of Norwegian regulation policy, and therefore neither fish disease legislation nor the role of expert occupations has been traced in detail in any analyses. Aarseth (1997) and Berge (2002) have analysed regulation policy relating to the aquaculture industry, but fish disease legislation is not significant in their analyses. However, Berge is aware that the aquaculture industry was regulated by the Diseases of Fish Act in 1968 and that the act connected veterinarians to the industry, but this is only mentioned in a footnote (Berge 2002, p. 95). In my view, in order to understand the aquaculture industry field, including regulation policies, it is necessary to include an analysis of fish disease legislation, jurisdictional disputes between professions, and the division of work in the fish health field.

The veterinary profession is considered a classical profession and a powerful interest group in the agriculture sector, and any study of agriculture should therefore consider veterinarians and agronomists as decisive actors in agriculture policy. For example, Jacobsen, D. (1964), in his analysis of the development of public agriculture administration, focuses on agronomists and how processes of professionalization developed parallel to the development of Norwegian public agriculture administration. According to Dahl Jacobsen, it was important to understand the agronomist profession's loyalty to farmers in order to understand the agriculture sector. Not only Dahl Jacobsen but also authors of later studies consider the relationship between the Ministry of Agriculture and the veterinary profession to be close historically (Asdal, 2005; Kjæmpenes, 1988). In the case of the fish health field, there were are close relations between marine scientists, fish health biologists, the Ministry of Fisheries, the Directorate of Fisheries, and the Institute of Marine Research (Kjæmpenes, 1988).

Today, the three most important ministries for Norwegian public fish health administration are the Ministry of Agriculture and Food (Landbruks- og matdepartementet), the Ministry of Fishery and Coastal Affairs (Fiskeri- og kystdepartementet), and the Ministry

of Environment (Miljøverndepartementet). In 2012, the ministries' responsibilities were as follows:

- **The Ministry of Fisheries and Coastal Affairs:** the fisheries industry, the aquaculture industry, seafood safety and fish health and welfare, harbours, infrastructure for sea transport, and emergency preparedness for pollution incidents (Fiskeridepartementet, n.d.).
- **Ministry of Agriculture and Food:** to provide consumers with wholesome, high-quality food products, and ensure that the food production process is carried out with environmental, public health and animal welfare concerns in mind. The Ministry of Agriculture shares responsibility with the Ministry of Fisheries and Coastal Affairs and the Ministry of Health and Social Affairs (Sosial- og helsedepartementet) (Landbruksdepartementet, n.d.).
- **The Ministry of Environment:** involved in fish health through its responsibility for wild anadromous fish, coastal zone management and pollution control, but not directly responsibility for fish health. Before the establishment of the Ministry of Environment in 1972, the Ministry of Agriculture and the underlying Directorate of Hunting, Game Preservation and Freshwater Fishing (Direktoratet for jakt, viltstell og ferskvannsfiske) was responsible for wild anadromous fish (NOU 1999:9).

4.1.1 The agriculture and fishery sector in Norway

The agriculture and fishery sectors, with differing historical traditions, have become involved in the new, expanding fish farming industry. Historically, the two sectors were strikingly different in terms of their economy and their political and societal roles in Norway.

Farmers had an important role in the nation-building that took place from the mid-19th century to the beginning of the 20th century, where national identity was linked to farmers. Politically, the farmers and farmers' movement played important roles as national icons that were used to evoke national spirit in Norwegians' attempts to free themselves from Danish rule and cultural hegemony (Gornitzka, 2003).

In terms of national policy, already before World War II, farmers' incomes were defined by Parliament (then Odelstinget) as a domain of public concern and included in the political agenda (Gornitzka, 2003). The institutionalization of the educational and research

structure was marked by the founding of the Agricultural University of Norway in 1859, which was purely an educational institution with close links to the fields of practice. Research was introduced as a primary function in the reorganization of 1897 of the Agricultural University (Gornitzka, 2003, p. 18). The mission of the Agricultural University was to serve farmers and public administration in the agriculture sector. From a historical perspective, the agriculture sector has been highly autonomous in Norway, and has more than a 100-year tradition for educating members of its own professions (e.g. agronomists and veterinarians). Many members have been employed in the civil service.

The year 1997 was a historical year for research and education within the agriculture sector because administrative responsibility for the Norwegian School of Veterinary Science (Norges Veterinærhøgskole, NVH) and the Norwegian Agriculture School (Norges Landbrukshøgskole) was transferred from the Ministry of Agriculture to the Ministry of Church Affairs, Education and Research (Kirke-, utdannings- og forskningsdepartementet (KUF): as from 2002-2006 Utdanning- og forskningsdepartementet). This transfer integrated the two research and educational institutions into the rest of the system of higher education in Norway. The event marked the end of a more than 100-year tradition, during which the Ministry of Agriculture had held administrative responsibility for educating the agriculture sector's professions.

By contrast, the fishery sector has been less organized, less politically significant, and has not had the same significance in Norwegian history as the agriculture sector (Wicken cited in Gornitzka, 2003). The sector has been influenced by premises from other sectors, and it has not had any long tradition of educating professions. Historically, fishery is a traditional export industry in Norway, and the currency policy gave in the 1950s-1960 premises for the fishery policy (Jacobsen, K. D. 1965). The fishery sector has had very little import protection, and few trade regulations central to policies in the post-war period compared to the agriculture sector (Gornitzka, 2003). Regarding research and education, higher education in fishery was first established in 1972 with courses at the University of Tromsø. However, marine research has a long tradition, dating back to the 19th century, but the education of a client-oriented profession was not attempted until 1972 (Gornitzka, 2003).

The aquaculture industry has many similarities to the fishery industry (Aarseth, 1997; Berge, 2002). Since no particular profession dominates the fishery sector in Norway, the study of the role of professions and knowledge experts has not been an issue for social science studies of the aquaculture industry. The disputes in the 1970s about whether aquaculture should be administrated by the Ministry of Fisheries or the Ministry of Agriculture were

finally settled with the Lysø Committee's report in 1977 (NOU 1977:39) (see 4.1.5) and the establishment of the Norwegian Fish Farmers Sales Organisation (FOS) in 1978, which connected aquaculture closer to the fishery sector.

However, the discourse on an institutional framework for public fish health administration was not settled. Disputes about fish disease legislation and responsibility for knowledge services were to continue for 20 more years. Although since 1968 the Ministry of Agriculture through its state veterinary service had main responsibility for questions concerning the preventative methods to control and eradicate diseases in freshwater fish and anadromous species, the wider field of diseases in marine species and sea mammals was not covered by any legislation. Hence, this was an open knowledge field for actors to become involved in.

4.1.2 Fish disease legislation in Norway

The control of fish diseases is a challenge for the aquaculture industry worldwide, and it is commonly known that countries with a developed fish health regime, research milieus, and fish health services have reduced a major risk factor. Despite close monitoring, fish diseases can never be eliminated, but knowledge about fish diseases and developed monitoring schedules may create an advantage in the market. In the 1960s, knowledge about fish farming and fish diseases was not a common knowledge field, but the Norwegian Government had to address the problems occurring as a result of the import of two serious fish diseases, namely furunculosis and Egtvedt Disease (viral haemorrhagic septicaemia VHS)[52].

4.1.3 The Diseases of Fish Act of 1968 (Fiskesjukdomslova av 1968)

In 1964 evidence was found that some fish diseases in pond farms probably were caused by imports of live fish and roe. The amount of imported roe was expanding fast: in the period 1950–1951 the number of imported roe was estimated to be c.1 million, and by the period 1965–1966 it was estimated at 15 million.

Fish biologists and representatives of pond fish farmers and veterinary institutions requested the Department of Agriculture to investigate how to prevent the spreading fish

[52] VHS, which is also known as Egtvedt Disease in Norway, is an infectious disease that causes major losses in farmed rainbow trout (Veterinærinstituttet, 2005).

diseases. In February 1967 an expert committee was set up by the Ministry of Agriculture in consultation with the Directorate for Hunting, Game Preservation and Freshwater Fishing (Direktorat for jakt, viltstell og ferskvannsfiske)[53] to investigate the following:

1. The practical and organizational structure, size, and distribution of the pond farming industry
2. The need for imports of live roe and how this need is met
3. Experience of disease problems
4. The risk of infection from one pond farm to another domestically
5. The risk of infection to wild stocks

(Ot.prp. nr. 41 (1967-68), pp. 1–2).[54]

The members of the expert committee were:

- Veterinary Inspector (Kontrollveterinær) Olav Hagen, from Kristiansand South.
- Scientific consultant Gunnar Holt, a veterinary surgeon from the National Veterinary Institute (NVI)
- Scientific consultant Tore Håstein, a veterinary surgeon from the NVI
- Scientific consultant Kjell W. Jensen (Cand. Real[55]), from the Directorate for Hunting, Game Preservation and Freshwater Fishing
- Fishery consultant Trygve Løkensgard (Cand. Real.), from the Ministry of Agriculture
- Head of Division (Avdelingsleder) Leiv Rossland (Cand. Real), from the Directorate for Hunting, Game Preservation and Freshwater Fishing.

[53] The Directorate for Hunting, Game Preservation and Freshwater Fishing was established in 1965 as a subordinate agency under the Ministry of Agriculture. In 1973 it was transferred to the Ministry of Environment. In 1974 its name was changed to the Directorate for Game and Freshwater Fish (Direktoratet for vilt og ferskvannsfisk), and in 1985 it was again changed to the Directorate for Nature Management (Miljøverndepartementet) (Miljøverndepartementet, n.d.).

[54] 1. *Damfisknæringens praktiske og organisasjonsmessige oppbygging, dens omfang og utbredelse*

2. Behovsanalyse for innførsel av levende rogn, herunder også hvordan importbehovet i dag blir dekket

3. Erfarte problemer av sjukdomsmessig art

4. Risikoen for smitte fra dambruk til dambruk innenlands

5. Risikoen for smitte av 'ville' fiskebestander. (Ot.prp. nr. 41 (1967-68), p. 2)

[55] A Cand Real degree corresponds to a Master of Science degree.

In addition, on request from the Ministry of Agriculture, Magnus O. Kleven represented Norwegian pond fish farmers. Veterinarians and biologists were represented in the committee and were employed by institutions affiliated to the Ministry of Agriculture. The committee recommended in its report produced in August 1967 that there was an immediate need for legislative action to prevent the import of dangerous fish diseases. It also recommended that several fish diseases should be notifiable, among them were furunculosis, vibriosis, and VHS, and reported to a veterinarian or the police. The committee found there was a need for a licensing system for the establishment of new freshwater fish farms in watercourses and that the Ministry of Agriculture should have the administrative responsibility for such licenses.

The Diseases of Fish Bill was read in Parliament (then Odelstinget) for the first time on 31 October 1968. The bill was introduced by Rolf Schjerven (Conservative), a member of the Agriculture Committee[56] and educated agronomist (*sivilagronom*), who said that the only point on which opinions differed was the proposal for a licensing system for the establishment of new fish farms in watercourses. Both the Directorate for Hunting, Game Preservation and Freshwater Fishing and the Norwegian Association of Hunters and Anglers (Norges Jeger- og Fiskerforbund, NJFF) had doubts about the proposal. However, the committee maintained that a licensing system was necessary and the Agriculture Committee followed its recommendation. In the first reading of the bill, Parliament followed the Agriculture Committee's recommendations without any debate, and the bill was passed for reading in the Lagting (one of two chambers of the Norwegian Parliament).

However, during the Diseases of Fish Bill's first reading in the Lagting,[57] several members of the chamber did not agree with the proposed licensing system set out in §7 of the bill. Trygve Owren (Conservative), whose was an agricultural farmer and fur farmer,[58] was of the opinion that since both the Directorate for Hunting, Game Preservation and Freshwater Fishing and the Norwegian Association of Hunters and Anglers had doubts about the proposal, it was unnecessary to connect licensing to fish disease control. He was also concerned worried about the delay that could be caused by the proposed licensing system. If the Ministry wanted to obtain a statement from a fish biologist or a fish pathologist before a license was granted, there would not be enough experts, and this would cause a delay. Accordingly, Trygve Owren proposed that the Lagting should not approve the proposal and

[56] The Agriculture Committee is a parliamentary committee.

[57] 7 November 1968

[58] Trygve Owren had received lower agricultural school education from Forvalteravdelingen (Vinterlandbruksskolen), 1937.

that §7 should be omitted. His proposal was supported by 22 votes, with 12 votes against. The bill was sent back for a second reading in Parliament, where §7 was changed. Under the revised bill it would still be forbidden to establish hatcheries in freshwater without permission from the Ministry and if a new fish farm were to be established it would have to be notified to the Ministry, but a license would not be necessary. The new proposal was approved with one vote against. In its second reading, the Lagting approved the bill.

There are no traces of disputes about administrative responsibility between the agriculture and fishery sectors in debates prior to the enactment of the new fish diseases act. For example, the Minister of Agriculture, Anstein Lyngstad, stated:

> I would say that on the Ministry's side there is no need to include Paragraph 7, because no one is interested in having any more administrative work than necessary under the Ministry's responsibility. What we have done in the Ministry is to follow the advice of appointed expert committee and also the advice we have received from outstanding biologists. It is they who are of the opinion that one should not have the right to operate and control the hatcheries unless one has had prior control in the establishment of them. (*Forhandlinger i Lagtinget* for 1968-1969, p. 9; my translation)[59]

It was §7 about the licensing system that was subject to debate, rather than the need for control of fish diseases. Moreover, there were no disputes about knowledge experts. The Ministry had just followed the advice of the expert committee and fish biologists, i.e. that there was a need for a licensing system to control the spread of fish diseases. There were no conflicts between interests regarding the responsibility for diseases in fresh water. However, it is noteworthy that all representatives on the committee were associated with the agriculture sector and therefore it was clear to them that responsibility for notifiable diseases in freshwater fish should come under the Ministry of Agriculture; at least, there was no debate about this question. The Diseases of Fish Act of 1968 was seen as closely related to the Animal Diseases Act of 1962 (Husdyrloven av 1962) as the Ministry could authorize veterinarians and others to inspect hatcheries and farms. Hence, with 1968 Act, the state veterinary service gained the right and responsibility to care for diseased freshwater fish.

[59] '*Men eg vil gjerne ha sagt at for departementet er det i og for seg ikkje noko om å gjere å ha §7, for ein er ikkje interessert i å få lagt meir enn nødvendig inn under departementets arbeidsområde. Det vi har gjort i departementet, er å følgje det sakkunnige utval som er nedsett, og også følgje dei råd vi har fått frå framståande biologar. Det er dei som meiner at ein ikkje får det riktige tak på dette arbeidet og kontroll med desse anlegga rundt om med mindre ein har ein slik etableringskontroll.*' (*Forhandlinger i Lagtinget* for 1968-1969, p. 10)

However, if the licensing system (§7) had been approved giving the Ministry of Agriculture administrative responsibility for licensing fish farms in freshwater, the Diseases of Fish Act could have given the Ministry an even stronger position in the coming debates on administrative responsibility for the fish farming industry.

As I show in chapter three, despite the absence of conflicting discourses associated with the enactment of the Diseases of Fish Act of 1968, the Act institutionalized a practice in the fish health field that influenced later discourses concerning fish health and the public administration of the fish farming industry in general. Under the first regulation of the act, farmed fish were related to animals and to the field of agriculture.

4.1.4 The Devik Committee

A few years after the enactment of the Diseases of Fish Act, in June 1970 the Norwegian Fish Farming Association (NFF) appointed the Devik Committee to consider the need for public involvement and organization initiatives in order to stimulate rational development of Norwegian pond fish farming.[60] The committee gave its report in November 1971. According to Berge (2002), central in the Devik Committee's proposal is the lack of coordination between involved public actors in the development of fish farming knowledge, and the committee urged the need for coordination concerning public advice and research:

> [W]ith regard to research tasks, pond fish farming is connected to several disciplines, especially those that today are the administrative responsibility of the Ministry of Agricultures and the Ministry of Fishery. In this situation, there is a need for public institutions that are able to coordinate the initiated efforts concerning research, guidance, and so forth. (Devikutvalget, cited in Berge 2002, p. 93; my translation)[61]

In the early 1970s three sectors, each with their own research traditions, were involved in the fish farming industry. The three industries' related research councils were the Royal

[60] 'Offentlige og organisasjonsmessige tiltak som bør settes i verk for å stimulere en rasjonell utbygging av norsk damfisknæring. Innstilling fra et utvalg oppnevnt av Norsk Fiskeoppdretteres Forening juni 1970. Trondheim: Norske Fiskeoppdretteres Forening.' (Devikutvalget cited in Bergen, 2002, pp. 93–95)

[61] '[N]år det gjelder forskningsoppgaver har dambruksnæringen tilknytning til flere fagområder, spesielt områder som i dag er administrativt underlagt Landbruksdepartementet og Fiskeridepartementet. I denne situasjonen er det behov for organ som kan koordinere den innsats når det gjelder forskning, veiledning m.v. som blir satt i verk.' (Devikutvalget, cited in Berge, 2002, p. 93)

Norwegian Council for Agriculture Research (Norges Landbruksvitenskaplige forskningsråd, NLVF), the Royal Norwegian Council for Fishery Research (Norges Fiskeriforskningsråd (NFF), and the Royal Norwegian Council for Scientific and Industrial Research (Norges teknisk-naturvitenskaplige forskningsråd, NTNF). Aarseth (1997, p. 101) states 'Each council had responsibility for research within a particular sector of industrial life. The research councils were corporate bodies, used by the government to blend governmental objectives and public needs with ideas from researchers in order to create and implement strategies for further research.' The agriculture sector, with its long tradition of developing knowledge and educating members of its own professions, was now being challenged by the Devik Committee, which wanted it to cooperate with researchers from the other two sectors (i.e. fishery and industry). The fishery sector had a long tradition within the marine science research (Institute of Marine research), but at the time it did not have a tradition of educating professions – the Norwegian College of Fishery Science was established in 1972.

According to the Devik Committee, one solution to the lack of coordination between advice and research efforts was for the Government or the Ministry to appoint an industry committee:

> It is assumed that the industry committee [Bransjeutvalget] would have a coordinating role and be an advisory committee, and it would need to have the responsibility and authority that experience deems appropriate. Its most important responsibilities would be to coordinate public efforts concerning research, advice, and other stimulating measures within the sector, as well as to arrange the desired contact amongst implicated institutions/organizations and the industry. The committee would have to take the initiative to promote cases of interest to pond fish farming. (Devikutvalget, 1971, p. 22; my translation)[62]

The idea of an industry committee was not followed up, but together with the establishment of the Devik Committee it marked that start of the debate about fish farming's connection to agriculture and fishery as well as to industry. The request for coordinated research does not only concern fish diseases, but it is one of the first signs of the coming conflict of interests in

[62] 'Bransjeutvalget forutsettes å skulle være et koordinerende, rådgivende utvalg og må få de arbeidsoppgaver og den myndighet som erfaringen viser er hensiktsmessige. De viktigste oppgaver vil være å koordinere den offentlige innsats når det gjelder forskning, veiledning og andre stimulerende tiltak på denne sektoren, samt å formidle den ønskelige kontakt mellom de impliserte institusjoner/organisasjoner og næringens folk. Utvalget bør selv ta initiativ til å fremme saker av interesse for dambruket' (Devikutvalget, 1971, p. 22).

the fish health field between the Ministry of Agriculture and the Ministry of Fisheries. It is also worth mentioning that the agriculture sector was not represented in the Devik Committee.[63]

However, the Government followed up another initiative and appointed the Lysø Committee on 25 February 1972. Vet Tore Håstein from the NVI and marine scientist Dag Møller (IMR) were members of the committee. Early in the history of fish farming, they had both institutionally represented the two central sectors, agriculture and fishery.

4.1.5 The Lysø Committee

The Lysø Committee was appointed in February 1972 with a very wide mandate to examine the following:

1. The possibilities of developing fish farming into an industry
2. How to organize the industry
3. The need for research
4. Laws and regulations

The committee was not mandated to look into fish disease regulations, but as the control of fish diseases was such an important part of fish farming, it became part of the general discourse on regulation. In January 1973, the committee presented a proposal for a temporary fish farming act, which was approved in Parliament in June the same year. The committee submitted its final report in April 1977 (NOU 1977:39), which stated the majority of its members recommended that the Ministry of Fishery should have general administrative responsibility for the fish farming industry. This matter was finally settled in 1977 when the temporary Fish Farming Act of 1973 was enacted as a permanent Act.

The Lysø Committee was not unanimous in its decisions. The majority of its members, which were also representatives from the fishery sector, had voted in favour of the Ministry of Fisheries having overall administrative responsibility for fish farming on the basis of the argument that if aquaculture were to expand, it would be in seawater and that knowledge about the marine environment would be important for this expansion. Important knowledge experts were biologists, specialists in oceanography, and engineers already working in the

[63] The members of the Devik Committee were Ole Devik (Christian Michelsens Institutt), Jørgen Try (DU), Dag Møller (Havforskningsinsituttet), Kåre Skutvik (NØ), and Arne Ratchje (NFF) (Devikutvalget, 1971, p. 1).

Ministry of Fisheries. The experts already had leading competence in questions concerning the marine environment. Dag Møller, from the MRI and former member of the Devik Committee, represented the majority in arguing the case for fish farming's connection to the fishery sector. The minority, mainly representatives from the agriculture sector, had recommended that the Ministry of Agriculture should have administrative responsibility for aquaculture. Their argument was based on the fact that animal husbandry already had a long history of experience in diseases, reproduction, fodder and nutrition, breeding, and processing, which also would be important for the fish farming industry. They also argued that the framework of the Diseases of Fish Act and the practice of it could become crucial; the act could mean more for the development of the fish farming industry than all other acts related to fish farming. Harald Skjervold, from the Norwegian Agriculture School (Norges Landbrukshøgsole, NLH) (today the Norwegian University of Life Sciences (Universitetet for miljø og biovitenskap, UMB)), and who was central in work on classical breeding and genetic improvements, represented the minority on the Lysø Committee. Both the majority and the minority were aware of the need for knowledge development and of the opportunity that the new industry could represent. Therefore, they recognized the importance of fish farming being part of the sector they represented, and they support their argument by referring to knowledge experts. Dag Møller drew attention to fish scientists and Harald Skjervold to veterinarians and agronomists.

Many years later, Skjervold reflected on the work of the Lysø Committee, and in hindsight he wished that more use could have been made of the knowledge from animal husbandry:

> [T]o be objective, I must say that where the rearing and care of domesticated animals is concerned, there is so much more to be learned from the field, isn't there? Because we did not yet have aquaculture in Norway ... and I would still say, if only we could have used some more of knowledge from husbandry at the time. (Harald Skjervold, interview , 8 November, 1991; my translation)[64]

[64] '*[J]eg må jo si objektivt at når det gjeld kultur, stell av domestiserte dyr, så er det jo mye mer å lære ifrå det terrisitiske, ikke sant? Fordi vi hadde jo ikke akvakultur i Norge enda…og jeg vil jo fremdeles si at du verden viss vi kunna benytta lite mer av lærdommen vi har frå husdyrbruket i den der saken.*' (Harald Skjervold, interview, 1991)

Although the overall responsibility for fish farming was settled with the Lysø Committee, the dispute about responsibility for the fish disease field was not resolved. The agreement to give the Ministry of Fisheries administrative responsibility for fish farming was decisive for the later legislative debate between the Ministry of Agriculture and the Ministry of Fisheries concerning responsibility for diseases in marine fish. The Ministry of Fisheries held a strong position in the fish farming industry and could continue the discourse about administrative responsibility for fish health management. Marine fish diseases were yet not regulated field.

4.1.6 The 1980s - the reopening of the Diseases of Fish Act of 1968 (Fiskesjukdomslova av 1968)

In the 1980s, a debate started concerning the revision of the Fish Diseases Act of 1968, because authorities saw a need for public control of diseases in farmed marine species. The question of administrative responsibility for diseases in marine fish thus became problematic because the Aquaculture industry was expanding fast and all matters relating to marine water had traditionally been the administrative responsibility of the fishery authority. At this point, the two ministries became deeply involved in fish farming.

In June 1979, following advice from the Director General of Fisheries (Fiskeridirektøren), the Ministry of Fisheries appointed a working group to invest the need for its own fish diseases law for marine species. The members of the working group were: Egil Kvamme, Principal Officer (*byråsjef*) in the Ministry of Fisheries; Jan Gjerde Head of Unit in the Directorate of Fisheries (and also a vet and microbiologist); Lisbeth Plassa, Executive officer (*konsulent*) in the Directorate of Fisheries; Emmy Egedius, a researcher from the Institute of Marine Research; and Martin Dahle, an editor from the Norwegian Fishery Association. Brynjar Mørkved, an executive officer in the Ministry of Fisheries, also participated in the group's work. The agriculture sector and fish farmers were not represented. In June 1984 the working group presented a draft for a fish diseases bill for marine species and all species farmed in the sea, because they wanted to include diseases in salmon and trout in the new law. The working group proposed that the Ministry of Fisheries should be given responsibility for administering the law.[65]

Although the draft of a new fish diseases law for marine species was not introduced to the Standing Committee on Shipping and Fisheries (Sjøfarts- og fiskerikomiteen) or to the

[65] Utredning om tiltak mot sjuk dom hos organismer i saltvannsmiljø. Utkast til lov. juni 1984.

Standing Committee on Agriculture (Landbruks -komiteen), it highlighted the conflicts between the agriculture sector and the fishery sector in the legislation debate. In the proposal, the working group argued for the necessity of engaging scientists from marine research institutions in marine fish disease research. Among the members of the working group, one person is noteworthy, the researcher Emmy Egedius.[66] Egedius was the first scientist to conduct research on diseases in wild fish, and some years later she was active in developing the 'Hitra disease' vaccine (Schwach, 2000).With the development of the vaccine, the marine science milieu managed to strengthen its position in the knowledge field, a point that I return to in Chapter 6.

4.1.7 Veterinary services for fish farmers

While the working group appointed by the Ministry of Fisheries was investigating the need for a fish diseases law for marine species, another work group was appointed, in 1984, to investigate veterinary services for fish farmers. In a meeting held in September 1983, the Ministry of Fisheries, the Ministry of Agriculture, and the Norwegian Fish Farmers Association agreed to appoint a working group to investigate some circumstances around fish diseases and the future structure of the veterinary service for fish farming. However, disagreement over the group's mandate resulted in postponement of the appointment until March 1984. Prior to the appointment, the NFF had put pressure on the Ministry of Agriculture, and during its annual meeting in 1981 it stated that the Ministry had to give high priority to making a plan for future veterinary service in fish farming, and the plan had to be developed in cooperation with the fish farmer organizations (*Norsk Fiskeoppdrett*, 1981, No. 4, s 2-3).

The Ministry of Agriculture, the Ministry of Fisheries, and the Norwegian Fish Farming Association each had a member in the work group[67]and veterinarians were appointed as expert consultants. The work group's mandate was to investigate the need for a

[66] In 1970 marine scientist Emmy Egedius (1929–1989) was the first woman to be engaged as researcher at the Marine Research Institute and the first women on-board a research ship (Schwach, 2000, p. 328).

[67] The members of the working group were: H.O. Bach-Gansmo (Chairman), Assistant Director in the Ministry of Agriculture; (Underdirektør); Kari Bjørbæk, Principal Officer (*byråsjef*) in the Ministry of Fisheries; Svein Vik-Mo, a fish farmer; Jørgen Arnesen, Principal Officer in the Ministry of Agriculture. In addition, the working group included the following expert consultants: Tore Håstein, Veterinary Inspector; Wollert Krohn-Hansen, Head of Department and veterinarian; Jan Gjerde, Head of Unit and veterinarian; and Olav Gladhaug, veterinary inspector (Landbruksdepartementet, 1984).

veterinary service in fish farming and how such a service could be expanded. In this regard, the work group was to look into the diagnostic services provided at veterinary laboratories, as well as their advisory services. It became quite clear at this point that the veterinary service was unable to provide the required fish health services. In 1984, six and half posts at the Norwegian Veterinary Institute were designated for work on statutory duties on fish diseases, but in fact the only permanent appointment was a senior laboratory technician who worked half-time (Landbruksdepartementet, 1984).[68] The Ministry of Agriculture employed a Veterinary Inspector, who executed the Ministry's governmental responsibilities in the veterinary service for fish disease, while simultaneously being in charge of the special laboratory for fish diseases at the Norwegian Veterinary Institute.[69]

In addition, one local veterinary officer (without district) focused especially on fish diseases. This post was on loan from the Chief County Veterinary Office for the counties of Trøndelag and Møre og Romsdal (Fylkesveterinæren for Trøndelag and Møre og Romsdal). No one at the four regional veterinary diagnostic laboratories worked especially on fish diseases. The four quality control laboratories under the Directorate of Fisheries had staff with both the capacity and some expertise to cover the required laboratory service for fish diseases. Also the Food Quality Control (Næringsmiddelkontrollen) had some laboratory capacity that could be used for fish disease work (Landbruksdepartementet, 1984). Local veterinarians employed by the state veterinary service, some of whom lacked knowledge of fish diseases, were supposed to take care of traditional veterinary responsibilities as well as fish diseases. In some districts where fish farming dominated, this could imply a considerable amount of work with fish diseases.

Given the veterinarians' work field and the knowledge level of staff engaged in fish disease work in the early 1980s, it is evident that fish diseases were still not given priority by veterinary authorities. Simultaneously, the committee that investigated veterinary services for the fish farmers rendered visible the lack of staff working with fish diseases and the industry's

[68] The Ministry of Agriculture reported the appointment of the group in a letter dated 5 March 1984 to the Ministry of Fisheries and the Norwegian Fish Farmers Association.

[69] In 1984 the staff employed to work on fish diseases were : one veterinary inspector of fish diseases employed by the Ministry of Agriculture, with a workplace at the National Veterinary Institute; one senior laboratory technician at the National Veterinary Institute, who worked 50% with fish diseases and 50% with diseases in wild animals (the only permanent post paid by the Institute); one temporary laboratory assistant and one researcher working at the National Veterinary Institute, but paid by the Direktorat for vilt og ferskvannsfisk (DVF); and two researchers, one laboratory engineer, and one laboratory assistant holding temporary positions paid by the Norwegian Council for Agriculture Research (Landbruksdepartementet, 1984, p. 9).

disease problems increased. Antibiotics were the only effective form of treatment, and in 1984, 19 tonnes of antibiotics were used in fish farming (Statistisk sentralbyrå, n.d.), which was a matter of concern for the responsible authorities.

According to the work group appointed by the Ministry of Fisheries, there was a need to reorganize the veterinary service in order to deal with the challenges facing the fish farming industry in terms of diseases, and also a need for veterinarians to have more knowledge about fish disease work. Thus, the general veterinary curriculum had to include course in fish diseases, and the possibility to specialize in fish disease work (Landbruksdepartementet, 1984).

The working group was familiar with the work done by the group appointed by the Ministry of Fisheries to investigate the need for a new law on diseases in marine fish. The group decided that it would not be a good solution to have responsibility for fish health services for freshwater fish and marine species held by two ministries. Rather, there should be only one fish diseases act. In several places in the group's report, a representative of the Ministry of Fisheries makes special statements rendering visible the disagreement between agriculture and fisheries in matters concerning the management of fish health. One argument used by the representative is that since the Diseases of Fish Act of 1968 was passed, a new act, the Fish Farming Act has given the Ministry of Fisheries overall administrative responsibility for the fish farming industry (Landbruksdepartementet, 1984). It was therefore important that the Veterinary Department (Veterinæravdelingen) of the Ministry of Agriculture provided information about conditions regarding fish farm sites to the appropriate professional agency under the Ministry of Fisheries. Traditionally, the agriculture and fishery sectors had been administered separately, without any need for cooperation. Fish health was thus a separate field because the institutional arrangements required two separate ministries to cooperate:

> In issues concerning this industry it is necessary for the veterinary department to inform the appropriate competent authority within the Ministry of Fisheries about situations concerning fish farms that the veterinary authority has information about. (Kari Bjørbæk, Ministry of Fisheries cited in Landbruksdepartementet, 1984, p. 4; my translation)[70]

[70] '*I saker vedrørende denne næring er det derfor nødvendig at Veterinæravdelingen underretter vedkommende fagmyndighet under Fiskeridepartementet om forhold angående oppdrettsanleggene som veterinærmyndighetene får kunnskap om*' (Landbruksdepartementet,1984, p. 4)

Bjørbæk agreed that it was natural for decentralized fish disease work to be the responsibility of the National Veterinary Laboratory (Veterinærinstituttet). However, she stated that in future discussions about a new fish diseases act which would include freshwater fish and marine species, new administrative responsibility and new expert agencies' involvement could come into question:

> However, in connection with discussions about a merger of the fish diseases act for freshwater fish and a fish diseases act for marine organisms, the issue may arise as to whether other administrative or professional institutions should be involved in efforts to combat diseases (Kari Bjørbæk, Ministry of Fisheries cited in Landbruksdepartementet, 1984, p. 6; my translation)[71]

In Bjørbæk's statement, the connection between administrative institutions and professional institutions became clear, and use of the marine science milieu's knowledge became an argument in the debate on administrative responsibility for diseases in marine species. Elsewhere in the working group's report, it is stated that fish diseases are a separate veterinary field that requires specialization (Landbruksdepartementet, 1984, p. 10). The discussion about the role of the veterinary profession in the fish health field had never been so apparent, as it was in that particular report. On the other side, in the special comments of the representative of the Ministry of Fisheries, the report also demonstrates the conflicts between agriculture and fishery. The interrelation between state and profession was close, and professions were close connected to sectors, and for the first time, the two sectors were aiming to serve the same users.

According to Berge (2002, p. 211), the Government signalled stronger concentration on environmental and veterinary challenges in a new proposal for a fish farming act in 1984. The main question in the proposal, however, was whether to liberalize the ownership structure, but the debate also indicated a new discourse concerning fish diseases legislation.

In the mid- and late 1980s, fish diseases resulted in huge losses for Norwegian fish farmers and the use of antibiotics was an environmental problem and influenced both the

[71] 'Men i forbindelse med drøftelser om en sammenslåing av sjukdomslov om ferskvannsfisk og sjukdomslov for organismer i saltvannsmiljø, kan det imidlertid bli spørsmål om andre administrative og faglige organers deltakelse i sjukdomsbekjempelsen' (Landbruksdepartementet, 1984, p. 6).

administrative debate and the legislative debate. In a report by Statskonsult (1988),[72] public administration of aquaculture is evaluated on behalf of the Government. The report comments on aquaculture research as follows:

> Those interviews that Statskonsult has carried out give an impression that there has been less systematic cooperation between the research milieus than is desirable. The problems so far have been especially tangible concerning the relationship between aquatic research/biotechnology and veterinary medicine regarding fish diseases … Those coordination problems that are noticed are partly caused by different competence, geographical distance and also a lack of understanding of each other's disciplines. (Statskonsult, 1988, pp. 45–46)[73]

The report states that the lack of coordination between different research institutions relates especially to the fish disease research field, and with a cautious statement about the disciplines' mutual lack of understanding, it points to the jurisdictional dispute between veterinarians from the agriculture sector and marine scientists from the fishery sector. There is no doubt, however, that there was public awareness of the conflict between the field of veterinary science and the field of marine science.

4.1.8 The Josefson Committee

In June 1987, Prime Minister Gro Harlem Bruntland appointed an interdepartmental working group to consider the possibility of developing a better and more effective administration of aquaculture issues. Director General Øystein Josefsen, from the Prime Minister's office served as the group's chairman.[74] The report published by Statskonsult in 1988 formed the basis for the Josefson Committee's recommendations regarding coordination of the administration of the aquaculture industry. In order to strengthen the public administration of

[72] Statskonsult was a public agency that provided management consulting services relating to reorganization processes in the public sector.

[73] 'De intervjuer som statskonsult har foretatt gir inntrykk av at det har vært mindre systematisk samarbeid mellom de ulike forskningsmiljøene enn man kan ønske. Problemene har hittil vært spesielt følbare når det gjelder forholdet mellom akvatisk forskning/bioteknologi og veterinærmedisin, når det gjelder fiskesykdommer.. De samarbeidsproblemer som registreres, har dels sin bakgrunn i ulik kompetanse, dels i geografisk avstand, men kan til dels også skyldes manglende forståelse av andres fagfelt' (Statskonsult, 1988, pp. 45–46).

[74] Samordning av Havbruksforvaltningen. Arbeidsgruppe nedsatt av Statsministerens kontor, juni 1987.

fish health and diseases, the Josefsen Committee recommended a common fish disease act for all aquatic animals under the veterinary authority's responsibility. Further, they recommended the establishment of a veterinary directorate, and that responsibility for veterinary education, with its multidisciplinary content, was transferred from the Ministry of Agriculture to the Ministry of Culture and Science. The majority of the committee members [75] recommended that the Ministry of Agriculture was given e responsibility for a new veterinary directorate. The minority, consisting only of Gunnar Gundersen, Secretary General (departementsråd) in the Ministry of Fisheries, recommended that the new veterinary directorate's responsibility for marine species and farmed fish (including farmed salmon and trout) should be the Ministry of Fishery's responsibility, and the rest should be the Ministry of Agriculture's responsibility. He claimed that this would be the only possibility for the administration of fish health to be connected with the administration of marine resources in general (Statsministerens kontor, 1988, p. 28–32).

4.1.9 Legislative amendments related to fish health – the temporary Diseases of Fish Act of 1990

While the dispute about fish health was on-going, marine fish farming was expanding fast and there were no laws for regulating diseases in marine species. The need for legislation related to farmed marine species made it necessary for a temporary fish diseases act to be passed in June 1990 (Temporary Act on Measures Against the Diseases in Aquatic Organisms of 1990).[76] The temporary fish disease act applied to both farmed and wild freshwater fish, but with regard to marine fish it only applied to those in captivity, which included farmed marine fish but excluded wild marine fish. The distinction between farmed marine fish and wild fish is important in order to understand the discourse. If wild fish had been included in the act, it the Ministry of Fisheries intervention in traditional administrative responsibility would have been very strong.

The temporary act was intended to last for a period of two years, but it was seven years before it was replaced by a new act. Although the discourse on public administration of the fish farming industry was settled by the Lysø Committee, the discourse continued with

[75] Director General Øystein Josefsen The Prime Minister's Office; Secretary General Per Harald Grue, the Ministry of Agriculture; Director General Jan Abrahamsen, The Ministry of Environment (Statsministerens kontor, 1988, p. 32).

[76] Lov 1990-06-22 nr. 44. Midlertidig lov om tiltak mot sjukdom hos akvatiske organismer.

renewed strength in the fish diseases field. The legislative debate around the temporary fish diseases bill made visible how important the fish health field was for the agriculture sector and fishery sector, and how close relations were between professions, knowledge experts, and the ministries.

The first reading of the temporary fish diseases bill in Parliament (Odelstinget) was introduced by Oscar D. Hillgaar (member of the Progress Party)[77]. Hillgaar was also a member of the Standing Committee on Agriculture (Landbrukskomiteen). He pointed out the need for the bill was especially supported by international confidence in the work done by the Norwegian veterinary service in the fish farming industry. Oscar D. Hillgaar also remarked that in the preparation of the permanent fish disease bill it would be important to eliminate any possibilities for conflict between the involved ministries regarding their administrative responsibilities:

> I would otherwise ask that the preparation of the later and final act ensures that any possible conflict over competence between a number of ministries is removed. Under the new act, the responsibilities must be unambiguous. (*Stortingstidende* 1990, p. 249; my translation)[78]

In the debate, Ruth Kleppe (Conservative), Associate Professor in Biochemistry at the University of Bergen, agreed with the suggestion that the monitoring of fish diseases should be the veterinary authority's responsibility. With regarding fish disease research, she considered it important that all institutions conducting relevant research should be given priority. Hence, several researchers should be given the possibility to concentrate on fish pathology, to develop and test vaccines, and to perform diagnostic work using advanced methods. Kleppe deemed this provision necessary if the bill's aims were to be met and the fish farming industry were to be able continue its growth (*Stortingstidende*, 1990, p. 250). Kleppe cited the successful development of the 'Hitra disease' vaccine at the Marine Institute as an argument for the inclusion of the marine research milieu in the fish health knowledge development.

Roger Gudmundseth (Labour), who had a background in fishery and was a former member of the Standing Committee on Shipping and Fisheries (Sjøfarts- og fiskerikomiteen),

[77] Fremskrittspartiet (FRP): a liberal party on the right wing of the Conservative Party).

[78] 'Jeg vil for øvrig be om at man ved utarbeidelsen av den senere, endelige lov sørger for at mulig kompetansestrid mellom flere departementer fjernes. Den nye lov må gi klare ansvarsforhold.' (Stortingstidende, 1990, p. 249)

compared §7 in the temporary fish diseases bill with the Fish Farming Act of June 1989, and described the contents of §7 as follows:

> It is not allowed to establish new hatcheries without a licence from the Ministry. It is also forbidden to establish or expand existing fish farms without the Ministry's permission. The Ministry may prescribe detailed provisions relating to the content of this section. (*Stortingstidende*, 1990, p. 251; my translation)[79]

Roger Gudmundseth' s main argument was that the fish farming bill gave the Ministry of Fisheries authority to grant licenses to establish hatcheries and fish farms, whereas §7 of the diseases of fish bill gave the Ministry of Agriculture administrative authority to intervene in licenses granted for hatcheries and fish farms, whether in fresh water or marine water. Gudmundseth asked why it was necessary to have a law which would give the Ministry of Agriculture authority to delegate administrative responsibility to the administration of fisheries, an authority that had already been given under the Fish Farming Act of 1973(85):

> Thus, I find inconsistency between today's proposed bill and the act already passed by Parliament, since today's proposed bill gives the Ministry of Agriculture authorization to intervene in the Aquaculture Act. In Paragraph 2 of this act, it is specifically mentioned that the law covers all aquatic organisms, whether in captivity or farmed. I must therefore ask the Minister: What is the reason for, and justification of, the necessity for including in the temporary fish diseases bill the same authorization to grant permissions as already are included in an already passed act? *(Stortingstidende*, 1990, p, 251; my translation)[80]

The fish diseases bill built on the Diseases of Fish Act of 1968. Paragraph 7 was important for the Ministry of Agriculture's warrant for monitoring work, and was probably

[79] 'Det er forbudt å etablere nye anlegg for klekking av rogn uten tillatelse av departementet. Det er også forbudt å etablere nye og utvide bestående anlegg for oppdrett av akvatiske organismer uten tillatelse av departementet. Departementet kan sette vilkår for tillatelsen i henhold til paragrafen her.' (Stortingstidende, 1990, p. 251)

[80] 'Jeg ser således en motstrid mellom det lovforslag som fremmes i dag, og de lover som Stortinget allerede har vedtatt, ved at lovforslaget i dag gir en forvaltningsmessig hjemmel for Landbruksdepartementet til å gripe inn i konsesjonsloven for oppdrett av fisk, skalldyr m.v. I den lovens bestemmelser, §2, er det spesifikt nevnt at loven også skal omfatte alle levende organismer som settes i fangenskap og under oppdrett. Jeg må spørre statsråden: Hva er årsaken til og begrunnelsen for at man i den midlertidige loven om tiltak mot fiskesykdommer finner det nødvendig å ha samme forvaltningshjemmel til å gi tillatelser som ligger i en allerede etablert lov?' (Stortingstidende, 1990, p. 251)

important for the Ministry's role in fish farming. The subsequent dispute between the Minister and Roger Gudmundseth revealed that they both had an awareness of the existence of a conflict without specifically mentioning in Parliament (then Odelstinget). The Minister of Agriculture, Anne Vik, responded that Roger Gudmundseth, in his comments to §7, had alluded to an existing conflict between the Ministry of Agriculture and the Ministry of Fisheries concerning §7 (*Stortingstidende*, 1990). Further, she said that all three ministries[81] had agreed that the veterinary authority had the necessary competence to take care of fish diseases. However, Roger Gudmundseth found the Minister's argument for the inclusion of §7 difficult to understand. Her mentioning of a conflict (that he had not said anything about) between the ministries surprised him, because he had supposed that there was a joint government, including the Minister of Fisheries, behind the bill. Minister Anne Vik, repeated that she had understood that Roger Gudmundseth in his first statement had suggested the existence of a conflict between the ministries, one that she wanted to weaken. She also commented on the introduction of the bill by Oscar D. Hillgaar, who wanted a new permanent bill that avoided conflicts over competence between ministries:

> In the case of Hillgaar's wish to remove the competence conflict between the ministries in a permanent act, I would like to make clear that we have very good cooperation between the three ministries. (*Stortingstidende*, 1990, p. 251; my translation)[82]

Further, Minister Vik said that the bill had been prepared in close cooperation between the Ministry of Agriculture, the Ministry of Fisheries, and the Ministry of Environment:

> Initially, the plan was to propose a new, permanent act. However, it would take a long time to work out a proposal for a new bill. Due to the urgent need to widen the authority under law, it has been pass a temporary act, which will be effective for two years (*Stortingstidende*, 1990, p. 251; my translation)[83]

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[81] The Ministry of Agriculture, Ministry of Fisheries, and Ministry of Environment.

[82] '*Når det gjelder Hillgaars ønske om at den kompetansestrid som har vært mellom departementene, må fjernes ved endelig utarbeidelse av loven, vil jeg presisere at vi har hatt et meget godt samarbeid mellom de tre departementene*.' (*Stortingstidende*, 1990, p. 251).

[83] '*Opprinnelig var planen å legge fram et forslag til en ny, permanent lov. Å utarbeide forslag til en ny, permanent lov tar imidlertid lang tid. Da det hastet, å få en utvidelse av hjemmelsgrunnlaget, valgte man å gå veien om en midlertidig lov som skal gjelde to år.*' (*Stortingstidende*, 1990, p. 251)

Clearly, Anne Vik wanted to limit the debate concerning the conflict between the Ministry of Agriculture and the Ministry of Fisheries. There was such an urgent need for legislation concerning marine farmed fish, that there was political and administrative agreement to enact a temporary act.

In the Lagting, Bjarne Mørk Eidem (Labour), the former Minister of Fisheries, found the question raised by Roger Gudmundseth about §7 interesting, and said that the Agriculture Committee had contacted the Ministry of Justice and Police (Justis- og politidepartementet) for clarification. The Ministry of Justice did not find any legal difficulties with §7, according to which permission had to be given under two laws, yet it raised another question of whether or not it was necessary to have the 'dual track system'. The Ministry considered that the latter question ought to be considered by Parliament (Odelstinget), the involved ministries, and the Standing Committee (*Forhandlinger i Lagtinget*, 1990, 5 June p. 24). The Lagting approved the Odelsting's decision.

There were openings in the temporary fish diseases act for both the Ministry of Agriculture and the Ministry of Fisheries to cease administrative responsibility for fish diseases in marine and freshwater fish. A report on fish farming to Parliament from the Ministry of Fisheries was anticipated in 1994, but it was not completed until June 1995 (St. meld. nr. 48 (1994-95)) but it did not present any point of view relating to administrative responsibility for marine wild fish. The Temporary Fish Diseases Act of 1990 was prolonged until 19 June 1997, when it was replaced by a new act.

4.1.10 The Fish Diseases Act of 1997

In 1997, the Norwegian Government presented a proposal for a new and permanent fish diseases bill (Ot.prp. nr. 52 (1996-97)). The bill was intended to replace the Temporary Fish Diseases Act. The Ministry of Agriculture stated that the Ministry of Agriculture and the Ministry of Fisheries had worked for some time with the distribution of responsibility for wild aquatic animals and aquatic animals in captivity. The ministries had agreed to establish a coordination agency (*samordningsorgan*) headed by the Ministry of Fisheries, where questions concerning aquaculture and fish health would be dealt with in order to coordinate activities. According to the proposal, the main changes would be that the new bill would cover wild marine aquatic animals and sea mammals, and authority to establish epidemiologically separate regions and internal control (Ot.prp. nr. 52 (1996-97)). Pursuant to the bill, the Ministry of Fisheries would become responsible for the administration of wild

marine aquatic animals and sea mammals (i.e. concerning the prevention, control, and eradication diseases in wild aquatic organisms). With this new agreement, the new Fish Diseases Act was enacted in 1997. The agreement settled a 15-year dispute between the Ministry of Agriculture and the Ministry of Fisheries regarding regulation and administrative responsibilities in the fish health field. The Ministry of Agriculture still had responsibility for farmed and wild freshwater fish, and marine fish in captivity.

The agreement on the division of administrative responsibility incorporated in the new Disease of Fish Act of 1997 was decisive for the further professionalization process of the fish health biologists (discussed further in Chapter 5). The responsibility of diseases in wild marine species gave the Ministry of Fisheries, including its affiliated administrative and research institutions, a role in negotiations about a new animal health personnel act , namely the Veterinarians and Other Animal Health Personnel Act of 1991 (Dyrehelsepersonelloven av 1991), that amended the Veterinary Surgeons Act of 1948 (Veterinærloven av 1948). This act finally gave aquamedicine biologists jurisdiction in the fish health field. I continue to the discussion on the regulation debate in Chapters 5 and 6, which focus on the role of the professions and universities respectively.

4.1.11 Summary: the case of Norway

Table 8 gives a schematic representation of important events involving the government and ministries relevant for the field of fish health, and covers the same time periods as listed Tables 4 and 5 in Chapter 3. The purpose of using the same time periods is to show how state institutions' interests and roles changes over time regarding policy related to fish health. According to T. Johnson (1995), states are an ensemble of institutions and emerge out of a complex interplay of political activities that include struggles for occupational jurisdiction. States are both regulators of professional life and an instrument of professional advancement (Burrage et al., 1990). Regulation of the fish health field in 1968 set standards for the struggle between veterinarians, marine scientists and microbiologists, and for the administrative battle between the two sector's ministries in subsequent years. I argue that by investigating the interplay between state institutions, professions, and occupational groups, the complex constitution of fish health policy in Norway can be brought to the fore.

In addition, the approach gives an opportunity to clarify parts of the complex constitution of the fish farming policy. Many of the same actors have been involved. The Ministry of Agriculture and the Ministry of Fisheries are state institutions, each with their

own knowledge-based occupations that have struggled for administrative responsibility for fish and the related field of fish health. The first Diseases of Fish Act of 1968 was enacted in response to the threat of imported diseases. The initiative to propose the bill was taken by biologists, veterinarians, and pond fish farmers, whereas the Ministry of Agriculture used affiliated veterinarians and biologists as expert consultants in their investigate work leading to the fish diseases act. However, there was a major limitation to the act in that it only applied to freshwater fish and anadromous species. The management of diseased marine fish and wild fish was not covered by the Diseases of Fish Act of 1968. Diseases in freshwater fish were related to pond fish farming, but the Diseases of Fish Act did not directly affect fishery interests. The act was seen as closely replicating the animal health act and incorporated the responsibility of the veterinary service.

As I show in Chapter 5, the veterinary profession's interest in the field had not yet been aroused in the 1960s. A few years later, the successful farming of fish on seabeds had created a new situation and the field of fish health became interesting to research and educational institutions, both from the agriculture and fishery sector. Through the work of the Lysø Committee, the two sectors fought for administrative responsibility for the new administrative field and their knowledge experts became involved in the discourse. The Government followed the majority's recommendation and the Ministry of Fisheries was allocated responsibility for executions of the Aquaculture Act. However, management of fish disease legislation for freshwater fish was still the responsibility of the Ministry of Agriculture. The disputes about the fish health field continued between agriculture and fishery interests, and between the veterinary profession and the marine science milieu. The fish farming industry became engaged in the discourse with a pragmatic view, demanding researchers to cooperate in knowledge development at the same time as they were demanding a professional veterinary service.

The Government settled the jurisdictional discourse about management of the new Diseases of Fish Act in 1997, by divided the responsibility for management of diseased fish: the agriculture sector would take responsibility for freshwater fish, and the fishery sector for wild marine fish. In 2003, the Fish Disease Act of 1997 was included in the new Food Act of 2003 (Matloven av 2003)and the Ministry of Fisheries gained the responsibility for fish health. In a study of jurisdictional disputes concerning a specialist field of work, it is often professions and occupations within a sector or work field that are studied. In my case, in the Diseases of Fish Act of 1997 the state took into consideration the complexity of the management of the fish health field and decided upon a division of responsibility. The

division of responsibility between the Ministry of Agriculture and the Ministry of Fisheries opened up opportunities for fishery scientists. Thus, the strong interrelationships between the two sectors' institutions and professions were decisive for the division of work in the Norwegian fish health field.

Table 8 Norway: Government involvement in the fish health field of relevance for the division of knowledge-based work

	1960–1970	1970–1980	1980–1990	1990–2005
Ministries involved in fish health	Ministry of Agriculture (fish diseases)	Ministry of Fishery (Fish Farming Acts of 1973 and 1977) Ministry of Environment (Salmon and Freshwater Fishing Act of 1964, superseded by the Salmon and Inland Fisheries Act of 1992)	Ministry of Environment, Pollution Control Act of 1981, Planning and Building Act of 1985	
Definition of fish farming	Agriculture sector: Supplementary income for farmers Fishery sector: Small business with fisherman likened to ship owners			Industry – large-scale businesses
Individual experts and their institutional employment	Tore Håstein, Fish veterinarian, NVI Harald Skjervold, Norwegian Agriculture School Emmy Egedius, microbiologist, IMR.	Dag Møller, researcher in marine zoology, IMR		
Regulations	Diseases of Fish Act of 1968 Veterinary Surgeons Act of 1948	Fish Farming Act of 1973	Fish Farming Act of 1985	**1990:** The Temporary Diseases of Fish Act of 1990 1997: New Diseases of Fish Act **2001:** Veterinarians and other health personnel

				2003: Act relating to food production and food safety, etc. (includes Fish disease, Ministry of Fisheries responsible for fish diseases **2004:** EU directive **2004/28**: amending the community code relating to veterinary medical products **2005:**The Aquaculture Act
Committees and their institutional affiliation	1967: Ministry of Agriculture expert committee investigated fish diseases, initiated by fish biologists, representatives of pond fish farmers, and veterinary institutions	1971: Devik Committee 1972:The Lysø Committee (a governmental committee) 1979: Ministry of Fisheries appointed a working group to investigate the need for its own fish diseases law for marine species	1984: Ministry of Agriculture, Ministry of Fisheries, and the NFF appointed a working group to investigate fish diseases and the future structure of the veterinary service for fish farming 1984: Draft for a new marine fish diseases bill presented 1987: Josefson Committee	

4.2 The case of Scotland

Similar to the Norwegian case, in the UK the Diseases of Fish Act of 1937 was a significant event in the Scottish fish health field. Scotland had a fish diseases act 30 years before Norway, and long before fish farming was thought of as an industry. The regulation of the fish health field was established because of concerns about furunculosis outbreaks in salmon rivers. Prior to 1926 the disease was unknown in Scotland, but in 1926 there were some outbreaks resembling furunculosis in some rivers in Scotland and by 1928 the number of cases of furunculosis had increased and the disease was recorded in 16 rivers (Mackie et al.,

1930). The Furunculosis Committee was appointed in July 1929, and in its first report published in 1930 it urged the need for legislative action. The Ministry of Agriculture and Fisheries had administrative responsibility for the act, except in Scotland, where the Secretary of State of Scotland held responsibility.

Fish farming in Scotland started to develop to a commercial industry in the late 1970s, but from the beginning it was largely driven and dominated by large companies. From the start it had been an industry and investment led. Berge (2002) argues that an understanding of the difference in social embeddedness between Scottish and Norwegian fish farming should be sought not only in the industry-specific matters relating to fish farming in itself, but also in national differences, such as structural differences in how the two fishing industries and coastal communities developed. The UK fishery was industrialized relatively early on and capitalized with the development of large fishing companies, and a parallel can be drawn between these features and the industrialization of fish farming (Berge, 2002). Although there were small family-owned fish farms also in Scotland, the social identity of fish farming was not connected to farming or agriculture in the public debate, at least not as it was in Norway. It is, however, worth mentioning that there were discussions about whether fish farming should be seen as farming or not. The following quote appeared in the *Scottish Farming Leader* after it had been decided that the Scottish Fish Farming Association (SFFA) would formally seek affiliation with the National Farmers Union, Scotland (NFUS) in 1977:

> Over the years fish farmers have had great difficulties in achieving Government recognition and the kind of relationship with Departments which the Union has ... So from the fish farmers' point of view the advantage of joining the Union will be the provision of the facilities for effective representation. The Union is practised in the businesses of running a continuing relationship with Government and since the same Government departments cover both farming and fishing there is an obvious tie up between the interests. (*Scottish Farming Leader*, April 1977, p. 36)

In a short notice on the role of aquaculture in May 1977, it was mentioned that the NFUS's committee had agreed that 'Fish farming should be seen as a form of livestock production, albeit as a separate identifiable entity within agriculture' (*Scottish Farming Leader*, May 1977, p. 65). The further development of fish farming, with large-scale companies increasing their share of the production helped by the CEC leasing policy and lack of governmental involvement, led to an early definition of fish farming as an industry.

Fish farming continued to be a separate identifiable entity defined as an industry, but without a governmental body directly responsible for aquaculture policy. In Scotland in the 1970s, fish farms, through the Scottish Fish Farming Association, urged the Government to take more interest in fish farming. The National Farmers Union of Scotland and of England and Wales submitted a joint document to the Minister of Agriculture and the Secretary of State for Scotland in August 1978, in which they pointed to the need for a revision of the Government's policy towards the fish farming industry. The topics covered were prevention and control of diseases, rights in the sea, rating, planning, and granting aid:

> The paper sets out the areas in which it is likely that changes will need to be made in Government policies with a view to providing the future needs of the fish farming industry. It is hoped that such changes will be able to provide the necessary framework for the growth of the industry in the interests of not only of fish farmers themselves, but also in the interest of other water uses, amenity interests, and particularly in the national interest. (*Scottish Farming Leader*, September 1978, p. 30)

Since there was already governmental responsibility for the industry, it is to be expected that there had been informal discussions with civil servants about fish diseases and that a formal proposal for new disease legislation was expected to emerge in the spring of 1979. There was also a paper in progress on a licensing procedure for fish farms, which was to be submitted to the Department of Agriculture and Fisheries for Scotland (DAFS) (*Scottish Farming Leader*, March 1979, p. 46). The development of good planning procedures was set to become a long dispute between farmers and the CEC (see Chapter 3).

All of the issues that concerned fish farmers are of interesting when it comes to understanding the context in which the division of work in the fish health field took place. In the case of Scotland, the governmental bodies' involvement in fish diseases started with the Furunculosis Committee. Before investigating the work of the Furunculosis Committee and its proposal the 1930s for new fish disease legislation, I will briefly present the present-day governmental administrative responsibilities for fish health. The period of time that I have chosen to study ends in 2005, and the choice of date is justified by Norwegian aquamedicine biologists' attainment of professional status. Although there were also many institutional changes in Scotland, especially after the Scottish Parliament was established in 1999, I have concentrated on changes relevant for the fish health field. And as far as I know there are no changes in Scotland in terms of professionalization of the fish health work field. In addition, I

have chosen to briefly outline the current government arrangements relevant to fish health. But the institutional changes after 2005 will not be considered.

Ministries responsibilities for fish health in Scotland in 2012

The Scottish Government, formerly known as the Scottish Executive prior to 2007, and as the Scottish Office prior to 1999, is responsible for all issues that are not explicitly reserved for the United Kingdom Parliament at Westminster by Schedule 5 of the Scotland Act 1998. Devolved matters include health, education, justice, home affairs, rural affairs, economic development, and transport (Scottish Government, n.d.).

The **Cabinet of Rural Affairs and the Environment** has ministerial responsibility for the following areas directly relevant for fish health: Animal Health and Welfare (Animal Health and Welfare (Scotland) Act of 2006), Environmental Policy, Marine Planning and Policy, Marine Scotland Compliance, and Marine Scotland Science.

Marine Scotland is a new delivery arm (directorate) of the Scottish Government, which came into effect on 1 April 2009, and is the leading marine management authority in Scotland. Marine Scotland, including Marine Scotland Science, has responsibility for fish health and fish welfare.

The **Marine Scotland Science (MSS) Fish Health Inspectorate**'s main objective is to prevent the introduction and spread of serious fish and shellfish diseases in Scotland. The inspectorate provides advice and diagnostic services to fish and shellfish farmers, district salmon fishery boards, fishery trusts, and other stakeholders. Fish health inspectors are appointed by Scottish Ministers to act as veterinary inspectors under current fish health legislation. The majority of the Fish Health Inspectorate's (FHI) work is carried out in accordance with two main pieces of legislation concerning Aquaculture and Aquatic Animal Health: The Aquaculture and Fisheries (Scotland) Act of 2007 and the Aquatic Animal Health (Scotland) Regulation of 2009 (Marine Scotland, 2012. *Legislation*). The new regulations repealed the Diseases of Fish Act of 1937 and of 1983, and applied to Scotland, although similar and parallel regulations are required in England, Wales, and Northern Ireland. The EU Council Directive 2006/88/EC on animal health requirements for aquatic animals and products thereof, and on the prevention and control of certain diseases in aquatic animal are implemented under the 2007 regulation.

The FHI undertakes operations under The Animal and Animal Products (Examination for Residues and Maximum Residue Limits) Regulations 1997 on behalf of the Veterinary Medicines Directorate. This work involves inspecting fish farms' medicine records, taking samples from farmed fish for veterinary medicine residue testing, and investigating any positive results.

The **Veterinary Medicines Directorate (VMD)** is an Executive Agency of the Department for Environment, Food and Rural Affairs (DEFRA) (UK). The VMD is responsible for the safe and effective use of veterinary medicinal products in the UK (Petterson, 2011).

The House of Commons Agriculture Committee on Fish Farming reported in 1990 that the Ministry of Fisheries and Coastal Affairs' primary role in fish farming concerns statutory measures under the Diseases of Fish Act of 1937 and 1983 and the Sea Fisheries (Shellfish) Act of 1967. They have to prevent the introduction and spread of serious pests and diseases of fish. In the UK (including Scotland), fishery and agriculture are administered jointly; in 1990 they were managed by the Ministry of Agriculture, Fisheries and Food (MAFF) and Department of Agriculture and Fisheries for Scotland (DAFS) but had separate responsibility (House of Commons Agriculture Committee, 1990b).

Fish disease is the responsibility of fisheries and the responsibility has been unquestioned since the enactment of the Diseases of Fish Act in 1937. However, there have been several institutional changes, name changes, and political changes due to the devolution in 1998, when the Scottish Parliament was established by law. The Marine Laboratory in Aberdeen was a Scottish institution under the DAFS (now Marine Scotland Science).

4.2.1 The Furunculosis Committee and the Diseases of Fish Act of 1937

In 1911 there was high mortality of freshwater fish in some rivers in the south-west of England. Masterman and Arkwright proved that the mortality was due to an outbreak of furunculosis,[84] as described by Emmerich and Weibel. In 1912 and 1913 other observations were made about the disease (Mackie, T. et al. 1930). It had been assumed that the spread of

[84] In 1894 two German observers, Emmerich and Weibel were the first to describe furunculosis. Furunculosis is caused by the bacterium *Aeromonas salmonicida subsp. salmonicida*. The bacterium is found worldwide, with the exception of Australia, and can cause serious diseases in wild and farmed fish (Poppe & Mo, 1992).

disease was less extensive in the original areas of infection, but fresh outbreaks had occurred in other salmon rivers. The Kennet Valley Fisheries Association was concerned about this and in 1925 it invited subscriptions from interested persons and raised a fund in order to promote further study of the disease. The fund was supplemented by a grant from the Development Fund, but the initiative was held up because Major J. Horne, who was appointed to carry out the work, had to cease his work due to ill health. In 1926, the disease again assumed a wider and serious aspect and appeared in a river in north-east England, amongst salmon and sea trout in two districts in south-western Scotland, and in one of the principal rivers on the east coast of Scotland. Therefore, in 1927 research on the spread of the disease commenced in Scotland, aided by a small grant of GBP 20 from the funds administered by the Fishery Board for Scotland. In 1928, the Scottish work was linked up with that of the Kennet Valley Fisheries Association. The research was placed under the control of a small committee representing the Ministry of Agriculture and Fisheries, the Fishery Board for Scotland and the Kenneth Valley Fisheries Association. In July 1929, the Furunculosis Committee was appointed.[85] The Committee's mandate was:

> To investigate the origin, predisposing causes and mode of dissemination of furunculosis and similar infectious diseases among salmon, trout, and other freshwater fish in England and Scotland, and to conduct experiments with a view to ascertaining methods of combating the disease, and to report the results of their proceedings. (Mackie et al., 1930, p. 5)

All of the members of the Committee were men. Professor T.J. Mackie (Medical Doctor), from the Bacteriology Department of the University of Edinburgh, was appointed as Chairman, and William Martin of the Fishery Board for Scotland was appointed as Secretary of the Committee. J.A. Arkwright, one of the two persons that first discovered furunculosis in Great Britain, was appointed member of the Committee.

The Furunculosis Committee submitted three interim reports. The first Interim Report was submitted in March 1930, the second in June 1933, and the final report in July 1935 (Mackie et al. 1930; 1933; 1935). The Committee's mandate was formulated as a research project and the chairman of the committee supervised the research work. The Furunculosis Committee had the advantage of access to information and data collected by the smaller

[85] The Committee was appointed by The Rt. Hon. William Adamson, one of His Majesty's Principal Secretaries of State, and by The Rt. Hon. Noel Buxton, Minister of Agriculture and Fisheries.

informal committee mentioned above. The Committee used several sources of information to collect information about furunculosis. From the list of 19 representatives who have given personal evidence to the Committee, three were representatives of fishery boards and six were representatives of salmon fishery boards. Representatives of trout farms also gave evidence (Mackie et al. 1930; Appendix IX, p. 64).[86] Therefore, at a very early stage salmon fishery boards and other fishery boards were involved in matters relating to fish disease in Scotland.

In its first report, the Furunculosis Committee considered the economic aspects of trout fishery properties in Great Britain and stated:

> In any case, though the market value of brown trout, caught in Great Britain, is of comparatively slight commercial importance, the economic value of trout fisheries is high, and in the streams we have mentioned may be roughly stated as a pound sterling per pound weight of trout caught by rod and line. The capital value of trout fisheries in chalk streams, we are informed, may be as much as three thousand pounds per mile of river ... If the trout die of disease the value of the property will be depreciated, and the locality deprived of the contingent benefits. (Mackie et al., 1930, p. 40)

Since the investigation into fish diseases was considered from an economic perspective by the Committee, presumably due to concerns expressed by the river property owners about losing their incomes from renting their property to wealthy sport anglers, it influenced the Fishery Board of Scotland to conduct further research on the furunculosis disease. The committee also wanted the Government to become more involved in the control of fish diseases in fresh water and rivers. In Norway, the fish diseases enactment was motivated by the occurrence of fish diseases pond farms. The two countries' fish diseases acts were enacted in different historical contexts. While in Scotland mainly sport angling interests and river owners were concerned about fish diseases, in the case of Norway, fish farmers, sport angling interests, and river owners were concerned about diseases. For the veterinary profession in the UK, the main topic in the 1930s was the Agriculture Act of 1937 and the incorporating of the veterinary service into this act, but fish disease control was not a topic.

The Furunculosis Committee concluded in its first report in 1930 that there was not only a need for continued investigation, but also for immediate preventive action. In its

[86] The Tay Salmon Fishery District Board had two representatives: J. McRae and W. Malloch. Also the Forth Salmon Fishery District Board had two representatives: A. McNeil and E. Minto (Interim Report, 1930)

second report, the Committee expresses regrets that there had not yet been any legislative action taken:

> During the 1933-34 Session of Parliament, the Diseases of Fish Bill, which was based on the recommendations made in our former reports, was introduced and passed in all its stages in the House of Lords. It also received a Second Reading in the House of Commons but thereafter was not proceeded with, and was dropped along with other measures at the end of the Session. (Mackie et al., 1935, p. 6)

In its recommendations, the Committee urged the need for legislative action to be taken, and it regarded the following as essential provisions of such legislation:

> (a) The prohibition of the importation of live fish of the Salmonidae family
> (b) The importation of live eggs of the Salmonidae and live freshwater fish only under licences
> (c) The compulsory notification of outbreaks of the disease [i.e. furunculosis]
> (d) Powers to prohibit movement from an infected area of live fish and articles liable to carry infection
> (e) Compulsory powers of inspection of rivers and fish farms. (Mackie et al., 1935, p. 57)

The committee included inspections of fish farms as well as rivers because there had been outbreaks of furunculosis in a pond trout farm in 1930 (Mackie et al., 1933, p. 75). The Diseases of Fish Act was enacted in November 1937 and was intended to prevent the spreading of disease among freshwater fish in Great Britain, but would not extend to Northern Ireland. With the exception of Scotland, the act was administered by the Minister of Agriculture and Fisheries where the references to the Minister were substituted with reference to the Secretary of State. It did not include or exclude veterinarians, but only states that the Minister may authorize an inspector to carry out its direction (§2. (5)). In Scotland, all diagnostic work on fish required by the Diseases of Fish Act was done at the Bacteriology Department at Edinburgh University, and the explanation behind the Scottish Office's request for the Department to do this work was that the Department had done research work for the Furunculosis Committee. The staff had provided the Furunculosis Committee with knowledge on which that they could base their recommendation for a fish diseases bill. Thus, through this pioneering research work on furunculosis in Scotland, microbiologists consolidated their role in fish disease research and work. Diagnostic work on fish diseases can also be seen as an

extension of other governmental tasks, such as diagnostic services for environmental health work (e.g. water testing and milk testing), that the staff at the Bacteriology Department at Edinburgh University was doing (Isobel Smith, interview, 1991). I return to the role of the microbiologists in Chapter 6.

4.2.2 Diagnostic fish diseases service's move to the Marine Laboratory, Aberdeen

In 1953, the statutory responsibility for diagnostic work and research work on fish diseases was taken over by the Marine Laboratory in Aberdeen. Isobel Smith, who had done the same type of work at Bacteriology Department at the University of Edinburgh, moved to the Marine Laboratory and continued her work there. She supposed that the reason why the new laboratory had been set up in Aberdeen to do diagnostic work on fish was that the Scottish Office wanted more work done and Professor Mackie was unable to accommodate this in his department (Isobel Smith, interview, 1991).

Diagnostic work on fish was first done at the Fresh Water Fisheries Laboratory in Pitlochry, but Isobel Smith felt she was located too distant from the problem. However, she remained working at the laboratory for approximately three years while she was setting up a new laboratory at the Marine Laboratory in Aberdeen. Isobel Smith worked at the Marine Laboratory in Aberdeen from 1953 to 1962, during which time she finished he work relating to fisheries and thereafter moved back to work at the Bacteriology Department at Edinburgh University. Among the reasons why she gave up her work related to fish diseases was due to a sense of isolation and that there was no hope for treatment because they were not allowed to use antibiotics (Isobel Smith, interview, 1991). She encouraged Alan Munro's interest in fish diseases, and he took over her work at the Marine Laboratory in Aberdeen in1965. From the beginning of the 1960s, until he retired in the 1990s, Professor Munro, a microbiologist, had a significant role in diagnostic work of fish diseases at the laboratory. For several years, he was Senior Principal Scientific Officer for Fish Cultivation at the Marine Lab, and his work including field investigations and virology.

During an interview in 1991, Alan Munro stated that there had not been any fish farming in Scotland in 1965. Therefore, most of his activity for the first five or six years at the Marine Laboratory was as a microbiologist, studying energy flow from green plants to sea and to young fish). At the time, he had a low level of responsibility for diagnoses of disease in

wild salmon and trout, and he had an assistant whose job was specifically to look at the causes of death and sickness in wild salmon:

> So ... any time the proprietor of a river found dead or dying fish in his river he could send them to this laboratory and could get a diagnosis of what was wrong with them, free of charge. Now in [19]67 we had a very serious outbreak of disease in wild fish, an endemic of the disease called ulcerative dermal necrosis; UDM it was called. And from about 1967 until about 1971, about four years anyway, we had really massive numbers of deaths, particularly in north-east coastal rivers. A large number of fish were being sent in, so that my time spent as a microbial ecologist became less and less and I became much more involved in fish methodology. As I say, there were only two of us in [19]65, by [19]71 I think there were four or five of us and by [19]71 I was full-time. (Alan Munro, interview, 1991)

The outbreak of disease in wild salmon in the mid-1960s was an event that reinforced the role of the Marine Laboratory in diagnostic services, and the number of staff increased rapidly. Also, in the period 1969–1970, trout and salmon farming started in Scotland. According to Alan Munro, the Marine Laboratory was very close to the Scottish pioneers in fish farming:

> Our neighbouring institution down the road ... we had then ... Unilever Research, who actually started salmon farming activity in Scotland, were actually based only a few hundred yards away from us, and they were investigating all sorts of possibilities for fish farming from [19]69 and onward, I think. (Alan Munro, interview, 1991)

The Marine Laboratory in Aberdeen had more staff employed to carry out research and diagnostic work on fish diseases than the Norwegian Veterinary Institute in Oslo. The NVI employed the first full-time fish pathologist in the 1960s, but it was not until 1975 that the first veterinary inspector in fish diseases was employed, namely Tore Håstein. Resources available for fish disease problems were meagre for a number of years in Norway (see Chapter 5). Compared to the Norwegian case, the UK already in the 1950s had had 10–15 years of government-funded research on fish diseases. During the period 1980–1981, trout farming grew quite rapidly and just under 10 salmon farms started to grow more rapidly than other farms. Throughout the 1980s, the farmed salmon production in Scotland grew from 600 tonnes to 30,000 tonnes. According to Munro,

> The demand for services for pathological and general advisory information on husbandry and disease methods was quite dramatic ... I would say from the mid-seventies in trout and then running straight on to salmon. So, in the last 15 years we have been under tremendous pressure here, and have never had enough staff to deal with the dramatic growth in the industry. (Alan Munro, interview, 1991)

In 1991, Alan Munro's research and diagnostic fish disease team at the government-funded laboratory consisted of c.20 permanent staff and a further 10 supplementary staff (Alan Munro, 1991, interview). Munro did not have any veterinarians employed at the Marine Laboratory, and he explains the reason for this as follows:

> I work for the DAFS and there is an agriculture department and there are fisheries, and they are basically one department. But on the agriculture side, they employ veterinarians and they are paid on a different scale. In fisheries there are only scientists and there is only one scale. If a veterinarian wanted to work in fisheries he'd been paid as a scientist, he would not get the extra money that a veterinarian gets, so it would not be attractive to him. And this is sort of origin why veterinarians are never employed by the Fishery Department to study or assist in fish disease, I have noticed. I have in the past, I think I have had one veterinarian on the staff working for me, but he didn't stay long. He stayed with us about two years and took off to earn more money. (Alan Munro, interview, 1990).

From Munro's comment on the division between the agriculture and fishery side of the DAFS, it may be concluded that the two sectors were quite separate, and that it would have been an even a cheaper arrangement to employ scientists rather than veterinarians, since veterinarians are generally better paid.

In Scotland, the Marine Laboratory in Aberdeen, through institutional changes in the Scottish Government, has held its position in fish health research and monitoring fish health (today as the Fish Health Inspectorate, Marine Scotland). Another institution within the fish health field worth mentioning in this context is the Unit of Aquatic Pathobiology, which was established at the University of Stirling in 1971. I investigate the unit in more detail in Chapter Six. The unit was established by veterinarians, although several members of staff were scientists. The Unit of Aquatic Pathobiology had direct involvement with the industry during its rapid expansion and provided disease and environmental management services to industry. Several veterinarians from UK and abroad were awarded a doctoral degree in fish disease related issues at Unit of Aquatic Pathobiology. Although veterinarians have not been

involved in statutory work, Unit of Aquatic Pathobiology has had an important role in fish disease research and diagnostic service and treatment.

4.2.3. Fish Health Research service (The Marine Laboratory) and Fish health inspectors

In 1997 the Fisheries Research Services (FRS) was established as an Executive Agency of the Scottish Office (Scottish Executive from 1999) compromising the Marine Laboratory (MLA) and the Freshwater Fisheries Laboratory Pitlochry (FFL). In 2009 FRS merged with the Scottish Fisheries protection Agency and Scottish Fisheries and Scottish Government Marine Directorate to form Marine Scotland, a part of the core Scottish Government. Today, the Fish Health Inspectorate (FHI) is part of Marine Scotland Science (MSS).

FRS is responsible for carrying out statutory fish and shellfish health inspections and disease control. And it is their Fish Health Inspectors that act as Duty Inspectors (DI) (Veterinary Inspectors) and deal with sampling of fish forwarded to the Fisheries Research Services Marine Laboratory for disease diagnosis and notifications of suspicion of a notifiable disease of fish or shellfish.
Trevor Hastings, microbiologists and employed to do fish disease work in 1978 at the Marine Laboratory describes what distinguishes the work of the staff at the Marine laboratory and fellow veterinarians:

> ‘Our role is in control of notifiable diseases that is our one number priority. I don’t think we need to prescribe medicines. None of us here are company vets, none of us will be in charge of the health and welfare of the fish on the farm. That is the responsibility of the farmer and his vet.’ (Hasting, interview, 24 November 2000)

The Fish Health Inspectors have been few in numbers, but they are part of a large scientific team at the laboratory. Pauline Munro, operation manager for the Fish Health Inspectorate (earlier called field investigations) said it requires a degree level to be employed as a fish health inspector. It can be in almost any relevant biological science, generally its zoology and marine biology. Also veterinarians could be employed as fish health inspectors but according to Munro it is highly unlikely that this would happen because the salary is much lower for a fish health inspector than a veterinarian. Some of the inspectors also have a

Master's degree (M.Sc.) in relevant subjects but that's not compulsory (Paula Munro, Interview, 24 November 2000).

In Scotland, there were outbreaks of ISA over the years 1998-99. The Fisheries Research Service (FRS) estimated cost to the industry was around £30 million (The Global Spread of Infectious Salmon Anaemia, The fish site, 12 january2009).
The government acted promptly and granted money for employing further fish health inspectors. According to Pauline Munro (Interview, 2000) the FHI had 8 inspectors when she started in 1998.

> 'Each inspector had a geographical area that they were responsible for and only them. So for example somebody was responsible for the Shetland Islands and they did all the statutory sampling and all the diagnostic work and the certification work in that area. Since the ISA came along we organized teams, so there are three teams of inspectors and each team is responsible for an area. So there are three teams and there are five inspectors in each team. So there are 15 full time inspectors now. And we have three administrators. Well we have got extra money from the Government to carry on with surveillance for the next three years.' (P.Munro, Interview, 24 November 2000)

Munro also describes how they changed their number of inspections and samples taken from fish farms. Their fish health inspectors, before the outbreaks of the ISA, did the minimum of what was required under fish disease legislation. They were doing one inspection on the fish farm annually and sampling from 50% of the fish farms every year. Since then they have done three inspections for ISA annually for marine salmon farms. The fish work inspection routine is the same now as it was before ISA, but the number has tripled. In surveillance areas which are the areas surrounding the infected or suspected sites they are doing six visits per year. And they did one visit per month to all the sites in the surveillance area for a year after the initially outbreak occurred (P. Munro, Interview 24 of November 2000).

The Marine laboratory conducts in-house training. Mainly they have people going out on inspections with an experienced inspector for at least six months before they go out by themselves. Before ISA it used to be longer, but because of the ISA they got more experience as they do so many field inspections and they pack a lot into the six months of training, before people go out by themselves. In addition the laboratory run training courses where they have lectures from staff at the laboratory and a two day course where they experience what

happens in the laboratories and get familiar with the tests and everything that is going on so that they can explain to fish farmers if necessary (P. Munro, Interview 24 of November 2000).

In 2012 the frequency of visits to fish farms is still based upon the level of risk of disease emergence, or spread that they pose. 'Those farms posing the highest risk are visited every year, those posing a lesser risk are visited less frequently. In addition, all farms holding species susceptible to G. Salaris, BKD and SVC are inspected every year, and thirty fish are sampled once every two years' (Fish Health Inspectorate Service charter, April 2010, p.4.). The Inspectorate comprises the Group Leader, two administrative staff and 16 fish health inspectors who operate in two regional teams which together cover the whole of Scotland (Fish Health Inspectorate Service charter, April 2010).

4.2.4 Fish Diseases Act of 1983

The fish disease legislation in Scotland remained unchanged until 1983. The Diseases of Fish Act of 1983 was brought into force in response to changing risks as farming expanded and knowledge of fish disease in Great Britain and other countries increased (Hill, 1996). The Scottish Fish Farming Association was responsible for initiating the amendment to the fish diseases act (*Scottish Farming Leader*, March, 1979, p. 46). Under the new legislation, fish disease control measures were introduced to cover situations not foreseen by the 1937 Act. The main changes provided by the 1983 Act were the permission to import live salmonids, the possibility to designate marine water (as well as fresh water) as being infected by a notifiable disease, and the requirement for fish farms to be registered and to provide stock information. The blanket prohibition on the importation of live salmonids was thus lifted by this act (Hill, 1996). The news about the fish diseases bill was welcomed in the *Veterinary Record*, and there were no critical comments on the bill (*Veterinary Record*, 1983, p. 91), nor were there any administrative changes regarding responsibility for fish diseases.

4.2.5 Summary: the case of Scotland

The Furunculosis Committee researchers from the Bacteriology Department at the University of Edinburgh, and the work done by Isobel Smith in building up a new laboratory in Aberdeen, were important for today's administrative arrangements at Marine Scotland, Fish Health Inspectorate (FHI). If it had not been for the Bacteriology Department's involvement in fish disease and diagnostic work, the Marine Laboratory might not have become

responsible for fish health management. Few scientists took an interest in this field. It should also be added that Professor T.J. Mackie's contacts in the Scottish Office and the Fishery Board for Scotland was important as a starting point for fish disease work at the Bacteriology Department, where he had microbiologists to whom he entrusted investigations. The initiatives of and positions held by individual actors such as Professor Mackie are important for understanding the institutional development relating to the field of fish health. If the Bacteriology Department had not become involved, the veterinary service could well have ended up taking care of the task, as they did in the rest of Europe some years later. In Scotland, however, sport anglers took the initiative to raise funding for fish diseases, due to concerns about diseases in salmon and trout in rivers. There were also outbreaks of diseases in wild fish in the late 1960s, that resulted in early developments in public fish disease work, and hence an increase of the number of employees.

The first role that the Government had in fish farming was the control of fish diseases. The role of the Crown Estate in leasing seabeds explains why historically the state's role has been reduced in Scottish licensing politics. Table 9 summarizes Government's involvement in the fish health field that I consider to be of importance for understanding the division of work in the field. The Scottish fish farming has been defined from the start as industry, and the industry became early a large user of the Marine Laboratory's services, since Alan Munro underlines the pressure he and his staff felt by the trout farming industry and the salmon farms in the early 1980s. Considering how the industry in Scotland developed the eight salmon farms were multi-national companies. Although there are legislative changes in the fish health field, the institution responsible for monitoring fish health work is not changed, and the work is still done by scientists and fish health inspectors.

Table 9 Scotland: Government involvement in the fish health field of relevance for the division of knowledge-based work

	1920–1960	1960–1970	1970–1980	1980–1990	1990–2005
Ministries and agencies involved in fish health	Ministry of Agriculture and Fisheries, and Secretary of State of Scotland Laboratory work done at the Bacteriology Department, University of Edinburgh	The Marine Laboratory expanded its staff engaged in fish disease work due to serious outbreaks of disease in wild fish			1997 Fisheries Research Service established as an Executive Agency of The Scottish Office

	1953: Statutory responsibility for diagnostic work and research work on fish diseases was taken over by the Marine Laboratory in Aberdeen				2009: Fisheries Research Services (FRS) merged with the Scottish Fisheries Protection Agency and the Scottish Government Marine Directorate to form Marine Scotland
Definition of fish farming		Industry	→	→	Large-scale industry
Knowledge based occupations and institutional belonging	Microbiologists at the Bacteriological Department, University of Edinburgh		1971:Veterinarians took the initiative to establish the Unit of Aquatic Patho-biology at the University of Stirling	1990: The Fish Veterinary Society formed	
Regulations	The Diseases of Fish Act 1937 The Agriculture Act of 1937 and the incorporation of veterinary services in this act	The Medicines Act of 1968 included fish under veterinary drugs. Only veterinarians could supply prescription for medicinal use (POM drugs)		Diseases of Fish Act 1983(amended the 1937 Act)	2009: Aquatic Animal Health (Scotland) Regulation 2009 (repealed the 1937 and 1983 acts)
Committees and their institutional affiliation	Furunculosis Committee (Ministry of Agriculture and Fisheries (UK) and the Secretaries of State for Scotland				
Constitutional changes	1973: Membership of the European Community				1993: EU Common Market

CHAPTER 5: PRACTISING PROFESSIONALS AND OTHER PROFESSIONS AND OCCUPATIONAL GROUPS IN THE FIELD OF FISH HEALTH

The term 'profession' is commonly used in academic work and everyday language (Muzio et al., 2011). In academic work, however, it is a troublesome concept, as the meanings of particular professions and occupations that might be described as professions change over time (Burrage et al., 1990). Most researchers have accepted the definitional uncertainty around the concept and they focus on discourses of professionalism as a mechanism of the control of work (Evetts, 2006a). Conze and Kocka's definition of profession, used in Burrage et al.'s actor model, brings awareness to relationships between actors in the field as well as the characteristics of professions and the demands and claims they put forward (Conze and Kocka cited in Burrage et al., 1990) (see Chapter 2, 2.4.). Characteristics such as non-manual, full-time, and practise presupposing specialized, systematic, and scholarly training are associated with knowledge-based occupations and occupational groups. Further, if an occupational group demands monopoly of services as well as freedom from control by others on the basis of the group's competence, professional ethics, and special importance for society, it may be described as a profession (Conze and Kocka cited in Burrage et al., 1990). According to Abbot (1988) it is by claiming jurisdiction that a profession asks society to recognize its cognitive structure through exclusive rights, and such claims can be put forward in public, legal, or workplace arenas.

The aim of a practising member of a profession is to control entry by others to their profession and practice of it, and to protect and enhance the corporate interest. To pursue and realize these aims, a profession requires the cooperation of other actors, the state, universities, and their users at minimum cost to their autonomy (Burrage et al., 1990). Other professions or occupational groups are actors of considerable significance for practising professions, and according to Abbot (1988), professions develop when a jurisdiction becomes vacant, either because it is newly created, tenants have left it, or tenants have lost control of their tenancy. The way professions control their knowledge is determined by the relationships between the actors and ultimately the professionalization of their field. The theoretical approach presented above is the starting point for this chapter, which focuses on two groups of actors: practising professionals, and other professions/ knowledge-based occupational groups.

Practising professional's major resource are (1) their organization, (2) their ideology that inspires practice and constrains practitioners and justifies privilege to public service, and (3) persistence (goals of the profession) and proximity (i.e. always being interested and involved in their professional services (Burrage et al., 1990). Burrage et al. distinguish four major ideal types of organizations: discussion circles, lobby organizations oriented towards the state, organizations that negotiate on behalf of their members, and organizations that seek to regulate the members of their profession (Burrage et al., 1990). Other professions and knowledge-based occupational groups (the fifth actor) should be analysed using the same approach as for practising members. The reason why I have included this fifth actor is because I consider interprofessional relations to be significant for how a new work field is established and how division of work takes place. I follow Abbot's (1988) approach that sees professionalization as a process which is pursued by the interrelationship between professions.

In Figure 2 (see Chapter 2, Section 2.8.), Norwegian actors in the field of fish health are placed in the five-actor model, and the starting point is the position of the actors when the first regulation was put in place, namely the Diseases of Fish Act of 1968. The veterinary profession comprises practising professionals in the fish health field, and marine scientists and microbiologists are the fifth actor. Figure 3 (see Chapter 2, Section 2.8.) shows actors in the Scottish fish health field, and microbiologists, marine scientists, fish health inspectors. I place the veterinary profession as a practicing professional because of their role of prescribing medicine for treatment of fish: This role places them within the jurisdiction of the fish health field. But since they are not involved in statutory fish health work, they have not obtained full legal jurisdiction and therefore they may also be placed as other professions with interest in the field. Despite the fact that marine scientists and microbiologists are the fifth actors (other knowledge-based groups) in the Scottish case, I have not dealt with this fifth actor there. Although this knowledge-based group is interested in working in this field there has not been any attempt to professionalize or establish a profession. This group's role as employees' government institutions is described in Chapter 4.

5.1 The case of Norway

The following quote is taken from a minute from a board meeting of the Norwegian Veterinary Association on 15 June 1989:

Education in fish health at the Norwegian College of Fishery Science

In a very lavish brochure with information about students of fish health starting at the Norwegian College of Fishery Science, University of Tromsø, in the autumn, we find that students are being trained to perform *veterinary services*. The same has been stated in the advertisements included in the daily press in the past few weeks regarding the application process. The information brochure notifies that an application has already been made the appropriate ministries for fish health graduates to have the right to prescribe medicines. The DNV's last board meeting regarded the situation as serious. It was decided to write to the NFH to point out that the veterinary title is protected. It is unthinkable to allow the graduates to perform fish health veterinary services, just as it is not possible for other personnel than doctors to provide medical services. (*Norsk Veterinærtidsskrift*, 1989, no 7, p. 638; my translation)[87]

In many ways, the minute is representative of the struggle between the veterinary profession and the universities in Norway, and sheds light on how the struggle became tougher with the establishment of fish health educators and their application for the right of graduates to prescribe medicines. The universities challenged the veterinary profession's jurisdiction, yet the veterinarians did not want their work field to be encroached upon by other occupations.

In 2005, the science milieus at the University of Bergen and the University of Tromsø celebrated the winning of a 15-year long jurisdictional struggle in the legislation arena. Their fish health biologists had gained the right to prescribe medicines and were finally juxtaposed with veterinarians in the fish health field, through the following Norwegian regulation:

- *Regulation for resolution about the right for aquamedicine biologists to requisition medicines shall enter into force*.[88] Prescribed by the Ministry of Agriculture and Food

[87] 'Fiskehelsestudiet ved Norges Fiskerihøgskole. I en meget påkostet brosjyre med informasjon om det studium for fiskehelsekandidater som starter ved Norges Fiskerihøgskole/Universitetet i Tromsø til høsten finner vi at kandidatene skal utdannes til bl.a. å utføre veterinærtjenester. Det samme vil framgå av de annonser som er tatt inn i dagspressen i de siste par uker vedrørende opptak til studiet. I informasjonsbrosjyren meddeles det at en allerede har søkt de behørige departementene om forskrivningsrett av legemidler for kandidatene på fiskehelsestudiet. DNV's sentralstyre så alvorlig på situasjonen i sitt siste møte. Det ble besluttet å tilskrive Norges Fiskerihøgskole for å gjøre oppmerksom på at veterinærtittelen er beskyttet. Det kan derfor ikke bli tale om å la fiskerikandidatene utføre veterinærtjenester, like lite som annet personell enn leger kan utføre tjenester.' (Norsk Veterinærtidsskrift, 1989, No 7, p. 638).

[88] My emphasis.

the 12 of July 2005 pursuant to the Act of 15 June 2001 No. 75 relating to Veterinarians and Other Animal Health Personnel section 38, second paragraph.

- Act of 15 June 2001 No. 75 relating to Veterinarians and Other Animal Health Personnel section 17, second paragraph shall enter into force.
- The regulation applies from 15 August 2005.[89]

The reopening of the Veterinary Surgeons Act in 1994 was a predecessor that affected the decision to allow fish health biologists to requisition medicines. It took several years before new veterinary legislation was in place. The Veterinary Surgeons Act dated from 1948 and the need for change was justified by structural changes in agriculture, the WTO and the EEA agreement providing a new framework for international trade in live animals and animal products, and a fast expanding fish farming industry (Ot.prp. nr. 52 (2000-2001)).

In 2001, the Act of 15 June 2001 relating to Veterinarians and Other Animal Health Personnel replaced the Veterinary Surgeons Act of 1948. Under the act aquamedicine biologists were authorized to requisition medicines for aquatic animals, with the exception of marine mammals. However, the right did not apply until August 2005, due to the fact that the Norwegian Government represented by the Ministry of Foreign Affairs and the Ministry of Agriculture saw the EEA agreement[90] as an obstacle. In a new directive,[91] however, the EU left it to each country to decide what occupational groups were qualified to requisition veterinary medicines (Landbruks- og matdepartementet, 2005).

Thus, a matrix of structures and social relations resulted in legislative recognition of aquamedicine biologists as a profession with legislative rights. In Chapter 6, I return to the profession's jurisdictional discourse between the veterinary professions on the one side and aquamedicine biologists and universities on the other side concerning the reopening of the Veterinary Surgeons Act and the amendment of the EU directive.

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[89]Forskrift om vedtak om ikrafttredelse av rekvireringsrett for fiskehelsebiologar. Fastsatt av Landbruks og matdepartementet 12 juli 2005 med hjemmel i lov 15 juni 2001 nr 75 om veterinærer og annet dyrehelsepersonell §38 annet ledd.
Lov 15.juni 2001 nr.75 om veterinærer og annet dyrehelsepersonell § 17 annet ledd skal tre i kraft. Ikrafttredelsen skal ha virkning fra 15. august 2005.

[90] Directive 81/851/EØF and Directive 00/37/EF

[91] Directive 2004/28/EC

5.1.1 Current veterinary legislation – authorization, protected title, and the right to prescribe medicines

Under current veterinary legislation, Veterinarians and Other Animal Health Personnel Act of 2001(Dyrehelsepersonelloven), Chapter 2, Section 4 states, '[a]ny person who can provide documentary proof of having taken a relevant degree at a Norwegian university or university college of science is entitled to authorization to practice as a veterinarian or an aquamedicine biologist.' Animal health personnel's duties and right are to promote the welfare and health of animals, including stocks of animals living in the wild, to contribute to ethically and environmentally sound animal husbandry and to protect society against hazards and damage caused by animal diseases or by food and products of animal origin (§12).

The title of veterinarian is protected and only veterinarians may requisition prescription medicines for animals. Notwithstanding the first paragraph of the Animal Health Personnel Act, aquamedicine biologists may requisition prescription medicines for aquatic animals, with the exception of marine mammals (§§ 16 and 17 of the Animal Health Personnel Act of 2001).

Through the Veterinary Surgeons Act of 1948 (amended by the Veterinarians and Other Health Personnel Act of 2001), the veterinary profession had the monopoly over prescribing medicines, including those for fish, up until 2005. As part of the autonomous agriculture sector that both educated and employed its own professions, their position in the field of animal health was unquestioned when fish farming started to develop as an industry. The Diseases of Fish Act of 1968 built on the Veterinary Surgeons Act, and fish health services were added as part of the state veterinary service.

5.1.2 The Norwegian veterinary profession

In this section I describe some general characteristics of the Norwegian veterinary profession, and specific events related to fish health. I do not cover the professionalization of the veterinary profession, yet interestingly Asdal (2005) remarks that although the veterinary profession and veterinary and agriculture institutions have had a key role in the shaping of the Norwegian food and health policy since the 1890s, it is remarkable that their role has not been a topic of broad historical investigation. Norwegian veterinary history has been written by veterinarians themselves (Frøslie and Ødegård, 1991; Horne, 1925; Malm, 1899; Minsaas, 1988a og b); Kari Tove Elvbakken (1997) was the first person outside the profession to give a

description of veterinary history, with focus on food control. Another and more recent study of the veterinary system is Kristin Asdal's (2005) book on the impact of boarder traffic on food policy and veterinary history. In Sweden, Inga Hellberg (1978; 1990) has studied the professionalization of Swedish veterinarians. Her main focus is on relationships between veterinarians and the state and how veterinarians sought to persuade the state, as the ultimate guarantor of a knowledge and occupational monopoly, to allow veterinarians to protect vital social interests (Hellberg, 1990, p. 174).

The Norwegian veterinary profession's history dates back to the end of the 1700s century and the Union between Norway and Denmark. The Danish veterinary school in Copenhagen was established in 1773 and admitted also Norwegian students. Trainee veterinarians were to be engaged in particular tasks with horses, and the Danish cavalry regiment was to have an officer or a subordinate officer as a student at the veterinary school. Thus, it was through the military that the state used veterinary knowledge and veterinarians manual skills (i.e. in farriery). The arrangement did not come into full effect until 1816. In 1814, c.50 veterinarians and horse doctors and/or farriers (*kursmeder*) graduated from Copenhagen. Already in 1815, the Norwegian parliament had debated the possibility of providing veterinary education in Norway, but it was to be a 120 years before the Norwegian Veterinary School was established (Elvbakken, 1997; Horne, 1925).

Traditionally, relations between the veterinary profession and the Ministry of Agriculture have been strong in Norway. In 1890, the state veterinary service was separated from the medical service and transferred to the Ministry of the Interior (Indredepartementet) with Chief Surgeon Ole Malm[92] as executive for the Veterinary Office.[93] The Ministry of the Interior was also responsible for agriculture (Elvbakken, 1997). State veterinary affairs had become part of the Ministry of Agriculture's remit when it was established in 1900. Ole Malm wanted state veterinary affairs to be managed by a director, separate from state medical affairs and co-ordinated agriculture affairs (Elvbakken, 1997, p. 214). He succeeded in becoming Chief Veterinary Officer (Veterinærdirektør) for the civil veterinary service in 1894 (Horne, 1925, pp. 4–5). State-paid positions as county veterinarians (*amtsdyrleger*) were established, and later county veterinarians were replaced by local veterinary services in 1920.

In Norway, in the first part of the 19th century, the field of food safety control involved veterinarians, engineers, and technologists, but no professions had a specialized

[92] In 1887, Malm received a scholarship to study veterinary science, and in 1989 he was awarded a degree in veterinary science (Elvbakken, 1997).

[93] In Sweden, state veterinary affairs were separated from state medical affairs in 1914 (Hellberg, 1990).

education for this work field. Whereas medical doctors were an important profession in the food control field during the late 19th century, they are no longer involved today (Elvbakken, 1997, p. 195).

The veterinarians established a monopoly of tasks through the control of meat, administered by the local municipal health committees (*Helserådene*). Through this monopoly, the veterinarians gained an alternative role whereby farmers were regarded as clients, and thus veterinarians controlled access to the labour market. In line with Elvbakken (1997), it is reasonable to anticipate that the veterinary profession strengthened its general position in society through its general scientific knowledge orientation and its position in public health work in the municipalities.

From the 1950s, the veterinary profession became the leading profession in food control in Norway. Elvbakken and Hellebø (2000) state that medical doctors had 'left the field' and allowed veterinarians to take over. Thus, the development of food control in Norway is characterized by a move from health policy to agricultural influence (Elvbakken and Hellebø, 2000, p. 4).

In the 1960s the veterinary professions also became involved with fish, albeit reluctantly. In the 1980s the professions' interest in fish farming increased, and by the late 1980s the Norwegian Veterinary Association (Den Norske Veterinærforeningen, DNV) was working towards a better veterinary service for fish farmers and increasing the capacity of the laboratories (*Norsk Veterinærtidsskrift*, 1988, No 1, p. 49-50). The veterinary professions and veterinary authorities responded to the fish farming industry's need for control of serious diseases (i.e. 'Hitradisease' and furunculosis) and to the challenge from the marine scientists based at the universities that wanted to get more involved in research on fish health.

5.1.3 The Norwegian Veterinary Association

The Norwegian Veterinary Association (DNV) is over 100 years old and was established in 1888 with the objective to support the state veterinary service and the veterinary profession's interests.[94] In 1888, there were 106 veterinarians in Norway (Minsaas 1988a). Although local veterinary services had been established and veterinarians had had a veterinary association for almost 50 years, it was not until 1935 that the Norwegian College of Veterinary Medicine was

[94] 'at virke for fremme af så vel dyrlægevesenet som standens interesser' (Minsaas, 1988a), p. 26).

established. In 1920, there were c.250 registered veterinarians in Norway, 1142 in 1980, and 1967 in 2000 (St.prp. nr 54 (1999-2000); *Veterinærstatistikk* 1988).

The founders of DNV considered it important to establish a veterinary record and the first number of *Norsk tidsskrift for Veterinærer* was published in 1989 (Minsaas, 1988a). The journal's editor was Ole Thesen, Chairman of DNV. Thesen taught veterinary science at the Agricultural University of Norway at Ås (Elvbakken 1997, p. 219). After he died in 1895, Ole Malm continued as editor until 1897, when he was replaced by Halvor Horne. Malm and Horne both worked for the government and were involved in research. According to Elvbakken (1997, p. 220), they can be described as management and research personnel '*forvaltningens (og forskningens menn)*'. *Norsk tidsskrift for Veterinærer* changed name several times, and from 1948 to 1969 the record was only a member's bulletin. During that period Nordic veterinary associations published scientific articles in the journal *Nordisk Veterinærmedisin* (Nordic Veterinary Medicine). After 1970, the journal again became more scientific in its orientation (Elvbakken 1997, p. 221).

In a chapter in memorial volume for DNV's 100-year anniversary, Grøndalen (1988, p. 210) deals with untraditional work fields for veterinarians, including engagement in fish disease problems. In the early 1960s it had not yet been settled that fish diseases would were the responsibility of veterinarians. However, Tore Håstein, had been engaged as the first 'fish veterinarian' by DNV in 1967, contributed to the memorial volume a whole chapter on the fish farming industry and veterinarians (Håstein, 1988).

From the start, DNV has been both a union and a professional association. All Norwegian veterinarians and veterinarians working in Norway can be members. DNV negotiates wages and terms for its members (*Vetnett*, n.d.). Today, approximately 90% of the employed veterinarians are members in the DNV. In addition, in accordance with Chapter 2 of Act No. 75 of 15 June 2001 relating to Veterinarians and Other Animal Health Personnel (Dyrehelsepersonelloven av 2001), any person wishing to practise as a veterinary surgeon has to hold a licence issued by the Norwegian Food Safety Authority.

Today, DNV is affiliated to the Federation of Norwegian Professional Associations (Akademikerne), an organization dedicated to improving the salaries and working conditions of professionals with a higher education. The federations' members include lawyers, engineers, psychologists, researchers, doctors, veterinary surgeons, clergy, social scientists, architects, business school graduates, economists, dentists, agronomists, and officers in the armed forces. The Federation of Norwegian Professional Associations has 13 member organizations, with a total of c.131,000 members (Akademikerne, n.d.). Approximately 90%

of veterinarians in employment are members of DNV, and the aim of DNV is to promote and handle the profession's economic, professional, collegial, and social interests. Only Norwegian veterinarians and veterinarians working in Norway can be members of DNV.

5.1.4 Akvaveterinærenes forening (The Norwegian Aquaculture Veterinary Association)

The Aquaveterinarians Association (Akvaveterinærenes forening. AVF), a subgroup (Særforening) of the Norwegian Veterinary Association, was founded in 1990 with the aim of supporting its members' professional, collegial, and political interests. The association developed supplementary courses and works for aquaculture issues on behalf of the DNV, politicians and public authorities. Currently, the AVF has a closed forum on the Internet, where members can discuss subjects and exchange views with colleagues. Members contribute regularly to *Norsk veterinærtidsskrift*. Membership of the AVF automatically includes membership of the DNV.

A few months after the AVF was established, the membership had risen to almost 100 members. The AVF board already aimed to discuss the agreement between the DNV and NFF about the standard agreement relating to veterinary service in fish farming. They specifically wanted to discuss goals for work related to fish health work. They also wanted to discuss whether or not it should be possible to allow non-members to subscribe to their magazine *AKVAVET*. They decided that this magazine should be only for members and that it should be a place where the members could debate more informally; a more public journal would have required another type of approach to exchanges of information. The AVF was also concerned about the use of antibiotics in the fish farming industry and planned to contact the Ministry of Social Affairs about the problem (*Norsk veterinærtidsskrift*, 1991,no 3, pp. 251–253). The AVF's aim was to serve as forum for discussions and as an interest organization for aquaveterinarians, and was one of five subgroups of the DNV. They were the voice of veterinary professions in matters concerning fish farming. Negotiations with the state are the DNV's responsibility.

5.1.5 The Norwegian Veterinary Institute and veterinary fish disease research

The National Veterinary Institute (NVI) was established in 1891 (under the name Veterinær-pahtologisk Laboratorium).[95] The institute was the first in Scandinavia without any connection to an educational institution (Frøslie and Ødegaard, 1991, p. 10). When the Norwegian Veterinary School was established in Oslo in 1937, scientific personnel from NVI were recruited to work at the school. The proper organization of state veterinary services and the establishment of the veterinary laboratory soon had a general effect that resulted in enhanced diagnostic work, improved reporting, and more intensive measures to combat infectious animal diseases (Sandvik, 1992, p. 22). In the late 20th century, the NVI did not deal solely with infectious animal diseases, but also had considerable involvement regarding other types of animal diseases.

As Norway's central scientific and diagnostic institution, the NVI has acted in an advisory capacity to veterinary authorities with regard to disease control and the administration of official regulations. The task has expanded from concerning the health of just livestock to also fish, domestic reindeer, and game. According to Sandvik (1992, p. 56), many members of staff at the NVI have fulfilled important functions as members of official committees established not only by the Ministry of Agriculture but also by other official bodies. One such example is Tore Håstein's role in the official committee that provided expert advice on the first Diseases of Fish Act. There are close interrelations between staff at the NVI, the Ministry of Agriculture, and other official actors in the agricultural sector (Kjæmpenes, 1988).

However, not much research was conducted on fish diseases by veterinarians until the 1960s, with the exception of Aaser's doctoral thesis in 1923 and the recipient (a veterinarian) of a scholarship to study fish diseases, awarded by the Municipal Health Committee in Bergen, (Grøndalen, 1988, p. 210). According to Håstein (1991, p. 212), some samples from fish were sent to the NVI for examination in the period after World War II. In the 1950s, very few samples, mostly taken from live wild fish were sent to the Institute. Most of the work involved new material and diagnostic work on different parasite species. At the time, there was not a large demand for scientific expertise in fish disease diagnostics. In the 1960s

[95] Sweden established a state veterinary laboratory in 1914, while in the UK a veterinary laboratory was establish in Weybridge in 1917.

however, the need for scientific expertise increased parallel to the increase in disease problems in the fish farming industry.

In the period 1961–1967, Gunnar Holth, a wildlife pathologist at the NVI, took care of samples sent by fish farmers. In addition to fish disease work at the NVI, veterinarian Gunnar W. Eide was awarded a scholarship from the Regional Development Fund in 1962, on the recommendation of the Directorate of Fisheries in Bergen. Eide studied the pathology of farmed fish kept in seawater in England (Grøndalen 1988, p. 210).

During the 1960s, research on fish expanded rapidly, and there was a need for a fish pathologist at the NVI. The post was administered by the Directorate for Hunting, Game Fishing[96] in Trondheim, but the workplace was located at NVI in Oslo (Håstein, 1991, p. 212; Sandvik, 1992, p. 54[97]). According to Sandvik, the arrangement was due in part to the fact that the salary was paid by the newly established State Angling Fund (Fiskeavgiftsfondet) that in turn earned its income from fishing licence fees, and in part to the fact that at the time the Directorate was a part of the Ministry of Agriculture (Sandvik, 1992, p. 54). The involvement of angling interests in the first phase of fish diseases research and diagnostic work in Norway was parallel to the situation in the UK.

In his examination of Animal Health Standards in Norway from a historical perspective, Olav Sandvik, as former Director of the NVI (1975–1983), stated that even though the NVI in the 1960s considered that the need for special expertise in diagnostic work involving fish was quite clear, the Ministry of Agriculture and the veterinary authorities had adopted a waiting attitude:

> [A]t the same time, a struggle was in progress as to who should have the responsibility for dealing with fish diseases. Zoologists were not in favour of veterinarians involving themselves in a scientific field which they felt was primarily one for biologists, first, and foremost parasitologists. On the other hand, there were fish biologists who expressed a view that veterinarians should take on this work, as they had, inter alia, a well organised infrastructure at their disposal to deal with problem in the field. As will be quite apparent, there was a dispute right from the start as to who should deal with problems raised by fish diseases. (Sandvik, 1992, p. 54)

[96] Direktoratet for jakt, viltstell og ferskvannsfiske, now the Directorate for Nature Management (1985).

[97] Olav Sandvik was former Chief Veterinary Officer (Veterinærdirektør) (1983–1990), former Director of the Veterinary Institute of Norway (1975–1983), former Principal of the Norwegian College of Veterinary Medicine (1963–1975), and Professor in Microbiology and Immunology.

On 1 April 1975, Tore Håstein was employed as veterinary inspector in fish diseases, and in May of the same year he was awarded as PhD in fish disease vibriosis by the University of Stirling, Scotland. By 1986, three veterinary graduates, in addition to Tore Håstein, had been awarded a doctoral degree in fish pathology (*Norsk veterinærtidsskrift*,1986, No. 11, 869-872).

Resources available for work on fish disease problems were very meagre for a number of years. Sandvik stated that the need for research in what was, in many ways, a completely new discipline, was bottomless. The tremendous extent to which the domestication of salmonids in sea cages came to be carried out caused an explosion in the range and frequency of the infectious diseases encountered. New infectious diseases emerged, as well as new manifestations of previously known conditions (Sandvik, 1992, p. 54):

> The concessionary policy which was practised in the development of the fish farming industry interfered with the establishment of the necessary infrastructure, competence, and capacity, to tackle the considerable disease problems which inevitably came to afflict the industry. Efforts were at the same time hampered by insufficient resources, and by overlapping responsibilities and poor cooperation on the part of the authorities on the one hand and by poor discipline, competence, and cooperation on the part of many fish farmers on the other. (Sandvik, 1992, p. 54)

Sandvik also stated that matters began to improve from the mid-1980s onwards. More posts were created at the NVI, regional veterinary laboratories, regional veterinary offices, and in central government administration. However, in 1981 a report[98] published by a committee appointed by the Ministry of Agriculture to examine the new organizational structure of the veterinary service at regional and district level, did not give much attention to disease problems faced by the fish farming industry (NOU 1981:10).

Considering the veterinary authorities' engagement in fish farming, Sandvik was probably correct in his observation that matters had begun to improve in the mid-1980s. Veterinary services at all levels were increasingly adapted to the situation created by the growth of aquaculture. At the same time, Norwegian universities were planning to establish courses in fish health.

[98] The report is dated 3 February 1981.

5.1.6 Revision of the Veterinary Surgeons Act

In 1994, the Veterinary Surgeons Act of 1948 was reopened due to its need to encompass new social and professional challenges, as well as all animal health personnel (Ot.prp. nr. 52 (2000-2001)). The process of including all animal health personnel was parallel to the Health Personnel Act of 1999.[99] The government considered that radical changes in animal husbandry and rapid development of the fish farming during the previous 25 years had resulted in new vocational challenges for veterinarians, which need to be incorporated in a new animal health personnel act.

The discourse on authorization and the right to prescribe medicines should be seen in connection with the reopening of the Veterinary Surgeons Act, yet before that the Diseases of Fish Acts had laid some premises for the discourse. The reopening of the Veterinary Surgeons Act turned out to offer a new opening for universities and the fish health biologists in their efforts to achieve authorization and the right to requisition medicines for aquatic animals. Management responsibility for the Diseases of Fish Act in 1997 was divided between the Ministry of Agriculture and the Ministry of Fisheries. This division left the door open for authorization of fish health biologists to prescribe medicines (as described in Chapter 6).

5.1.7 The public veterinary service and the veterinary profession's role in the field of fish health

In the 1960s, the organization of a veterinary service that was to become wide-ranging was a decisive argument for veterinarians' and the Ministry of Agriculture's involvement in fish diseases and related diagnostic work. Although veterinarians as a profession initially did not show any particular interest in the field, the veterinary service had responsibility for fish health under the Diseases of Fish Act of 1968. Furthermore, the veterinary service turned out to be an important factor and a decisive argument for the necessity of having veterinarians involved in fish health, despite having been criticized by fish farmers for not giving priority to fish farming. The veterinary service has a history, dating back to the 1890s, when it was formally established as a distinct entity by royal decree (Sandvik, 1992). The Veterinary Laboratory was established in 1891 in Oslo to serve the veterinary system with laboratory services. Once again, there was a close connection between institutions in the veterinary field.

According to Sandvik (1992), the history of the veterinary service in Norway is in many ways also the history of the National Veterinary Institute (NVI).

In 1979, 30 years after the veterinary service first was examined,[100] an examination of local veterinary services was carried out. A committee was appointed by the Ministry of Agriculture to examine the local veterinary service scheme. The committee submitted its report in 1981 (NOU 1981:10). Considering the development of the fish farming industry during the 1970s, it could be expected that veterinary service's fish health work would be dealt with to some extent in the report, but fish diseases and fish health work are not much attention. This is probably due to the fact that fish farming was a small part of veterinarians' responsibility, and all fish farms were concentrated in a few counties. Although fish farming was becoming part of the public debate through the Lysø Committee's work (report in NOU 1977:39), fish health work was not given much attention by the veterinary authorities in their examination of veterinary services published in 1981. Only one sentence mentions the new challenges relating to freshwater fish diseases in the future:

> In addition, the combat of infectious diseases in freshwater fish demands increased veterinary participation. (NOU 1981:10, p. 16; my translation)[101]

In the late 1970s and early 1980s fish diseases were not considered by the veterinary authorities to be among future challenges likely to face local veterinary services. In 1988, however, the situation changed dramatically. A new report on the veterinary service was submitted (St. meld. nr.9, (1988-89))[102] and already in its first section the Ministry of Agriculture mentions fish farming:

[100] The last report was dated 20 December 1946. In April 1946, the Ministry of Agriculture appointed a committee to examine local veterinary services (distriktsveterinærordningen) (NOU 1981:10).

[101] 'I tillegg krever bekjempelsen av smittsomme sjukdommer hos ferskvannsfisk økt veterinær innsats.' (NOU 1981:10, p. 16)

[102] The report is based on NOU 1981:10, and a discussion document on local veterinary service that was out for sent out for consultation in 1987 (Landbruksdepartementet, 1987).

> Simultaneously with rapid changes in livestock farming from the 1960s and onward, the fish farming industry has developed rapidly, accompanied by new and large challenges. (St. meld. nr. 9 (1988-89), p. 7; my translation)[103]

Almost 20 years after the Diseases of Fish Act was enacted in 1968, fish farming was for the first time considered by the Ministry of Agriculture as representing a new challenge for the veterinary service. The ministry proposed an adjustment of the local veterinary service according to the structural changes in husbandry and the expanding fish farming industry. A White Paper (St. meld. nr.9, (1988-89), p. 27) mentions that the expansion of fish farming in areas where animal farming is of less importance poses a challenge because veterinary services in such districts have not kept up with developments fish farming industry. In 1988, the Norwegian parliament granted funding for the establishment of three new posts for specialist veterinarians at the headquarters office of regional veterinary officers (St.prp. nr. 1 (1987-88), Chapter 1107).

It should also be mentioned that for the veterinary profession there were many issues other than fish farming of importance to be addressed in relation to the reorganization of the state veterinary field service 1989. The NOU report published on the district veterinary field service (Distriktsveterinærordningen) represented the beginning of the process (NOU 1981:10). In autumn 1981 there was a shift in political leadership. The Conservative Party (Høgre) won the general election and Johan C. Løken replaced the Labour Party minister (of the Ministry of Agriculture). The new political leadership had other political viewpoints on the future state veterinary service. In 1983, for the first time, the DNV's leadership saw it necessary to call a meeting with the Ministry of Agriculture's political leadership:

> [S]uch meeting with political leadership has seldom or never been used in the association's past, but should prove to become a useful step in the future, both in this case and in other matters of special importance for the relationship between the association and the veterinary authorities. (Minsaas, 1988b, p. 260)

[103] 'Samtidig med de raske endringene det tradisjonelle husdyrbruket har gjennomgått fra 60-årene og utover, har det skjedd en rivende utvikling innen fiskeoppdrettsnæringen med de store, nye utfordringene denne representerer.' (St.meld. nr. 9 (1988-89), p. 7)

In 1989 the new state veterinary service was in place, also with a focus on veterinary services for the fish farming industry. However, for the veterinary profession, the achievement had been a long process, with negotiations with the political leadership that changed several times during the 1980s. Even in 1985, the profession had ceased all voluntary arrangement in clinical practice in order to focus on their claims (Minas, 1988b). The relief scheme (*avløserordningen*) was one of the important issues for DNV.

In connection with the Waite Paper on fish farming (St. meld. nr. 65 (1986-87) *Om Havbruk*), the Norwegian parliament gave its approval regarding the Ministry of Fisheries' (Fiskeridepartmentet) proposal for strengthening public support for, and administration of, the fish farming industry by using income from a fee to establish seven posts in the central and regional veterinary services.

In 1988, plans were made to increase the number of man-labour years in the state veterinary service in the period 1988–2008 in order to meet demands from the fish farming industry. Fish farming was considered a new industry that had changed the demand for veterinary services (St. meld. nr. 9 (1988-89), pp. 28–32).

There were only seven years between the 1981 report on the veterinary service and the 1988 report, but within this period the Ministry of Agriculture's comprehension of the fish farming industry and engagement in fish health work had dramatically changed. It is important to take into consideration the rapid development of the industry and the pressure it placed on the veterinary services. In 1984 the veterinary authorities allowed (after political pressure) the import of smolt from Scotland. However, the smolt turned out to be infected by furunculosis. Furunculosis and 'Hitra disease' (vibriosis) were two diseases that resulted in severe losses in the 1980s, and consequently the use of antibiotics had increased dramatically. The rapid development of the fish farming industry and the disease problems in the period led to the allocation of additional governmental and research resources. In addition, existing manpower and financial resources were also reorganized, sometimes to the detriment of other important tasks (Sandvik, 1992, p. 55).

5.1.8 Reorganization of the Veterinary Department (Veterinæravdelingen)

During the 1990s, the Ministry of Agriculture and Food had other challenges and made several further reorganizations in it departments. The focus was on food control and several

public report104s[104] proposed changes in the organizational structure in order to meet consumer demands. According to Folkestad (2000), new challenges such as consumer rights, new disease problems in the fish farming industry, international questions relating to the European Economic Area Agreement (EEA), the World Trade Organization (WTO) agreement, and negotiations concerning the EU and border crossing (*grensepassering*) by fish resulted in reorganization whereby operative work was separated from the Ministry's more long-term and general aims such as legislation. The ministry was to concentrate on its role as a political secretary (Folkestad, 2000, p. 36). This is part of what Christensen and Lægreid (2007) call the third element in new public management (NMP) reforms, which resulted in structural devolution that in turn resulted in autonomisation and agentification of public sector organizations.

Under the new arrangements, in January 1996 state veterinary affairs were transferred to the Norwegian Animal Health Authority, a directorate that reported to the Ministry of Agriculture. Following the establishment of the Animal Health Authority, the Ministry of Agriculture was left with half of its original numbers of personnel. The Department of Agriculture, Department of Farming, and the Veterinary Department (Veterinæravdelingen) were dissolved and two new departments were established, namely the Department of Agricultural Policy (Landbrukspolitisk avdeling) and the Department of Food Production and Health (Avdeling for matproduksjon og helse) (Folkestad, 2000).[105]

The former Chief Veterinary Officer (Veterinærdirektør) Gudbrand Bakken became head of the Department of Food Production and Health, a department with responsibility for budgets and profits of the Norwegian Corp Research Institute (Planteforsk), the National Veterinary Institute, the Norwegian Agricultural Inspection Service (Statens landbrukstilsyn), the Norwegian Animal Health Authority, and the Norwegian Food Control Authority (Statens næringsmiddeltilsyn). The title Chief Veterinary Officer was replaced by Director General (Ekspedisjonssjef) (Folkestad 2000). The title of Chief Veterinary Officer could still be used

[103] Article 4 of Act No 64 of 2 July 1999 relating to Health Personnel etc.
(Lov 2. juli 1999 nr. 64 om helsepersonell m.v – "the Health Personnel Act")

[104] St.prp. nr. 8 (1992-93) Landbruk i utvikling, St.meld. nr. 40 (1996-97) Matkvalitet og forbrukertrygghet, St.meld. nr. 17 (1998-99) Verdiskaping og miljø – muligheter i skogsektoren, og St.meld. nr. 19 (1999-2000) Om norsk landbruk og matproduksjon.

[105] In 2003 the Department of Food Production and Health was renamed the Department of Food Policy (Avdeling for matpolitikk).

in international connections. During the year 1998, the distribution of roles between the Ministry and the Animal Health Authority was brought to an end. The Chief Veterinary Officer's authority was delegated to the Animal Health Authority, and former Chief Veterinary Officer Gudbrand Bakken informed that he was no longer Chief Veterinary Officer, in accordance with his wishes. Instead, he continued as Director General for the Department of Food Production and Health.

The public sector in the 1990s undertook NPM reforms, including changes in public institutions in the agriculture sector. With the establishment of the Animal Health Authority as a directorate, veterinary expertise was moved out of the Ministry of Agriculture. The Veterinary Department had been a part of the Ministry of Agriculture since 1900 (Elvbakken, 1997, p. 211). This marked a changed in an almost 100-year old tradition of involving veterinary expertise within the ministry closely with policy-making. It is also striking that the term 'veterinary' was eradicated from institutional terminology. A further change was that in 1997 the responsibility for veterinary education was transferred from the Ministry of Agriculture to the Ministry of Church, Education and Research. The above-mentioned changes shaped a new context for the professionalization process in the fish health field, especially the transference of all education and research under the same roof. It was within this context that the reopening of the Veterinary Surgeons Act and the discourse on a new diseases of fish act took place. The veterinary profession had to focus on large changes in central administration relating to both national and international demands, especially food control issues.

5.1.9 The reopening of the Veterinary Surgeons Act

In 1994, the veterinary surgeons act of 1948 was reopened caused by the need of encompassing the act to new social and professional challenges as well as including all animal health personnel in the act (Ot.prp. nr.52 (2000 -2001)). This process to include all animal health personnel is a parallel to the health personnel act.[106] The Government considers that radical changes in animal husbandry and rapid development of the fish farming during the last

[106] Act of 2 of July 1999, No.64 relating to Health Personnel etc. (Lov 2. juli 1999 nr. 64 om helsepersonell m.v – "the Health Personnel Act")

25 years, give the veterinarians new vocational challenges that need to be incorporated in a new animal health personnel act.

The discourse about authorisation and the right to prescribe medicine must be seen in connection with the reopening of the Veterinary Surgeons Act, but before that the fish diseases acts laid some premises for the discourse. The reopening of the veterinary surgeons act turned out to be a new opening for universities and the fish health biologists in their strife to achieve authorisation and the right to requisition medicines for aquatic animals. Management responsibility for the Diseases of Fish Act in 1997 was divided between the Ministry of Agriculture and the Ministry of Fisheries. This division left, as we shall see in next chapter, the door open for an authorisation of the fish health biologists.

5.1.10 Fish biology and pathology – an integrated part of veterinary studies?

As showed in the preceding section, the veterinary profession's general position in society was strengthened by the field of food control, and therefore food control was a part of the veterinary curriculum, albeit not a central field, when education was established in veterinary science in Norway in 1935. The first professor of public food health control and forensic medicine was appointed in 1938. Professor Aaser's former appointment had been as a State Veterinarian (Statsveterinær) and executive of food control in the capital city, Oslo. He had not produced any scientific publications on food control. It is worth mentioning that in 1925 Aaser was awarded a doctoral degree on the pike plague (*gjeddepesten*) in the 1920s,[107] while he was head of department at the Veterinary Institute, although this was not directly relevant for the interrelationships between fish biologists and veterinarians. His dissertation was the first Norwegian doctoral dissertation in veterinary medicine. According to Håstein (1991), Aaser's work on the pike plague is considered pioneering in both national and international fish disease research, yet at the time fish diseases were not a field of interest in veterinary medicine in general. For Aaser, diagnostic disease work was the driving force, not fish diseases in particular[108]. It took more than 50 years from the first doctoral dissertation until

[107] Håstein (1988, p. 243) mentions that Aaser published his doctoral dissertation in 1923, whereas in a publication in 1991 (p. 23) he states that Aaser was awarded a doctoral degree by the University of Oslo in 1925, on the pike plague. However, Aaser completed his research in 1923.

[108] This has parallels to the 1960s when salmon were regarded as an interesting research subject in order to acquire knowledge about the breeding of Norwegian Red cattle (Norsk rødt fe). The research project 'Rødt fe'

fish biology and pathology became an integrated part of veterinary education in Norway. The work to include fish biology and pathology started in the autumn of 1985. In the new veterinary curriculum in autumn 1987, the biology and pathology of fish and wild animals was taught in a total of 40 course-hours. The special course was available in addition to established courses on fish (Lyngset, 1986).

However, lectures in fish diseases were not delivered at the Veterinary School until 1968. Fish diseases and wild animal diseases were favoured in the new curriculum, with five hours of the syllabus allocated for each subject, and the training was carried out by the Department of Fish Diseases at the Veterinary Institute's laboratory. The course in fish diseases was probably a necessity caused by veterinary responsibility under the Diseases of Fish Act of 1968. During the 1970s, the training increased to 10–12 hours (Lyngset, 1986). During the 1960s, the veterinary profession had not gained responsibility for the field without objections, and there was no agreement within the profession as to whether or not fish diseases should be a veterinary work field (Grøndalen 1988, p. 211). After the enactment of the Diseases of Fish Act in 1968, it took almost 20 years before fish biology and pathology became an integrated part of veterinary studies.

The late integration of fish in veterinary education demonstrates the veterinary professions' ambivalence about becoming involved in the field of fish health. For almost 20 years, neither the Norwegian Veterinary School nor the profession was a driving force in developing a knowledge base in the fish health field. The exception was a member of staff at the NVI, and a few practising veterinarians with special interests. Before fish disease became an integrated part of the veterinary education curriculum, graduates from the Norwegian Veterinary School had attained knowledge through practical experience, education abroad (e.g. the University of Stirling), and continuous courses arranged by the Norwegian Veterinary Association. For example, in 1971, all local veterinary officers had to attend an introduction course on fish biology and fish diseases (Håstein 1988, p. 245). Additional courses were arranged in 1975 and 1978, and since 1984 similar courses have been held annually (Lyngset, 1986).

Olav Lyngset, the Director of Studies at the Norwegian College of Veterinary Medicine (NVH), states that biology and pathology of aquatic animal species used for

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was led by Professor Harald Skjervold from the Agriculture University of Norway at Ås. Initially, Skjervold was not particularly interested in breeding of salmon, but the research turned out to be very successful and later Skjervold became involved in salmon farming and was a key minority member of the Lysø Committee, where he recommended that fish farming should be organized under the Ministry of Agriculture.

breeding did not become an integrated part of the veterinary curriculum until 1986. This means that features specific to fish were taught together with features of mammalian and avian species in the various departments (Lyngset, 1986).

5.1.11 Demand for more veterinarians and more veterinary expertise in fish diseases

In the mid-1980s, the veterinary authorities did not manage to supply the fish farming industry's demand for veterinary services. There were too few veterinarians, especially in rural areas, and there were few veterinarians working in regions and districts where fish farming was practised. The White Paper on the veterinary service provided at regional and district level (St. meld. nr. 9 (1988-89)), was the result of an initiative to investigate the new challenges. The Ministry of Agriculture saw the need to stimulate veterinarians to work in remote rural areas, not only in traditional veterinary practices but also to meet the new demands that the fish farming industry represented. One proposal was that specialist competence should be required in fish farming and pig production (St. meld. nr. 9 (1988-89), p. 30). There was public pressure on the veterinary profession to seek solutions that could meet the demands of veterinarians, and the DNV wanted the state to pay for student places at veterinary schools abroad (President of the NVF, P. Folkestad in *Nationen* 18 May1988, cited in *Norsk Veterinærtidsskrift*, 1988, p. 492). The Government was unwilling to pay for places abroad and the Ministry of Agriculture had to find a solution to meet the need for veterinarians in rural districts.

One alternative was to create veterinary education in Tromsø. In an article published in *Norsk veterinærtidsskrift*, *(*1989, No 1, p. 40), veterinarian Trond Slettbakk[109] wrote that there was a need for unprejudiced debate within the profession regarding whether to concentrate veterinary education in Oslo or to be open to other alternatives. Other strong research milieus were competing with NVH and the NVI to secure funding for research in the fish health field. Slettbakk stated that the profession was in the midst of a battle over future competence in a new field and where this competence should be developed geographically (Slettbakk, T. 1989 *Norsk veterinærtidsskrift*, no 1, p. 40). For the veterinary system, the

[109] Veterinarian Trond Slettbakk from the DNV was chairman of the committee for specialist education in veterinary medicine, appointed in autumn 1988. The committee included members from the DNV, the Ministry of Agriculture, the Norwegian Veterinary School, the Veterinary Institute, and the Norwegian Medical Control Authority.

solution to the political pressure was not to cooperate closely with the universities about veterinary education but rather to establish a veterinary investigation centre in Tromsø with responsibility for supplementary education in fish diseases, reindeer, and wild animals in the Arctic. In a White Paper (St.prp. nr. 1 (1988-89)), the Government provided guidelines for the development of veterinary education and the co-operation of the University of Tromsø. In 1992, the Ministry of Agriculture established the Veterinary Investigation Centre (Veterinærmedisinsk Senter (VETMEST)) in cooperation with the University in Tromsø.[110]

The Veterinary Investigation Centre was supposed to spend more than half of its time on work with fish diseases and fish health as well as upgrading courses for veterinarians in fish health work, whereas the remainder of the time should be spent on work related to reindeer and some other species. Veterinary education was still be provided at the Veterinary School in Oslo, but in the period 1991–1992 the Veterinary Investigation Centre undertook some of the responsibility for follow-up studies for veterinarians, in cooperation with the Veterinary Association and the Norwegian Veterinary School (NOU 1994:16, p. 3).

Simultaneously with the debate on meeting the demand for more veterinarians, there was an on-going debate within the veterinary profession concerning veterinary specialist education. The pressure on veterinary education for more involvement in the fish health field was reflected in the debate. In the autumn of 1988, the DNV appointed a working group to investigate veterinary specialist education and in its report, presented in December 1989, it focused on specialist education within the fish health field (*Norsk veterinærtidsskrift*, 1990, No, 3, p. 171). The DNV's president informed the DNV's Board of Representatives in 1990 that the members of the working group wanted to gain experience in the development of specialist courses and therefore the fish sector was chosen. According to the president, there were several reasons for choosing the fish sector, and one reason was that the Veterinary Investigation Centre in Tromsø had offered their services in this field (Bjørnøy, President of DNV, *Norsk veterinærtidsskrift*, 1990, 102, 11, p. 787). However, there was no agreement on this aim within the veterinary profession. Jorunn Grøndalen from the Small Animal Veterinary Association (Smådyrpraktiserende veterinærer forening, SVF) stated that the DNV's aims for the fish sector means letting down traditional veterinary work. Further, SVF could not have imagined that fish veterinarians were the only ones securing the possibility to specialize in their discipline:

[110] At the end of the 1990s the Veterinary Investigation Centre was transferred to the NVH, and today is the Section for Arctic Veterinary Medicine (Arktisk veterinærmedisin). The section teaches classes on sea mammals, reindeer, and other wild animals.

> In fact, we thought that if fish diseases became a priority for specialist education the need within this field would open a possibility for Norwegian veterinarians to provide clinical specialist education in several disciplines, but it was not in our dream that the fish veterinarians would be the only ones to achieve this. (Grøndalen, *Norsk veterinærtidsskrift*, 1990, 102, 11, p. 808; my translation)

The DNV listened to the resistance against starting with only one specialist education course within the fish field. In 1990 it was decided to establish four specialist fields: fish, small animals, production animals, and horses (*Norsk veterinærtidsskrift*, 1991, No.3, p. 253). Specialist education in the four fields was established in 1993, four years after the universities had established their course in fish health studies. With this step, the veterinary profession gained a stronger position in the work field.

Parallel to this debate within the veterinary profession there were changes going on at the legislative arena. Relating to fish, the two established fish health educations wanted their students to be included in a new Act relating to Veterinarians and Other Animal Health Personnel (Dyrehelsepersonelloven av 2001).

5.1.12 Other professions and knowledge-based occupations

Changes concerning professional work are linked with interprofessional relationships (Abbot, 1988). I have argued that it is necessary to include other professions and knowledge-based occupations as a fifth actor since I consider that interprofessional relations have significance for how new work fields are established and how the division of work takes place. I follow an approach that sees professionalization as a process which is pursued by the interrelationship (Abbot, 1988), as well as the interaction between the other four actors (Burrage et.al. 1990).

5.1.13 Marine research scientists involved in fish health

Marine science is a broad-ranging field that covers subjects as diverse as biology, fish biology, zoology, microbiology, plant physiology, biochemistry, and general physiology, just to mention a few. Common to marine scientists working within this field is that they are involved in questions related to fish health and that they are part of a marine research milieu. There have been many types of knowledge-based occupations involved in the Norwegian fish health field. Time, place and sequences affect when and why they get involved. The knowledge disputes between marine and veterinary scientists related to the 'Hitra disease' in

the 1980s (see chapter six) resulted in the initiative to establish a new fish health education. It was not a coincidence that this initiative came from the marine science milieu in Tromsø and Bergen, because they had succeeded in the development of an effective vaccine against the virus causing the 'Hitradisease'. With the establishment of the fish health education, the marine science milieu was ensured to get economical support for education and research on fish health[111]. A field that otherwise might have remained a veterinary work field, because the agricultural sector had strong traditions for institutionalising the state –research relationship (Gornitzka, 2003, p. 19).

The Ministry's veterinary department was responsible for the Veterinary School and the Veterinary Institute, and they also had its own agriculture university (The Norwegian Agricultural University). If marine scientists wanted to involve in fish disease research they had to gain entry to the agriculture sector's fish health field. According to Halvorsen (1995) sectors have a crucial explanatory power when looking at how professions establish forms of collective actions, identities and practices. As mentioned earlier, there has been a close interrelationship between the veterinary profession and the Ministry of Agriculture, and 'institution identity has been less linked to academia, and more to the sector it was to serve' (Gornitzka, 2003, p. 19). Fish health was established in the late 1960s as a veterinary field, but the vet profession did not manage to provide satisfying fish health services or respond fast enough to the need of knowledge development. The practising profession's (vets') knowledge base was first challenged by marine scientists and microbiologists through the success of the marine science vaccine in the 1980s.

The marine science milieu wanted larger access to the fish health field. The Veterinary School did not educate enough veterinarians to fill the need for healthcare professionals and the marine science milieu established a new aquamedicine biologists study in 1989 (see chapter six). In 1994 the first aquamedicine biologist graduated. The universities applied for a protected title and a limited right to prescribe medicine for fish for their graduates.

In 1997, the Aquamedicine biologists themselves engaged in the process. In Bergen they established a group that worked to gain the right to prescribe medicine (reseptrettgruppen i Bergen) that was an interest group for the fish health students and they cooperated with the students in Tromsø (Killie, 2007). The purpose of this group is obvious, but to gain strength

[111] To build this education the Storting allocated funding for a professor and mid-level positions (mellomstillinger) to the University in Tromsø (Killie,2006).

as an interest group they formed the 'Fiskehelseforeningen' (Aquamedicine Biologist Association) were students and graduated could be members. The initiative to establish the association came from students at the Fish Health Study, Institute of Biology, University of Bergen (BIO-INFO 14/2005).

5.1.14 Fiskehelseforeningen (The Aquamedicine Biologists Association)

In November 1997 "Fiskehelseforeningen" (Aquamedicine Biologists Association) was formed as a professional group of the Norwegian Society of Chartered Engineers (NIF) which is a member of the umbrella organisation for the Federation of Norwegian Professional Associations (Akademikerne). 'Fiskehelseforeningen' is an association of fish health biologists who work within the fields of aquaculture and fish health. In 1999 'Fiskehelseforingen' had 53 members of which the majority was students (Fiskehelse, 1 Juni, 1999, p. 4), and in October 2012 the Association has 154 members that are authorized by or hold a licence issued by the Norwegian Food Safety Authority (personal communication, Kristian Ivsett Johansen, Tekna, October 2012).

The Association's purpose is to promote the members' policy and collegiate interests. Both practising fish health biologists and students can be members. In 2004 NIF changed its name to Tekna – Teknisk-naturvitenskaplig forening and Fiskehelseforeningen changed its name to Tekna Fiskehelseforeningen. Tekna is Norway´s largest society of professionals with a master´s degree or the equivalent, in science or technology. The journal Fiskehelse is published by Tekna Fiskehelseforeningen. The first issue was published in 1999 and it is the only journal in Norway that focuses only on fish health.

In 1997 when the association was established, the Aquamedicine biologists had not yet achieved a protected title and the right to sign prescriptions, something that had been an outspoken goal when the studies were established (Hovlid, Steine og Olsen, 1999). The Association was formed nine years after the first students were enrolled and the first graduates had been practising in the fish health service for three years.

As mentioned earlier, the Veterinary Surgeons Act of 1948 was reopened in 1994 but it became clear after the first hearing in 1996 that such extensive changes in the framework for public veterinarians were needed (see chapter 6) that the process was delayed. In 2000 the bill was sent out for comments. This is the first time that the aquamedicine biologists' association was involved in the process of claiming jurisdiction in the field through the legal arena.

The professionalization process of the Aquamedicine biologists took 15 years. In 2004 EU allowed member countries to decide whether a professional person was qualified to prescribe veterinary medical products or not. The right for the aquamedicine biologists to give medical treatment to aquatic animals, except for sea mammals could be carried out according to the Veterinary and animal health personnel Act of 2001 (see chapter six for more details).

This act gave the aquamedicine biologists authorization. Any person wishing to practise as a veterinary surgeon or as an aquamedicine biologist in Norway must be authorized by or hold a licence issued by the Norwegian Food Safety Authority (Mattilsynet, 06-10 2011). The protected title is "fiskehelsebiologer" in Norwegian and aquamedicine biologists in English.

'Fiskehelseforeningen' gives in the consultative round detailed comments to the Ministry of Agriculture's Veterinary and animal health personnel bill[112]. Its summary states:

> The Fish Health Association is pleased that the Ministry is in favour of adding a restricted prescription right for fish health biologists in as a resting clause in the text. Fish health biologists want to be juxtaposed with veterinarians as animal health personnel when it comes to aquatic animals excluding sea mammals, concerning both rights and obligations. This is important for a fish health biologist in order to carry out their activities as animal health personnel. In essence, the Association asks the Ministry to make changes in § 4, § 19, § 27 § 28 § 32 and § 38 to ensure that fish health biologists have rights and obligations as animal health personnel on an equal footing with vets, in the period until a limited right to prescribe comes in to effect. The Association asks the Ministry to make the necessary changes in the text as outlined (Fiskehelseforeningen, 31 October 2000 (my translation).[113]

The Ministry of Agriculture did take into account the comments from the 'Fiskehelseforeningens' in the Veterinary and animal health personnel Act of 2001. In chapter

[112] Fiskehelseforeningen, 31. oktober 2000. Høring-utkast til Lov om veterinærer og annet dyrehelsepersonell.

[113] 'Fiskehelseforeningen er fornøyd med at departementet går inn for å legge en begrenset reseptrett for fiskehelsebiologene inn som en hvilende paragraf i lovteksten. Fiskehelsebiologene vil sidestilles veterinærer som dyrehelsepersonell når det gjelder akvatiske dyr med unntak av sjøpattedyr, både med plikter og rettigheter. Dette er viktig for at fiskehelsebiologer skal kunne utøve sin virksomhet som dyrehelsepersonell. I hovedsak ber Fiskehelseforeningen departementet om å gjøre endringer i lovens §4, §19, §27, §28, §32 and §38 for å sikre at fiskehelsebiologene får rettigheter og plikter, som dyrehelsepersonell på lik linje med veterinærer, i perioden frem til en aktivering av en begrenset rekvireringsrett. Foreningen ber derfor at departementet gjør de nødvendige endringer i lovteksten som er skissert'(Fiskehelseforeningen,31.oktober 2000).

six I will show that these comments were met by resistance from the veterinary institutions, but for the aquamedicine biologists this would prove to be a very good strategy.

For practising professionals the organisation is a major resource. With the formation of the Association 'Fiskehelseforeningen' the aquamedicine biologists took their first own step to become a profession. It was an important step, because they came in formal position to claim jurisdiction on the legal arena. I will examine their interests in the field closer in the next chapter.

5.1.15 Summary the practising professionals and other professions and knowledge-based occupations

In this chapter I have scrutinised the veterinary professions, the marine scientists and the aquamedicine biologists. Table 10 sums up some of the important events for the interrelationship between them. It is difficult to separate the veterinary institutions from each other because they are so interwoven. I have tried to focus on fish health, but in order to understand for example the veterinary profession's and the veterinary authorities' lack of focus on the field in the 1980s, one also have to look into other issues such as a reorganisation of the State Veterinary Service. This was an issue that took a lot of the Veterinary profession's and the government's time and resources. It should also be added that if the profession wanted to control the fish health field from being entered by other professions and enhancing their corporate interest (Burrage et.al. 1990), the reorganisation of the veterinary service would have been an opportunity to reinforce the profession's jurisdiction in fish health.

Although the Veterinary Institute (VI) was involved early in diagnostic work through the veterinary system's administrative responsibility for the Diseases of Fish Act of 1968 (Fiskesjukdomslova av 1968), fish health was considered an untraditional veterinary work field in the 1960s and 1970s (Grøndalen, 1988, p 211). In the 1980s the Veterinary authorities and the profession did not manage to respond to the rapid development of the fish farming industry and the disease problems. The marine scientists wanted to break the agriculture sector's hegemony and the vet monopoly in the fish health field. Their first opportunity in this process was to prove that their knowledge would benefit the industry. With the development of the effective "Hitradisease" they received recognition for their knowledge. The next step was to establish the aquamedicine education. A prerequisite for the education was the graduates' prescription right. They had to claim jurisdiction on the legal

arena in order to be juxtaposed with vets already holding a jurisdiction. The knowledge-based occupation itself came late on to the jurisdiction arena. The time however was just right, because the Veterinary Surgeons Act of 1948 was reopened and a new bill was proposed (the Veterinary and Animal Health Personnel Act of 2001). Despite the aquamedicine biologists involved in the process, the universities were still important actors in the professionalization process.

Table 10 Norway: Practicing professionals and other professional or knowledge-based occupations involved in the fish health field, their organizations and events of importance.

Year:	1960-1970	1970-1980	1980-1990	1990-2005
Knowledge-based occupations involved in 1) fish disease research 2) notifiable fish disease work	-Veterinary profession involved in research and notifiable fish disease work from1968 (1&2). -Fish pathologists/ marine scientists involved in research (1) -Agriculture scientists involved in research (1) -Microbiologist (marine) involved in research(1)	→	→	Veterinary profession 2001:Aquamedicine biologists receives status as a profession 2005:, allowed to prescribe medicine in 2005 (1&2).
			1984; Import of smolt infected by furunculosis from Scotland. 1987 The Hitradisease vaccine allowed for testing. Developed by microbiologists from MRI Bergen and the University of Tromsø 1988: 10 new veterinary posts within the SVS caused by the fish farming industry's demand for service. 1989: Fish health biologist (Aqua medicine biologists) education established.	
Individual actors	Tore Håstein, Veterinarian, VI			

	Harald Skjervold, Professor in breeding, Norwegian Agriculture School Emmy Egedius, microbiologists, IMR.	Dag Møller, Marine Researcher (Zoologist) IMR		Heidrun Wergeland, Microbiologists, Institute for Biology.
Claiming jurisdiction on the public, legal or workplace arena?	1968: Veterinary Authority responsible for the Diseases of Fish Act of 1968. No active claiming of jurisdiction.		Aquamedicine biologists claim jurisdiction on legislation arena. Veterinary professions claims continued monopoly both in public and the legal arenas	2005: Vets and Aquamedicine biologists shared jurisdiction
Regulations exercised by state institutions	Diseases of fish Act 1968, Ministry of Fisheries. Veterinary Surgeons Act of 1948			**1990:** The temporary fish diseases act. 1997: New diseases of fish act. **1992:** the Ministry of Agriculture establishes the Veterinary Investigation Centre in Tromsø. **2003:** Act relating to food production and food safety, etc. (Includes Fish diseases, Ministry of Fisheries responsible) **2004:** EU directive **2004/28**: amending Community code relating to veterinary medical products **1994**:reopening of the Veterinary Surgeons Act **2001:** Veterinarians and other health personnel (amends the veterinary surgeons act)
Type of organization	The Norwegian Veterinary Association (NVF): a union and professional association			1990: Aqua veterinary Association established (Subgroup of NVF): Both a professional, collegial and political interests' organisation. Represents the NVF in fish health matters.

Governmental Committees involving veterinary issues.	1967: Ministry of Agriculture expert committee to investigate fish diseases		1981: Committee appointed by the Ministry of Agriculture to examine the veterinary service. N 1984: Draft new Diseases of fish bill from the Ministry of Agriculture, Ministry of Fisheries and NFF working group. 1988: Report on the veterinary service. Fish farming an important issue.	

5.2 The case of Scotland

The veterinary profession in the UK has features described in the Anglo-American model in profession theories, where the system favours guild-like and market-related development in professions. In this model, a professional association is in charge of education, examination, and licensing (Svensson and Evetts, 2003). The Royal College of Veterinary Surgeons (RCVS) is the statutory regulator for the veterinary profession in the UK. Registration is a prerequisite to being allowed to practise. The RCVS undertakes the responsibilities set out in the Veterinary Surgeons Act 1966, i.e. to maintain a register of veterinary surgeons eligible to practise in the UK; to regulate veterinary education in the UK, and to regulate professional conduct (Royal College of Veterinary Surgeons, 2012). In Continental and Scandinavian professionalism there has been close cooperation between professional associations and government bureaucracies (Svensson and Evetts, 2003), and one effect of this is that in Norway the authorization and licence to practise as a veterinarian or aquamedicine biologist is granted by the Norwegian Food Safety Authority under the Act relating to Veterinarians and Animal Health Personnel of 2001 (Mattilsynet, 2011). The Veterinary Surgeons Act of 1966 is a UK public general act that applies to the UK as a whole. Scotland does not have a separate legislation for veterinarians.

5.2.1 British veterinary surgeons and the British Veterinary Association – a brief history

According to Boden (n.d.)[114] the British veterinarians were a disparate and disorganized group in the mid-19th century. The Royal College of Veterinary Surgeons (RCVS) had received a royal charter in 1844. The RCVS had registered members but there were 'no exclusive rights to the title and anyone could call himself a veterinary surgeon' (Boden, n.d.). At the time, two colleges taught veterinary courses: William Dick's Veterinary College in Edinburgh and the Royal Veterinary College in London. The RCVS awarded diplomas to the graduates from the London College, whereas the Highland and Agricultural Society validated the Scottish awards. However, after the Veterinary Surgeons Act was passed in 1881, the Army Veterinary Department and the British Veterinary Association were formed. Under the Veterinary Surgeons Act the title Veterinary Surgeon was restricted to members of the RCVS (Boden, n.d.). According to Carr-Saunders and Wilson (1933), the RCVS became an organ of the state for the certification of veterinary surgeons by virtue of its role of register members and admit membership to those who passed the examination.

The *Veterinary Record* was launched in 1887 and since then it has been the main journal for the veterinary profession in the UK (Boden, n.d.). In 1920, the Veterinary Surgeons Act of 1881 was amended and the RCVS was permitted to levy a registration fee, which provided a source of income for the college. In 1984, the Economic Advisory Council Committee on Cattle Diseases recommended that a state veterinary service should be established (Pattison, 1991). According to Pattison, the NVMA (National Veterinary Medical Association) supported the idea and envisaged

> a department of animal health headed by a principal veterinary officer responsible to the Minister of the State, backed up by area, county municipal and laboratory officers. The Animal Health Division of the Ministry of Agriculture and Fisheries, established on April 1, 1938, was based on this plan. (Pattison, 1991, p. 474)

The next significant episode was the enactment of the Veterinary Surgeons Act in 1948, and with this act the veterinary schools were absorbed by the university system (Pattison, 1991).

[114] Edward Boden was editor of the Veterinary Record, 1973–1991 (British Veterinary Association, n.d., What's the difference between the British Veterinary Association (BVA) and the Royal College of Veterinary Surgeons (RCVS)?)

Today, the RCVS is the statutory body responsible for administering the Veterinary Surgeons Act and for the registration, education, and discipline of members of the profession. Before a person can practise in veterinary surgeries and dispense medicines in the UK, they have to be a member of the RCVS.

5.2.2 The British Veterinary Association

The British Veterinary Association (BVA) is currently the national representative body for the veterinary profession in Britain, with over 13,000 members. Its role is to promote and support its members' interests, and those of the animals under their care. Their aim is to develop and maintain channels of communication with government, parliamentarians, and the media (British Veterinary Association, n.d. About us).

The BVA was formed from the National Veterinary Medical Association (formerly the National Veterinary Association). The organization includes directors, divisions, a council, and three directorates, each of which has a specific role respectively in business operations, veterinary policy, and publications.

The BVA has two branches in the devolved regions[115] Scotland and Wales that are composed of members' resident in the regions. The branches assist the BVA in activities related to issues within the devolved regions.

The BVA's Scottish Branch fosters the interests of the profession in Scotland, particularly with reference to the Scottish Parliament and Government, Scottish law, the National Farmers Union of Scotland and Scottish animal welfare organizations (British Veterinary Association, n.d, about us).

The Fish Veterinary Society is one of 21 specialist divisions that serve members sharing an interest in fish health and welfare information by holding discussions on fish health care and problems and functioning as a forum for exchanges of professional and scientific information between members. The specialist division is represented on the BVA Council (British Veterinary Association, n.d. About us). I return to the role of the Fish Veterinary Society in Section 5.2.12).

The *Veterinary Record* is the BVA's official journal and it has been an important source for information for my research. Especially, the *Veterinary Record's* comments and letters have been rich sources of information about the BVA's activities, disagreements, and

[115] In the UK, Scotland, Wales, and the Northern Ireland Assembly were devolved in 1997, but England was not.

political interests. Following the short presentation of veterinary history in the UK and brief review of the Veterinary Association above, next I return to the field of fish health.

5.2.3 Norwegian and British veterinarians' concerns about the Norwegian Government's attempt to amend EU legislation

In 1995 two Norwegian members of veterinary staff at the Norwegian Veterinary School's Department of Pharmacology, Microbiology and Food Hygiene, Kari Grave and Inger Nafstad, published a letter in the *Veterinary Record*, the journal of the British Veterinary Association (8 July 1995, pp. 51–52), in which they stated that they wanted the British veterinary profession to draw attention to the question of authorization of fish health biologists:

> At present, the question of authorisation for 'fish doctors' to prescribe drugs in Norway seems to have become a political matter and we expect that a proposal will be forwarded through the EU system by Norwegian politicians in the near future. Traditionally, prescription authorisation has been limited to physicians, veterinarians and dentists. This restricted practice is an important tool for controlling drug use in general. The principle of restricted prescription practice is more important than ever, especially for antibacterial drugs because of the worldwide problem of microbial resistance associated with the use of antibiotics. Antibacterial drugs would be the main group of drugs prescribed by the 'fish doctors'. Increased numbers of prescribers can be expected to result in increased drug utilisation. Additionally, this problem would be intensified by the situation that new prescribers would work in competition with veterinarians. In conclusion, we strongly want to warn against any liberalisation in drug prescription policy. (Grave and Nafstad, 1995, pp.51-52)

In the next issue of the *Veterinary Record*, Andrew Grant from Marine Harvest and Tony Wall from the Fish Vet Group (both veterinarians) responded to the information from their Norwegian counterparts:

> Your Norwegian correspondents (VR, July 8, p. 51) quite rightly draw attention to an issue as serious for the profession in the UK as it evidently is in other major fish farming countries. It has for various reasons come about that farmed fish do not somehow qualify as bona fide 'animals' and consequently are not seen as requiring as comprehensive a standard of veterinary care as do other livestock … Health care for fish farms is already fragmented

> because the administration of the Diseases of Fish Act is outwith the remit of the State Veterinary Service while the practising veterinarians are involved on a day to day basis with health problems at the farm level. Thus it is impossible to take initiative on a national basis to combat diseases of economic importance, for example, a coordinated approach to sea lice control. If it is indeed true that an attempt will be made to amend EC legislation to obtain, for fish, a derogation from the legal constraints on medicines supply, then it should serve as a warning to the professions as a whole … We all know that there is much more to a comprehensive veterinary service than the supply of a prescription. I hope than our political lobbyists will remain vigilant and that the BVA and RCVS recognise the threat that this matter represents. (Grant and Wall, 1995, pp. 227–228)

The Norwegian politicians managed to change the EU directive and in 2005 aquamedicine biologists gained the right to prescribe drugs. The two letters quoted above illustrate the situation of the British and Norwegian veterinary profession's struggle for jurisdiction over the fish health work field, i.e. the British fish veterinarians that had to leave the work field to scientists from the Fish Health Inspectorate and Norwegian veterinarians that were losing jurisdictional control. Thus, the struggle fell into the EU legislation arena.

5.2.4 The British veterinary profession and work related to fish health

The veterinary profession does not have any statutory role in fish disease management as fish and other aquatic organisms are not included in the Veterinary Surgeons Act of 1966. However, through its monopoly of prescribing medicines to animals, including fish, the veterinary profession became involved in fish farming at an early stage. Under the Medicines Act of 1968, [116]only a veterinarian can authorize the supply and administration of prescription only medicines (POMs) (*Veterinary Record*, 10 August 1991, p. 124).

Fish diseases have not been a field of priority for the British Veterinary Association. The Diseases of Fish Act was passed in 1937 and it took over 40 years before the first policy statement was considered by the Veterinary Council and published in the *Veterinary Record* (10 August 1991, pp. 124–125). According to Lydia A. Brown, the policy statement was part of an attempt to encourage veterinarians to engage in the field of aquatic veterinary medicine. The formation of the Fish Veterinary Society in 1990 was a further part of this attempt (Lydia A. Brown, letter, *Veterinary Record*, 31 August 1991, p.202). With the formation of the Fish

[116] Amended 1992.

Veterinary Society, the aim was to raise the level of interest in fish-related matters within the profession.

In Norway in the late 1980s, there was increased activity within the veterinary system, both in education and services, to meet the demand from the fish farming industry. Simultaneously, there was a strong discourse on knowledge development and division of work in the field between sectors and between veterinarians and scientists. In Scotland and the UK, however, there were no discourses on fish disease knowledge between the science milieus. Only a few veterinarians struggled to persuade the veterinary profession to take more interest in fish.

As shown in Chapter 4, the initiative to establish the Furunculosis Committee was an important event that formed the trajectories of the division of work in the Scottish fish disease field. At this time, the actors involved had formal contacts with the veterinary science milieu. It may also be worth mentioning that in the 1920s, simultaneously with the period when the Furunculosis Committee was active, the British veterinary profession was busy shifting from focusing almost exclusively on the health of cattle herds and work related to horses to the additional problems of pig, sheep, and poultry farming, and at the same time an increase work related to cats and dogs (Mary Brancker, interview 1 of April, 1993).

5.2.5 The State Veterinary Service and Veterinary Investigation centres in UK

The implementation of animal health and welfare policy, and veterinary public health policy throughout England and Scotland (and Wales) are carried out by a single unified State Veterinary Service (SVS) under the line management of the Chief Veterinary Officer (CVO). Similarly the activities of the Meat Hygiene Service in Scotland are subject to agreed arrangements set out in a specific concordat (Ministry of Agriculture, Fisheries and Food, Devolution Main Concordat between the Ministry of Agriculture, Fisheries and Food and the Scottish Executive. November 1999)[117]. The Veterinary Investigation Service was established

[117] "In April 2007 the State Veterinary Service, the Dairy Hygiene Inspectorate, Egg Marketing Inspectorate and the Wildlife Licensing and Registration Service, came together as Animal Health to provide animal health, welfare and conservation expertise under one roof" (Animal Health, 2012, http://animalhealth.defra.gov.uk/about/aboutanimalhealth/history.html)

in 1922 and incorporated into the Ministry of Agriculture, Fisheries and Food (Swabe, 1999). Swabe who has done research on human-animal relations and the rise of the veterinary medicine describes the service as follows;

> 'The interaction between local veterinarians, veterinary investigation officers, the researchers of the Central Veterinary laboratory and legislators in fact provides a good illustration of the increasing complexity of animal disease control during the twentieth century. At the grass root level, practicing veterinary surgeons observe and report the local incidence of animal disease. This in turn is investigated by veterinary investigation officers who conduct field investigations and epidemiological studies to gauge the extent of animal health problems. In the meantime, the Central Veterinary Laboratory attempts to understand the aetiology of the disease and explores how it may effectively be controlled. These combined investigations may in turn lead to inception of statutory control measures, vaccination, test and slaughter programmes to contain and eradicate animal disease' (Swabe, 199, p. 146).

The Central Veterinary Laboratory and the Veterinary Investigation Service merged to form the Veterinary Laboratories Agency in 1995 (Swabe, 1999).

In the U.K, the SVS is not involved in statutory fish and shellfish health inspections and disease control. Richards said in an interview in 1993, looking back on the history of statutory fish disease control in 1993 that Veterinary Investigation Centres would have been a logical way to handle the fish disease field service since there already were a good structure in place for animal disease control.

> 'Instead of employing a lot of inspectors working at Aberdeen, they could place them in the Veterinary Investigation Centres around the country and create some jobs that way. But I think they are too late for that, because the jobs have been filled now' (Richards, Interview 30 March1993).

In 1993 the Scottish Agriculture College veterinary investigation centre had one veterinarian specialised in fish pathology doing diagnostic fish disease work. He had worked a couple of years as an extra vet partly to assist the normal work (animal diseases) but also to build up the fish disease work. Collins underlined in the interview that he was working on a fairly basic level, because they didn't have facilities for fish at the Centre (Collins, Interview, 1991). He meant that the laboratories, either Stirling or Aberdeen should be closer to the industry and working alongside the Veterinary Investigation Centre. He had also experience that fish

farmers were annoyed because they had to go along to a veterinary surgeon to get drugs even though the veterinary surgeon knew nothing about fish diseases. But the situation is improving (Collins, Interview, 25 April 1991). Again it is the role of prescribing medicine that is important for veterinarians involvement in fish diseases work.

5.2.6 Jurisdiction on professions' role in the field of fish diseases

There have been several UK laws affecting veterinary involvement in fish health work:

- The Veterinary Surgeons Act of 1966
- The Medicines Act of 1968
- The Diseases of Fish Act of 1937 and 1983
- The Fish Health Regulations of 1997
- The Diseases of Fish (Control) Regulations of 1994[118]

There is an anomaly in the UK fish health legislation because fish are included in the Medicines Act under veterinary drugs, but not in the Veterinary Surgeons Act of 1966, as mentioned by Grant and Wall in the *Veterinary Record* (Grant and Wall, 1995, pp. 227–228). The Veterinary Surgeons Act of 1966 neither includes nor excludes fish from the definition of animals. Current legislation allows other groups than veterinarians to diagnose and treat fish diseases, but only veterinarians can supply prescriptions for the use of POMs.[119] Veterinary

[118] The majority of the Fish Health Inspectorate's work is stipulated in just two main pieces of legislation concerning aquaculture and aquatic animal health: the Aquaculture and Fisheries (Scotland) Act of 2007 and the Aquatic Animal Health (Scotland) Regulation 2009 (The Scottish Government, Marine Scotland, Fish Health Inspectorate, n.d.). The two new regulations repealed the Diseases of Fish Act of 1937 and of 1983 and apply to Scotland. Although similar and parallel regulations are in place in England, Wales, and Northern Ireland, I have not examined changes beyond 2005 and have not described in the Scottish legislative process in detail because there have not yet been any changes in the interrelationship between Scottish veterinarians and fish health inspectorate and fish health inspectors.

[119] Veterinary medical products are classified as General Sale List products (GSLs), Prescription Only Medicines (POMs), Pharmacy and Merchants' List products (PMLs) and Pharmacy Medicines (PMs). Only veterinarians or persons acting under the direction of veterinarians may administer veterinary drugs that are POMs. Aquaguard, licensed antibiotics, and injectable vaccines used in aquaculture are all POMs (Fish Veterinary Society, policy statement, about Fish and The Veterinary Surgeons Act, August 1992). An additional problem is that veterinary surgeons may only prescribe and administer POM drugs to fish under their 'care'. This means that the fish must be seen by a veterinary surgeon that is not trained in fish diseases and fish husbandry. However, the situation is improving rapidly as more and more veterinary surgeons are taking on work related to fish (personal communication, Mary Brancker, September 1996).

surgeons may only prescribe and administer POM drugs to fish under their care. In the Medicines Act 1968, the treatment of fish is clearly defined as follows:

> Any medicinal product which is manufactured, sold, supplies, imported or exported for the purpose of being administrated to animals, but not for the purpose of being administrated to human beings is classified under the Act as a 'veterinary drug' (p. 132, (1)). All drugs used for the medical treatment of fish are, therefore, veterinary drugs. (Howart, 1990, p. 157)

The Medicines Act 1968 imposes controls upon the sale and use of medical products of all kinds for the treatment of either humans or animals, including fish, and is administered jointly by the health and agricultural ministers throughout the UK (Howart 1990, p. 157).

The anomaly in the legislation – that fish are included in the Medicines Act under veterinary drugs but not in the Veterinary Surgeons Act – should be understood in connection with fish disease research carried out by microbiologists at the Medical School at the University of Edinburgh and their responsibility to follow up the Diseases of Fish Act of 1937. The anomaly should also be understood in the light of the fact that the veterinary profession has been occupied with other issues.

5.2.7 Agricultural depression and the establishment of national veterinary inspectors – the main veterinary issue in the 1930s

The area under cultivation in Britain shrank from 12 million acres in 1918 to under 9 million acres by 1926. Farms were impoverished, and farming equipment rusted (Foreman, 1989, p 25):

> In 1937 the Agriculture depression had become more and more profound. Early in 1937 the Minister obtained wide powers in the Agriculture Act of 1937 to improve the condition of the industry. Amongst its many provisions was authority 'to establish a national service of veterinary inspectors to promote the eradication of diseases of animals and poultry' (Winnifrith, J. 1965, *Veterinary Record*, 16 October, p. 1226)

Thus, in the 1930s, issues such as the agricultural depression and the establishment of a national service of veterinary inspectors were more important for the veterinary profession than fish disease work and the new Diseases of Fish Act. For instance, in 1934 the veterinary profession was more concerned about proposals to organize the work of the profession on a

national scale that was to be state-aided (Pattison, I. 1991, *Veterinary Record*, 18 May 1991, p. 473). In 1937, the Agriculture Act amalgamated all veterinary services under the Agriculture Act of 1937 (Foreman, 1989, p 63). This co-ordination of the greater part of the veterinary service is probably one of the greatest developments that the veterinary profession has faced. The veterinary profession was fully occupied with the questions around these new arrangements.

In the 1930s, the veterinary profession was not involved in the investigation work that led to the Diseases of Fish Act of 1937 (revised in 1983). In 1933 and 1934 the Furunculosis Committee was mentioned in the *Veterinary Record* and its reports were reviewed (*Veterinary Record*, 4 November 1933, p. 1135; 10 March 1934, p. 269). The profession paid attention to the Furunculosis Committee and the research work done. However, the *Veterinary Record* for that time does not appear to contain any comments on what role the veterinary profession should have in fish disease work. For example, in 1934 the *Veterinary Record* mentions that the Diseases of Fish Bill was under consideration by the House of Lords (*Veterinary Record*, 10 March 1934, p. 269), but there is no debate on whether or not fish should be included in the Diseases of Animal Act of 1894. If fish had been included in the act, notifiable fish diseases could have become a veterinary responsibility. At the time, however, the veterinary profession did not show any particular interest in including fish disease work included in their statutory list of duties.

In addition, with regard to the implementation of the co-ordinated veterinary service, meat controls were another field that the veterinary profession wanted to take a stronger part in. After representations made by the NVMA to the Joint Committee of the Lords and Commons considering the Food and Drugs Bill, an amendment was brought forward. Under the provision of the Food and Drugs Act, the amendment gave any member of the Royal College of Veterinary Surgeons the same right to be deemed an authorized officer for the purposes of slaughter and examination of meat as a medical officer or council sanitary inspector (*Veterinary Record*, 21 May 1938, p. 624). Prior to then, a veterinary surgeon first had to be appointed as a sanitary inspector before he or she could act as a meat inspector.

5.2.8 Lack of funding for veterinary research work in the 1920s

In 1922 a report was published by a governmental advisory committee on research into diseases in animals:

> The committee had found that cattle, sheep and pigs of an estimated value in the United Kingdom of £400 million had been the subject of Government-funded research in 1920/21 of £3696. It was concluded that 'such a condition of affairs constitutes a national disgrace'. It also was discovered that there were only five full-time veterinary research workers in the United Kingdom, three with McFadyean at the London school, and two in the Government laboratory at Weybridge. All other research was on a part-time basis. (Pattison, 1991)

At the annual meeting of the Animal Disease Research Association of Scotland in 1927, the president indicated that a scheme for increasing the numbers of research staff was being considered, and emphasized the need for funding to make the development possible. The president said that the association was now in possession of a really well-equipped institute and that the association's laboratories at the Royal (Dick) Veterinary College would be equipped especially for the branches of the work which could be executed other than on large animals (*Veterinary Record*, 13 August 1927, No. 33, p. 712).

The Furunculosis Committee was appointed in 1929 and one of its main purposes was to investigate furunculosis in salmon, trout, and other freshwater fish. At the time when the Furunculosis Committee was appointed, the veterinary school in Edinburgh did not have a fully equipped laboratory and probably needed more research and diagnostic work on animal diseases than it was able to comply with at the time. It is noteworthy that in 1922 there were only five full-time veterinary research workers in the UK. It is therefore understandable that fish disease research work was not an issue of interest to the veterinary profession.

5.2.9 The Veterinary Surgeons Bill of 1966

It took c.30 years after the enactment of the Diseases of Fish Act before the question of veterinary involvement in the fish disease work field was pursued as a veterinary issue. In 1966, the Veterinary Surgeons Act (1948) was reopened. The act's passage through the House of Commons and the House of Lords was followed with great attention in the *Veterinary Record*. In January 1966, representatives of the British Veterinary Association met officials of the Ministry of Agriculture and Fisheries and Food to discuss fully the implementation of the Veterinary Surgeons Bill. Among several proposals, the BVA requested that, in accordance with clause 27, fish should be included in the definition of 'animal'. It was suggested that a better definition would be 'all vertebrates', and the Ministry agreed to look into this proposal (*Veterinary Record*, 15 January 1966, p. 109).

It is worth following the debate in the House of Lords in some detail in order to understand the discourse on the veterinary profession's involvement in the fish health field. In fact, the discourse about the involvement of knowledge-based occupations' involvement had been raised earlier in the UK than in Norway. In Norway, in the 1960s, there was no debate either about the administration of the disease of fish act, or expert involvement in its administration; the responsibility had been given to the Ministry of Agriculture and the veterinary authority without any debate. By contrast, in the UK, diagnostic work was already being undertaken at the Marine Laboratory in Aberdeen. Therefore, the veterinary profession in GB tried to gain entry to the fish health field through veterinary legislation, not through fish health legislation.

In the UK, Lord Balerno[120] pleaded in the House of Lords for the inclusion of fish in the Veterinary Surgeons Bill. Lord Champion, who had introduced the Bill, stated that including fish could appear to be a takeover bid by veterinarians, and specifically a takeover by fish scientists (*Veterinary Record*, 5 February, 1966, p. 207). This seems to have been the first time that the different interests of occupational groups were debated in Parliament. At the end of the debate, Lord Balerno withdrew the amendment due to lack of support and Lord Champion's last comment on the proposed amendment was:

> It is because the Government appreciates the noble Lord's argument for enlightenment and progress in the scientific field, that we are not including fish. This is the way to ensure not only that veterinary surgeons may treat fish, diagnose diseases in fish or give advice about fish, but also that other experts, in particular the various fishery scientists, may do work on this kind. With the advent of fish-farming, disease among fish may become a greater problem, and I think that we should leave this matter open so that both fishery scientists and veterinarians may be permitted to work in this field. (*Veterinary Record*, 4 June 1966, p. 816)

Veterinarian Mary Brancker[121] provided me with some comments on Lord Champion's comment, in a letter:

[120] According to veterinarian Mary Brancker, Lord Balerno was a good friend of the veterinary profession (personal information, Mary Brancker, 2001).

[121] Mary Brancker was member of the BVA's council in 1966. In 1967 she was the first woman elected as president of the BVA. In 1996 she received an honorary doctorate from the University of Stirling for her engagement in the fish health field.

> There is one interesting fact which might have changed the situation in England. When the Veterinary Surgeons Act went through Parliament in the early part of 1966, I had no interest in fish. Although I was on the Council of the British Veterinary Association, I was not directly involved with the Bill. It was late 1966 or early 1967 when I learnt that a Plaice egg had been hatched and reared at the Ministry of Agriculture Marine Research Laboratory at Bangor in North Wales. I realised that this opened the way to the development of marine species. This in turn meant that the veterinary profession needed to become involved in spite of the fact that there was little enthusiasm. If I had realised this a year earlier it is possible that the BVA would have urged Lord Balerno to continue fighting and he might have won. A few years later there was talk of the Act being re-opened and at that time there were amicable discussions with a large number of the fish biologists on the way forward. The proposals were that those biologists already working in the field should be given legal rights to continue but that no new biologists should be added to the list. However, the Act was not reopened (personal communication, Mary Brancker, 11 November 2001).

One of the reasons why fish were not included in the UK Veterinary Surgeons Act was the fact that fishery scientists were already heavily involved. In the first reading of the bill, Lord Champion's last comment on the proposed amendment was that Parliament wanted to permit both fishery scientists and veterinarians to work in the field. The politicians did not want to give the veterinarian monopoly in the field through the Veterinary Surgeons Act.

5.2.10 The Veterinary Surgeons Bill: second reading

Following a general election, the Veterinary Surgeons Bill had to be represented to the new Parliament; it was read a second time in the House of Lords on 17 May 1966. In its second reading, Lord Champion continued to introduce the bill and Lord Balerno returned to the question of the inclusion of fish in the bill:

> I must now ask your Lordships' pardon if I return to the matter of an Amendment which I raised when the earlier Bill was in Committee; that is, why fish are not included in the new Bill. I attended a meeting of the Parliamentary and Scientific Committee on April 26th, when the Committee was addressed by Sir Fredrick Brundrett, who is the chairman of research and development in the White Fish Authority, and also by Dr. H.A. Cole, the Director of the Fisheries Laboratory of the Ministry of Agriculture, Fisheries and Food. Both addresses were most interesting, and both of them forecast that fish farming would be taking place in the

> future and might develop in this country in not distant future. (*Veterinary Record*, 21 May 1966, p. 723)

Lord Balerno continued by referring to what Lord Champion had said when disputing his amendment:

> The noble Lord, Lord Champion, continued: If fish were to be included in the definition of animals it would mean that the various fisheries scientists of the fishery laboratories and aquaria would be unable to treat fish, diagnose diseases in fish, or give advice about disease or treatment of fish. (*Veterinary Record*, 21 May 1966, p. 723)

Lord Bolero's response to Lord Champion was:

> I am not quite sure that the noble Lord was entirely correct in saying that ... if fish are included in this Bill, I cannot possibly see how it will affect the operations of those zoologists, and other biologists who have already been doing such excellent work with fish, almost entirely with the wild fish, and why they cannot go on with their work. It would be quite as possible to have malpractices in fish farming as it is to have malpractices in intensive poultry farming, and it would be perfectly logical and sensible that the veterinary profession should be authorised to look after and protect the fish farms, as well as the poultry farms ...Why, again, should they (the Government) be in favour of the vested interests of the few fish scientists who are located in the Ministry of Agriculture, Fisheries and Food? (*Veterinary Record*, 21 May 1966, pp. 723–724)?

Clearly, already in 1966, fish scientists had a position in the fish disease field and they also had advocates for their interests within Parliament. It was the first time that different occupational interests in the field were connected to the discussion of a bill. There seems to have been two advocates of the veterinary profession's interests within the Parliament, one was Lord Balerno in the House of Lords and the other was W.H.K. Baker in the House of Commons. On 26 May 1966 the bill was considered by a House of Lords committee, and Lord Balerno advocated as follows:

> I should like to elaborate somewhat on the reasons why fish should be included in this Bill, along with reptiles and birds. One reason is the increase that we can expect in the not-so-distant future, in fish farming … They will need examination just as much as the battery poultry are getting at the present time, and it is only the veterinary profession that will be able

> to make the necessary technical intervention ... The inclusion of fish in this Bill would in no way affect the scientists who are not veterinary surgeons from treating fish anywhere in the United Kingdom or in the seas around this Island. But if fish are excluded what will happen? Anyone will be able to start up as an expert on fish. We shall get fish doctors just as, in the old days, we had the cow doctors. (*Veterinary Record*, 4 June 1966, p. 814)

Thus far, the question about including fish in the bill had been debated between Lord Champion and Lord Balerno within the House of Lords, but others were becoming involved in the debate. Bearing in mind that in the 1960s few knew much about fish farming, the discussion about including fish had not been regarded as a big issue. However, the members of the House of Lords became aware that professional conflicts might arise if they included fish in the bill. A further consideration was the fact that fish farming in the future could provide needed protein. not only to Great Britain but also to other parts of the world. Viscount Massereene and Ferrand is quote as follows in the *Veterinary Record* (*Veterinary Record*, 4 June, 1966, p. 814):

> May I ask the noble Lord, Lord Balerno, whether he has ascertained from the veterinary profession that they are prepared to take on the care of fish? ... because, personally, I have never heard of a 'vet' who has ever had anything to do with fish.

One Lord responded with the quip: 'Except to eat them'. Viscount Masserne and Ferrard continued:

> 'Vets' are not instructed in fish, at least, I do not think so. I have some fisheries and when I have had occasion to ask advice I have always applied to the Ministry of Agriculture and Fisheries, who have excellent fish scientists. I should have thought that if this Amendment were accepted it would then exclude the owner of a fishery from applying to the Ministry for advice. What is the point of having fish scientists if the 'vets' are going to take on fish? I have not studied the question, but it strikes me as rather odd to ask the 'vets' to deal with fish. (*Veterinary Record*, 4 June 1966, p. 814)

Lord Boothby responded:

> I would only say that in principle I would welcome the advent of fish doctors which the noble Lord, Lord Balerno, seemed to dread so much: I think fish want a good deal of doctoring.

> When they disappear, we want people to find out why they have disappeared and to where. We have had a lot of trouble in the North Sea in the last three of four years in the matter of herrings. I think the noble Lord's Amendment should be rejected. (*Veterinary Record*, 4 June 1966, p. 814)

At this point, Lord Boothby went further than talking just about fish farming, and saw the discussion regarding the inclusion of fish in the Veterinary Surgeons Bill in connection with wild fish. Lord Champion's last reply to the proposed Amendment was:

> It is because the Government appreciates the noble Lord's argument for enlightenment and progress in the scientific field, that we are not including fish. This is the way to ensure not only that veterinary surgeons may treat fish, diagnose diseases in fish or give advice about fish, but also that other experts, in particular the various fishery scientists, may do work on this kind ... I agree with the noble Lord that perhaps in the fullness of time Parliament may consider that the diagnosis and treatment of diseases in fish should be confined to veterinary surgeons, but at present what little is known about this subject is known mainly by fishery scientists who are not qualified in veterinary surgery. With the advent of fish-farming, disease among fish may become a greater problem, and I think that we should leave this matter open so that both fishery scientists and veterinarians may be permitted to work in this field. In short, it would be a mistake for this subject at this stage to be "cabin'd, cribbed, confined". I would ask the Committee to reject this amendment. (*Veterinary Record*, 4 June 1966, p. 816)

At the end of the debate, due to lack of support, Lord Balerno withdrew the proposed amendment. The Veterinary Surgeons Bill had its third reading in the House of Lords on 23 June 1966 and was passed. During the reading, Lord Champion wanted to say a few words about the bill, and he mentioned the debate on including fish in the bill:

> I am afraid I have disappointed the noble Lord, Lord Balerno, in not being able to go along with him including fish in the definition of animals. (*Veterinary Record*, 2 July 1966, p. 18)

The bill was presented to the House of Commons, and on its second reading, yet again the inclusion of fish was mentioned by W.H.K. Baker, who had noticed that clause 27 had been dealt with at some length by Lord Balerno. Baker had visited a private enterprise fish farm owned by Unilever at Findon in Aberdeenshire:

> It was interested to see during my tour of the laboratory some microscopic slides showing some of the effects of the diseases from which these fish had died. They were horrific to say the least. The scientists did not seem to know whether these diseases were transmissible to human beings … It is important, therefore that it should be made clear that the veterinary surgeons are the people who are responsible for looking after the health of such fish. (*Veterinary Record*, 30 July 1966, p. 143)

In November, the Veterinary Surgeons Bill had its last reading in the House of Commons. The bill was the subject of the *Veterinary Record*'s leading article in November 1966 (*Veterinary Record*, 19 November 1966, p. 585). The discussion regarding including fish in the bill was not mentioned. Clearly, the BVA did not have any particular interest in fish diseases in the 1960s. Similar to the BVA, the Norwegian Veterinary Association did not have any particular interest in fish, but its role in the field was different from that of the British veterinary profession because in 1968 it gained responsibility for notifiable diseases in freshwater fish. Due to this responsibility, the Norwegian veterinary profession had recognized the need to acquire knowledge about fish diseases.

5.2.11 Awakening the British veterinary profession's interest in work related to fish diseases

Shortly after the Veterinary Surgeons Bill was passed in 1966, several letters from members of the veterinary profession were published in the *Veterinary Record*. In a letter to the *Veterinary Record*, for example, Mark H. Fussel asked 'if anybody knows whether serious research is being carried out on diseases of fish at any of the veterinary schools in Great Britain, or indeed in any other West European countries, or the USA' (*Veterinary Record*, 3 December 1966, p. 718). He had travelled to Eastern Europe and had been impressed by the research carried out on fish there. Especially, in Hungary, veterinarians were expected to spend some of their time at their local laboratory investigating fish diseases, and a course on fish diseases was included in the normal veterinary training programme. His questions were answered in two letters. One letter was from W.E. Pearson, who stated that although research in fish diseases was being conducted in other parts of the world, very few veterinarians were involved, except perhaps in the Soviet group of countries, Germany, Italy, and France. He himself had tried to access from the RCVS:

> Some five years ago when I commenced a study of fish diseases, I turned to the Royal College of Veterinary Surgeons for help. In talking to the Registrar at that time, I was told that there was just no information available in the library and that I should look elsewhere, which I did with success. Surely it is now the time that we as a profession make provision for the future by introducing a course in fish pathology in our veterinary schools? ... Who is better fitted to study fish diseases than the veterinarian with his extensive basic training? (*Veterinary Record*, 17 December 1966, p. 816)

The other letter was from fish pathologists Donald W. Jolly and Lionel E. Mawdesley-Thomas from the Huntingdon Research Centre, who wrote:

> We believe the demand for cultured fish in this country is growing (present it is mainly trout for sport and hotels), and we share Dr. Fussell's belief in the food potentials inherit in the intensive fish farming. We are, therefore, attempting to establish a laboratory service for the diagnosis and the study of fish diseases and their prevention. (*Veterinary Record*, 17 December 1966, p. 817)

From 1966 to 1970, several letters were published in the *Veterinary Record* that in one way or another discussed fish farming, fish diseases work, and the role of veterinarians.[122] In addition, the journal published three articles specifically on the subject of fish.[123] From 1966 onwards, some members of the veterinary profession were aware of the prospects of fish farming, and also the need for veterinarians to become involved at this stage. As already mentioned, the profession had an opportunity to include fish in the Veterinary Surgeons Bill, but it did not seem to push hard on this matter. It is evident from the *Veterinary Record* that members of the veterinary profession were seemingly unaware of the work done by fish scientists and the fact that two laboratories had been set up to deal with fish diseases. The Marine Laboratory in Aberdeen had been set up in 1953, and the Fish Diseases Laboratory in Weymouth had been set up in 1969.

[122] For the period from November 1966 to the end of 1970, I found 15 letters in the *Veterinary Record* on the subject of either fish farming or fish diseases.

[123] The three articles were: 'Fish farming and the veterinary profession' by Lionel E. Mawedsley-Thomas, MB, BS, (*Veterinary Record*, 9 August 1969, pp. 134–138); 'Some aspects of fish farming in the British Isles' by D.R. Swift, MSc (*Veterinary Record*, 31 October 1970, pp. 522–524); and 'The problems of fish disease' by J.P. Stevenson, PhD (*Veterinary Record*, 31 October 1970, pp. 529–531).

The BVA research and academic committee meeting in 1967 had received a letter from the President of the British Small Animals Veterinary Association which expressed the view that it was important for the veterinary profession to take an interest in the management and diseases of fish, and that there was a need for members to specialize in the field (*Veterinary Record*, 8 July 1967, p. 60). At the meeting, the secretary outlined how, in 1966, there had been an exchange of correspondence and meetings between representatives from the White Fish Authority, the Department of Fisheries, and the secretary of the BVA about co-operation and collaboration in work relating to fish diseases. The Secretary also informed about a meeting held at Mansfield Street on 26 September 1967 for veterinary surgeons interested in the establishment of an association to deal with the management and diseases of fish. It appeared that 42 members of the profession or people closely associated with the veterinary profession had indicated their wish to form an association (*Veterinary Record*, 8 July 1967, p. 60). In the next issue of the *Veterinary Record*, fish pathologists Lionel E. Mawdesley-Thomas and Donald W. Jolly from the Huntingdon Research Centre informed about the decision to form a British Fisheries Society to promote the further study of fish. The decision to form the society was the direct result of the third British Coarse Fish Conference, which had not been attended by official veterinary representatives. In the preceding six years, the driving forces behind both the project to form a society and the Coarse Fish Conference had been Dr Jack Jones, Reader in Zoology at the University of Liverpool and Peter Tombleson from Angling Time Limited, in Peterborough (*Veterinary Record*, 15 July 1967, Vol. 81, No. 4. p. 86). The Fisheries Society of the British Isles (FSBI) was established in October 1967.

Also in 1967, there was a separate initiative to form a British Veterinary Fish Association, open to members of the BVA. The inaugural meeting was held in September, one month before the Fisheries Society of the British Isles was formed. At the meeting I. Richardson, Research Secretary for the White Fish Authority presented a paper titled ‘Marine fish farming experiments’ (*Veterinary Record*, 16 September 1967, pp. 294-295), which indicated that the veterinary profession’s interests in fish had be awakened and within the veterinary profession there was awareness of the growing fish farming industry and fish disease work.

5.2.12 The Fish Veterinary Society

The Fish Veterinary Society announced its formation in 1990. However, there had been an active fish group in the BVA since 1974.[124] The president of the society, G.D. Cawley, explained what had stimulated the development of the society:

> First, the rapidly increasing fish farming industry which requires management, therapeutic environmental and public health advice and help from us. Secondly, the aquarium and pet fish area is also growing … The society was founded for the benefit of any veterinary surgeon who is involved in either of these fields, and intends to be a forum for the discussion of all matters relevant to either of these topics. (*Veterinary Record*, 8 December 1990, p. 580)

For the first time in its published comments, the *Veterinary Record* discussed the veterinary profession's involvement in the fish farming industry (*Veterinary Record*, 22 June 1991, p. 7). A letter from the secretary of the Fish Veterinary Society, Peter Southgate, prompted the discussion:

> Yet, despite the size of the industry and the excellent and pioneering work of the Institute of Aquaculture at Stirling under the directorship of Dr. Roberts, veterinary involvement overall remains relatively slight. Mr. Peter Southgate, secretary of the Fish Veterinary Society, indicates the extent of veterinary involvement in fish farming, and highlights some of the problems. Fish are not included in the Veterinary Surgeons Act of 1966, and as a result, veterinarians are only consulted when a prescription only medicine is felt necessary for the treatment of a particular problem ... By becoming involved in fish farming veterinarians could, by encouraging better husbandry, help to keep the use of medicine to a minimum and, therefore reduce the threat to the environment. At its meeting next month, the BVA's Council will consider whether vets should be as involved in fish farming as they are in other forms of

[124] I have not found out if there is connection between the Fish Veterinary Society and this earlier active fish group formed in 1967.

> agriculture, and whether greater emphasis should be placed on aquaculture in veterinary training. (*Veterinary Record*, 22 June 1991, p. 77)

In his letter, Peter Southgate informed the veterinary profession that there were several veterinarians working as full-time consultants in the fish farming industry, but no veterinarians were involved in statutory fish disease control. Southgate also informed that the UK was one of very few EC countries where this was the case. In 1991 the membership of the Fish Veterinary Society stood at 44 (*Veterinary Record*, 22 June 1991, p. 598).

In 1991, the British Veterinary Association published its first policy document on the role of veterinarians in fish farming and aquaculture:

> Diagnosis of disease has been left to fish biologists. The veterinarian's training provides a wider experience in disease, animal physiology and the use of medicinal products. There are two areas of increasing sensitivity where the veterinarian's experience is relevant. These are animal welfare and meat quality. Currently the training of veterinarians is being overhauled and the opportunity should be taken to provide a training module in aquaculture. Council is invited to agree that: (a) the veterinarian should be as involved in fish farming (aquaculture) as land farming; and that (b) the opportunity should be taken, during overhaul of veterinary training, further to equip veterinarians who are to be involved in fish farming and aquaculture. ... Only a minor extension of training or expertise would be needed to allow a full part to be played in fish husbandry ... [T]he public finds it hard to understand why their veterinarians have no training in fish work ... Veterinarians play an important part in safeguarding red meat supplies ... No such public health measures apply to fish meat ... The BVA believes that if fish meat were brought within the testing regime, the results would help to reassure the consumers about the quality of fish meat as food … But above all the BVA considers that fish and invertebrate aquaculture would benefit to a significant degree from the involvement of veterinarians. (*Veterinary Record*, 10 August 1991, p. 124)

In a response to the BVA policy document on fish farming, Peter W. Scott, who earlier had written letters on fish farming to the *Veterinary Record*, said that the he felt that the policy document misled members of the profession and underestimated the importance and significance of the contributions made by fish biologists:

> Fish biologists became involved because vets failed miserably as a profession to support the industry, treating fish as a triviality … On training and research, the policy document makes

> no mention of the University of Stirling, where veterinarians from all over the world, including Britain, receive the specialist training necessary to serve the fish farming industry … The fish farming will certainly benefit from veterinary involvement of the right type, not from vets encouraged to 'play at it' because it is easy and an alternative to falling large animal work. (*Veterinary Record*, 17 August 1991, pp. 151–52)

Dr Lydia Brown commented on Peter Scott's letter, stating that in her opinion the BVA's policy statement acknowledged the work done by fish biologists doing veterinary work in the industry, and although the authors of the policy document regretted the lack of veterinary involvement in fish farming, they were seeking to address the situation. She asked Mr. Scott, as a well-respected fish veterinarian, to join with other fish veterinarians in welcoming the approach of the BVA, and thus seemed to emphasize the growing importance of aquatic species in veterinary medicine (*Veterinary Record*, 31 August 1991, p. 202).
The fish farming industry and its need for veterinary products led to the appointment of Professor Randolph Richards (a veterinarian) to the Veterinary Products Committee in 1992. At the time, he was deputy director of the Institute of Aquaculture at the University of Stirling, (*Veterinary Record*, 11 January 1992, p. 22). The appointment indicated recognition of veterinarian competence within the field of fish health. The Fish Veterinary Society was also working towards the inclusion of fish in the Veterinary Surgeons Act, and in the same letter, it commented on a CIWF (Compassion in World Farming) report, as follows:

> At a time[125] when a case is being made for the inclusion of fish in the Veterinary Surgeons Act of 1966, which could have enormous implications for their welfare, it is vital that the profession is presented with and acts on accurate evidence and reasoned argument and not supposition. (*Veterinary Record*, 13 June 1992, p. 543)

In June 1992, the RCVS agreed to the registration of certificate and diplomas in aquatic animal health (*Veterinary Record*, 13 June 1992, p. 543). This was recognition of the veterinary profession's responsibility for the fish health field.

5.2.13 Veterinary profession's involvement and the use of veterinary drugs in the fish farming industry

[125] In 1990, there was a movement to amend the Veterinary Surgeons Act of 1966.

In the 1980s, the fish farming industry was an expanding industry. In the UK, the first product licences for vaccinations for fish were issued in 1983. Three major fish diseases were covered by the vaccines available: enteric redmouth, furunculosis, and vibriosis (*Veterinary Record*, 2 June 1984, p. 537). In a letter to the *Veterinary Record*, Professor Roberts, from the Institute of Aquaculture, expressed his concerns about fish farmers' use of diagnostic kits, which they could purchase without prior consultation. He also said:

> A number of us, here at Stirling and elsewhere, have struggled, with little or no recognition from the profession's official organisations, for many years to ensure veterinarians' right to serve, along with colleagues from other relevant professions, the needs of aquatic livestock. (*Veterinary Record*, 21 June 1986, p. 707)

P.W. Scott supported Professor Roberts regarding the prescribing of antibacterial products and vaccines for fish:

> All too often veterinary surgeons in practice are approached to provide drugs or scripts for fish farmers to treat fish problems which may have been examined and diagnosed by others. (*Veterinary Record*, 5 July 1986, p. 23)

Scott was concerned about the allocation of responsibility if treated fish were to die, and he considered that veterinary surgeons should be insured for the sums involved in potential claims, which could exceed GBP 1,000,000. The economic aspect of fish disease work thus became clearer as the fish farming industry expanded.

Veterinarians in the UK did not have a monopoly over diagnostic work relating to fish, nor did they have professional responsibility for notifiable diseases. However, the veterinary profession's role in fish health work was regulated by the Medicines Act of 1966 and POM-V[126] products could only be prescribed by a veterinary surgeon following clinical assessment of animals, and the animals had to be under the care of the veterinary surgeon who was prescribing medicines. Thus, in order to meet the demand for knowledge about treatment of fish diseases, a few veterinarians within the profession had worked for both more interest in fish from veterinarians and from their organization.

[126] POM-V- Prescription only medicine – veterinarian.

5.2.14 The European Community's fish health regime

Since its inception in Brussels in 1975, the Federation of Veterinarians of Europe (FVE) has been the recognized channel through which veterinary influence is brought to bear in the EU (*Veterinary Record*, 16 May 1992, p.433). The federation is an umbrella organization for veterinary organizations from 35 European countries, including Norway. At a meeting held in Madrid in October 1986, the European Union of Veterinary Practitioners (UEVP), a section of the FVE, expressed concerns about the lack of veterinary involvement in member states' fish industries:

> The meeting proposed that the national veterinary organisations should identify veterinarians who are experts in fish and ensure that management and diseases of fish are included in the veterinary curriculum. These measures, it was felt would ensure that veterinarians could take their rightful place in disease control and food inspection relating to fish. (*Veterinary Record*, 22 November 1986, p. 515)

Although diseases of fish were recognized by the UEVP, it was not a field that the British Veterinary Association has any policy on in the 1980s. The EU was a potential source of funding for research projects, and, for example, in 1990 the European Commission proposed to contribute with GBP 21 million to fisheries research in the next three years. The Commission wanted to encourage work on the identification and treatment of diseases in fish and shellfish (*Veterinary Record*, 27 January 1990, p. 72).

5.2.15 Proposals to legislate for a new Veterinary surgeons act

In 2003 and 2005 the Royal College of Veterinary Surgeons consulted veterinary surgeons, veterinary nurses and other interested bodies to legislate for a new Veterinary Surgeons Act. In November 2005 the RCVS sought new legislation on the grounds that the present Act did not measure up to present-day expectations for the regulation of the profession The DERFA agreed that the Act was in urgent need of updating, but there was no funding available for work on a Withe Paper until at least 2011. The Environmental, Food and Rural Committee was disappointed that the RCVS had not yet sorted out the detail involved in its reform proposal and in that way managed to persuade the DEFRA of the need for new legislation in the field (House of Commons Environment, Food and Rural Affairs Committee, April 2008).

In the Review of the Veterinary Surgeons Act 1966 from 2005 the RCVS states the following;

> "The consultation paper of 2003 asked whether the Act should apply to all animals, including fish, that regularly enter the human food chain or are kept for commercial or sporting purposes or as companion animals. The current legislation does not define "animal", but it says that animals include birds and reptiles. This is unnecessary, since birds and reptiles are clearly animals, and it creates uncertainty over the status of other groups of species. We therefore propose that new legislation should apply to animals in general and refrain from defining this expression (Royal College veterinary Surgeons Council, June 2005, Review of the Veterinary Surgeons Act. Proposals from the RCVS Council, Royal College of Veterinary Surgeons).[127]

The Veterinary profession was not yet interested in including fish in the Veterinary Surgeons act. In Norway in 2005, they celebrated a new profession in fish health, while in the UK they did not use the opportunity to include fish in a new proposal for a Veterinary Surgeons Act.

5.2.16 Summary

The veterinary profession was not involved in the investigation work that led up to the Fish Diseases Act of 1937 (revised in 1983). In 1933 and 1934 the Furunculosis Committee was mentioned in the *Veterinary Record*,[128] where its reports were reviewed. Although the veterinary profession paid attention to the Furunculosis Committee and the research work that was being done, it has not been possible to find any comments in the *Veterinary Record* on what role the veterinary profession should have in fish disease work. For example, and issue of the *Veterinary Record* published in 1934 mentions that the Diseases of Fish Bill was under consideration by the House of Lords, without any debate on whether or not fish should be included in the Diseases of Animal Act of 1894[129]. It would have been an easy matter to include fish in the act, and thus ensure that thereafter fish diseases would be treated as the other notifiable diseases of animal by a veterinarian. At the time, the profession did not show

[127] RCV had a new consultation in 2009 on their proposed views but "[m]uch if the pressure for a new Act has been removed because the RCVS was advised that they had more scope under their Charter and the Current Act than initially thought..a Legislative Reform Order is currently being drafted [2012](which separates the regulation setting and disciplinary procedures) and there is potential to make amendments to the existing Act under Section 60 of the Health Act 1999"(British Veterinary Association, u.d.)

[128] *Veterinary Record*, 4 November 1933, p. 1135

[129] *Veterinary Record*, 10 March 1934, p. 269

any particular interest in having fish disease work included under their statutory duties. In the 1960s the Veterinary Surgeons Act of 1948 was reopened. Mary Brancker, President of the Veterinary Association, made effort to include fish in the act, but the marine scientists already had a strong position in the work field and politicians did not want to exclude them by including fish in the Veterinary Surgeons Act.

The interrelationships between marine scientists and the veterinary profession appears in the legislation debate in the 1966 (see 5.2.10), but there is no professionalization initiative. Through their position as employees in the marine laboratories they have a strong position in the research field. The furunculosis committees role in the 1930s and the enactment of the Diseases of Fish Act in 1937 (see Section 4.2.1) explain this position in the fish health work field. Fish Health Inspectors that carry out the field work are few in numbers, and they are part of a large scientific team at the Marine Laboratory. It requires a degree level in relevant biological science to be employed as a fish health inspector. The marine scientists researcher has not been interested in treatment of fish (including the right to prescribe medicines (see Section 4.2.1).

Today, in the role of veterinarians in the fish health field has remained unchanged. Marine Scotland and the Fish Health Inspectorate and their Fish Health Inspectors are responsible for statutory fish health work. Nevertheless, veterinarians have an important professional role in the fish health work field through their role in prescribing medicines for fish.

Table 11 show practising professionals and other professional or knowledge-based occupations involved in the fish health field, their organisations and events of importance. In the 1930s the veterinary professions witnessed the establishment of a state veterinary service. Fish diseases were not a part of a fish farming industry, and the disease problems in the 1930s were a 'Scottish problem'. In the 1930s, medical microbiologists at the University of Edinburgh were involved in fish disease work mainly through T.J. Mackie's role as Head of the Bacteriology Department. However, when fish farming demanded that more work done at the department's laboratory, the department left the field and built up a new laboratory in Aberdeen, without any debate. Mackie had a role on the Fishery Board, and as the Marine Laboratory was involved in fishery research, it was probably seen as a natural that the laboratory would also take on responsibility for providing diagnostic services related to fish. The continuity from the Bacteriology Department was secured through the engagement of the microbiologist Isobel Smith.

Table 11 Scotland: Practising professionals and other professional or knowledge-based occupations[130] involved in the fish health field, their organizations, and events of importance.

Year:	1920-1960	1960-1970	1970-1980	1980-1990	1990-2005
Occupational groups involved 1) fish disease research 2) notifiable fish disease work 3) treatment	1937: The Minister of Agriculture and Fisheries has the duty to authorize an inspector to act on behalf of the Minister. Microbiologists At the Bacteriology Department, University of Edinburgh. The Bacteriology Department responsible for notifiable disease (2) 1956: Microbiologists at the Marine Laboratory Aberdeen. The Laboratory responsible for notifiable disease (2)	Veterinary profession (1, 3) The veterinary profession is involved on a day to day basis where they supply prescription of medicine. Not involved in notifiable disease work (2)		.	1997 Fisheries Research Service established; Fish Health Inspectorate. Responsible for notifiable diseases (2) Inspectors named :Fish health inspectors .
Individual experts and their institutional employment	Professor T,J, Mackie and his staff at the Bacteriology department, University of Edinburgh. Microbiologists Isobel Smith Establish the Fish disease laboratory at the Marine laboratory 1922, were only five full-time veterinary research workers in the United Kingdom	.President in the Veterinary Association Mary Brancker. Initiated amendment of the veterinary legislation and initiate the funding of the Institute of Aquaculture, University of Edinburgh. Vet. Ron. Roberts, establish the Institute of Aquaculture, Stirling. 1965: Alan Munro, Microbiologist (ecology)			.
Claiming jurisdiction on the public,		Reopening of the veterinary surgeons act. The veterinary association			

[130] Information based on chapter 4 (4.2).

legal or workplace arena?		tries to include fish.			
Regulations	Diseases of Animal act 1894 Veterinary Surgeons Act of 1948.	The Medicines Act of 1968 Veterinary Surgeons Act of 1948 reopened and veterinary school's absorbed by into the University system In 1968 read a second time in the House of Lords. Veterinary association wanted fish included but it was decided to leave this matter open so that both fishery scientists and veterinarians may be permitted to work in this field			
Type of organization	The British Veterinary Association; a union and professional association				1990: the fish veterinary society June 1992, the RCVS has agreed to the registration of certificate and diplomas in aquatic animal health Fish Health Inspectors or other employed at the marine laboratories have not formed any association specifically related to fish health work

CHAPTER 6: UNIVERSITIES AND OTHER RESEARCH INSITUTIONS

The universities major resources in the interrelationship between actors are their knowledge (Burrage et.al. 1990). And the training institutions has often been seen as part of the emergence of the professions, and often not identified as an own actor. Erichsen (1990) argues that professional knowledge cannot be separated from its use. «Knowledge derives, we know, from the question asked. And the question asked often spring from the application of knowledge" (Erichsen, 1990, p. 181). It is by scrutinizing the national arrangement that we can approach an understanding of how professional knowledge is transformed to professional practice (Erichsen, 1990). Erichsen states that a crucial point is "How knowledge is constructed and reconstructed in a dialectical process between production and application between production and application" (Erichsen, 1990, pp. 181-182).

Professions confront each other epistemologically and knowledge is in continuous dispute with alternative forms of knowledge. This raises the question: What decides whether a particular form of knowledge survives as a profession's solution to a problem? (Halvorsen, 1995). Burrage et al. (1990) ask: Who controls and transits the knowledge required for admission to a profession? A profession's demand for autonomy and material rewards rests on an evaluation of their claimed expertise, and over the years there has been a trend toward university-based professional training. With the enactment of the Veterinary surgeons Act 1948 the UK Veterinary schools became part of the university system in 1948. In Norway the Ministry of Agriculture had the responsibility for education related to the agriculture sector until 1997.

Burrage et al. (1990) maintain that we cannot assume that the interests of practitioners and academics invariably coincide. Universities may even take an active political part in the establishment of new professions. The relationship is a variable one, and the analysis needs to be sensitive to this. An approach that identify universities as an own actor, does in my opinion, not only bring up information about the interrelationship between practising professions and the universities, but also the relationships with the other actors in the model.

In Figure 2 three Norwegian universities and training institutions are named. Aquamedicine biologists are educated at the University of Bergen (Department of Marine Biology), and the University of Tromsø (Norwegian College of Fishery Science). And veterinarians are educated at the Veterinary School.

In Figure 3 there is two universities, the University of Edinburgh and the University of Stirling. Their role varies in this field. The Bacteriology Department at University of

Edinburgh has been central as a knowledge producer up until the late 1950s with their role in fish disease research and diagnostic work for the Government. The Institute of Aquaculture, University of Stirling, established in the 1960s, has been a training and research institutions in fish health for both scientists and veterinarians that want to specialize in fish health. The veterinary schools are not involved in fish health specifically.

What interests do these universities and training institutions as knowledge producers have in professionalization of the fish health field?

6.1 The case of Norway

During the 1980s, the veterinary system in Norway did not manage to respond to the increasing demand for expertise in the fish health field. In this context, actors from the marine research and education milieus at the University of Bergen and the University of Tromsø grasped the opportunity to establish education covering the demand from industry. As described thus far in this thesis, several events formed the background to the universities' possibility to take advantage of the situation. First, there was the disagreement that dominated in the 1970s, 1980s, and early 1990s between the agricultural sector and the fishery sector regarding responsibility for the regulation of fish farming industries. Second, there were the institutional reforms in public administration that changed the veterinary profession's relation to the state. Third, in the 1980s the fish farming industry was faced with huge disease problems and there was an alarming use of antibiotics, both of which made the need for a fish veterinary service and knowledge about fish diseases clearly apparent.

6.1.1 Universities: central actors in professionalization processes in the field of fish health in Norway?

Many individuals start the process of professionalization in work related to fish health, and in a newspaper article in 1984, Professor Jostein Goksøyr, a microbiologist, wrote about the demand for a university education in aquaculture, and also referred to the veterinary professions' monopoly over hygiene, fish diseases and medical treatment:

> [I]n this field one gets the impression that the veterinarians aim at establishing a monopoly which is based less on actual professional knowledge in the area than on holding a particular

> formal academic degree. (*Aftenposten* cited in Norsk Veterinærtidsskrift 1984, no.10, p. 664; my translation)

Goksøyr pointed out that if the establishment of such education had been unrestricted the University in Bergen would have had the possibility to develop education for the profession of 'fish doctor', more adjusted to the needs of the industry than a traditional veterinary education. In addition, he stated:

> [I]t is, of course, naive to believe that one can, without further discussion, establish an education with legal admission to prescribe medicines ... Perhaps what one might dream about, if fish farming expands and becomes an important industry along the coastline, is that the Veterinary School wants to cooperate with the University of Bergen and establish a branch that educates what sooner or later must become a special veterinary surgeon, namely a 'fish doctor'. (*Aftenposten* cited in NV 1984, no 10, p. 664; my translation).

Thus, for the first time in Norwegian history, knowledge experts confronted each other in public. The Norwegian Veterinary Association (Den Norske Veterinærforening, DNV) was annoyed about their members' lack of access to the debate, because several responses from veterinarians to Professor Goksøyr' s statement were not published by *Aftenposten*. Only Pro-Rector Professor Kåre Fossum, from the Norwegian School of Veterinary Science (Norges veterinærhøgskole, NVH), who was disregarded three times, succeeded to having his response printed:

> A series of conditions affecting traditional veterinary knowledge give valuable insight with relevance to fish farming and fish health. In research on breeding, fish have been used as 'experimental animals'[131] partly for the breeding of fish in itself, but also as model for breeding in general. (*Aftenposten* 15 October 1984 cited in NVT, 1984, No.10, p. 665; my translation)

Fossum documented that from 1970s onwards several veterinarians held a doctoral degree in fish-related research, and in an extension of this argument stated:

[131] Professor Harald Skjervold from the Agricultural School accomplished the research work, not members of the veterinary science milieu.

> It is no coincidence that the public combat of fish diseases is the state veterinary services' responsibility. (*Aftenposten* 15 October 1984 cited in NVT 1984, no 10, p. 666; my translation)

The debate between the scientists illustrates the fairly heated debates on knowledge and education in fish diseases in the 1980s. Two years after Professor Goksøyr's letter was published in *Aftenposten*, the hope of education for 'fish doctors' was probably more than a dream for Goksøyr, because by then he is was chairman of the Fish Pathology Committee[132] (Fiskepatologikomiteen) appointed by the Director of the University of Bergen to evaluate a study of the health and environmental problems facing the fish farming industry. The committee had been formed by Professor Kjell Kleppe and Professor Dag Møller. In June 1987, a new study course in aquaculture, health and diseases at the University in Bergen was proposed by the committee. The committee stated that there was a lack of specialized occupations in fish health. The proposed education was intended to build on existing courses and relevant subjects, and was designed to provide the fish farming industry with qualified persons that could take care of fish health and environmental work. The committee did not presuppose that the graduates would be given any rights to prescribe medicine to fish, but they were open to the possibility that graduates could take an approved examination at the NVH in order to have the right to prescribe medicine. In other words, they had not yet considered opportunities for graduates to become professionals. A qualifying examination had to be approved by the veterinary authority. Veterinary Director Olav Sandvik, commented on the proposal for an approved examination in a newspaper interview, and said that he had not seen the plans for the new study, but there was no signal that the Veterinary Director would comply with the University of Bergen's wishes. Rather, he stated that if the new course was concerned with prevention and treatment of fish diseases, such education was already provided for veterinarian in Norway (*Bergens Tidende*, 16 July 1987).

[132] Members of Fiskepatologikomiteen were: Jan Christensen, Pro-Rector of the Gade Institute, Department of Pathology; Emmy Egidius, researcher at the Directorate of Fisheries' Institute of Marine Research; Jostein Goksøyr, Professor at the Institute of Microbiology and Plant Physiology; Tor Hofstad, Professor at Gade Institute's Department for Microbiology and Immunology; Harald Kryvi, Professor at the Zoological Laboratory; and Georg Lambertsen, researcher at the Directorate of Fisheries' Institute of Nutrition. Veterinarian Jan Gjerde assisted the committee with advice and Research Fellow Øyvind Enger served as secretary (Fiskepatologikomiteen, 1987, p. 4).

However, the University of Bergen continued its work, and in 1989 established a study course in fish health. Simultaneously, the University of Tromsø planned to introduce a course in fish health. The fish farming industry was expanding fast and at the same time disease problems were increasing. In contrast to the University of Bergen, the University of Tromsø wanted to restrict possibilities for their graduates to prescribe medicine. In autumn 1989, simultaneously with the University of Bergen, the University of Tromsø established a course in fish health.

Ahead of the decision to establish an education in fish health, the proposals had been debated in newspapers in North Norway. One year earlier, in 1988, Odd Handegård, director of the Norwegian College of Fishery Science at the University of Tromsø, wrote about fish health education in a debate article published in *Nordlys* (12 November 1988). The article was a response to a leading article in the same newspaper, which had brought education in fish health into focus. Following Handegård's article, opinions about fish health education became divided into two distinct camps. First, the agricultural authorities claimed that veterinarians should have the key jobs in animal health work and fish health work. Second, most of those with knowledge about fish, fish health, and marine environments agreed that veterinary education would be excellent for the purpose it had been developed to serve, but it would be a mistake in terms of skills and politics if veterinarians gained a monopoly over preventive fish health work and the treatment of fish diseases.

Handegård pointed out that the conflict was between professions, and referred to two reports on the same subject, produced by different authorities. One is a report[133] published in the autumn of 1988, describing how agricultural authorities had concluded that too few veterinarians were educated in Norway and that the fish farming industry had special needs. The other report had been produced by xxx, and concerned the University of Bergen's and the University of Tromsø with Norwegian College of Fishery Science's plans for new course in fish health, that were supported by the Norwegian Council for Fishery Research (Norges Fiskeriforskningsråd). According to Handegård, the only way to solve the conflict, which he saw as a conflict between professions and the agricultural and fishery authorities, would be to have overall political coordination, where all questions concerning fish health, from both the educational side and administrative side, could be solved without interference from professional groups with narrow interests
(*Nordlys*, 12 November 1988).

[133] He is referring to St.meld. 9, 1988-89.

Clearly, fish health education was a political issue in the mid-1980s. In a report on aquaculture in Norway (NOU 1985:22), a working group consisting of members drawn from fishery institutions, the Ministry of Environment, and the Directorate for Game and Freshwater Fish[134] made the following statement on aquaculture education and research:

> The working group is of the opinion that graduates and veterinarians should acquire more knowledge about the marine environment, especially within marine microbiology. Such competence is already in place at several universities, where lectures are held on these disciplines. The Norwegian Veterinary School ought to contact the universities with competence in marine microbiology in order to initiate supplementary education for veterinary graduates that want to specialize in fish diseases. Further, the universities with competence in marine microbiology and fish pathology ought to offer supplementary education for veterinarians. (NOU 1985:22, p. 61; my translation)

With the NOU report, political pressure was put on the veterinary profession and providers of veterinary education to cooperate with other competence milieus. Further, the Norwegian Parliament's Standing Committee on Shipping and Fisheries (Sjøfarts- og Fiskerikommiteen) supported the development of veterinary education with emphasis on aquaculture, at the University in Bergen and the University in Tromsø (Inst. S. nr. 205 (1987-88)).

6.1.2 Fish disease knowledge dispute – marine science versus veterinary science

Universities' major resources are their knowledge bases, and professions' status is dependent upon such knowledge (Burrage et al., 1990). Scientists from the universities in Tromsø and Bergen and from research institutions involved in marine research have been involved in knowledge development in the fish farming industry. Marine science and aquaculture have been viewed as biological science, but fish disease research does not have a tradition within either of these disciplines. Not only the veterinary profession but also the marine science

[134] Members of the working group were: Viggo Jan Olsen, Deputy Director of the Directorate of Fisheries; Dag Møller, Director of Research at the Institute of Marine Research; Torben Foss, Assistant Director General of the Ministry of Fishery; Pål S. Hernær, Senior Executive Officer in the Ministry of Environment; Svein Aage Mehli, Senior Executive Officer in the Directorate for Game and Freshwater Fish; Roald Vaage, Director of the Norwegian Fishery Research Council; Odd Steinsbø, Director of the Norwegian Fish Farmers Association; and Martin Dahle, editor from the Norwegian Fisher Association.

research institutions were challenged by the fish farming industry, since cultured species could be exposed to disease organism and diseases in farmed fish became more visible than those in wild fish. Emmy Egidius was the first person to conduct research on fish diseases at the Marine Research Institute. She was a microbiologist and a pioneer within research on marine fish diseases (Nerland and Bergh, 2000; Schwach, 2000, p. 340). In 1975, Emmy Egidius and Kari Andersen wrote an article in *Fisken og Havet*[135] about an epizootic of vibriosis in young saithe. They concluded that the death of young saithe was caused by the bacteria *Vibrio anguillarum*, also called vibriosis (Egidius and Andersen, 1975). Further, they informed that the Marine Research Institute had started its work on marine fish diseases in 1972, in connection with salmon farming in marine waters:

> Vibriosis is causing high losses in salmon farming, and therefore it is reasonable that the Institute primarily concentrates on this disease. (Egidius and Andersen, 1975, p 3; my translation).

Vibriosis or cold-water vibriosis was later renamed 'Hitra disease', and it occurred on a large scale for the first time in 1979, in fish farms on the Norwegian island of Hitra. Today, it is well known and accepted that 'Hitra disease' is caused by the bacteria *Vibrio salmonicida*. In the 1980s, however, the knowledge dispute between veterinary medicine scientists and marine scientists and microbiologists about the causes of 'Hitra disease' was quite heated. In the following subsections, I will examine the debate in some detail because, as a knowledge dispute between two scientific communities, it was an event that opened up opportunities for marine scientists to engage in work related to fish diseases. Marine scientists together with microbiologists proved their capability in diagnostic work and their ability to develop effective vaccines. With the breakthrough in developing a vaccine 'Hitra disease', they managed to save the fish farming industry from severe losses. In addition, they proved their ability to provide the industry with knowledge related to fish species vulnerable to diseases, at a time when losses due to diseases were threatening the industry and the use of antibiotics was increasing.

As mentioned in Chapter 5, the fish farming industry channelled money into fish disease research through the Frisk Fisk programme, and the industry emphasized the need for research institutions to cooperate within this field. However, it was difficult to achieve

[135] A report published by the Directory of Fishery's Marine Research Institute.

cooperation because the institutions differed greatly in their methods. In 1987, the conclusions presented in the Frisk Fisk research project differed, as shown in an information document from the Frisk Fisk research programme edited by Brit Hjeltnes, a researcher from the Marine Institute. Veterinarian T. Poppe mentioned in his summary of a research project on a different disease[136] that some aspects of the disease might be relevant to discussions about 'Hitra disease':

> As we know, there is considerable professional disagreement between different Norwegian research milieus about this. Some are of the opinion that this is foremost about an infection caused by bacteria, whereas others, amongst them the veterinary science milieu, including the Veterinary Institute, claim that salmon suffer from one of several basic illnesses caused by a nutritional or metabolism problems that leave the fish exposed to secondary infections, amongst them the bacterium suggested as being *Vibrio salmonicida*. (Poppe, 1987, p. 11; my translation)

Further, Poppe states:

> A number of causal conditions of 'Hitra disease' cannot be explained by bacteria alone ... nutrition, bacteria, environment, and perhaps viruses, are conditions that work together and form the complex that is called the 'Hitra disease'. (Poppe, 1987, p. 11; my translation)

In the spring of 1986, Poppe presented a doctoral thesis that, in line with the statements presented above, emphasizes that 'Hitra disease' is a nutritional disease. One practical consequence of Poppe's work was that vitamin E and selenium was added to the fodder for farmed fish (Kjæmpenes, 1988, p. 104). Brit Hjeltnes and Emmy Egidius state, in their research project summary, that already in 1979 researchers from the Marine Institute had isolated bacteria similar to the vibriosis bacteria found in 'Hitra disease'. They were convinced that a bacteria caused 'Hitra disease' and proposes that it should be called *Vibrio salmonicida* (which is the name used today). In addition, they informed that the marine science milieu had been working for some time to develop a vaccine. The vaccine was tested in 1987 (Hjeltnes og Egidius, 1987). Trond Jørgensen from the University of Tromsø states:

[136] Exocrine pancreatic disease (EPD)

> ‘The “Hitra disease” puzzle’ ... that despite everything is not a puzzle anymore, but a bacterial disease in line with classical vibriosis. (Jørgensen, 1987, p. 15; my translation)

Jørgensen also describes that the results of tests on vaccines were promising.

In an information document consisting of summaries of research projects published by the Frisk Fisk research programme in 1987, it is clear, even to those outside the research field, that the conclusions were conflicting. In the foreword, Chairman of the research programme Dag Møller states:

> The following project summaries are the responsibility of the individual authors. The programme’s committee has not deemed it correct to censor the individual contributions. (Møller, 1987, p. 2; my translation)

Given that the fish farming industry itself was the target group, it is unexpected to find that research project’s summaries differ greatly in their conclusions. Clearly, the field of knowledge of fish diseases was in its infancy, and no knowledge group was able to front its knowledge convincingly. In 1987, it was not possible for the veterinary science milieu to offer their own diagnosis, and the veterinary authorities allowed fish farmers to test the ‘Hitra disease’ vaccine regardless. *Vibrio salmonicida* was accepted as the bacteria causing ‘Hitra disease’ and it was listed as a notifiable disease. Since the successful development of the cold-water vibriosis vaccine, this disease has not been a problem for the salmon and trout farming industry in Norway.

Not only was vibriosis challenging the Norwegian fish farming industry, but also new diseases were emerging. In 1985, smolt infected with furunculosis were imported from Scotland[137] and the Norwegian salmon farming industry experienced significant losses for three years as a consequence.). According to Wergeland (Interview 2 April 2008) knowledge about vaccines was in its infancy in the 1980s, but in the early 1990s, oil-adjuvanted vaccines (OAVs) were introduced in Norway. The use of OAVs was the major factor in the reduction of losses caused by furunculosis, and it would not have been possible to develop the vaccine without the new disease laboratories established in Norway in the early 1990s.

[137] See The Furunculosis Sentence in the Supreme Court (Høgsterett) 1992 (Rt-1992-453 (141–192)) for thorough review of the account about the import of furunculosis-infected smolt to Norway and the role played by the Norwegian veterinary authorities, the DAFS, and the University of Stirling.

6.1.3 Universities challenging the veterinary profession's monopoly in the fish health field.

In 1989, the University of Tromsø together with the Norwegian College of Fishery Science applied for restricted possibilities for their graduates of fish health to prescribe medicines. The Ministry of Education and Research sent the application out for comment. After the hearing, the Ministry followed the Ministry of Agriculture's Chief Veterinary Officer's recommendation and denied the application on the grounds that the graduates lacked the necessary competence to prescribe medicines and their knowledge about pharmacology was too limited.[138] At the time, the Ministry of Agriculture had responsibility for veterinary education and therefore there were two ministries involved in the approval process.

The hearing showed that all of the institutions that did not want to give fish health biologists the right to prescribe medicine were connected to the agricultural and veterinary profession, and among them were: Norwegian Food Safety Control (Statens Næringsmiddeltilsyn), under the Ministry of Health and Social Affairs; the Norwegian Medical Association; the Faculty of Medicine at the University of Oslo[139]; the Norwegian Medicines Control Authority; and the Norwegian Association of Pharmacists (Norges Farmaceutiske Forening). Amongst those who wanted to grant prescribing rights were the Department of Fisheries, the Norwegian Fish Farmers Association, the Ministry of Environment, the Norwegian Association of Proprietor Pharmacists (Norges Apotekerforening), and the University of Bergen (i.e. the Senate of the University of Bergen) (Utdannings- og forskningsdepartementet, 26 March1990). In its summary of the comments from the hearing, the Ministry of Education and Research concluded:

> [T]there is no agreement, neither regarding whether the graduates of fish health graduates have the competence to prescribe medicines to diseased fish, nor whether it is advisable. It is possible to distinguish between actors from veterinary- and medicine on one side, and users and actors from the fishery on the other side. This applies for both the question about

[138] Letter to the University of Tromsø from the Ministry of Education and Research, dated 28 June 1990, and referred to in the minutes of a meeting between the Ministry of Education and Research and the University of Tromsø on 18 December 1990 (Utdannings- og Forskningsdepartementet, Universitets- og Høgskoleavdelingen, 18. December, 1990).

[139] The Department of Pharmacology, Faculty of Mathematics and Natural Sciences, was invited to give a statement but declined.

> competence and the question about whether or not it is desirable. (Utdannings og Forskningsdepartementet,, 26 March 1990; my translation)

Further, the Ministry of Education and Research advised the University of Tromsø to adjust and change its curriculum in accordance with the comments made by the Ministry of Agriculture's Chief Veterinary Officer and, if they did so, there would be a possibility of a new hearing (Utdannings- og forskningsdepartementet, 26 March 1990). It is clear from a letter to the Ministry of Education and Research, dated 25 May 1990, that the Chief Veterinary Officer was strongly against a new application and a new hearing, and concluded as follows:

> The case will not be returned to the UiT/NFH with a request for an extension of the curriculum in preparation for competence to prescribe medicine ... Therefore, initiative should be taken by the Norwegian Veterinary School and the Norwegian College of Fishery Science to mutually discuss their respective curricula with a view to achieving broad and optimized competence within the field of aquaculture field. (Letter from the Ministry of Agriculture (Veterinary Division) to the Ministry of Education and Research, 25 May 1990; my translation)

The application from the University of Tromsø was denied on the grounds that its curriculum did not generate the required competence to prescribe medicine. The University of Tromsø did not accept the rejection, and argued that the need from the fish farming industry and the discussion about competence did not correspond with actual facts. The University of Tromsø jointly with the NFH proposed a meeting between the Ministry of Education and Research and the universities to discuss the need for restricted possibility to prescribe medicines, the relevant competence developed at the University of Tromsø, and further treatment of the case Letter from Ole D. Mjøs, Principal of the University in Tromsø, and Kjell K. Olsen, Principal of the Norwegian College of Fishery Science to the Ministry of Education and Research (Mjøs, O.D. and Olsen, K.K., 17 October 1990).

The close relation between veterinarians and the Ministry of Agriculture's veterinary division made it possible for the veterinary profession to protect their field of work. Veterinarians had several ways of making statements: through the Ministry of Agriculture, the Norwegian College of Veterinary Medicine, the National Veterinary Institute, and the Norwegian Veterinary Association. In the hearing, all the statements from the aforementioned bodies were negative towards granting fish health graduates restricted possibility to prescribe

medicines. In this respect, the veterinary profession had received support also from the medical profession and the Ministry of Social Affairs for their arguments; the Ministry of Social Affairs is a governmental body that administers permissions to prescribe medicines under the Medicines Act of 1964 (Legemiddelloven) (Utdannings- og forskningsdepartementet, 26 March 1990).

In December 1990, a meeting was held between the University of Tromsø and the Ministry of Education and Research about the further treatment of the application regarding prescribing rights. The Ministry agreed that they had to continue the work to get fish health biologists recognized as a profession with the right to prescribe medicine, but the University of Bergen had to be included before a new application could be promoted. The specific number of drugs, what acts that needed to be changed and further treatment of the case had to be clarified (Minutes from the meeting on studies of fish health and aquatic environmental hygiene regarding further work on the application for restricted rights to prescribe medicine, 18 December 1990).[140] In April 1993, a new application for restricted possibility to prescribe medicines came from two universities.

In September 1993, the Ministry of Church, Education and Research[141] arranged a meeting with the Ministry of Agriculture, the Ministry of Fisheries, the Ministry of Environment, the Ministry of Social Affairs, Norwegian Food Safety Control (Statens Næringsmiddeltilsyn), Directorate of Health (Helsedirektoratet), and the universities for the purpose to clarifying whether it was advisable that graduates of fish health should share parts of the veterinary profession's sphere of responsibility and competence. According to the Ministry of Church, Education and Research, the conclusion reached was that it was advisable, and that the application for restricted possibility to prescribe medicines should be sent to the Ministry of Social Affairs (Letter from the Ministry of Church, Education and Research, 28 September 1993). The Ministry of Agriculture's veterinary Department responded to the letter, stating that both the Ministry of Agriculture and Norwegian Food Safety Control had objected to the application. Some of the factors that the Ministry had called attention to were:

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[140] *Referat fra møte den 18.desember 1990 om studietilbud i fiskehelse /akvatisk miljøhygiene. Det videre arbeidet med søknad om begrenset reseptrett* (Utdannings- og Forskningsdepartementet, Universitets- og Høgskoleavdelingen, December 18, 1990).

[141] Ministry of Education and Research was renamed the Ministry of Church, Education and Research on January 1, 1991.

- The lack of need for other occupations to prescribe veterinary medicines.
- Competence in pharmacology and pathology was not sufficiently covered.
- The liberalization of the right to prescribe medicines might provoke a reaction from the export market, e.g. the EU.
- The right to prescribe medicines to fish should be more restricted rather than be extended.

(Letter from the Ministry of Agriculture (Veterinary Department) to the Ministry of Church, Education and Research, 12 October 1993; my translation)

In 1994, a new argument emerged when the Ministry of Agriculture (Veterinary Department) questioned the right of the Ministry of Health and Social Affairs, through the Medicines Act of 1964, to allow the fish health biologists to prescribe medicines for fish. They argued the need for clarification regarding whether restricted possibility to prescribe medicines could be founded on the Medicines Act of 1964or the Veterinary Surgeons Act of 1948r whether a new act for fish health biologists should be enacted (Letter from the veterinary division Ministry of Agriculture of the to the Ministry of Social and Health, 25 March 1994). However, the argument had already been considered by jurist Peter Ørebech, from the Norwegian School of Fishery Science. In June 1992, he concluded that in order to give graduates of fish health authorization as members of a profession with rights and duties, the easiest way would be to include them in a new version of the Veterinary Surgeons Ac of 1948. If it proved difficult to grant them prescribing rights, the issue could be solved by treating it as an exception (Ørebech, 1992).

In 1994, a working group was appointed by the Ministry of Agriculture with members from the Ministry of Fisheries, the Ministry of Social Affairs and Health, the Norwegian Health Control Authority (Statens helsetilsyn), and the Norwegian Medicines Control Authority (Statens legemiddelkontroll). The group's task was to consider the incorporation of the right of fish health biologists to prescribe medicines under the legal system (Letter from the Ministry of Agriculture (Veterinary Department) to the Ministry of Church, Education and Research, 11 August 1994). In 1995, the working group submitted a divided proposal in response to the question of rights to prescribe medicines. In a later meeting between the ministries, an agreement was reached that it was technically justifiable for a fish health biologists to have prescribing rights (Information letter from the Fish Health Biologist's Association (Fiskehelseforeningen), February 2001).[142] In 1997, the Norwegian School of

[142] The letter refers to a letter from the Ministry of Church, Education and Research to the University of Tromsø and University of Bergen, dated 17 July 1996.

Veterinary Science (Veterinærhøgskolen) and the Norwegian Agriculture School (Norges Landbrukshøgskole) were transferred from the Ministry of Agriculture to the Ministry of Church, Education and Research. The transfer meant a new situation for the universities that were applying for recognition for their graduates as members of a profession with the right to prescribe medicines for fish. The agriculture sector's control of education and research was weakened by the transfer of its affiliated educational and research institutions.

However, when the focus shift from the Medicines Act to the Veterinary Surgeons Act the Ministry of Church, Education and Research became a more passive spectator in the debate about rights to prescribe medicines, and the Ministry of Agriculture (Veterinary Department) again took over the leading role. Simultaneously with the discourse on prescribing rights there was ongoing work towards a permanent fish diseases act, and the Veterinary Surgeons Act was reopened.

6.1.4 Revisions to the Veterinary Surgeons Act – fish health biologists challenging vets' sole right to prescribe medicines for aquatic animals

The Veterinary Surgeons Act was reopened in 1994, due to the need for the act to encompassing new social and professional challenges as well as all animal health personnel (Ot.prp. nr. 52 (2000-2001)). Parallel to human medicine, the Ministry of Agriculture wanted to control alternative treatment of animals such as acupuncture, homeopathy, herbal medicine, and healing. Since the Veterinary Surgeons Act of 1948 had been passed, animal husbandry had changed radically and fish farming had developed; in 1995 the working group appointed to consider the incorporation of rights for fish health biologists to prescribe medicines had come to an agreement that it was technically justifiable; and the first graduates in fish health biologists had emerged. The Fish Health Association (Fiskehelseforeningen) was established in 1997, seven years after the Norwegian Aquaculture Veterinary Association (Akvaveterinærenes forening). In addition, for the first time there was an organized association to advocate the interests of fish health biologists. There was also political willingness from the Norwegian Government to juxtapose veterinarians and fish health biologists in the fish health field:

> In the future, it will also be important to ensure a high level of expertise by exchanging information and education across different occupational groups. In this respect, there have been, among other things, recently educated specialists in fish health in Tromsø and Bergen.

> The Government aims to give these specialists the right to prescribe medicines. With their high level of competence, these university graduates will make a valuable contribution to the further development of the fish farming industry. (St.meld. nr. 48, 1994-1995, p. 93; my translation)

The Ministry of Agriculture sent the new veterinary surgeons bill for its first hearing in 1996. During the work with statements from the hearings, it became clear that the extent of changes in the framework for public veterinarians were such that it would have consequences for the structure of the new bill. The extent of public tasks and the need for qualification in administration had only increased considerably since the reopening of the Veterinary Surgeons Act of 1994. Many regional veterinarians (distriktsveterinærer) could not have a private practice within ordinary working hours, and the result was that all clinical work had to be covered by private veterinarians. The distinction between public and private veterinarians needed to be clarified and therefore a new organization and funding of the public veterinary service was demanded. The Government was of the opinion that a special reference to the public veterinary system was not needed in a new act that included veterinarians and other animal health personnel. According to the Government, the public services in animal health and protection would be covered by special laws with their own directives and work-related instructions for individual employees. The Government maintained that how the state organized its veterinary services did not need to be pursuant to statutory law (Ot.prp. nr. 52 (2000-2001)). The new changes in legislation demonstrate that the interrelations between the veterinary profession and the state had changed, as the state wanted to organize the veterinary service to a larger degree, without having to negotiate with the profession in terms of statutory authority. The Norwegian Parliament (Stortinget) passed a resolution in June 2000 based on St.prp. 54 (1999-2000) that stated that there was no need to include the public veterinary service in the new bill and the new proposal should be a professional law.

The bill relating to veterinarians and other animal health personnel was sent out for comment in September 2000. The bill gave fish health biologists authorization and the right to requisition prescription medicines for aquatic animals, with the exception of marine mammals. The hearing statements were not unanimous and most of them were linked to questions about the use of medicine, cooperation, and distribution of duties as well as fish health biologists' authorization and right to requisition medicines. In other words, in the legislation process, the issue regarding fish health biologists' rights was not a small issue. The Norwegian Board of Health Supervision, the Norwegian Medical Association, the Veterinary

Association, and the Norwegian Pharmacy Association did not want to give fish health biologists the right to prescribe medicines. They argued that it would entail far more if the fish health biologists were given the right to prescribe medicines. It increased the chances of increased numbers of requisitions for prescription medicine only, and was a development that constituted a risk for increasing consumption of drugs in general and antibacterial agents in particular, with the consequences that the Norwegian fish farming industry would lose their credibility (Ot.prp. nr. 52 (2000-2001), Subsection 1.5.7.3).

There was, however, agreement among the hearing authorities that, according to EEA Agreement Directive 81/851/EØF and Directive 00/37/EF, veterinarians would only be qualified to prescribe veterinary medicines. Thus, the EEA Agreement Directive would have to be changed before authorization and prescribing rights could be granted.

6.1.5 Norwegian vets contact European vets for help regarding legislation concerning prescribing medicines for fish

Already in 1995, in a letter to the Federation of Veterinarians of Europe (FVE) and the European Union of Veterinary Practitioners (UEVP) (recounted in Norsk Veterinærtidsskrift, 1995, No. 11), the Norwegian Veterinary Association had asked the FVE for help in their work to stop fish health graduates from gaining the right to prescribe medicines for fish. In the letter, the Norwegian Veterinary Association informed their colleagues in Brussels that the Norwegian Government probably would lobby to change the EU regulation in order to give the fish health biologists (aquamedicine biologists) the prescribing rights for fish:

> In connection with the EEA agreement, the EU regulations in this field (prescribing medicine) came into force, and politicians considering the market are assumed to have had second thoughts and problems with earlier promises. Probably, they will try to influence decision-making agencies within the EU to approve that the right to prescribe medicines to fish is expanded to include also fish health graduates. It is known that lobby activities have already been carried out in Brussels for this purpose. (Norsk Veterinærtidsskrift, 1995, no 11, p. 1087; my translation)[143]

[143] I forbindelse med medlemskap i EØS ble EUs regelverk gjeldende på dette felt, og det antas at ledende politikere utifra markedshensyn har fått betenkeligheter og problemer med sine tidligere løfter, det vil antagelig bli satset på å søke å påvirke besluttende organer innen EU to å godkjenne forskrivningsretten for legemidler til fisk utvides til også å omfatte fiskehelsekandidater. En er kjent med at det allerede er iverksatt lobbyvirksomhet i Brüssel i denne hensikt. (Norsk Veterinærtidsskrift, 1995, No. 11, p. 1087)

Thus, the Norwegian Veterinary Association argued that the case was not only in the Norwegian profession's interest. The British Veterinary Association (BVA) had taken note of the Norwegian case and stated in the *Veterinary Record* (*Veterinary Record*, August 1995) that they hoped that their political lobbyists would be alerted to the case, and that the BVA and the RCVS (Royal College of Veterinary Surgeons) realized the threat that issue represented.

As the largest producer of salmon in the EU, the fish health field is well known to the British Veterinary Association. The British veterinary profession's lack of involvement in notifiable fish disease work is a cause for concern for the profession. Marine scientists from the Fisheries Research Services (FRS) represent the UK in the EU's Standing Veterinary Committee. In October 1995 the Federation of Veterinarians of Europe (FVE) passed a unanimous resolution supporting the Norwegian Veterinary Association's request to retain sole prescribing rights for veterinarians in fish health, and refrain from extending this right to lay persons, including fish health graduates. Further, the FVE argued:

> It is the opinion of the FVE that the sole right of veterinarians to prescribe medicines is essential for the efficient protection of public health and environment. The prescribing right is based upon the ethos of the veterinary curriculum combining pharmacology, toxicology, pathology, veterinary medicine, and preventive veterinary medicine, with microbiology, virology, parasitology, food hygiene, and public health in all species of animals and food of animal origin, including fish. (FVE Resolution cited in Norsk Veterinærtidsskrift, 1996, no, 4, p. 272)

In February 1996, Aud Skrudland, board member of the Norwegian Veterinary Association (DNV) and member of the Veterinary Aquaculture Association, and Eirik Mørkholm, Secretary General DNV, held a meeting with the Parliament's Committee of Industry, were they informed about the DNV's view on St.prp. 48 (Havbruksmeldingen). The DNV informed that their request to retain the sole prescribing rights of veterinarians in fish health had received unanimous support from the FVE. Skrudland's plea is recounted in Norsk Veterinærtidsskrift (NVT):

> In the Havbruksmeldingen, [144] the Government suggests giving fish health biologists the right to prescribe medicine. There has been strong reaction to this from European specialists, because the development is unfavourable in cases where several occupational groups are involved in the management of medicines. Experience of developments within animal husbandry with the increased use of hormones and antibiotics and the unfortunate consequences of the use should require a tightening of the right to prescribe medicines, not an expansion of it. (*Norsk Veterinærtidsskrift* 1996, No 4, p. 273; my translation)[145]

The Veterinary Aquaculture Association was optimistic and believed their arguments would win. The editor was referring to a fax dated 9 April 1996 sent by the Ministry of Foreign Affairs to several ministries,[146] which had been written by Harald E. Hauge (former president in the Norwegian Medical Association). Hauge realized that currently the EU did not want to comply with the Norwegian request, but that it would be better for Norway to come back to the question in two years' time. By then, Norway would probably be established within the EU's veterinary system and the turbulence around the prices of farmed salmon would be settled (*Norsk Veterinærtidsskrift*, 1996, no 8/9, p. 568). Hague's statement was considered a victory for the Norwegian Veterinary Associations (Norsk *Veterinærtidsskrift*, 1996, no 8/9, 568-569).

6.1.6 Department of Biology, University of Bergen, and its role in changing EU legislation

The Ministry of Church, Education and Research continued its work towards persuading the EU Commission to grant authorization for fish health biologists to prescribe medicines:

> For the universities' information, we can report that the Ministry of Foreign Affairs has been contacted about the case and we have asked the Ministry to bring up the case formally with the European Commission with the understanding it will need some time to obtain clarification of

[144] A report to Parliament.

[145] Reseptrett til fiskehelsekandidater er foreslått fra regjeringen I Havbruksmeldingen. Det har kommet sterke reaksjoner fra europeiske fagmiljø på dette da en utvikling der flere yrkesgrupper skal forvalte medisiner er uheldig. Den utvikling vi kjenner innen legemiddelbruk i husdyrhold med økende fokus på hormonbruk og antibiotikabruk og uheldige konsekvenser av dette, skulle tilsi en innskjerping av forskrivningsrett, ikke en utviding. (Norsk Veterinærtidsskrift 1996,no 4, p. 273)

[146] The Ministry of Agriculture, the Ministry of Social and Health Affairs, the Ministry of Fisheries, and the Ministry of Church, Education and Research.

> the issue. Simultaneously, the affected Ministries will clarify other formal decisions needed or to be adjusted. (*Norsk Veterinærtidsskrift* 1996, no 8/9, p. 569; my translation)[147]

In 1997, the same year as the Fish Health Association (Fiskehelseforeningen) was established, students and graduate fish health biologists from the Fish Health study in Bergen formed a committee called the Reseptrettgruppen ('Prescribing Rights Group') with the aim of commenting on the hearing on the rights of fish health biologists to prescribe medicines (Killie, 2007). The group and Heidrun Wergeland, Professor in Immunology at the University in Bergen and a microbiologist, were closely involved in this phase of the process. Professor Wergeland worked with the wording of the bill relating to veterinarians and other animal health personnel and attended meetings with the Ministry of Agriculture. According to Wergeland (Interview 2 April 2008), fish health biologists and university lecturers were aware that they had to avoid confrontation with the veterinary profession and therefore avoided involvement in the ongoing public debate.

In a meeting with the Ministry of Agriculture's jurists, the representatives of University of Bergen wanted to have their own jurist in attendance. Principal Rommetveit asked Ørnulf Rasmussen, Professor in Administrative Law, to join the meeting. According to Wergeland, Rasmussen was able to convince the Ministry's jurists that there were possibilities within the EU regulations to obtain a licence for graduates from the fish health studies in Bergen and Tromsø to prescribe medicines (Wergeland, Interview 2 April, 2008). The documentation of the qualification of fish health biologists brought forward by the University of Bergen and the University of Tromsø, and Professor Rasmussen's contribution in the meeting, led to the Ministry continuing its work both nationally and towards persuading the EU Commission to grant authorization for fish health biologists to prescribe medicines. Prior to this phase, Professor Wergeland had stated that she did not receive much active support from her department in many cases, but that the university's leadership was active when she sought support. Generally, both within and outside the university it was considered not possible to achieve permission for fish health biologists to prescribe medicine (Wergeland, Interview 2 April, 2008).

[147] Til universitetenes orientering kan vi opplyse at saken nå er tatt opp med Utenriksdepartementet idet vi har bedt Utenriksdepartementet ta saken opp formelt med EU-kommisjonen med sikte på at det kan ta tid å få en *avklaring. Samtidig vil de berørte departement* klarlegge *hvilke øvrige formelle bestemmelser det er aktuelt å fastsette, eventuelt justere.* (*Norsk Veterinærtidsskrift,* 1996, no 8/9, p. 569).

In 1997, the Fish Health Biologist Association (Fiskehelseforeningen) had two main issues on its agenda: the right to prescribe medicine, and the new bill relating to veterinarians and other animal health personnel. For the first time, members of the profession had formed an interest organization to participate in the work for authorization regarding prescribing rights (Killie, 2007).

In September 2000, the final draft of a new bill relating to veterinarians and other animal health personnel was sent out for comment, and in the hearing graduate fish health biologists were juxtaposed with veterinary surgeons in the work with aquatic organisms, but the work towards the EU Commission continued. The result of the work was settled in 2005, when the EU Commission amended its directive. Political and administrative work on ministry level carried out towards the EU Commission and political work towards the reopening of the Veterinary Surgeons Act finally resulted in the right of fish health biologists to prescribe medicines for fish.

6.1.7 Summary: the case of Norway

A combination of several events explains the professionalization process of aquamedicine biologists. In 1997 the Diseases of Fish Act was passed and the Ministry of Fisheries gained administrative responsibility for diseases in wild marine species, the Ministry of Church, Education and Research had the veterinary education transferred to it from the Ministry of Agriculture, and the Veterinary Surgeons bill was on its first hearing. There was also strong political pressure to give fish health biologists' restricted possibility to prescribe medicines for fish. In St.meld nr. 48 (1994-1995, p. 93), the Government[148] states that they want to give the new specialists in fish health educated at the University of Tromsø and University of Bergen the right to prescribe medicines. Their ability to produce knowledge resulting in effective vaccines in the late 1980s was a breakthrough for the recognition of their body of knowledge in the field of fish health work. Their knowledge was in demand from both the fish farming industry and the Government.

The professionalization processes of the fish health biologists have involved several events and actors at both institutional and individual level. Table 12 shows how university and research institutions have been active over a period of time. There was a significant institutional change between the 1990s and the 2000s, partly because of new public

[148] Gro Harlem Brundtland was Prime Minister of the Labour Government.

management reforms. The settlement of administrative responsibility for the Diseases of Fish Act of 1997, the reopening of the Veterinary Surgeons Act of 1984, and the new role of the Ministry of Education in the application process for fish health biologists to have prescribing rights were all influential events. This historical and social context made it possible for the University of Bergen, with its experts in microbiology and law, to convince the Ministry of Foreign Affairs to continue its work towards amending the EEA directive. The professionalization process of aquamedicine biologists is first and foremost a result of the involved universities' resources and interests in establishing new study course and giving their graduates the status of a profession. It is apparent from Table 12 that the period 1980–1990 was decisive and that lay the foundation for aquamedicine biologist's access to veterinarian's fish health jurisdiction.

Table 12 Norway: Universities and other training institutions in the fish health field

Year:	1960-1970	1970-1980	1980-1990	1990-2005
Universities Norwegian School of Veterinary Science			1989: University of Tromsø and University of Bergen establish a fish health course	1997: Veterinary education transferred From Ministry of Agriculture to the Ministry of Church, Education and Research 2001: Authorisation of title fish health biologist.
Norwegian Veterinary Institute (NVI) (diagnostic service and research)	Fish Disease research (few scientists employed for fish related work)	Tore Håstein with PhD from University of Stirling employed at VI	1986: Poppe and others from veterinary research institutions states that the Hitra-disease is not caused by bacteria.	2004 Norwegian Food Safety Authority established incorporating the animal health authority and fish health legislation.
Marine Research Institute (MRI)		1972: The Marine Research Institute started marine fish diseases research	1987 Researchers from the MRI, Bergen, and the University of Tromsø concluded that 'Hitra disease' is caused by bacteria and developed an effective vaccine. It was permitted to be subject to testing. The vaccine	2005 : Rights to prescribe medicine granted, and fish health biologists juxtaposed with veterinarians in the fish health field

			was subsequently developed by microbiologists from MRI, Bergen, and the University of Tromsø.	
Individual experts and their institutional affiliation	Harald Skjervold, Norwegian Agriculture School Emmy Egedius, microbiologists, IMR.	1975 Tore Håstein employed at the VI Dag Møller, Marine Researcher (Zoology) IMR	1986: Trygve Poppe's doctoral thesis concludes that 'Hitra disease' is a nutritional disease causing fish to become exposed to secondary infections. 1987: Testing of 'Hitra disease' vaccine developed by researchers from the MRI and University of Tromsø 1987 Fiskepatologikomiteen (Fish Pathology Committee) delivered its recommendation regarding a new study course in fish health. The committee was initiated Professor Dag Møller and appointed by the Director of the University of Bergen Professor Kjell Kleppe. Simultaneously, the Norwegian College of Fishery Science (Norges Fiskerihøgskole) University of Tromsø planned a course in fish health.	1990s: Microbiologists Heidrun Wergeland involves in the legislation debate about prescription right for their graduates from Bergen (and from Tromsø).
Political support			Political support for the establishment of educational courses in fish health (NOU 1985:22), by the Committee on Shipping and Fisheries	1994: A working group was appointed by the Ministry of Agriculture, with members from the Ministry of Fisheries, the Ministry of Social Affairs and Health, the Norwegian Health Control Authority (Statens helsetilsyn), and the Norwegian

				Medicines Control Authority (Statens legemiddelkontroll). to consider the incorporation of fish health biologists' right to prescribe medicines under the legal system St.meld. nr. 48, 1994-1995, on governmental support for fish health biologist's right to prescribe medicines

6.2 The case of Scotland

There are two universities that have an active role in the field of Scottish fish health knowledge both as producers of knowledge and as educators (see Figure 3). The time and sequence for their involvement is significant for understanding the Scottish case. In chapter four the Furunculosis Committee and its work in the 1920s-30s call attention to the urgent need of a fish diseases act is described. Their recommendation was based on knowledge produced by female researchers at the Bacteriology Department of Edinburgh University. This Department plays the most important role in the beginning of the history of the Scottish fish disease research and diagnostic work. But the Department leaves the field in the late 1950s as their diagnostic work is transferred to the Marine Laboratory in Aberdeen.
The Institute of Aquaculture has since it was established been a training and research institutions in fish health as well as aquaculture. Both scientists and veterinarians that want to specialize in fish health have taken courses at this Institute. The veterinary schools are not involved in fish health specifically. Fish is included in the veterinary curriculum but the veterinary schools only have a one or two day course on fish (Richards Interview, November 24, 2000). Therefore, many vets taking interest in fish disease work have taken courses at the Institute of Aquaculture.

What interests, resources and strategies does the University of Stirling have as an actor in the professionalization of the fish health field? Why does not the Institute of Stirling follow the Norwegian example and go for a new fish health line of study?

6.2.1 The Bacteriology Department at the Medical School, University of Edinburgh, and fish disease research

The fish disease research work for the Furunculosis Committee was carried out under the direct supervision of the Chairman of the Committee, Professor T.J. Mackie, of the Bacteriology Department. In addition, to Dr Isobel Blake (BSc, PhD), who as I.J.F. Williamson first undertook duties for the informal committee, and was a full-time investigator, the committee employed the following graduate workers from the Bacteriology Department:

- E.J.M. Anderson, BSc, PhD, 3 months, 1929
- J. Cowan Clark, BSc, 18 months, 1930–1931
- A.S.R. Lowden, BSc, 1 month, 1931
- G. Borthwick, BSc, 3 months, 1932–1933
- M.H. Christison, BSc, PhD, 1 week, 1934.

In the Furunculosis Committee's first report, I.J.F. Williamson's research work is mentioned several times. In addition, in the final report, the committee gives credit to her for her abilities in this particular branch of biological investigation. After the Diseases of Fish Act was implemented in 1937, all diagnostic work on fish was performed at the Bacteriology Department.

There are a number of reasons why the Bacteriology Department acquired such an important role in early fish disease research and diagnostic work. First, the department's role in fish disease work can be understood from its role as a public health laboratory in the 1920s, in addition to performing diagnostic work for hospitals. As an extension of their work, they engaged in environmental issues such as testing water and milk and performing diagnostic work related to fish. Second, Professor Mackie, who worked in the department, was in close contact with the Scottish Office, and from 1926 he acted as a consultant to the Fisheries Board for Scotland. His link to the Fisheries Board may have affected his role in the Agriculture Research Council in the 1930s. Both T.J. Mackie and Dr J.A. Arkwright were members of a powerful group in the Agriculture Research Council, which had been newly established in

1931 (DeJager, 1993).[149] Simultaneously, Mackie and Arkwright were engaged in work for the Furunculosis Committee. Third, according to microbiologist Dr Isobel Smith (Smith, Interview 23 May, 1991), engagement in fish diseases research and diagnostic work was that the staff at the Department included known bacteriologists. At the time, she presumed that the department's staff could have been viewed as better investigation officers.

Several female researchers carried out the research work for the Furunculosis committee, and according to (Smith, Interview 23 May, 1991) there have always been several female microbiologists among the staff. The department enabled its staff to combine microbiological diagnostic work with family life. For employees, it was almost like having a nine-to-five job, and not like being clinicians on call. This implies that the female researchers made a strategic career choice in order to combine a job and family, and the fish health field was open to the involvement of female scientists.

In 1953 the diagnostic work on fish diseases was moved from the Department of Bacteriology to the Marine Laboratory in Aberdeen. It was both a geographical relocation, from Edinburgh to Aberdeen, and an institutional change, from a public diagnostic service laboratory at the University of Edinburgh to a marine research and laboratory institution. Originally, the Department of Fishery and Agriculture for Scotland had had responsibility for fish diseases under the 1937 Act, but with the move the consolidation of fish health work and fishery institutions became stronger (see Chapter 4 for my discussion relating to the Marine Laboratory). The responsibility for diagnostic work and notifiable diseases has been at the Marine laboratory since.

6.2.2 Unit of Aquatic Pathobiology at the University of Stirling

The Institute of Aquaculture at the University of Stirling, which was established in 1971 as the Unit of Aquatic Pathobiology, was the second important institution in fish health and disease research in Scotland. The Unit was part of the Biology Department and it consisted of a group of five, principally vets, and all doing research into fish diseases. The disease problems were connected to wild fish (Richards, interview 14 April1990).[150] It is noteworthy that a centre for fish health education was established very early in Scotland. It was not an education only for veterinarians, but many veterinarians have both worked and attended

[149] DeJager (1993) discusses the origins of the Agricultural Research Council, 1930–1937, and how following disputes the council ended up being concerned with how pure science should meet the practical needs of British agriculture, and taking as its model the more established Medical Research Council.
[150] Randolf Richards was a member of this group.

courses at this Institute. The establishment of the Unit of Aquatic Pathobiology in 1971 was a result of collaboration between a biologist from the White Fish Authority and two veterinary surgeons. Contacts were made with the Nuffield Foundation. Discussion groups were organised and resulted among other things, in a unit lead by veterinarian R.J.Roberts, with the remit to carry out both research and teaching on fish husbandry and fish diseases (Veterinary Record, 15 August, 1992, p 138; personal information in letter from veterinarian Mary Brancker, 11-11-2001).

The Unit at the University of Stirling was to become an important aquaculture and veterinary research centre, a centre which today has educated veterinarians (and scientists) from all over the world, also from Norway, in fish pathology. The Institute has had direct involvement with the industry during its rapid expansion and provided disease and environmental management services to industry. Several veterinarians both domestic and from abroad have taken their PhD in fish disease related questions at this Institute (including the Norwegian veterinarian Tore Håstein.

If vets have wanted to work with statutory fish work there has been an opportunity at the Weymouth laboratory (England and Wales, established in 1969 to study the cause of diseases in salmon) and at the Marine Laboratory (Aberdeen, Scotland, established in 1953). These two laboratories have monitoring responsibilities for fish diseases. However, for veterinarians these jobs were not attractive since they had to be employed as scientists and get lesser paid.

The Unit of Aquatic Pathology, however, gave veterinarians and also other knowledge-based occupations opportunities to specialise in fish diseases (education) and to do research work. There was also a possibility to work with disease and environmental management services.

6.2.3 Mary Brancker and her role in the establishment of the Unit of Aquatic Pathobiology at the University of Stirling

Studies of professions have shown that interrelationships between actors at individual and institutional levels have influence the division of work in particular fields. Actors' interests and resources may influence a given field's trajectory. Veterinarian Mary Brancker had an important role in the veterinary fish disease field in Britain, both as a veterinarian with an interest in the field and through her more formal position within the BVA as a board member and as president of the British Veterinary Association in the 1960s. It was through personal

information from veterinarian Peter Southgate,[151] that I became aware of Mary Brancker's role in veterinary fish health work. Regarding the establishment of the Unit of Aquatic Pathobiology, the connection between Mary Brancker and R.J. Roberts is not very visible in public documents and other written sources. However, Mary Brancker was one of the two veterinarians behind the initiative to contact the Nuffield Foundation. She did not want the profession to lose out again as it had in the case of poultry farming in the 1930s. In the late 1960s, Brancker tried to stimulate interest in work related to fish, but the veterinary profession as a whole showed little enthusiasm (personal communication, Mary Brancker, 11 November 2001). According to Brancker, the Nuffield Foundation emphasized that it was not interested in building an institution for veterinarians only. Thereby, the Nuffield Foundation laid an important influence on the role of the Institute of Aquaculture. It was not to be an institution only for the veterinary profession. According to Richards (Interview 24 November, 2000) Brancker was pushing very hard for the veterinary profession to involve in fish diseases, but in the 1960s fish diseases were a different opportunity. The salmon farming industry had not yet started.

Brancker involved veterinarian Ronald Roberts in the establishment of the Institute of Aquaculture (Mary Brancker, interview, 1 March 1993). Roberts had retained an interest in fish throughout his veterinary studies. According to Brancker, he was 'a very unhappy man at the [Veterinary] Pathology Department in Glasgow and I used to ring him up and say "For heaven's sake, stay where you are, because we shall have a job for you in a years' time"' (Mary Brancker, interview, 1 March 1993). Brancker' s involvement in the fish health field and in the establishment of the Unit of Aquatic Pathobiology was very important, not only for fish veterinarians and scientists in the UK, but also for fish veterinarians and other scientists abroad. Although her role in persuading the Nuffield Foundation to fund the Institute of Aquaculture is not very visible in written documents, her efforts in the field were acknowledged, and in 1996 she awarded an honorary doctorate by the University of Stirling She did not succeed to include fish in the Veterinary Surgeons Act of 1968, but she managed through her foresight to contribute to the establishment of a veterinary research and training institution in Scotland.

[151] Veterinarian Peter Southgate, former Secretary of the Fish Veterinary Society, interview, March 1993.

6.2.4. The Institute of Aquaculture a unique institution in the Scottish fish health field?

" ..we were the first vets to be involved in UK really, in fish disease work and it is still a quite strong veterinary group, fish disease group" (Richards, interview 14 April 1990).
The institute got, as the fish farming industry developed both with trout and salmon, more involved with research and teaching in the field of fish diseases (Richards, interview, 14 April 1990).

In 1979 the university acquired the Howietoun Fishery, 10 km away from the campus. Howietoun is one of the oldest fish farms in Scotland. The Brown trout hatched at Howietoun have a world-wide reputation for their quality. The Marine Environmental Research Laboratory located at Machrihanish in Kintyre on the west coast of Scotland was built in 1991, and expanded in 1998. The Institute have had different facilities that have provided contract research services and hire of facilities to industry and academic institutions. These facilities have been an important support for research and teaching at the Institute of Aquaculture (Fish research service, Institute of Aquaculture, 2012).

The Institute runs M.Sc. Aquaculture and MSc Aquatic Veterinary Studies/ Aquatic Pathobiology. The Aqua Veterinary Studies and Aquatic pathobiology studies are practically identical degrees for different groups, one for vets and one for biologists (Richards, interview 8 April 1991).

It has also had an important role in offering a diagnostic service where they, according to Richards (Interview, 14 April 1990), are very much like a practice, but a specialist practice. Today they also have a contract research service which supports development and testing of a wide range of products for use in aquaculture and fisheries, including parasiticides, antibiotics, vaccines, feeds and feed additives (Fish research service, Institute of Aquaculture, 2012).

The institute's funding has been very mixed. In 1990 for example they got money from different research councils, from the SGGA, from individual fishfarms and from a number of grants from overseas students to carry out work. According to Richards (Interview, 1990), the SSGA is becoming more powerful in 1990, since they have got budget for research over the last three years. Before that there was no money coming from an industrial association. The Institute have, like other research institutions, mixed sources for funding, and it has research links with places like DAFS and MAFF (Richards, interview, 1990). In April 1990 the Institute of Aquaculture gave a supplementary memorandum on Research and

Development Support to the House of Commons Agriculture Committee investigating fish farming in the UK (House of Commons Agriculture Committee, Volume II, 1990). In this memorandum they stated that funding levels are insufficient and referred to Norway and Japan that used 2-3 times more in funding towards aquaculture research than the UK (even after the relative size of aquaculture production in each country had been taken into account).They also meant that there is no forum that co-ordinates body to decide R&D priorities and that "[T]hree-quarters of all aquaculture related R&D in the UK is provided through MAFF for in-house work in the constituent MAFF and DAFS laboratories… Again a body representing all the funding organisations and the major research groups would be required to co-ordinate this policy" (House of Commons Agriculture Committee, Volume II, 1990, p. 424). In Norway, there was also several research councils involved in funding of aquaculture research. In fish diseases research, the industry itself took the initiative to a closer cooperation between the industry and research institutions. The Institute of Aquaculture got direct funding for applied research from the SSGA. And it is also worth mentioning that Richards in an interview in 1991 said that the government institution that their Institute was most involved in was the Ministry of Overseas Development, because they did a lot of work overseas (Richards, interview 8 April, 1991).

The Institute has a special and influential role as an international training institution. According to Richards (Interview, 2000) many of the vets that have gone through vets course at the Institute are now on EC Committees representing their countries on veterinary affairs. "We have taken an international role and trained people internationally so our people are in position to control the disease methods in many countries" (Richards, Interview, 24 November 2000). Despite this central international role in the education of veterinarians in fish diseases this institution has not influenced the veterinary profession to fight for an inclusion of fish in the Veterinary Surgeons Act. If fish was included in the Veterinary surgeons act there would be a legal acquirement for the veterinarians to apply for training at veterinary schools, thus the Veterinary School would have to provide a proper training course. Probably would this influence the role of the Institute as well.

Today the Institute is the leading international centre for aquaculture research and training and the largest of its kind in the world. The Institute, as mentioned earlier, is not only a veterinary research and training institution, although it was initiated and have been led by veterinarians. The Institute brings together cross-disciplinary researchers and has more than

110 staff and 120 postgraduate students from all over the world (Fish research service, Institute of Aquaculture, 2012).

Dr. Richards has acted as adviser to the SSGA and through this role he became involved in the Committee consisting of members from industry and the Government that developed the Industry's code of practice (Richards, interview, November 24, 2000). He was not involved through the official veterinary institutions.[152] It is not as members of the veterinary profession that veterinarians from the Institute have taken a place in the fish health field, but it is through their position at the Institute itself. There has been a lot of talking about veterinarians not being the competent authority but that has only been talking, nothing is happening (Richards, Interview 24 November, 2000).

6.2.5 Summary: the case of Scotland

In Scotland, as in Norway, universities have played a significant role in the development of knowledge and development of a diagnostic fish disease service. Several factors have influenced the path that fish health administration has taken in Scotland, but the role of microbiologists in the Department of Bacteriology at the University of Edinburgh in the 1920s were decisive for the division of work in the fish health field. They provided the Furunculosis Committee with scientific knowledge in such a convincing way that fish disease legislation was deemed the main solution to controlling fish diseases in salmon rivers. The Disease of Fisg act of 1937 did not exclude any knowledge-based occupation..

In the 1960s, some members of the veterinary profession worked for the inclusion of fish in the Veterinary Surgeons bill. Lord Champion, who introduced the bill, argued that the reason why the politicians did not want to include fish was that the field should be open both for fishery scientists and veterinarians. In other words, the politicians were not interested in the field of work field being the sole preserve of one group of experts, as they might have done by including fish in the Veterinary Surgeons Bill. The same argument was used by the Nuffield Foundation, which funded the University of Stirling; the foundation did not want to build an education and research institution only for veterinarians.

In Scotland (and the UK in general) there has not been any professionalization of the fish health work field; rather, it is a multidisciplinary field. Monitoring work is taken care of by fish health inspectors appointed by Scottish ministers to act as veterinary inspectors under

[152] The Code of Good Practice for Scottish Finfish Aquaculture has been operational since 2006.

the fish health legislation (in England and Wales, fish health inspectors work under the Centre for Environment, Fisheries & Aquaculture Science). Table 13 shows that the only significant University involved in veterinary fish disease training is the Institute of Aquaculture at the University of Stirling. The institute, although lead by veterinarian, is not part of the Veterinary School structure. The Veterinary Schools have not shown any big interest in fish diseases. They have fish disease in their curriculum, but they are only giving small one or two day courses.

Table 13 Scotland: Universities and other training institutions in the fish health field.

Year:	1920-1960	1960-1970	1970-1980	1980-1990	1990-2005
Universities:	1920-30s: The Bacteriology department at the University of Edinburgh. 1956: Fish disease work moved to the Marine laboratory, Aberdeen.		1971: The Unit of Patho-biology established at the University of Stirling. Ph.D. at the University of Stirling in Fish Diseases	.	Veterinary Schools not responsible for training courses in notifiable fish disease work Marine Scotland, Fish Health inspectorate. Scientists involved in diagnosis and notifiable fish health work. . University of Stirling, Institute of Aquaculture have; MSc courses in Aquatic Veterinary Studies, aquatic biology and PhD
Individual experts and their institutional affiliation	Professor T.J. Mackie and his staff at the Bacteriology department, University of Edinburgh. Microbiologists Isobel Smith	President in the Veterinary Association Mary Brancker initiated amendment of the Veterinary Surgeons Act and initiated the funding of the Institute of Aquaculture, University of Edinburgh.			.

	established the fish disease laboratory at the Marine Laboratory 1922: Only five full-time veterinary research workers in the United Kingdom	Ron. Roberts, establish the Institute of Aquaculture, Stirling which provided fish disease research and training 1965: Alan Munro, Microbiologist (ecology)			Dr. Munro was, for several years, Senior Principal Scientific Officer for Fish Cultivation at the Marine Lab,
Claiming jurisdiction on the public, legal or workplace arena?		Reopening of the veterinary surgeons act. The veterinary association tries to include fish.			Fish not included in the Veterinary Surgeons Act

CHAPTER 7: PROFESSIONALIZATION IN FISH HEALTH AN INTERPLAY OF FIVE ACTORS?

First, I return to the initial research question: *Why have Norway and Scotland, both of which have experienced a new and fast expanding knowledge-based industry, taken different trajectories in the professionalization and division of fish health work?* I have used a five-actor model as a framework for my study. The model I have used is based on Burrage et al.'s (1990) four-actor model. I have combined the model with Abbot's (1988) jurisdictional theory. In addition, it has been important to combine the approach with contributions from theorists such as Saks (2003), Evetts (2003; 2006a; 2006b), Kuhlmann (2004; 2006), and Kuhlman and Saks (2008a &b). As a result, a mixture of relationships that has changed over time has become visible. I have presented the time, place, and sequences of when and how the involved actors that were important in the professionalization of a knowledge-based occupation took place. Mike Saks (2003) points to the usefulness of studying occupations that strive to professionali**z**e and how such an approach opens up important areas of exploration**,** and keeps in view the broader occupational context in which practitioners operate. He states that in this way the sociology of professions should return to its broader theoretical roots in studies of professions (in his case health professions) and see them as part of the wider division of labour (Saks, 2003, p. 24).

In Norway, a new profession of aquamedicine biologists has developed over a period of 20 years, that started in c.1989. Currently, Norway has two professions involved in fish health work, namely veterinarians and Aquamedicine biologists (Fiskehelsebiologer) Scotland, England, and Wales (i.e. Great Britain) are the 'odd man out' in Europe, since their vets are not involved in notifiable fish disease work (although they to practise diagnostic work and medication of diseased fish). This raises the following questions: Why has not the British veterinary profession or other veterinary institutions taken an interest in fish disease work? Why has not an aquamedicine profession developed in Scotland? Why are two professions involved in the Norwegian fish health field? Before I return to these questions, I summarize my main findings.

7.1 Findings: actor's resources, interests, and strategies

In this thesis, I have placed professionalization in a wider structural and political context. Features of the Norwegian and Scottish fish health fields that I consider relevant for understanding the interests, resources, and strategies that actors can take advantage of in their interplay are briefly listed in Table 14.

Table 14 Features of the Norwegian and Scottish fish health field relevant to processes of professionalization.

	Owner structure	Institutional belonging	Fish health regulation	Professions involved in monitoring fish health work	Universities
Norway	Regulated by state	Agriculture and fishery	Diseases of Fish Act of 1968	Aquamedicine biologists (achieved legal jurisdiction in 2005) Veterinarians	University of Bergen University of Tromsø The Veterinary School
Scotland (GB)	Not regulated	Fishery	Diseases of Fish Act of 1937	No professions responsible for notifiable fish health work. Veterinarians supply treatment and prescriptions The Marine Laboratory (later the Fish Health Inspectorate), responsible for notifiable fish disease work	Department of Bacteriology, University of Edinburg (until end of the 1950s) Institute of Aquaculture, University of Stirling

Through using a comparative approach, it has become evident that the fish farming industry's ownership structure is important for understanding their power in the interplay between professions and other knowledge-based occupation, the state, and the universities. The

Norwegian ownership structure was regulated by the state relatively early. Norway's fish farming industry, which was characterized by an ownership structure based on small enterprises, local ownership and widely distributed enterprises, needed the government to be involved in the provision of fish health services. However, it was difficult for fish farmers to persuade the state to provide a satisfactory fish veterinary service, partly because in the 1960s the Ministry of Agriculture and the veterinary profession were not particularly interested in fish diseases. By contrast, in Scotland, there was no regulations governing ownership structure and fish farming was open to anyone. Large multinational companies took the opportunity to establish themselves in the industry. They employed their own scientists and had less need for a state-run fish health service. The fish farming industry has been satisfied with the role that the Marine Laboratory has played in disease control.

A state can be defined as an ensemble of institutions with different interests in professions and occupational groups (T.L. Johnson, 1995). In the case of Norway, the governmental institutions involved in fish health services belong to the agriculture sector and the fishery sector. The general disputes between two ministries (the Ministry of Agriculture and the Ministry of Fisheries), weakening of ties between the veterinary profession and the Ministry of Agriculture due to new public reforms in the 1990s, and fish farmers' need for help in solving disease problems all led to the development of the new profession of aquamedicine biologists.

In Scotland, aquaculture is part of the fishery sector. At the University of Edinburgh, the Bacteriology Department became involved diagnostic services for fish due to its laboratory facilities, staff experienced in environmental health work (milk testing), and departmental head with contacts with the Fishery Board of Scotland. In late 1950s, the diagnostic work shifted to the Marine Laboratory in Aberdeen, where it has remained ever since, and today is known as the Fish Health Inspectorate. All public involvement in fish diseases was motivated by the need to prevent outbreaks of diseases in Scottish salmon rivers. From the outset, there was no debate about involving the agriculture sector because fish diseases were not associated with fish farming. This context is important for understanding why professionalization of the fish health work field did not occur in Scotland.

Claims for legal jurisdiction of the fish health field have been a core issue for the veterinary professions in Norway, but also the British Veterinary profession attempted to claim legal jurisdiction in 19660 with the reopening of the Veterinary Surgeons Act. Jurisdictional disputes will often be about definitions of tasks or construction of problems (Abbot, 1988), and the outcome will depend on the interests of other actors and the context in

which the disputes take place. In Norway, the Diseases of Fish Act in 1968 was passed at a time when fish farming was just beginning, but had not yet been placed within an institutional arrangement. Although fish were included in the Veterinary Surgeons Act of 1948, the veterinary profession had no specific interest in fish diseases, and neither had any other knowledge-based groups.

As mentioned above, in the UK the Diseases of Fish Act of 1937 was enacted to protect salmon stocks in rivers. Fish was not included in the Veterinary Surgeons Act of 1948 (1966), and therefore no one saw a need for vets to be involved in work related to fish diseases. In the 1960s, some members of the veterinary professions tried to awake their respective professions' interest in fish, but failed.

Universities and other training institutions are important knowledge-producing institutions, and in the 1980s the research milieus in Tromsø and Bergen succeeded in developing a vaccine that saved fish farmers from severe losses due to diseases in their stocks. With the breakthrough, the researchers also proved their capability for solving fish disease problems, and consequently the University of Tromsø and the University of Bergen established new courses in aquamedicine biology. The two universities applied for prescribing rights for their students in 1989. In 2005, a 15-year long struggle ended in the establishment of a new profession, namely aquamedicine biologists. Thus, Norwegian universities had played an active role in the claim for legal jurisdiction for aquamedicine biologists.It had taken almost 10 years, from the first application for prescribing rights, before aquamedicine biologists as an interest group were able to participate in the professionalization process of the fish health work field.

In the UK, members of the veterinary profession had no responsibility for fish health because fish were not included in the Veterinary Surgeons Ac of 1948 (1966). The veterinary profession had no training in fish diseases, although under the Medicines Act of 1968 members had responsibility for prescribing medicine to diseased fish. The Institute of Aquaculture was established in Stirling in 1970, and offered courses in fish disease for veterinarians and scientists. Thus, the organization of practitioners and professional training institutions in the UK has been quite separate (Burrage et al., 1990). The University of Stirling could have followed the Norwegian example and established education in aquamedicine biology, but the national context did not favour such an initiative. The marine laboratory services and its scientific staff provides satisfying services for large companies, but for treatment and medication the companies employ their own veterinarians. However, if the

veterinary profession had not been allowed to prescribe medicine for fish, the situation could have developed differently.

Whereas the profession of aquaculture medicine biologists has been established in Norway, neither the veterinary profession nor other knowledge-based occupations have claimed jurisdiction over the field in Scotland. In Scotland, knowledge-based occupations in the marine science milieu provide expert advice to the Government. Universities and research institutions have not taken part in any professionalization of the field. The lack of professionalization in aquaculture medicine has been influenced by the ownership structure, the time of enactment of important legislation, existence of satisfactory fish disease services, and existence of a veterinary profession with little or no interest in fish.

The new Norwegian profession has been shaped by a combination of several features that mark the Norwegian aquaculture field. The growth of the industry and need for knowledge about fish diseases is one main factor in the development, but also characteristics of the fishery sector and agriculture sector have played a role. The uniqueness of the professionalization process of aquaculture medicine biologists proves how important it is to study professionalization processes in a historical institutional perspective. As stated by Erichsen (1990), it is necessary to study how professional development relates in systematic ways to particular national experiences.

In the case of Norway, universities and individual actors were driving forces in the professionalization of aquamedicine biologists. University of Tromsø and University of Bergen both had several institutions involved in public fishery research and they did not want to be left out of the new knowledge field. Without the initiative of the universities and their scientists, the new profession would never have been established. It is also a fact that Norwegian politicians did not want the veterinary profession to monopolize the fish health field, but wanted to open it up to several knowledge-based occupations. The historical shaping of a matrix of structures and social relations in the Norwegian aquaculture field had laid the groundwork upon which the universities could work to promote their interests. Institutional changes in the 1990s weakened the close relations between the state and the veterinary profession, and control over agricultural and veterinary education was transferred to the Ministry of Education and Research. However, the change also weakened the interrelationships between the veterinary profession and the state, a change that opened up an opportunity for the universities to challenge the veterinary professions' monopoly in the fish health field.

Based upon the findings presented above, I highlight four observations:

Demand for scientific knowledge opens up for the involvement of universities and advanced training institutions

A new work field that requires new scientific knowledge is open for the involvement of any university and research institution, and if no professions already involved in the field in question, then the field will be open to a new profession.

If there is a tradition for professionalization led by practitioners it is less likely that universities or professional schools will become involved in professionalization processes.

The possibility for a profession to develop under circumstances where knowledge is in demand is less likely to occur if there is a tradition of professionalization being practitioner-led. Also, it will be less likely for a new profession to develop. In England, professionalization has almost invariably been practitioner-led. According to Burrage et al., 'the British state played a rather passive role in the development of the professions, and the universities have hesitated to assert their interest in professional knowledge or in training of future members of the profession' (Burrage et al., 1990, p. 219).

State-profession relationships change due to reforms in the public sector.

If state-profession relationships change due to reforms in the public sector, new relationships will be established in the field in question and the division of knowledge-based work may change. This has been the case in Norway, where relationships between the veterinary profession and the Ministry of Agriculture were weakened during the 1990s. Responsibility for veterinary education was transferred to the Ministry of Education and the veterinary profession became less involved in processes when the universities applied for their students' right to prescribe medicine.

New professions or knowledge-based occupations challenge established professions that do not provide users with satisfactory services

If established professions do not meet the demand for knowledge in the practical field, new professions will challenge them.

By bringing in time, place, and sequences, interrelationships between actors can be unveiled. Professionalization in the fish health work field is an outcome of actors' strategies and resources and the interrelationships between practising professionals and other

professions and/or knowledge-based groups, the state, users, and universities. Individual actors may play an important role in the development of a new profession or institution, but the interrelationship between actors defines the space for action.

7.2 Theoretical implications

The five-actor model, inspired by Burrage et al. (1990) has been a useful analytical tool in the preparation of this thesis. The advantage of using the model as a framework is that actors' interest in professionalization processes can be revealed. In my research, I followed each actor and found that actors involved at different times depending on the strategies and interactions of other actors as well as the national context and the dynamics surrounding the field of fish health. In my study of professionalization processes in the new fish health work field, I saw the need to expand the four actor-model into a five-actor model. Burrage et al. (1990, p. 207) themselves expressed that

> [W]hile every profession involves a relationship of some kind between the four actors, it is by no means certain that it also entails a relationship of comparable significance and continuity with neighbouring and competing professions, even though conflicts with other professions, or more commonly with non-professionals, may at times be of some concern to its members.

They are probably correct in stating that interrelationships with other professions will vary depending upon the knowledge field that is being studied. The fact that also Muzio et al. (2011) suggested extending Burrage et al.'s (1990) actor model shows the need to adjust to the field of study. Muzio et al. placed *other (competing) professions* and employing organizations as a fifth actor. They placed most emphasis on employing companies as fifth actors in their study of the management consultancy field. In my opinion, their study and my own, provide support for the applicability of Burrage et al.'s actor model. Burrage et al's model adapts to contexts and it is open in such a way that it is easy to take on board other theoretical perspectives, such as Abbot's (1988) understanding of rival professions and knowledge-based occupation that is the 'system of professions'. Whether or not empirical findings based on such a theoretical approach contribute to general theory about professions is disputable.

One challenge is that the model becomes too open and therefore it becomes difficult to make comparisons. Burrage et al. (1990) hoped that the actor-model could be a way to

contribute to a general theory of professions. My study does not necessary support Burrage et al.'s objective, since the two cases that I have compared turned out to be very different. However, with help of the actor-model it has been possible to show that in order to understand the division of work in a society, one must analyse the interrelationships between actors and their role in the social constructions of professions. I hope there is still room in professional theory for approach such as the one that I have used in my study of occupational professionalism in order to understand occupational change and control of a particular field of work. My study shows that professionalization processes are not just about professions or knowledge-based groups that want to be part of a system of profession, but also about large institutional processes, both national and international.

7.3 Does a profession make any difference?

Currently, control of diseases and control of food for human consumption are two important aspects of the fish health work. They involve a classical tension between production/profit, food safety and protection of the environment. This raises the following questions: Does it matter who cares and who cures in the fish health field, considering that the industry gets more and more dominated by multinational concerns? Do profession have a future role in protection of the society's interests or will their interest as en employee in an organization become more prominent?

The professions advocate that their authorization oblige them to take an ethical responsibility in care and cure of fish, and to take care of the public interest either their employed in the public or private sector.

This thesis has been narrowed to two countries, and although EU regulation has been important, especially the amendment of the EU regulative allowing member countries to decide who is qualified to prescribe veterinary medical products, I have not scrutinized the processes in EU. International legislation might become more important for professionalization processes. Fish health is a unique field for such a study.

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