The simple is often the best

A political ecological analysis of a Norwegian broiler supply chain in the Pandemic Era

Inga Haugdahl Solberg

Master's Thesis in Development, Environment and Cultural Change

Centre for Development and the Environment (SUM)

University of Oslo

May 2023

2023

The simple is often the best: A political ecological analysis of a Norwegian broiler supply chain in the Pandemic Era

http://www.duo.uio.no/

Print: Reprosentralen, Universitetet i Oslo

Abstract

The broiler industry is a key driver of the enormous growth in meat production and consumption across the world. Currently, a global outbreak of highly pathogenic avian influenza (HPAI) is wreaking havoc on commercial poultry farms, and leaving masses of dead wild birds and other animals in its wake. Its zoonotic potential makes it one of several emerging infectious diseases monitored for pandemic risk. Infectious diseases represent one among various socioecological controversies surrounding the broiler industry. Increasing societal concern about the sustainability in agrifood systems pushes lead firms to change their behaviours in order to avoid reputational damage that might hinder accumulation, pursuing socioecological fixes to these problems.

This master's thesis is part of the research project Pandemic Entanglements: The Political Ecology of Industrial Meat Production in the "Pandemic Era" (PANDEMEAT), investigating the social dimensions of avian influenza outbreaks and preparedness in Norway and Denmark. My contribution to the project is a qualitative case study of a fully integrated broiler supply chain in Trøndelag, Norway, where the lead company Norsk Kylling, fully owned by the retailer Reitan Retail, controls the entire supply chain from the import of genetic material to the sales in Rema 1000 supermarkets. This production model is of particular interest because it represents a break with the strongly regulated Norwegian social corporate model in agriculture, challenged by increasing internationalisation, market-orientation and retailer-led restructuring of the agrifood industry.

This thesis aims to explore the relations between corporate responses to socioecological issues that are challenging the broiler industry, including disease risk and in particular related to HPAI, and the dynamic social relations of production and power hierarchies in the supply chain and the wider agrifood industry. Main findings indicate that increasing disease risk and responses to this might strengthen Norsk Kylling's efforts to consolidate their powerful position in the supply chain. Socioecological fixes related to ecological challenges including disease risk manifest in the company's attempts to make accumulation strategies more sustainable, as they adapt to the changing mode of regulation in the Norwegian context. These developments contribute to strengthening the retailer dominance in the agrifood industry.

Key words: industrial broiler production, poultryfication, emerging infectious diseases, highly pathogenic avian influenza, zoonoses, pandemics, biosecurity, socioecological fixes, supermarketisation, contract farming, accumulation, regulation.

Acknowledgements

Applying for the master's program at SUM in the spring of 2020 was a last minute, pandemic-intensified 'what-to-do-with-my-life' decision. It was a somewhat deeper pandemic distress that made me apply for a leave of absence from SUM in February 2021, take my fiddle and seek refuge in a mountain village in Telemark. A year later, it was time to get back, but the Great Idea for my thesis had not dawned on me, as I had hoped it would by this point. Lockdown was over, but pandemics again entered the stage, as I was invited to join the PANDEMEAT research project by my supervisors Mariel Aguilar-Støen and Jostein Jakobsen. I am very grateful for this opportunity, as participating in this project along with the rest of the PANDEMEAT group in Oslo, Copenhagen and Lund, has been a motivating and exciting experience. Special thanks goes to Mariel and Jostein for their thorough and constructive feedback, good advice and strong belief in my project. Ada also deserves a special mention, for the fruitful discussions, practical and emotional support, and for appreciating nerdy chicken jokes in the Teams chat.

To the informants of this thesis, and others who pointed me towards them, thank you. There would have been no thesis without you sharing your experiences and knowledge with me.

Writing a master's thesis can be a tough and lonely experience. I want to thank my wonderful master student colleagues at SUM, who have made the experience bearable and even enjoyable, with lunchbreaks, crossword breaks, dips in the river, and the occasional after-work beer that makes tired masterminds giddy in a second. A thank you also goes out to the strangers publishing their flawless Just Dance performances on YouTube for us to imitate – whoever you are, you have given us some badly needed moments of laughter at our own awkward and out-of-rhythm twisting and hip-shaking.

To my family and friends who I know are always there, even when I have disappeared deep down into the master's cave: thank you. To my bandmates in Sliteneliten: going on tour two months before the thesis deadline reminded me that there is a world outside the computer screen. Playing with you gives me joy and meaning. To my housemates, thank you for making Solskinnsfabrikken a safe and warm space to come home to. Thank you, Alexander, for hanging in there, and for doing things like taking me rowing in a tree boat on the Oslo fjord when I just wanted to sulk into a beer can, and for making me laugh even through tearful cursing at the oars, the thesis and the rest of the shebang.

Abbreviations

CAFO = concentrated animal feeding operation

ECC = European Chicken Commitment

EEA = European Economic Area

GCC = global commodity chain

GPN = global production network

GVC = global value chain

HPAI = highly pathogenic avian influenza

HSE = health, safety and environment

ILO = International Labour Organisation

JIT = just-in-time

LPAI = low pathogenic avian influenza

NAPA = Norwegian Animal Protection Alliance

NFSA = Norwegian Food Safety Authorities

Table of Contents

Chapter 1 – Introduction

1.1 Presenting the problem

There are almost four times as many chickens as humans in the world, calculating with numbers from 2020 (FAO 2023, Our World in Data n.d.), as chickens have become the most numerous bird species on the planet (Bennett, Thomas et al. 2018). This is a result of the global trend of 'poultryfication', or the increasingly central position of poultry, and especially of chicken in human diets (Hansen, Jakobsen et al. 2021). Poultryfication is one aspect of a wider 'meatification', i.e. the shift of meat, eggs and dairy from the periphery to the centre of human diets (Weis 2013). Meat consumption in Norway has seen tremendous growth since the last half of the 20th century and up until today, recently reaching European consumption levels (Hansen and Syse 2021). Chicken and turkey meat represented 88% of the growth in meat consumption in Norway between 1999 and 2018 (Holmen, Hillestad et al. 2020). In addition to dietary and related cultural change, this development represents important changes in the social and ecological relations of food production.

The poultry industry is the world's fastest growing livestock sector, expected to account for more than half of the global growth in meat production towards 2031 (OECD/FAO 2022). In 2021, chickens accounted for 73.7 billion of the about 77 billion animals slaughtered for meat globally (FAO 2021). This development is part of the so-called 'livestock revolution' that has taken place over the last half century (Delgado, Rosegrant et al. 2001), the most intensive expansion now happening in the Global South, although in an uneven fashion (Hansen, Jakobsen et al. 2021). The explosive growth of industrialised livestock production has been linked to a range of socioecological challenges including deforestation, land degradation, encroachments on wilder habitats, biodiversity loss, excessive wastes and pollution, greenhouse gas emissions, animal suffering, displacement of smallholders and indigenous people, and exploitative labour relations, (Delgado, Rosegrant et al. 2001, Striffler 2005, Emel and Neo 2011, Pachirat 2011, Weis 2013, Oliveira and Hecht 2016, Akram-Lodhi 2021). Additionally, there is a growing recognition of the connection between industrialised agriculture and the emergence of new, infectious diseases, including diseases with zoonotic potential, i.e. with the ability to jump from nonhuman animals to humans (Leibler, Otte et al. 2009, Wallace 2009, Gilbert, Xiao et al. 2017, IPBES 2020, FAIRR 2022).

A recent report from the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) claims that we have entered the Pandemic Era, where zoonotic pandemics are getting

more frequent, and we risk pandemics to "emerge more often, spread more rapidly, kill more people, and affect the global economy with more devastating impact than ever before" (IPBES 2020, 2). Highly pathogenic avian influenza (HPAI) is one of the emerging diseases with known zoonotic potential explicitly mentioned in this report. HPAI is believed to have evolved in intensified poultry production system, and then to have spread globally through international poultry trade, wild bird movements, the illegal pet trade and via various human activities (Hautefeuille, Dauphin et al. 2020, IPBES 2020). HPAI circulates among wild and domestic birds in various strains of the subtypes called H5 and H7, of which the strain H5N1 is the most contagious and virulent. There are also low pathogenic strains of avian influenza (LPAI) that cause few symptoms, however these might mutate into highly pathogenic strains when circulating in poultry flocks (Prinzi and Rohde 2022).

The HPAI strain known as H5N1 is particularly a source of worry because of its high morbidity and mortality levels, both among commercial and wild birds but also in the reported cases of infected mammals. These include 874 reported human cases between January 2003 and May 2023, of which 458 were fatal (WHO 2023a, WOAH 2023c). H5N1 was first identified in Hong Kong in 1997, when 18 people were infected directly from chickens. Six of these people died from the disease, and more than 1.5 million chickens were slaughtered in the aftermath (Chan 2002). The virus reemerged in humans in China in 2003, and from 2005 spread throughout Asia, Europe, and Africa (Wallace 2009). Various outbreaks of H5 HPAI have continued to occur up until 2021, when H5N1 became the dominant strain and caused the ongoing HPAI epidemic (2021-2023), unprecedented in scale and geographical spread (Prinzi and Rohde 2022). In addition to the serious consequences for people working in the poultry industry worldwide, H5N1's pandemic potential is another source of worry, as H5N1's ability to jump the species barrier has raised concern (Tullis 2022, The Economist 2023). While the WHO still qualifies the risk of human infection of H5N1 to be low (WHO 2023b), others have judged the pandemic risk associated with HPAI to be considerable, including the late historian and writer Mike Davis (Davis 2005), the epidemiologist Robert Wallace (Wallace 2009, 2016), and a recent article published by the American Society for Microbiology (Prinzi and Rohde 2022).

Critical accounts link the very production model of industrial meat production to outbreaks of infectious disease, arguing that concentrated animal feeding operations (CAFOs) closed off from their surroundings provide fertile breeding grounds for viruses to mutate into more virulent strands (Davis 2005, Wallace 2009, Wallace, Liebman et al. 2020). From this perspective, strengthening biosecurity measures might end up increasing the very problem as

well as stabilising the agro-business regime (Weis 2013, Dixon 2015, Wallace 2016), and thus do iatrogenic harm, as the cure causes the illness (Guthman 2019). This can be connected to a wider debate about how capitalism's 'fixes' to problems stemming from its internal contradictions are seldom more than temporary solutions, and might even strengthen the very problems they are aimed to resolve, no less when dealing with unruly natural processes (Boyd, Prudham et al. 2001, Harvey 2001, Moore 2015, Ekers and Prudham 2017). In the case of industrial agriculture, the permanent struggle to standardise, control and simplify nature leads to biophysical instabilities, and attempts to override these tend to further increase them in a harmful positive feedback loop (Weis 2013).

This master's thesis is part of the research project Pandemic Entanglements: The Political Ecology of Industrial Meat Production in the "Pandemic Era" (PANDEMEAT) at the Centre for Development and Environment, University of Oslo and the University of Copenhagen, investigating the social dimensions of avian influenza outbreaks and preparedness in Norway and Denmark. The current HPAI outbreak has hit the Danish poultry industry quite hard (The Danish Veterinary and Food Administration 2023), while there have only been four outbreaks in commercial poultry flocks in Norway, all four in Rogaland in 2021 and 2022 (Norwegian Veterinary Institute 2023a). However, the detection of HPAI in a wild goose in 2020 was the first record of HPAI in Norway ever (Granstad and Rømo 2022), and together with the outbreaks in domestic poultry, later outbreaks among wild birds along the entire coast have caused a lot of attention and concern.

While the main focus of PANDEMEAT's fieldwork in Norway has been on Rogaland, the case for my master project is Norsk Kylling's broiler supply chain in Trøndelag. Norsk Kylling is a company fully owned by the retailer Reitan Retail, and is one of the three main actors in the Norwegian poultry industry, in addition to the company Den Stolte Hane and the farmers' cooperative Nortura, concentrated respectively in Rogaland and the Eastern part of Norway (Bjørkhaug, Vik et al. 2017). The level of vertical and horizontal integration distinguishes the broiler industry in the context of Norwegian agrifood industry (Vik and Bjørkhaug 2015), and Norsk Kylling's production model, where a retailer-owned company owns and controls almost all stages of the supply chain, is of particular interest in this regard.

Norway's agricultural system is one of the most protected and subsidised of all high-income countries, and agricultural policies have focused on national supply, maintaining relatively small-scale food production across the country, and securing farmers' income despite unfavourable climatic and topographic conditions (Klimek and Hansen 2017). The Norwegian

social corporate governance model, where the state and the farmers' cooperative organisations collaborate in regulating the production of and markets for agricultural produce (Bjørkhaug, Vik et al. 2017), has been increasingly challenged in recent decades (Forbord, Bjørkhaug et al. 2014). Deregulation of poultry meat production represents a turn towards a more liberal agriculture in Norway (Bjørkhaug, Vik et al. 2017) in which power moves downstream the supply chain, with potential effects on relations between actors involved in production.

1.2 Rationale

My analysis and discussion will particularly build on agrarian political economy, political ecology, human geography and global production network (GPN) and global value chain (GVC) scholarship. From these fields, I take with me insights into the dynamic class relations in globalised capitalist agrifood systems (Bernstein 2010), which can shed light on dynamics of agrarian change represented by the growing poultry industry in Norway. The recent call for agrarian political economy to expand the view beyond the sphere of production and to the spheres of circulation and exchange (Arboleda 2020) is also of relevance to this project, as the importance of logistical control is central in integrated production networks like that of industrial broiler production (Boyd and Watts 1997). I will use concepts from political ecology and human geography that illuminate the role of nature in capitalism and the particular constraints and opportunities that natural conditions represent in the livestock industry, including poultry; and GPN/GVC perspectives that elucidate how the ecological basis of capitalism manifests in complex supply chains. With this case study of Norsk Kylling's fully integrated broiler supply chain, I hope to contribute with empirical details and nuances about a production model that stands out in the Norwegian agrifood system. Additionally, I hope to reach insights that can offer ground for comparison, both within the PANDEMEAT project and in a wider scholarly debate about food production and socioecological challenges including infectious diseases.

Hautefeuille, Dauphin and Peyre (2020) identify considerable knowledge gaps about the roles of different actors in poultry production and trade networks in the global spread of avian influenza, and they argue for including all actors involved from hatchery to slaughterhouse, including commercial farms, live-bird movements and human worker movements, at local, national and/or international levels. Although the focus of this research project has not been to identify specific transmission sources or routes but rather to explore social aspects of disease risk, this still serves to justify my focus on social relations of production along the entire supply chain.

I began my research focused on HPAI and other emerging infectious diseases, but as I have mentioned, HPAI is one among several contentious issues surrounding industrial poultry. As I advanced in the collection and analysis of data, I soon found that the industry's efforts to prevent and respond to disease risk could fruitfully be connected to wider aspirations to adapt to increasing societal concerns about sustainability issues, like animal welfare and climate change. My research questions therefore have a wider focus on socioecological challenges to industrial broiler production, in which I include emerging infectious diseases.

1.3 Aims and research questions

Political ecology insists that human-environment relationships are "always and everywhere political", and thus that it is necessary to analyse how power relations affect environmental problems and solutions (Oliveira 2022, 202-203). Jason Moore (2015) calls capitalism a way of organising nature, and to this Marion Werner (2022, 235) adds that "supply chains are [capitalism's] most tractable form". This master project is motivated by this urge to critically explore the unequal power relations and differentiated outcomes of processes of ecological change under capitalism.

By conducting a qualitative analysis of the responses and preparedness to the risk of highly pathogenic avian influenza in the fully integrated broiler supply chain of Norsk Kylling, I aim to investigate the effects of operating under the risk of a pathogen with zoonotic potential such as avian influenza. I will explore how the organisation of the unruly nature of chickens and pathogens affect power relations in the Norwegian agrifood industry, focusing on Norsk Kylling's broiler supply chain. More broadly, in this thesis I aim to explore the relations between corporate responses to current ecological challenges and power relations in the Norwegian agrifood industry, particularly as related to broiler production.

The main research question that will guide this endeavour is as follows:

> ***How do corporate responses to socioecological issues including disease risk, in particular related to avian influenza, interrelate with the social relations of production in a fully integrated broiler supply chain in Norway?***

In addition, two sub-questions will contribute to answer the main question:

- *In what ways do responses to disease risk in the fully integrated broiler supply chain of Norsk Kylling affect social relations of production and power relations along the supply chain?*

- *How do socioecological fixes related to ecological challenges including disease risk manifest in Norsk Kylling's supply chain, and with what effects to the organisation of nature and the distribution of work, profits and power?*

I will attempt to answer these questions through a qualitative analysis of findings from my empirical fieldwork, consisting of semi-structured interviews with actors at different stages of the supply chain, observation notes, and secondary data from various websites and media sources, and by drawing on relevant literature.

1.4 Thesis outline

This thesis consists of seven chapters. After this introductory chapter, where I have presented the context and rationale of my research project and the aims and research questions that will guide the further exploration of my case, chapter 2 provides a historical and political background of the development of the Norwegian agrifood system and the broiler industry more specifically, against the backdrop of global agrarian change. In chapter 3, I engage with some central discussions in agrarian political economy, human geography, political ecology and GPN/GVC scholarship that will serve as the theoretical grounding of my analysis. I present my methodological framework and methods, and reflect on ethical and methodological challenges in chapter 4. In chapter 5 and 6, I analyse and discuss my empirical findings in light of key theoretical insights from the literature chapter. Finally, in chapter 7, I sum up the main findings and arguments of the thesis, and round it all up with some concluding remarks about the implications of my findings for future research.

Chapter 2 – Background

Norwegian agriculture is often imagined, and sometimes purposely portrayed, as idyllic, small-scale, local and grass-based (Ursin, Myskja et al. 2016, Løkeland-Stai and Lie 2019, Bjørkdahl and Syse 2021). However, several developments gathering pace during the last thirty years challenge such bucolic representation. Norwegian agriculture has developed towards fewer and bigger farms concentrated in few areas in and around Jæren, the Oslo fjord and Trøndelag. There has been a phenomenal increase in meat production and a shift from grass-based to compound feed-based animal production, while a lot of cultivated soil has been abandoned or reallocated. Frozen farm-related incomes combined with increasing debt and costs, and a decline in producers' returns on products, have increased farmers' dependence on state subsidies (Løkeland-Stai and Lie 2012, 200-201). Strengthened market-orientation and internationalisation have weakened national control of agricultural politics, especially since the 1990s (Almås 2002, 397). The poultry industry, characterised by high-tech mass production inside large, closed off halls and detachment from local resources, clearly fits into this revised story, as a capital-intensive meat industry based solely on compound feed, concentrated in the three mentioned geographical areas. In many ways the industry is a winner in this story, because increasing demand of chicken meat has allowed for a production growth unlike other agricultural sectors (Bjørkhaug, Almås et al. 2015). How did we get here? In this chapter, I will describe some central political and institutional developments in the Norwegian agrifood system during the last century, with a particular focus on poultry production, so to set the stage to analyse current challenges facing the broiler industry in the Pandemic Era.

2.1 Norwegian capitalism and the agrifood industry

Rural class dynamics and agricultural politics at the beginning of the 20th century

In 1920, about half of the Norwegian population lived in the countryside, and four out of ten made their living fully or partly from agriculture (Almås 2002, 20). Since the previous century, industrialisation and urbanisation were gradually shifting the demographic balance towards the cities, but in a slower pace than in other Western countries (Myhre 2015b). Highly varying topographic and climatic conditions made for different production types in different parts of the country, and these lay the basis for varying degrees of class differentiation in rural communities. The biggest cleavages were found in the fertile valleys in Eastern Norway and around the Trondheim fjord, while inequalities were smaller along the coast and in smaller forest and mountain villages (Almås 2002, 20). Conflicts went along the lines separating landowners, with

large land areas and hired labour; self-owning farmers, working their own, smaller lots of land; and agricultural workers often renting the land they cultivated. These conflicts to a varying degree hindered alliances between the farmers' movement and the workers' movement in Norway (Løkeland-Stai and Lie 2019, 89-90).

The workers' movement had become a central political force by the 1930s, with their social basis in cities and industrial towns (Kjeldstadli 2015). Attempts at organising farm labourers in the 1930s were met with resistance from several farmers, especially bigger landowners in the Eastern part of Norway. Close social ties between workers and the employers, alongside whom they often lived and worked, made several workers hesitant to organise, while outright class hate towards landowning farmers was common among landless youth in places like Hedmark, where sharp class differences divided people (Almås 2002, 54-56). However, during the 1920s and 1930s, central Labour party politicians spoke up for the common interests of workers and self-owning farmers, considered a class antagonist among many on the Left. Landless workers and self-owning farmers were both to be considered working people, with a common enemy in capitalist forces, driving forth a development towards land speculation and a large-scale, debt-heavy agriculture (Almås 2002, 77-78, Løkeland-Stai and Lie 2019, 91-92).

This attitude shift on the Norwegian Left was an important factor when the direction in agricultural politics was to change in the 1920s and 1930s. In the years leading up to the First World War, the markedly liberal agricultural politics was centred around volume and free trade (Hundstad 2015). Import duties had been gradually removed and there were hardly any subsidies. Profitability was low, and Norway depended heavily on imports. The agricultural sector was ridden by crises of overproduction, heavy debt burdens and a low degree of self-sufficiency. A long period of liberalisations was going towards an end, replaced by an increasing consensus regarding agriculture's importance to society, by supplying food and managing land resources. This paved the way for an agricultural politics with clear goals, and a growing body of regulations and governance mechanisms to reach these goals (Almås 2002, 82, 395, Løkeland-Stai and Lie 2019, 17-18). New alliances between the workers' and the farmers' movements emerged, and the small-scale farmer was a central figure in the plan to turn this development around and help agriculture fulfil its societal task. Many new small farms were established with public support, but it soon became clear that in addition to more farmers, more regulation was needed to deal with persistent problems of overproduction and low profitability (Almås 2002, 84, Løkeland-Stai and Lie 2019, 93).

The construction of the social corporate model

The social corporate model[1] has its origin in the historic collaboration between the Labour party and the Farmers' party in the wake of the 1930s crisis, who despite scepticism in both camps came together to establish the bases of a nationally regulated food production (Almås 2002, 83-84, Løkeland-Stai and Lie 2019, 96). Overproduction and price collapse of agricultural produce on the world market led to the Cooperative marketing act[2] being introduced in 1930 to support sales of agricultural products and ensure balance in the Norwegian market. In 1936, the law was revised, and the Sales and Marketing Council was established (Bunger and Tufte 2016). This law marked an important turning point in Norwegian agricultural politics, and laid the basis of a system where distribution and industrial processing of agricultural produce were to be organised by the farmers' cooperatives (Olsen 2010). The cooperatives, reorganised from regional units to nation-wide federal cooperative structures, were also delegated authority to regulate the market, giving them the double role of both commercial players and administrative regulators (Olsen 2010, Klimek and Hansen 2017), also for the poultry industry (Vik and Bjørkhaug 2015). The social corporate model has since been characterised by cooperation between the state and the farmers' cooperative organisations in regulating the production and the market for agricultural produce (Olsen 2010, Bjørkhaug, Vik et al. 2017).

Concession laws regulating ownership of natural resources existed already before this period, and became important elements of the social corporate model (Bunger and Tufte 2016). From 1888 and throughout the first decades of the 20th century, the Norwegian parliament passed various concession laws aimed to prevent the accumulation of natural resources such as hydropower, forests, minerals and agricultural land in the hands of international and national capitalists, by regulating ownership and use of these resources. Separate concession laws regulating different resources were gathered in 1975 in the Act relating to concession in the acquisition of real property (Concession Act) (Løkeland-Stai and Lie 2019, Norges Bondelag n.d.).

Bunger and Tufte (2016) present four pillars of the Norwegian agricultural model: import duties, juridical regulations (including the Concession Act), the basic agricultural agreement, and market regulation. Import duties maintain agricultural production in a country with challenging geographical and topological conditions, high costs and a politically decided

[1] Farsund (2021) calls it the corporatist system.
[2]Translated to the Act on Sales of Agricultural Products in Bjørkhaug, Vik et al. (2017).

production structure. Juridical regulations of land ownership and land use aim to maintain agricultural production in areas suited for it, to hinder speculation in agricultural properties, and to uphold the structure of relatively small-scale self-owning family farms across the country. The basic agricultural agreement regulates yearly negotiations between the state and the farmers about economic framework conditions such as prices and subsidies. Market regulation measures should keep consumer prices at an acceptable level while securing the income of producers across the country (Bunger and Tufte 2016). Part of the cooperatives' role as market regulators is the collection of sales taxes from farmers to finance regulation measures on specified raw produce (Klimek and Hansen 2017). This sales tax included egg production from 1949, and chicken meat from 1957 (Foss, Rishovd et al. 2004).

The postwar period was marked by an optimistic belief in economic rationalisation and industrialisation (Almås 2002, Olsen 2010). While holding on to the regulatory framework established from the 1930s and onwards, there was a strong emphasis on modernising and increasing the efficiency of agriculture and moving labour power from agriculture to secondary industries. The same amount of food should be produced by a smaller number of farmers (Almås 2002, 120-121, Løkeland-Stai and Lie 2019, 25). The preferred target for new agricultural policies was the rational, economically profitable 'family farm'; however, this excluded a majority of small-scale farms (Almås 2002, 184-191). Specialisation of production, both on the individual farms and on a regional basis, substituted the previously typical combined production with livestock, grains and some vegetables, and increasing mechanisation came with a stronger dependence on imported machines, fuels and feed ingredients (Almås 2002, 191, 205-207). According to Almås (2002, 206-208), the 1960s marked a final watershed in the turn to a "science-based, specialised and mechanised agriculture", and at the end of the decade, the abandonment of small-scale farms sped up.

Løkeland-Stai and Lie (2019, 99-102) argue that this productivist turn represented a weakening of central political elements of the 1930s crisis-induced agreement, including an integral understanding of the internal complexity and the basic biological processes of the agricultural sector, the management of land as a common resource, and the worker-farmer alliance perspective. An increasingly powerful Ministry of Agriculture, political elites, the leaderships of farmers' organisations, and cooperatives with economic interests took over agricultural politics. According to Løkeland-Stai and Lie, the efficiency imperative trumped wider considerations of agricultural politics, including the utilisation of the resources across the

country, production balance, public nutrition, farmers' incomes and decentralised settlement patterns (2019, 99-102).

From the mid-1970s there was an attempt at moderating the structure rationalisation, as there was rising concern for districts politics (Almås 2002, Olsen 2010). This was partly a result of the new alliances forged between the agricultural sector, the political Left and the environmental movement in the period preceding the 1972 referendum about Norway's membership in the EC (later EU). Protecting Norwegian agriculture and fisheries against market forces was a central argument in the 'no'-campaign, which gained enormous popular support and resulted in the rejection of the referendum (Almås 2002, 242, Kristoffersen 2015). Farmers' economic and social status had gradually fallen in the postwar years, and in 1972, only the biggest farmers' incomes could match the wage levels of industry workers (Almås 2002, 255). A farmer tax strike in 1975 got wide media coverage, representing both a protest against the public agricultural politics and a grassroots revolt against the farmers' organisations (Almås 2002, 261). Additionally, the 1973 global food crisis placed national self-sufficiency on the international political agenda, also reaching the Norwegian debate (Almås 2002, 248).

The combination of these factors resulted in a period from 1975 to 1982 with increased public investments in the agricultural sector, and promises of real income increases, particularly with the 1976 income equalisation act (Almås 2002, Klimek and Hansen 2017). To curb structure rationalisation, tax reductions and subsidies were particularly aimed at medium sized farms. New areas were cultivated to increase self-sufficiency, farmers' social rights were strengthened, and the cooperatives' regulatory role was strengthened. These measures did reduce the pace of agrarian restructuring, but did not stop it, and although farmers' incomes were strengthened, they returned towards relative stagnation from the 1980s. What seemed to be a chronic situation of overproduction soon weakened the faith in the farmers' cooperatives (Almås 2002, 255, 279-308). From the 1990s, a neoliberal market-orientation of politics increasingly put pressure on the social corporate model (Almås 2002, Daugbjerg and Feindt 2017).

Agricultural exceptionalism

The Norwegian agricultural system is one of the most protected and subsidised among high-income countries, and the focus has been on national supply rather than exports. Climatic and topographic factors shaped early industrialisation of Norwegian agriculture, building upon a structure of small-scale family farms exploiting the few spots of arable land in the mountainous country. Strong farmers' cooperatives have been central in putting self-sufficiency and secured

incomes for farmers at the centre of agricultural politics, leading to the main strategy of isolation from the world market, as unfavourable geo-climatic conditions make Norwegian agricultural products uncompetitive internationally. The Norwegian agrifood chain is divided in two industrial segments, namely farming and agricultural industries, and the processing industry. The latter is much more exposed to international competition than the first (Klimek and Hansen 2017).

Agricultural exceptionalism, i.e. the special treatment of the agricultural sector by the government and international institutions, has not been unique for Norway, but was established as part of the post-war welfare consensus in most Western democracies (Daugbjerg and Feindt 2017). A set of ideas about the unique nature of agriculture relating to unpredictable natural risks; chronically low farm incomes; and its indispensable contribution to national interests, explained why the agricultural sector was unsuitable to be governed by market forces, and required exceptional policies regulating production and market conditions. The neoliberal turn in the 1980s challenged exceptionalist policies, and led to a gradual transformation of the agrifood policy realm in many countries to post-exceptionalist arrangements, where 'old' exceptionalist ideas, institutions, interests and policies co-exist with more market-based and performance-based policies (Daugbjerg and Feindt 2017). Despite increasing pressure, Norwegian agricultural policies have maintained much of this nationalised pattern, resisting opening up to the international market (Klimek and Hansen 2017).

The main arguments for exceptionalist policies are maintaining production and supporting farmer livelihoods. Lately, and especially faced with negotiations in the WTO Doha Round (starting in 2001), new arguments have become important. A key word is the 'multi-functionality' of agriculture, emphasising how agriculture provides food security for the Norwegian population, how it strengthens the socio-economic development of rural areas and contributes to environmental protection, and that achieving these goals require regulations of market forces. Despite the strong national support for exceptionalist policies, the political consensus is weakened (Bunger and Tufte 2016), as for instance the biggest conservative political parties are generally more sceptical to this regime, and more positive to free trade (Farsund and Daugbjerg 2017). It is also important to recognise the double role Norway has played in WTO negotiations: while defending protectionist policies for land based food production, Norway has at the same time pushed for the liberalisation of seafood markets, to expand market access for Norwegian seafood from the export-oriented aquaculture industry (Løkeland-Stai and Lie 2012, Farsund 2021).

Olsen (2010) describes the development of the Norwegian agrifood regime since the 1970s as transforming from one revolving around the idea and ideal of '*annerledeslandet*' (the 'different country') to an 'adaptation regime'. Annerledeslandet as a term was coined by the Center party (Senterpartiet – SP) before the second referendum about EU membership in 1994, referring to Norway as a country building on national sovereignty and locally anchored governance of land and resources, withstanding the unchecked capitalist market orientation abroad. Towards the end of the 1990s, the notion of annerledeslandet allowed no room left for action, and change was inevitable, argues Olsen (2010, 103). The adaptation regime followed, as new international framework conditions forced forward reactive and defensive policies, while trying to maintain the status quo as far as possible. Løkeland-Stai and Lie (2012, 197), however, criticise this "official story of Norwegian agriculture" where forces beyond politics drag us in a certain direction, and the room left for political action is reduced to attempts to regulate the speed and prepare the landing.

In this widely told story, Norwegian agricultural politics is portrayed as going 'counter-current' and aiming to constrain heavy, international trends of structure rationalisation and centralisation, and because the alternative – not trying to constrain these forces - would have been much worse, this politics is often described as a success (Løkeland-Stai and Lie 2012, 197-202). However, Løkeland-Stai and Lie (2012) argue that centralisation and structure rationalisation do not happen *despite* this counter-current politics, but that they are desired results of an active agricultural politics favouring this development. Although there is an outspoken goal of a geographically spread agriculture building on the local resource base, in reality there is an increased dependence on subsidies oriented to reduce the price of compound feed. This generally favours bigger farms, thus laying the basis for large-scale industrial agriculture in Norway (Løkeland-Stai and Lie 2012).

International institutional framework of the Norwegian food sector

The WTO agreements (1995) and the European Economic Area (EEA) agreement (1994) are those international regimes influencing Norwegian food production the most since the 1990s (Klimek and Hansen 2017). The agricultural sector is exempt from the EEA agreement, but the processing industry is not, and thus competes internationally (Smedshaug, Olsen et al. n.d.). However, within this situation of international competition, actors in the industry can be compensated for using Norwegian raw produce through the raw material compensation (RÅK) scheme (Norsk Landbrukssamvirke 2019). The international, and especially the European markets also affect the agricultural sector. With the establishment of the EU's internal market

in 1994, which includes all Norway's neighbouring countries except for Russia, competition with regards to both price and product selection increased, and efficiency pressure was transferred from retailers to suppliers and producers (Olsen 2010).

The WTO agreements from 1995 require Norway to reduce subsidies. This affects the target price system, a key element of the social corporate model. It consists of theoretical maximum prices that farmers should be able to obtain in the market, facilitated by the cooperative market regulators (Moi 2022) through various disposal measures in the case of overproduction, or through tariff reductions by the agricultural directorate if market prices are higher than target prices (Norwegian Agriculture Agency n.d.). WTO considers this a system of subsidised prices, and pressure from WTO was decisive when poultry meat was excluded from this system in 2007 (Klimek and Hansen 2017). Another direct consequence of the WTO was the elimination of export subsidies in 2020, decided on the 2015 WTO Ministerial Conference, until then used as a disposal measure in situations of overproduction to balance the domestic market (Farsund 2021, OECD 2021).

The supermarket revolution paves its way

From the end of the 1970s and onwards, retailer-driven agricultural restructuring has increasingly challenged the social corporate model of food production in Norway, moving power down the supply chain from producers and suppliers, to corporate entities such as retailers[3] (Olsen 2010, Richards, Bjørkhaug et al. 2012, Tranøy 2015). This development follows a global trend called the 'supermarket revolution' (McMichael 2005, Reardon and Gulati 2008, Olsen 2010, McMichael 2013) or the 'supermarketisation' of food systems (Reardon, Berdegué et al. 2005, Arboleda 2020). This development is characterised by a double movement of horizontal and vertical integration, as retailers increase their market share at the point of food sales to consumers while simultaneously increasing their control of processes upstream in the value chain, such as transport and production (Tranøy 2015). In addition to the increased economic power from controlling market shares, retailers to an increasing degree exercise regulatory power, especially through private standards imposing on producers and suppliers to comply with a range of criteria, from food safety to animal welfare and cosmetic appearances for fruits and vegetables (Richards, Bjørkhaug et al. 2012).

[3] I use the term 'retailers' like Reardon and Gulati (2008, 1) use 'supermarkets'; "referring to all modern retail, which includes chain stores of various formats such as supermarkets, hypermarkets, and convenience and neighbourhood stores".

From a structure of several smaller wholesalers and retailers, a quick integration process took off from the end of the 1970s, when Stein Erik Hagen and Odd Reitan established the supermarket chains Rimi 500 and Rema 600 (later to become Rimi and Rema 1000) (Olsen 2010). From 160 wholesalers in 1960, to 40 in 1975, by the end of 1980s there were four dominant wholesale actors left, 15 small actors, and Rimi and Rema who had developed integrated wholesale-retail systems. By 2000, 99% of grocery sales were organised by four supermarket chains – Rimi, Rema, NorgesGruppen and ICA, each one with their own wholesaler. In addition, six other wholesalers were left, among which one was organised by the farmers' cooperatives (Olsen 2010). Today there are three retailers left controlling almost the entire Norwegian grocery market, namely NorgesGruppen, Coop and Reitan Retail (Rema 1000) (Rye, Jenssen et al. 2019).

Consequences of the supermarketisation of the food system vary. According to McMichael (2013), what he calls 'value chain agriculture' mainly serves capital accumulation in private, corporate hands at the expense of producers, who are fixed in competitive markets through debt dependency, which reduces their autonomy over their land and what they produce there. Supermarketisation may however provide consumers with access to a wider choice of products to lower prices (Reardon and Gulati 2008), but at the same time the power concentration among the retailers happens on behalf of consumer power (Bjørkhaug, Almås et al. 2015, Tranøy 2015). It can offer market access and income increases to certain farmers and processors, but creates challenges for other small farmers, processors and retailers unable to compete with or meet the requirements from dominant retailers (Reardon and Gulati 2008), who then have to 'get big, or get out' (Richards, Bjørkhaug et al. 2012). This shift has wider consequences because it weakens the democratic governance of the food system, as public bodies under (at least indirect) democratic control cede their regulatory power to corporate entities (Richards, Bjørkhaug et al. 2012), whose logic will always be driven by profit maximisation and capital accumulation (Campling 2021). Olsen (2010, 13-16) worries that this development contributes to the gradual building down of the agrifood sector's role as a last frontier against the intense competition pressure of neoliberalism or what he terms 'super capitalism', challenging Norway's 'democratic capitalism' where an open economy still has wiggle room for political goals such as economic distribution and a welfare state.

In Norway, the supermarket revolution has met resistance in the social corporate model and its structures of power and governance (Richards, Bjørkhaug et al. 2012). The emergence of the retailer led model challenged and challenges the social corporate model on many levels, as it

brings with it changes to the legal regulation and the role distribution between industry actors, new technologies, and more market-oriented governance theories, institutions and organisational structures (Olsen 2010, 11-12). During the 1990s, in response to retailer power and increased competition resulting from changes in the international trade regime, the cooperative organisations had modernised and reorganised as centralised concerns. However, this reorganisation was not enough to maintain their formerly powerful position vis-à-vis retailers, who from their increasingly dominant position in the grocery market pushed prices down in negotiations, and forwarded new demands, including the transferral of work-demanding tasks that the retailers had used to do themselves, to suppliers (Olsen 2010).

Still, Richards et al. (2012) argue that two central elements of the social corporate model have slowed this development in Norway, namely the system of farmer-owned cooperatives, working as a buffer between individual farmers and major retailers, and the lack of a strong, retailer-driven system of private regulation through a plethora of standards and terms imposed on suppliers. Indeed, the key certification system Stiftelsen Norsk Mat[4] was established by the Ministry of Agriculture in 2007, although in cooperation with the food industry (Richards, Bjørkhaug et al. 2012, Stiftelsen Norsk Mat n.d.). As this standard basically represents government baseline standards, it contributes little to competitive differentiation among different producers, which private regulations often do, but is rather intended to strengthen the reputation and competitiveness of Norwegian agricultural production in general (Skarstad 2008, Richards, Bjørkhaug et al. 2012). However, this situation seems to be changing also in Norway, where Bjørkhaug, Almås et al. (2015) point at the increased use of private standards as central to the ongoing transferral of responsibility and regulation of the food chain from public to private hands. Richards et al. (2012) also acknowledge ongoing changes in the power dynamics between retailers and farmers' cooperatives. The position of the cooperatives indeed varies between different sectors of the Norwegian food industry, and as I will show, the broiker industry is illustrative in this regard.

The consumer turn in agrifood politics

At the same time, there has been a 'consumer turn' in Norwegian agrifood politics. This is explained by the increasing pressure from international institutional frameworks, growing international trade and globalisation, food scares, changing consumer attitudes, a Ministry of Agriculture eager to counter critiques of only serving producers' interests, and public

[4] Previously Kvalitetssystem i Landbruket – Matmerk.

authorities' will to resist the increasing dominance of retail and/or industry actors (Norwegian Ministry of Agriculture 1999, Asdal and Moser 2008, Rem 2008, Norwegian Ministry of Agriculture and Food 2016). Since 'consumer orientation' was proposed as a public political strategy for the first time in a white paper from the Norwegian Ministry of Agriculture to the parliament in 1999 (Norwegian Ministry of Agriculture 1999, Rem 2008), strengthening consumer power in the agrifood sector has been an outspoken priority of Norwegian authorities (Asdal and Moser 2008, Rem 2008). In various political documents, action plans and statements, consumers are presented as political actors with opinions and voices that can democratise agrifood politics, and the state assumes a new role of facilitating consumer choices (Asdal and Moser 2008). There are, however, various issues with this strategy to extend, or reclaim, democratic governance over food production.

Silje Rem (2008) analyses the Norwegian authorities' effort to strengthen consumer power within the context of an ongoing power shift towards market actors in the agrifood sector, and this as part of a wider trend of weakened democracies in many Western countries. Strengthened consumer power is often presented as an unconditionally good thing; however, a blurring of the line between consumers and citizens is not unproblematic. Consumers are supposed to exercise their political power through informed, rational choices when they buy food, however, neither information nor money are equally or democratically distributed in the population (Asdal and Moser 2008, Rem 2008). Additionally, a range of other psychological elements like advertisement, product placement and time constraints shape buying patterns (Rem 2008, 52). It is also debatable what kind of politics is possible in grocery stores, and whether all political issues, such as animal welfare, can be meaningfully measured by a price tag, and whether it should be something one can choose or not as a consumer at all. Social, political and ecological complexities of supply chains are reduced to various standards and certification schemes, and political action is reduced from participation in deliberate, collective processes dealing with questions of public interest, to individual choices that maximise consumers' interests – whatever they are (Asdal and Moser 2008, Rem 2008).

In sum, although the outspoken goal is to respond to the weakening of traditional democratic institutions and people's possibility of influencing politics through elections, by empowering them as consumers, public authorities at the same time reduce their own responsibility to deal with more structural problems of power distribution (Rem 2008, 60). The consumer orientation in agrifood politics bears witness to public authorities' reduced wiggle room confronting international institutional frameworks, but also their acceptance of the situation where power is

transferred to market actors. While recognising that increased vertical integration of the agrifood sector reduces both consumer power and the space for agricultural politics (Norwegian Ministry of Agriculture and Food 2016), the maintained focus on consumer power does not challenge this development per se. Where consumers must follow the rules of the market, in principle citizens have the power to shape or change these rules. The consumer turn might contribute to legitimising the market orientation of politics, and thus ultimately strengthen the very problem of weakened democratic control (Rem 2008, 45, 62).

2.2 Global poultry production: a problematic success story

Poultryfication

Meatification refers to the global shift of meat, eggs and dairy from the periphery to the centre of human diets (Weis 2013), and more specifically, poultryfication (Hansen, Jakobsen et al. 2021) or broilerisation (Løkeland-Stai and Lie 2012) refers to the central position of poultry production and consumption. Of pork, beef and poultry, the three industrially produced meat categories at the centre of meatification (Winders and Ransom 2019, cited in Hansen, Jakobsen et al. 2021), poultry production is by far the most industrialised and the fastest-growing (Weis 2013). In 2021, chickens accounting for 73.7 billion of the about 77 billion animals slaughtered for meat globally (FAO 2021). In Norway, chicken and turkey meat represented 88% of the growth in meat consumption between 1999 and 2018 (Holmen, Hillestad et al. 2020), and Bjørkhaug, Almås et al. (2015, 402) call it the "winner in the new agricultural industry".

The fast global expansion of the poultry industry is often considered a success in terms of growth and profit (Bjørkhaug, Almås et al. 2015), and the portrayal of chicken as a healthier and more environmentally friendly type of meat is quite common (Hansen, Jakobsen et al. 2021). The publicly funded Information Office for Eggs and Meat (MatPrat) for instance characterises chicken "from a sustainability perspective" as "resource efficient"[5] (MatPrat 2020). Bjørkhaug, Almås et al. (2015, 402) credit chicken production for being "climate-smart" and an efficient protein source for human consumption. They acknowledge challenges like access to feed, diseases and contagion, and the disposal of excess nutrients, but propose that they can be "solved in the long run",[6] given the close connection to research and development.

However, the poultry industry is "intertwined with a range of capitalist processes and their despoliations of nature" (Josephson 2020, cited in Hansen and Jakobsen 2021, 50), laid out in

[5] Citations are my translations from Norwegian
[6] Citations are my translations from Norwegian

detail by Weis (2013). The industry's phenomenal growth has in many cases been accompanied by some deeply problematic issues related to animal welfare, local and global environments, poor labour conditions, and asymmetrical power relations between producers and integrators (Bjørkhaug, Almås et al. 2015, Hansen, Jakobsen et al. 2021). There have been cases of this in Norway too; however, several mitigating mechanisms might have hindered these problems from gaining a strong foothold. These include the close cooperation between farmers, integrators and the Norwegian Food Safety Authority (NFSA); a national market relatively protected from international price pressures by import restrictions; and a free, critical press exposing scandals untenable for actors depending on a good reputation (Almås 2015, Bjørkhaug, Almås et al. 2015, Vik and Bjørkhaug 2015).

Organisation of a just-in-time industry

William Boyd and Michael Watts (1997) sketch out the postwar emergence of the 'southern broiler production complex' in the US South. Here, in the 1940s and 1950s chicken meat production developed from a by-production of egg production on small farms across the country, via a more professional, but informal structure of many specialised independent firms and small independent farmers, to a highly concentrated, vertically integrated and tightly coordinated, high-tech industry. The staggering growth of the broiler industry and the reorganisation of the value chain was driven by a handful of large corporate integrators, such as Tyson Foods, benefitting from big science and the industrialisation of the US diet, and on impoverished contract growers and marginalised workers.

Boyd and Watts (1997, 148-149), characterise the industry as a 'critical-path just-in-time' (JIT) system. One corporate structure integrates the different stages of chicken production, allowing for both flexibility and a tight coordination of "various biological lags in production time so as to maximise material and time efficiencies while controlling for quality and biosecurity", to deliver the right amount of chicken at the right time, responding to a shifting market demand. They argue that there is a distinct agrarian route to the JIT logic exemplified in broiler agroindustry, as its biological and sectoral demands, combined with distinctive regional agrarian structures, constituted the basis for relational contract relationships and flexible networking (Boyd and Watts 1997, 151). In the UK, a parallel development took place at about the same time, but with corporate retail – large supermarket chains – as the main players, different from the corporate integrator firms in the US. Instead of through direct ownership of the entire food supply chain, the big retailers exercise control of the JIT system through management-style integration (Allen and Lavau 2015). The case of Reitan Retail and Norsk

Kylling seems to represent a mix of these two models, combining direct ownership and management-style integration.

Regulation and deregulation of the Norwegian broiler industry

The globalisation of the broiler industry included the export of the JIT model, and Norway was no exception, however with its own contextual specificities, starting out with the firm rooting in the social corporate model. Also in Norway chicken meat used to be a by-product of egg-production (Bjørkhaug, Vik et al. 2017). Egg production had since the end of the 1800s its centre in Jæren, Rogaland, in South-West Norway, from where eggs were exported to serve the market in the capital (Dybesland 2006), establishing Jæren's position at the forefront of poultry production before and during the postwar expansion of the industry (Almås 2002, 169). The country-wide cooperative Norske Eggsentraler was established in 1929 to regulate the market and coordinate the many regional egg cooperatives (Nortura n.d.), and among the members were also chicken producers (Vik and Bjørkhaug 2015, Bjørkhaug, Vik et al. 2017).

Just like other agricultural sectors, the poultry sector was included in the social corporate model. By the end of the 1950s, as this model consolidated, most aspects of chicken production were regulated by public rules and institutional arrangements, in a co-governing system involving both the political system and the industry players, mainly represented through the cooperatives (Vik and Bjørkhaug 2015, 154). The concession boundary law from 1975 established livestock licensing regulations by setting upper concession boundaries for each producer. This was not to limit the establishment of new chicken houses, but to regulate the structure of concentrated animal feeding operations (CAFOs), maintaining geographical spread and hinder a development towards too big production units and to reduce problems with excessive manure (Bjørkhaug, Vik et al. 2017, Holmen, Hillestad et al. 2020).

As mentioned above, from the end of the 1970s, the social corporate model was increasingly challenged. The agricultural sector was, in a publicly assigned investigation of power relations in the Norwegian society, characterised as a 'segment of the state' quite closed to external interference. This was to change, pushed by a neoliberal wave in politics and the emergence of New Public Management ideology and policies (Vik and Bjørkhaug 2015, Bjørkhaug, Vik et al. 2017). Among the consequences was the restructuring of the farmers' cooperatives, which happened as the poultry industry, especially from the 1990s, grew and consolidated. According to Almås (2015, 75), it was not before this decade that chicken meat really became a central food commodity in Norway. This culminated in the founding of the centralised poultry

cooperative Prior Norge in 1999, reorganised as a concern in line with private business models in 2001 (Foss, Rishovd et al. 2004, Bjørkhaug, Vik et al. 2017), and merged with the meat cooperative Gilde to become Nortura in 2006 (Nortura n.d.). Despite this restructuring, the cooperative's role was weakened, exemplified by the closure of a national chicken breeding program in 1989. This tied the Norwegian poultry industry closer to international markets where a few, big actors control the development of chicken genetics (Vik and Bjørkhaug 2015, Bjørkhaug, Vik et al. 2017).

An important change came with the agricultural settlement in 2005 (active from 2007), when the poultry meat was taken out of the market regulation system with target prices and sales taxes led by the cooperative Prior/Nortura (Bjørkhaug, Vik et al. 2017). The reasons that were put forward included that there was little room for market regulation in an already strongly vertically integrated industry, and that the few producers and the short production cycle favoured quick adaptations to changing consumer demand. Additionally, production was already regulated through what in practice was a contract farming scheme between farmers and those supplying grandparent animals and receiving poultry for slaughter (Norwegian Ministry of Labour and Social Affairs 2005, Steine, Vasaasen et al. 2011, Bjørkhaug, Vik et al. 2017). In addition, increased pressure from WTO to reduce subsidies contributed to this decision (Steine, Vasaasen et al. 2011, Klimek and Hansen 2017, Smedshaug, Olsen et al. n.d.).

Additionally, several expansions of the concession boundary limits have had consequences for the structure of the industry, and there has been an ongoing transfer of responsibility and accountability from the public NFSA to the private integrator companies (Bjørkhaug, Vik et al. 2017). At the same time, other commercial actors have grown to considerable sizes, competing with Prior/Nortura, and by 2015, three companies; Nortura, Den Stolte Hane (previously Jærkylling), and Norsk Kylling, were dominating and sharing the market between them, in addition to some smaller actors like Ytterøykylling (Vik and Bjørkhaug 2015, Bjørkhaug, Vik et al. 2017). The main element left of the social corporate model that is affecting the broiler industry, is the maintenance of import taxes on poultry meat, which is especially important for this industry because most income comes from the market (Holmen, Hillestad et al. 2020). A consequence of high import tariffs is that there is hardly any import or export of broiler meat to or from Norway (Norwegian Agriculture Agency 2022).

Three ways of organising chicken production in Norway

Vik and Bjørkhaug (2015) characterise the three different models of organising chicken production, led by the abovementioned companies: Nortura's 'cooperative model', Den Stolte Hane's 'investment model', and Norsk Kylling's 'fully integrated value chain model' (Bjørkhaug, Vik et al. 2017). In the cooperative model, Nortura controls the supply chain from import of genetic material to the sale of processed meat to supermarkets. In the fully integrated value chain model, the retailer Reitan Retail owns the company Norsk Kylling AS, and controls the supply chain from import of genetic material to sales in their own Rema 1000 supermarkets. In the investment model, where Den Stolte Hane dominates several parts of the supply chain, ownership has changed a lot and private equity capital has been involved in the development of the model. Den Stolte Hane is now owned by the Nordic poultry giant Scandi Standard (Bjørkhaug, Vik et al. 2017). The supply chains controlled by Nortura and Den Stolte Hane are also closely tied to one retailer each, as main suppliers to respectively NorgesGruppen and Coop (Rye, Jenssen et al. 2019). Nortura's share of the chicken market has been considerably reduced in later years, in 2019 lying at around 40%, while Den Stolte Hane and Norsk Kylling cover about 30% each (Rye, Jenssen et al. 2019). Geographically, chicken production is concentrated in three main areas in Norway: Rogaland, Trøndelag and Eastern Norway (Hedmark and Østfold). This is where the big slaughterhouses to which producers deliver chickens on a contractual basis are found, run by Den Stolte Hane, Norsk Kylling and Nortura (Holmen, Hillestad et al. 2020).

Producing Norwegian poultry in the Pandemic Era

Between 2005 and 2021, frequent outbreaks of Highly Pathogenic Avian Influenza (HPAI) H5N1 have resulted in the death or culling of more than 316 million poultry worldwide (WOAH 2023b). The current outbreak (2021-2023) is unprecedented in the number of outbreaks and the geographical spread of the virus (WOAH 2023b), and only between October 2021 and December 2022, 140 million poultry were culled (Kevany 2022). Consequences for wild birds are also alarming (Tullis 2022). Although there have been some human cases and with a high mortality rate (WOAH 2023c), the WHO still considers that the risk of human infection is low (The Economist 2023, WHO (World Health Organization) 2023b). However, several cases of HPAI infected mammals have been reported across the world. In addition to more sporadic cases detected in a range of wild mammals including bears, foxes, otters, lynxes, mountain lions and badgers (Norwegian Veterinary Institute 2022b, USDA APHIS 2023); there have been cases of mass infection and death of seals and sea lions in Peru, Chile, and the US (BNO News

2023, Gamarra-Toledo, Plaza et al. 2023, Puryear, Sawatzki et al. 2023). In December 2022 there was an outbreak in a commercial ferret flock in a Spanish fur farm (Agüero, Monne et al. 2023). At least in the ferret case, the virus most likely spread not only from birds to ferrets, but also between ferrets, and this mammal-to-mammal contagion has heightened worry of HPAI's zoonotic potential (Kjørstad 2023, Monbiot 2023, Sidik 2023).

Consequences of HPAI for poultry producers can be dramatic, and programs for economic compensation vary a lot in different countries (Tullis 2022). In Norway, outbreaks in four commercial poultry flocks have been reported to date, all in Rogaland, in November 2021, October and November 2022, in addition to confirmed cases of HPAI in wild birds along the entire coastline since 2020 (Granstad, Rømo et al. 2023). The advice from authorities and the industry's response to the situation have generally been to sharpen biosecurity measures (Sleipnes 2022, Granstad, Rømo et al. 2023). However, several scholars are critical to the long-term effectiveness or even possibility to create a clear and impenetrable orders between an 'outside' and an 'inside' inside poultry production systems, which is the central premise of biosecurity (Weis 2013, Dixon 2015, Wallace 2016).

2.4 The case of Norsk Kylling

Norsk Kylling AS was founded by Agnar Østhus in 1991 in the village Støren, Midt-Gauldal, in the former county of Sør-Trøndelag, now part of Trøndelag. Støren was at that time a typical case of a rural village in economic and population stagnation, as formerly central primary and related secondary sector industries, some cooperatively owned, were ridden by shutdowns and recession. The new, private entrepreneurial business was therefore welcomed as a much-needed chance for revival for both the agriculture and the wider economy in the valley of Gauldal, and the municipality offered its support. Norsk Kylling expanded quickly and became Rema 1000's main supplier in 1994. In addition to the slaughterhouse and processing plant, Østhus and another partner established the hatchery Hugaas Rugeri. As chicken consumption just kept growing, Norsk Kylling's need for labour exceeded what was available in the local community, and the company started to actively recruit immigrant workers, especially from Eastern Europe. Seasonal work and the use of recruitment companies were common, as was the management's active opposition to unionising. The first five years of success were soon to be followed by several years of media-covered conflicts and scandals (Almås 2015, 56-58).

Between 1995-2015, the media regularly covered conflicts between Norsk Kylling and unions and labour authorities regarding wages and working conditions; conflicts with agricultural

authorities regarding concessions; with the NFSA about animal health, animal welfare and food safety; and with environmental authorities about air and water pollution. The manager Østhus generally rebutted the accusations, placed the blame elsewhere, and appealed to the court on several occasions. Despite the increasingly blemished regional reputation, this did not have too serious consequences, and both the municipality and Rema 1000 defended the company for a long time. However, when the NFSA in 2008 warned Norsk Kylling of daily fines of 10,000 NOK because of illegal slaughter methods, Rema 1000 took action, and demanded that Norsk Kylling changed their methods immediately (Almås 2015, 58-59).

After this, Rema 1000 gradually managed to increase their control over quality and reputation by getting involved on the owner side of Norsk Kylling. Until 2005, Østhus had run Norsk Kylling as a joint-stock business, where he himself was the majority shareholder. As the company grew, more capital was needed, and the Finnish private equity company CapMan, a subsidiary of Cardinal Foods, bought more than half of the shares. The rest was divided between several owners, one of which was Østhus' own Staur Private Equity. In 2011, CapMan/Cardinal Food sold their shares to Rema Industrier (owned by Rema 1000), and from 2012 Rema Industrier took over the remaining Norsk Kylling shares (Almås 2002, 59-60). Rema Industrier had bought 50% of the shares of Hugaas Industrier (including Hugaas Rugeri) already in 2009 (Rema 1000 n.d.-c), and then the remaining 50% in 2015 – making Rema 1000 the sole owner and integrator of the Norsk Kylling supply chain (Almås 2015, 60). Further up, Reitan Retail, a subsidiary of the holding company Reitan AS, owns Rema 1000.

Almås (2015) claims that Norsk Kylling was moving towards 'the southern model' of broiler production, characterised by vertical integration, flexible labour relations exploiting cheap and racialised labour forces, and marginalised contract farmers locked in asymmetrical relationships with integrators (Constance 2008) under Østhus' management. In Almås' words, Norsk Kylling's production model was at war with 'the Norwegian production model', characterised by public negotiations, strict environmental rules, several actors in the supply chain, including farmers' cooperatives, and a high degree of unionising among workers (Almås 2015, 61). However, when Rema 1000 became the owner of Norsk Kylling, they also took control of management, and conditions improved. Almås claims that the negative media coverage had become a too heavy burden for the Rema 1000 brand, and the company's conflicts with public authorities were not tenable in the Norwegian context. Another effect of the Rema 1000 takeover, however, was increased vertical integration of the chain, more control of quality,

efficiency and production in the hands of Rema 1000, and a consolidation of their power vis-à-vis producers (Almås 2015, 61-62).

Norsk Kylling has in recent years realised considerable investments in their supply chain, including the opening of a new slaughterhouse and processing plant in Orkanger in 2021, and a new hatchery planned to open in 2023. In addition to the strong environmental profile of these projects, the company has also implemented animal welfare reforms, including a transition from the broiler hybrid Ross 308, until then dominant in the Norwegian broiler industry, to the slower-growing Hubbard JA787 (Norsk Kylling 2021a, Norsk Kylling 2022).

2.5 Chapter summary

I have now sketched out some central political processes profoundly changing Norwegian agrifood industries during the last century. The social corporate model emerging from a historic alliance between the workers' and the farmers' movements in the 1930s was coupled with a drive for mechanisation, rationalisation and industrialisation of agriculture from the postwar years and up until today. Despite a stronger resistance to internationalisation in Norway than in many other Western countries, there has been a steady internationalisation and market-orientation, and private actors including retailers are increasingly challenging the dominance and regulatory role of the state and farmers' cooperatives. The strongly integrated broiler industry, with its dependence on international genetics companies and feed ingredients, illustrates this development. However, this industry also illustrates the new challenges facing industrial agricultural production, including infectious diseases.

Having set the stage, I will now continue to present the most important theoretical debates and concepts that I will draw from in the following analysis chapters.

Chapter 3 – Literature review

In this chapter, I will present some central academic debates in agrarian political economy, human geography, political ecology and GPN/GVC scholarship that I will draw from and engage with further on in this thesis. The first section discusses some key characteristics of capitalist agriculture from the perspective of agrarian political economy, focusing especially on capital-labour relationships that are of special importance in the broiler industry, namely contract farming and fragmented labour markets. Further, it discusses a recent call to expand the view in agrarian political economy beyond agricultural production to better account for the spheres of circulation and exchange. The second section reviews some parts of the discussion in political ecology and human geography about the role of nature in capitalism, more specifically engaging with the concepts of commodity frontiers, subsumption of nature and socioecological fixes, and with how these affect global production networks. The third section explores how some of these concepts have been used to analyse the biological characteristics and challenges of the broiler industry, especially as facing emerging infectious diseases. In the chapter conclusion, I collect the threads and reiterate how I will use this literature in the analysis of my empirical material.

3.1 Capitalist agriculture and agrarian questions of labour and circulation

Capitalist agriculture

In *Class dynamics of agrarian change* (2010), Henry Bernstein defines agrarian political economy as "the investigation of the social relations and dynamics of production and reproduction, property and power in agrarian formations and their processes of change" (Bernstein 2010, 1). Bernstein offers four key questions of political economy that provide a useful starting point for analysing different sites and scales of economic activity across time and space: *who owns what; who does what; who gets what;* and *what do they do with it* (Bernstein 2010, 22-23). Based on these questions, we can sketch out a basic characterisation of capitalist agriculture. The first question regards property regimes, or the distribution of the means of production and reproduction. In capitalist societies, the private ownership of land is central, converting it into a commodity. Secondly, asking about the social divisions of labour regard the distribution of activities and tasks between different producers and across different units of production, and along axes of social differentiation like gender and class, and arguably also race and ethnicity (Melamed 2015). The third question considers the social divisions of the 'fruits of labour', in capitalism most importantly individual or corporate money income. The

last question is about how the social product is distributed and used, and in addition to funds for consumption, replacement and ceremonial activities that are found in all agrarian societies, capitalism is unique for the centrality of capital accumulation based on the appropriation of surplus labour (Bernstein 2010, 22-23)

In modern capitalist economies, agriculture is connected with wider divisions of labour, processes of technological change and market dynamics (Bernstein 2010, 64). Capitalist agriculture encompasses farming, i.e. the cultivation of soil and raising of livestock, but also the various processes 'upstream' and 'downstream' of the farming itself, providing respectively the productive conditions to undertake farming, and the marketing, processing and distribution of the farm products after they leave the farm. Agri-input capital and agrifood capitals are typically powerful actors in capitalist agriculture, affecting farmers' productive and reproductive activities (Bernstein 2010, 62-65). Increasing corporate control "from seed to supermarket" (McMichael 2005, 296), as power is linked more to relations surrounding agricultural production (e.g. loans, materials supply, new technologies, warehousing systems, transportation, distribution and retail sales), than to control over land, is one of the key dynamics of an emergent world agriculture in what McMichael (2005, 64) calls the corporate food regime. Using these ideas, I will in chapter 5 describe the social relations of production in Norsk Kylling's broiler supply chain and examine how the retailer-owned company has gained power through controlling the relations surrounding the production of chicken meat.

Capitalist agriculture differs radically from how most farming historically was a localised activity and way of life, where the minimum social conditions of land, labour, tools and seeds were pooled from nearby sources and reproduced in closed-loop agro-ecological systems (Bernstein 2010, 64). Efforts to shape agriculture in the fashion of industrial production is characteristic to modern capitalist agriculture. To reduce the turnover time of capital, which in agriculture is limited by the natural growth rhythms of plants and animals, natural processes are simplified, standardised, and sped up. The result is a capital-intensive, 'flow-through' system where high-yield production of uniform plants or animals depends on technological inputs like fertilisers, herbicides, pesticides, and concentrated feed. Poultry production is an exemplary type of such industrialised agriculture, as the closed-off, environmentally controlled chicken 'factories' allow for an astonishingly uniform production, while being almost completely 'mobile' in the sense that it can be established wherever it is profitable, ""liberating" capital from land and locale specific constraints" (Bernstein 2010, 90-91).

Capital-labour relations in the agrifood industry: contract farming and fragmented labour markets

Agrarian political economy has its origins in what Bernstein (2006) terms the 'agrarian question of capital' going back to Karl Marx, which essentially dealt with what would happen to the pre-capitalist agrarian classes of landed property and the peasantry with the emergence of capitalist social relations of production. However, the consolidation of capitalist agriculture on a global scale and the class fragmentation on the countryside posited new 'agrarian questions of labour' (Bernstein 2006), exploring capital-labour relations and value creation in rural societies, while expanding the scope beyond a narrow focus on food production (Arboleda 2020, 348). Different forms and classes of capital in the countryside (and beyond) range from corporate agribusinesses to 'rich peasants', proving a diversity among farmers that makes it difficult to view them as one single class, or identify their common social relation with capital. Rather, one can talk about differentiated classes of 'petty commodity producers', a contradictory unity of the class locations of capital and labour (Bernstein 2010, 103, 112). Considering the agricultural sector beyond the farm, classes of labour include rural wage labourers with a range of social locations and identities and combinations of these, with "ever more fluid boundaries … defy[ing] inherited assumptions of fixed and uniform notions of "worker," "farmer," "petty trader," "urban," "rural," "employed" and "self-employed"" (Bernstein 2010, 111).

The complexities of agrarian class dynamics are illustrated in the scholarly discussion about contract farming, a central dynamic of agrarian restructuring towards increasingly standardised, globalised agricultural markets (Little and Watts 1994, Rehber 2007, Vicol, Fold et al. 2022). Contract farming refers to a type of agricultural production based on an agreement between a contractor, often agribusiness firms and/or supermarkets, and farmers, establishing conditions for the production and marketing of a farm product. The contracts vary in scope from simple agreements of the quantity, quality, date and price/pricing formula of product delivery; to contracts that in addition to production delivery includes key inputs like credit and technical assistance and wider aspects of production and management, generally considered to enhance contractors' control (Otsuka, Nakano et al. 2016). Most research on contract farming has focused on the Global South, where these types of arrangements became increasingly common especially around the 1980s and 1990s, in a period of increasing agricultural liberalisation and a rise in global trade of agricultural products (Little and Watts 1994, Vicol, Fold et al. 2022). However, contract farming has long been practiced also in the Global North (Watts 1994, Rehber 2007, Otsuka, Nakano et al. 2016). Contract farming arrangements are thus found in

very different political, historical and social contexts, leading to an "extreme heterogeneity in the form and features of contract farming arrangements" that make a unified theoretical definition difficult to pin down (Vicol, Fold et al. 2022, 14). However, on a general note it can be said that "contractual relationships are not only a distinctive feature of highly industrialized agro-food systems, but also a way for establishing an industrialized structure" (Rehber 2007, 17).

Development institutions and mainstream economists have often framed contract farming as a development opportunity that can modernise agriculture and improve smallholders' welfare (Otsuka, Nakano et al. 2016). More critical approaches, especially from political economy, have problematised the promised 'win-win' solutions for smallholders and agribusiness (Little and Watts 1994, Vicol, Fold et al. 2022). Vicol et al. (2022) review the main lines of critical inquiry, including how contract farming facilitates the transferral of risks from lead firms to farmers; how risks and conditional payments might quell political dissent among farmers; and how interlinking markets for credit, factors and produce advances capitalisation of agriculture and reinforces processes of industrialisation and transnationalisation of agribusiness. While the smallest producers are often marginalised, middle- and high-income farms have easier access to contract relationships. These might end up in ambiguous positions with less real autonomy than what is promised or formally claimed, in Watts' (1994, 130) words, in reality little more than "propertied proletarians". Social differentiation of contract farmers is contingent upon local contexts, and contract farmers might also qualify as middle- and large-scale firms (Vicol, Fold et al. 2022), perhaps making it more pertinent to talk about different classes of capital (Baglioni 2015, Campling 2021). From a global value chain (GVC) perspective, contract farming has been analysed as a hierarchical mechanism through which lead firms increase their control, but farmers might also influence contract relationships through collective action and resistance (Vicol, Fold et al. 2022). I use these ideas in chapter 5 to suggest that the organisation of broiler production through contracts between farmers and Norsk Kylling strengthens the latter's power over the production process.

Contract farming is the typical way of organising production in globalised industrial broiler production, and is a key element of the so-called 'southern model' described in chapter 2 (Boyd and Watts 1997, Constance 2008, Little and Watts 2022). This way of organising relations between producers and integrators also characterises the Norwegian industry (Almås 2015, Vik and Bjørkhaug 2015). There is not a lot of research on contract farming in the Norwegian context, where it has not been a widespread phenomenon historically (Steine, Vasaasen et al.

2011). Almås (2002, 229-230) describes how tendencies of a development towards contract farming schemes in the pork and egg sectors in the 1960s spurred strong resistance from the farmers' organisations. The farmers compared contract farming to the old Norwegian agricultural system, lasting to the beginning to the 20th century, where most farmers did not own their lands, but were crofters (*husmenn*) or tenants (*leilendinger*) (Myhre 2015a, Svensson, Amundsen et al. 2018). This resistance led to stronger regulation of large-scale farm operations in the 1970s (Almås 2002, 231). Nevertheless, with the increasing deregulation of Norwegian agriculture from the 1990s, private downstream actors are increasingly taking over the regulatory roles of public authorities and farmers' cooperatives' roles (Hegrenes and Borgen 2005, Bjørkhaug, Almås et al. 2015), and forms of contract production are increasingly found in various agricultural sectors in Norway too (Steine, Vasaasen et al. 2011).

A report by Rønning et al. (2013) deals specifically with the transition to contract production in the fruit and vegetables sector, where the farmers' cooperatives have disappeared completely. The authors argue that the transition lead to more insecurity and the transferral of risks and costs to farmers, a restructuring of the industry through concentration of production in fewer and bigger units, and low mobility in the market. While some producers successfully adapted to the increased market focus, they point at a general reduction of farmers' possibility to influence the industry (Rønning, Vik et al. 2013). The strong geographical concentration in Norwegian broiler production indicates a similar restructuring effect of contract production (Vik and Bjørkhaug 2015). Without going into details of the contractual relationship between broiler producers and contractors, Almås (2015) argues that the Norwegian institutional and regulatory context has hindered a full-scale adoption of the US 'southern model' as sketched by Constance (2008), including precarious contract conditions. Still, farmers are "at the mercy of the integrator" (Almås 2015, 63), a position that could prove risky especially in periods of market fluctuations. Almås' account thus aligns with the wider, abovementioned literature on contract farming, complicating the picture of an "egalitarian relationship between two parties who have come to an agreement on a 'pure' commercial transaction" (Watts 1994, cited in Vicol, Fold et al. 2022, 7). My analysis in chapter 5 contributes to fill the knowledge gap on Norwegian contract farming relations.

Beyond the relationship between farmers and contractors, capital-labour relations in the global agrifood system include wage-labour on farms and in food processing, sectors that are often characterised by temporary positions, low wages, dubious if not outright exploitative working conditions, and a strong dependence on immigrant workers (Pachirat 2011, Eisen 2019,

Milbourne and Coulson 2021, Rye and O'Reilly 2021). Some scholars talk about 'immigrant niches' in a 'secondary labour market' of unstable, manual, low-wage and low-skilled jobs, mainly occupied by immigrant labour (Davies 2019, Rye and O'Reilly 2021). The formation of such niches is explained by the supply of immigrants willing to take the jobs, a native-born workforce unwilling to do the same, and employers' preferences for immigrant labour, or a combination of these (Scott and Rye 2021, Slettebak and Rye 2022). Scholars like Anna Tsing (2009) and Ben Rogaly (2008) connect the growing fragmentation of labour markets to the increasing power concentration in supply chains, as lead firms' efforts to cut costs in the production of big volumes of cheap commodities involve the exploitation of a diversified workforce. Labour relations in the broiler industry largely fit into this picture, as shown in research from the UK (Davies 2019), Brazil (de Campos Silva 2020), the US (Boyd and Watts 1997, Striffler 2005, Constance 2008, Schwartzman 2013), Germany (Birke and Bluhm 2020) and Norway (Bjørkhaug, Vik et al. 2017).

Of course, there are important variations across different historical, social and political contexts. For instance, in various ways the state might mediate the process of increasing agribusiness dominance, and the ensuing restructuring of labour markets in the agrifood industry, both facilitating and/or impeding the deregulation of the industry, leading to what Marion Werner (2021) calls 'uneven regulatory development'. The presence or absence of strong labour unions in the country, and in the specific industry in question, also affect aspects such as wages and working conditions, and to varying degrees nonunionised workers may also exert agency and resistance affecting these conditions (Birke and Bluhm 2020, Slettebak and Rye 2022). However, legally enforced minimum wages and relatively strict labour regulations do not guarantee the compliance with these, as exemplified by documentation of substandard wages and working conditions in the Norwegian fish and poultry processing industries (Bjørkhaug, Vik et al. 2017, Slettebak and Rye 2022). In addition to national regulatory frameworks, other actions by public authority, and workers' resistance, negative media attention might represent a reputational risk pushing lead firms to improve working conditions, as in the case of Norsk Kylling (Almås 2015, Bjørkhaug, Vik et al. 2017), which I shall discuss further in chapter 5.

Expanding the view of agriculture

Martín Arboleda (2020) argues that there has been a decisive shift in power relations in agro-industrial systems, away from actors directly involved in agricultural production, and towards a range of other actors involved in infrastructures of circulation and connectivity. Arboleda argues that this represents a turning point in the historical evolution of agrarian change that

warrants reformulating the agrarian question, as the agrarian question of labour, with its focus on capital-labour relations and value creation in the sphere of production, does not sufficiently consider the dynamics of realisation of value in the sphere of exchange. Conversely, scholarship on food consumption has tended to ignore the industrialised agriculture at the base of the supply chains of which supermarkets and other retail spaces are but the endpoints (Hamilton 2019, cited in Arboleda 2020, 346). What is needed, argues Arboleda, is "an expanded conception of agriculture that integrates dialectically the production and realization of value as a differentiated unity" (Arboleda 2020, 359-360).

An 'agrarian question of circulation' should put into dialogue agrarian political economy's traditional concerns with capitalist industrialisation and class differentiation in the countryside with "putatively nonagrarian" processes and dynamics involved in agrifood systems (Arboleda 2020, 347). Very simply put, this can be interpreted as an invitation for agrarian political economy to consider how actors beyond the farm shape processes of capital accumulation and power distribution in agrifood systems. This might provide new insights and perspectives into "the present condition of agriculture" within the frame of increasingly urbanised, and digitally, financially and logistically connected planetary geographies. These insights might also be informative for advocates of alternative or noncapitalist forms of food production (Arboleda 2020, 360). One of the areas Arboleda considers in his expanded conception of agriculture is logistics and transport infrastructure.

Logistics has evolved from a narrow management area focused on transportation and storage, to encompass all stages of the supply chain in "the integrated management of the supply chain as a total system" (Danyluk 2018, 631). The increasing importance of logistical control represents considerable costs for small and medium sized firms, and augments socio-spatial inequalities among agricultural producers, leading actors such as supermarket chains and concentrated agricultural producers to strengthen their dominance. They have managed to employ the developments in logistical technology and infrastructure to "diminish asymmetries of information, expand their market reach, and reduce operational costs" (Arboleda 2020, 350). In the vertically integrated, just-in-time system of broiler production (Boyd and Watts 1997) described in chapter 2, considering the role of logistics in the coordination of the range of actors involved in the intensive, fast-paced production of chicken meat seems like a fruitful lead that I will follow in chapter 5.

3.2 Commodity frontiers, socioecological fixes and global production networks

I have mentioned agrarian political economy's concern with how natural cycles shape and constrain the industrialisation of agricultural production (Mann and Dickinson 1978, Boyd, Prudham et al. 2001, Bernstein 2010). In this section, I will further discuss certain insights from this field and from human geography, political ecology and GPC/GVC analysis, which I shall use in my analysis of the specific biophysical challenges facing industrial broiler production, how firms try to overcome them, and how this might affect power dynamics in the wider food production network.

Commodity frontier theory

Jason Moore conceptualises capitalism as a *world-ecological regime* (Moore 2011, 2015). Capitalism is fundamentally socioecological, meaning that instead of acting *upon* nature, capitalism "develops *through* human and extra-human natures" (Moore 2011, 4). Unlike other civilisations' organisation of the relationships between humans and the rest of nature – or the *oikeios*, which Moore calls it – the capitalist world-ecological regime shapes, channels and negotiates these socioecological relationships to serve the purpose of endless accumulation (Moore 2015, 119). In other words, capitalism develops through the endless quest of capital accumulation through the exploitation of human labour and the appropriation of nature (Moore 2015, 294). Capitalism also stands out from earlier world-ecological regimes because of its unprecedented pace and scale, having become a planetary system (Moore 2015, 68, 138). In Neil Smith's (2008, 79) words, "[n]o part of the earth's surface, the atmosphere, the oceans, the geological substratum, or the biological superstratum are immune from transformation by capital". Importantly, this planetary system proceeds through *uneven development*, in the sense that 'development' in one place depends on 'underdevelopment' in another (Smith 2008). In Werner's (2019, 955) words, the globalisation of production is not "a rising tide that lifts all boats … instead some boats are lifted while others sink".

Moore's commodity frontier theory conceptualises the historical expansion of capitalism through a 'double movement'. This double movement consists of an extensive commodity-widening strategy, geographically expanding the zone of appropriation of uncapitalised nature; and an intensive, commodity-deepening strategy of capitalisation, maximising productivity within the commodity zone (Moore 2011, 2015, Baglioni and Campling 2017). In the commodity-widening strategy, capitalism enters zones of 'high ecological surplus', meaning that less necessary human labour time is required to transform this nature – or the 'unpaid

work/energy' (Moore 2015) – into commodities. However, with time this ecological surplus is exhausted, and capital must either expand into new frontiers, or switch to the commodity-deepening strategy and "intensify the appropriation in an existing frontier" (Baglioni and Campling 2017, 2443) "through capital intensification and socio-technical innovation", that is, making "more out of less" (Moore 2015, 121). The increasing capitalisation of nature has its limits as costs of input and labour eventually rise and lead to falling profit rates, again driving the search for new commodity frontiers (Moore 2015, 161). These dialectical processes are uneven across space and time, and are shaped by the materiality of the 'natures' that are appropriated and/or capitalised (Banoub, Bridge et al. 2021).

The concepts of appropriation and capitalisation largely overlap with what William Boyd, Scott Prudham and Rachel Schurman (2001) termed the 'formal and real subsumption of nature'. Formal subsumption refers to how firms "simply" exploit nature, as they "invest in gaining access to or control over natural resources or ecosystems" (Boyd, Prudham et al. 2001, 562). Real subsumption of nature involves "systematic increases in or intensification of biological productivity" by the use of external inputs like synthetic fertilisers or pesticides, and more importantly, through "improvements of the genetic program" through traditional breeding programs and biotechnologies (Boyd, Prudham et al. 2001, 564). With these concepts, Boyd et al. (2001) shed light on how firms could increase productivity through the direct transformation of biophysical processes, and in this way open new opportunities for accumulation. Dealing explicitly with nature-based industries, they drew up a clear distinction between 'biologically based' and 'nonbiologically based industries'. Separating these by their respective production logics of cultivation and extraction, they argued that the real subsumption strategy was only applicable to biologically based industries. Although the clear distinction between biologically based and nonbiologically based industries has later been challenged by other scholars, the framework of formal and real subsumption remains a useful tool to explore the appropriation and capitalisation of nature, and how the material characteristics of different 'natures' shape these processes (Smith 2007, Boyd and Prudham 2017, Carton, Jönsson et al. 2017, Werner 2022). In chapter 6, I will use the subsumption framework together with concepts from commodity frontier theory to analyse how the natures of chickens, pathogens and monocultured soybeans shape, constraint and open up new accumulation avenues in the broiler production in Norsk Kylling.

While recognising that all industries are fundamentally socio*ecological* activities that ultimately depend on natural resources, the particular attention to 'nature-based industries'

(Boyd, Prudham et al. 2001) or 'natural resource industries' (Baglioni and Campling 2017) is justified because these sectors directly and immediately appropriate and transform nonhuman nature (Baglioni and Campling 2017, Boyd and Prudham 2017, 877). While 'nature' had been widely theorised as an 'obstacle' to capital in nature-based industries (Mann and Dickinson 1978), Boyd et al. (2001) expanded this notion by highlighting that nature also represents opportunities, uncertainties, and surprises to economic actors. These concepts help articulate how capital's attempts to fully control nature is an impossible project, as the ecological indeterminacy of the labour process shapes the appropriation and capitalisation of nature (Baglioni and Campling 2017). These insights are rooted in a view of capitalism as a fundamentally contradictory and crisis-ridden system, necessitating regular 'fixes' to these contradictions and crises (Harvey 2001, Moore 2015) .

Contradictions, crises and fixes

A central assumption in Marxist political economy is that capitalism's dependence on the increasingly intensified extraction of surplus from labour and nature leads to socioecological contradictions that represent obstacles to further economic growth (Robbins 2020, 51). The tendency towards the overaccumulation of capital stems from how capitalist commodity production, based on an inherently exploitative wage relation, is aimed at maximising gain (surplus value) rather than social need (Smith 2008). The result can be "some combination of surplus capital looking for productive investment, surplus commodities looking for buyers, and surplus labor looking for productive employment", potentially developing into economic crises (Ekers and Prudham 2017, 1374). David Harvey's concept of the 'spatial fix' refers to capitalism's need for geographical expansion and restructuring in order to resolve its inner crisis tendencies, especially stemming from the overaccumulation of capital (Harvey 2001). The term 'fix' has several connotations that are relevant in this regard. First, it refers to how capitalism must build fixed space in order to function, in other words; it needs fixed capital to set value in motion, the very definition of capital (Harvey 2020). Second, the fix refers to the resolution of a problem, i.e. an obstacle to capital accumulation. Third, the association with the fix of a drug addict indicates that this resolution can only be temporary (Harvey 2001).

Several scholars in geography and political ecology have built upon the concept of the spatial fix to explore how capitalism deals with socioecological transformation. Ekers and Prudham (2017) argue that spatial fixes are essentially metabolic processes that produce space and transform nature, and can therefore be considered 'socioecological fixes'. This builds on the recognition of another source of crisis tendency inherent to capitalism being the

underproduction of nature, that is, the inability of capitalism to reproduce the ecological conditions on which it depends, for instance deforesting areas without investing in the reproduction of trees, or exploiting non-renewable sources like fossil fuels (Moore 2015, Ekers and Prudham 2017). This underproduction is not absolute, but relational, implying that "what constitutes underproduction from the standpoint of one firm might be another's source of profitability" (Ekers and Prudham 2017, 1384), as nature becomes an accumulation strategy (Katz 1998, Smith 2007). Going back to commodity frontier theory, appropriation and capitalisation are the primary ways capitalism, historically and currently, seeks to fix this crisis tendency (Moore 2011).

Karen Bakker (2009) uses the term 'ecological fixes' to refer to how capitalists or the state confront 'negative externalities' of production. These can represent both barriers and opportunities to capital accumulation. Using the examples of pollution and pollution mitigation, Bakker shows how ecological fixes might respectively imply devolving costs elsewhere, or internalising the negative externalisation and turning them into profitable activities, cf. Katz' (1998) nature as accumulation strategy. Fixes in the name of 'sustainability', through the formal and real subsumption of nature or a combination of these, seem to be an increasingly common strategy of firms. As issues such as climate change and land degradation might represent real, material barriers to their continued growth, and because they must deal with increased public and political concern about these issues, firms present promises and ambitions, often marked by a techno-optimist environmentalism, to "metabolize nature differently" (Carton, Jönsson et al. 2017, Werner 2022, 241).

Mark Cooper (2017) applies the concept of the real subsumption of nature to the industrial livestock industry's efforts to biotechnologically transform the enteric ecology of ruminant livestock's stomachs as a fix to reduce greenhouse gas emissions from dairy and meat production. Drawing from the regulation approach, Cooper argues that the common explanation that capital pursues subsumption strategies solely to enhance accumulation is insufficient, as increasing concern about environmental and climate issues challenges the regime of accumulation of industrial livestock (813). Modes of social regulation, that is, rules, conventions, institutions and patterns of conduct, stabilise specific regimes of accumulation, meaning patterns of production and consumption (814). In this case, the livestock industry's attempts of real subsumption of nature are aimed not primarily at enhancing productivity, but at reducing livestock's production of greenhouse gas emissions and thereby moderate public

and political concern that otherwise might translate into government policies or consumer behaviour threatening existing accumulation strategies (Cooper 2017, 821).

Cooper's work sheds light on how the mounting evidence of socioecological externalities from the capitalist regime of accumulation leads to reactions among the public that the state and firms must take into account, and thus how these reactions shape further accumulation strategies. Nevertheless, the firms' and the state's allegiance to the existing regime of accumulation limits which solutions or fixes are acceptable. Notably, the ideology of efficiency, that is, the firm belief that technological innovation can resolve "potential contradictions between economic growth and environmental sustainability" (Cooper 2017, 823), shapes these "ambitious, but highly speculative" strategies. The role of technology is thus central, as Cooper argues that new technological fixes promising 'sustainable intensification' are the preferred responses for firms responding to sustainability concerns (Cooper 2017).

As Cooper's study shows, the terminology of socioecological fixes can usefully be applied to agriculture, building on agrarian political economy's long tradition of addressing capital's 'problem with nature' (Bernstein 2010, 89-90). The 'industrial grain-oilseed-livestock complex' is the name Tony Weis (2013) gives to the dominant system of agriculture across the temperate world, where monocultured grain and oilseed crops flow through concentrated livestock production systems including industrial poultry, "mediated by an array of technologies, inputs and large corporations" (Weis 2013, 8). Weis uses the concept of 'biophysical instabilities' about the range of problems of industrial monocultures, including the depletion of soils, the increased proliferation of pests, and the dependence on external energy sources; and 'overrides' about 'fixes' to these problems, including the use of synthetic fertilisers and synthetic chemical pesticides, and the dependence on fossil fuels. Weis argues that these overrides are essentially short-term fixes that fail to go to the root of the instabilities, and might even further exacerbate them (Weis 2013). Insights and concepts from these debates about socioecological fixes to capitalist agriculture's contradictions will inform my analysis in chapter 6 of Norsk Kylling's change of broiler breed, their quest for alternative protein sources in the chicken feed, and the comprehensive biosecurity programs along the supply chain. I will interpret these as socioecological fixes to the contradictory nature of industrial broiler production, and moreover discuss how the Norwegian regulatory context limits and facilitates these processes.

As is made evident by Harvey's allusion to the impermanent drug addict's fix (Harvey 2001), there is often a shared scepticism in much of the literature on capitalism's socioecological fixes

as to whether these can actually be permanent solutions. In her account of the Californian strawberry industry, Julie Guthman (2019) shows how the dependence on chemical soil fumigation to overcome ecological contradictions in the production leads to new problems like fungal pathogens. The cure of one illness causes a new illness, doing what Guthman terms 'iatrogenic harm', and this has fuelled a whole business of repair, profiting from continuous cycles of problems and short-term solutions (Guthman 2019). Cooper (2017) points to the highly insecure goal of biotechnologically reducing methane emissions from livestock production fast enough to counter the predicted overall production growth, in addition to the obstacles to achieving worldwide adoption of the technological fix if it were to succeed. Rutt and Jakobsen (2022) analyse the poultry industry's search for techno-scientific fixes to the current dominant practice of culling male chicks in the production of laying hens. They anticipate how proposed solutions might lead to new problems such as an overall increase in energy and material input, or other unforeseen consequences of for instance gene editing endeavours. Moreover, disguising the profitability objective as a quest for 'ethical sustainability', the regime-stabilising effect of such fixes might ultimately prevent more systematic criticisms of or alternatives to the dominant capitalist agro-industry (Rutt and Jakobsen 2022).

In a discussion about the 'neoliberalisation of nature', in which she includes socioecological fixes, Bakker (2010) warns against assuming that outcomes of such processes are "necessarily (and often solely) negative". A more nuanced understanding would be that 'costs' and 'benefits' are shifted, meaning that some, including "some aspects of what we conventionally classify as 'the environment'", win, while others lose (Bakker 2010, 728). Ekers and Prudham do not rule out that socioecological fixes might indeed reorient "technological and infrastructural development in more environmentally friendly and, hopefully, more socially progressive directions" (2017, 1384). Capital's increasing responsiveness to socioecological concern might indicate that social struggle and contestation are being heard. At the same time, investments of private capital into the greening of infrastructure "is also a mechanism for securing the reproduction of capitalism", again revealing the growing institutional and ideological fusion of environmentalism and capitalism in the neoliberal era (Ekers and Prudham 2017, 1385), the promises of which the authors seem to consider with ambivalence.

On a more general level, Moore (2015) argues that the assumptions of limitless substitutability and an interminable world that drive the commodity frontier strategy, are conceited. Importantly, beyond the idea of 'limits to growth' "as if they were imposed by this (external)

Nature", Moore argues that "the limits of capitalism are limits of a particular way of organizing nature" (2015, 94). Capitalism's "relentless flexibility" (73) has historically meant that the exhaustions of particular, 'historical natures' have given way to *developmental* crises resolved through new waves of accumulation through the double frontier movement. Moore nevertheless posits the current "likely demise of Cheap Nature" as a signal of a deeper, potentially *epochal* crisis. Highlighting the growing unavailability of new commodity frontiers and the accumulation of waste and toxification, including climate change, he suggests that the end to capitalism's historic strategy of expanding through fixes, with the dialectic double movement of appropriation and capitalisation, might eventually give way to new ways of organising nature – for better or for worse (Moore 2015).

Commodity frontiers and global production networks

"[I]f capitalism is a way of organizing nature, then supply chains are its most tractable form," writes Werner (2022). Global production network (GPN) analysis is a scholarly tradition in geography that builds upon the insights from the preceding global commodity chain (GCC) and global value chain (GVC) frameworks about the importance of interfirm relations as global production has become ever more fragmented and dispersed. GPN analysis pushes the research agenda further by highlighting the embeddedness of these relations in wider networks including non-firm actors such as the state and the civil society, relegated to the background in GCC/GVC frameworks (Strauss and McGrath 2017). Together with GVC/GPN scholars such as Baglioni and Campling (2017), Irarrázaval and Bustos-Gallardo (2019), and Campling and Havice (2019), Werner (2022) urges more research into the ways capitalism works through nature and the other way around in production networks.[7]

Building on insights from the world-ecology framework (Moore 2015) and uneven development (Smith 2008), studying global production networks can provide insight into ongoing processes of appropriation and capitalisation of nature as they are organised in supply chains, and how these processes have differentiated outcomes for different people in different places (Baglioni and Campling 2017, Werner 2019, Werner 2022). One aspect of this is how the material properties of nature might shape the capital-labour relations, the circulation of capital, and the relations between firms and other network actors (Baglioni and Campling 2017, Campling and Havice 2019). Parting from the assumption that nature becomes 'natural

[7] Following Werner (2022), I will use GPN/GVC to refer to the scholarly frameworks, and 'production network' and 'supply chains' when I refer to the concrete objects of study, the first referring to the wider network of firm and non-firm actors, and the second when I refer more narrowly to interfirm relations.

resources' only through the labour process, Baglioni and Campling (2017) argue that the impossibility of fully dominating nature results in a double indeterminacy of the labour process in natural resource industries. This ecological indeterminacy, along with the social indeterminacy stemming from the fundamentally unequal and conflict-ridden relation between employees and employers, could lead to disruptions and crises propagating with a 'bullwhip effect' in complexly organised production networks (Baglioni and Campling 2017). By "momentarily suspending and (re)shaping" circuits of capital at the firm level, such contradictions and crises could potentially spread throughout the wider production network (Baglioni, Campling et al. 2022, 326). This is a fitting picture of how the current HPAI outbreak leads to serious economic consequences for poultry farmers and others working in the industry across the world, while also affecting the wider network including consumers and public authorities.

In their study of the Chilean salmon industry, Irarrázaval and Bustos-Gallardo (2019) show how the material properties of Atlantic salmon shape the industry in the way the salmon's specific seawater requirements limit the industry's geographical location. Moreover, they highlight the ecological fragility of industrial salmon production, often concealed in economic success stories. Irarrázaval and Bustos-Gallardo analyse the infectious salmon anaemia (ISA) virus crisis striking the industry in 2008 as a result of the ecological contradictions inherent in the commodification process in intensive aquaculture. Further, they see the industry's efforts to combat the virus as attempts to reduce the ecological indeterminacy of the production process, crucial for upholding firms' profitability. The authors show how these strategies shaped the spatial organisation and the value dynamics in the Chilean salmon industry. They further suggest that such analyses of ecological contradictions and strategies to overcome them might illuminate power dynamics in GPNs. Unequally distributed resources in the struggle against ecological resistance to commodification can determine which firms take leading positions in production networks, at the expense of others (Irarrázaval and Bustos-Gallardo 2019).

Growing public and political concerns around sustainability issues have led to calls for and claims of firms managing their organisational structure and changing their practices in line with 'sustainable development' objectives, through so-called 'environmental upgrading' (Campling and Havice 2019). While some scholars see environmental upgrading as problem solving mechanisms, more critical accounts contend that environmental upgrading might strengthen buyer power in supply chains, and that the changes that are made are primarily in areas that enhance competitive advantages and business growth (Campling and Havice 2019). In a similar

line, Werner (2022) discusses how normative frameworks on sustainability and ethical animal treatment shape how firms appropriate and capitalise nature. For instance, firms may attempt to create and harvest symbolic value through practices of dissociation, that is, by marking their symbolic and material distance from unethical commodities.

What commodities or practices count as 'ethical' and/or 'sustainable' is of course not a straightforward issue, and partly a result of firms' abilities to frame them as such. Moreover, a possible consequence of 'greening' production is the overall increased commodity production and consumption, putting into the doubt the actual sustainability of these practices (Werner 2022). Guthman and Biltekoff (2021) touch upon these topics in their study of alternative protein companies in the US and their promise to replace the inhumane and environmentally unfriendly livestock industry with an (almost) dematerialised alternative food system for edible protein. Though sceptical to the claims of dematerialisation, Guthman and Biltekoff argue that the lack of meaningful transparency into the activities of these firms make it impossible to make proper, not to mention democratic, assessments of the promises in the first place (Guthman and Biltekoff 2021). In chapter 6, I will lean upon these insights into how ecological contradictions and the responses to them might shape the power dynamics in production networks, when I examine how Norsk Kylling's responses to ecological challenges affect their position in the broiler supply chain, and how this might affect the wider agrifood system.

3.3 The political ecology of industrial poultry production and infectious diseases

Political ecology is a broad interdisciplinary field of critical research on environmental issues, with a particular focus on different forms of power involved in environmental governance (Benjaminsen and Svarstad 2021, viii). With academic roots that include Marxist political economy, human and cultural ecology, poststructuralism, peasant studies, postcolonial theory, feminist theory, and science studies, political ecology is far from a coherent theory or unified method of research (Robbins 2020, 80), and is still a dynamic field interacting with new theoretical approaches (Benjaminsen and Svarstad 2021, 234-235). Political ecology stretches out in various directions, but Benjaminsen and Svarstad (2021, 4-5) highlight the strong tradition for case studies of local processes of environmental change, situated in a multilevel analysis including national and global influences. The traditions in political ecology to situate sociecological transformations in broader systems and rejecting politically inert views of ecological systems (Robbins 2020) make it an apt lens to study industrial broiler production as a power-laden expression of how capitalism organises nature. In this section, I discuss how the

industrial broiler is a result of the real subsumption of nature, and how the biological characteristics of chickens shape and are shaped by the industry. Further, I will review some central scholarly works about how the industrial ecologies of the livestock industry, including poultry production, represent a potential pandemic breeding ground.

Broilers as real subsumption of nature

The domestic chicken that is used in industrial broiler production today, *Gallus gallus domesticus*, has been through a long range of technological processes marking a considerable distance from its ancestor in the wild, the red jungle fowl, *Gallus gallus*, originally native to South and South-East Asia (Bennett, Thomas et al. 2018). Intensive scientific research and technological development particularly in the fields of animal breeding and genetic improvement, intensive confinement, nutrition and feeding practices, and drug use, have resulted in today's industrial broiler (Boyd 2001). The biological systems of the chicken have, in Boyd's words, been incorporated into the circuits of industrial capital and "made to operate as a productive force" (2001, 662). So productive indeed, that the domestic chicken has become the most populous bird species on the planet, likely having reached the highest number of standing specimens of a single bird species in Earth's history (Bennett, Thomas et al. 2018).

Exemplifying capitalist agriculture's effort to standardise, simplify and speed up natural processes (Bernstein 2010, 90-91), predominantly US genetics companies made broilers grow almost twice as heavy in less than half the time between 1935 and 1995 (Boyd 2001). Two broiler genetics companies currently dominate the global broiler industry, namely Aviagen, owned by the Erich Wesjohann (EW) group, and Cobb-Vantress, owned by Tyson Foods (Bjørkhaug, Vik et al. 2017, USDA APHIS 2022). In what is an extremely genetically uniform production (Bjørkhaug, Vik et al. 2017), today's typical broiler lives between four to seven weeks (Bennett, Thomas et al. 2018, Animalia 2022b), truly a result of efforts to make nature work "harder, faster, and better" through real subsumption of nature (Boyd, Prudham et al. 2001, 564). Nevertheless, capital's subsumption of nature is always incomplete, as the "life cycles of plants and animals can be accelerated but never annihilated; hence, idle-time cannot be totally eliminated" (Baglioni and Campling 2017, 2441).

The other side of the coin of capital's subsumption of chicken nature, then, is that the chicken's biological characteristics also contributed to shaping the particular agro-industrial JIT system of broiler production that emerged and consolidated in the postwar US (Boyd and Watts 1997). Big science, the industrialisation of the US diet, agrarian restructuring, and integration across

the entire value chain resulted in a system characterised by vertical integration, where top-down corporate control of the various stages of broiler production facilitates the coordination of biological constraints in each stage. In this way, material and time efficiencies are maximised while controlling for quality and biosecurity, ultimately maintaining a steady supply of a wide range of products (Boyd and Watts 1997, 148-149). The JIT broiler system might be considered a coproduction shaped by political, economic, social and institutional relations in the US South, along with biological attributes of the chicken itself (Boyd and Watts 1997).

First, the particular breeding method of hybridisation, i.e. that "only the first cross of two distinct parent lines would produce the high-yielding uniform hybrids", represented a 'biological lock' to further breeding by farmers or other buyers of parent lines (Boyd 2001, 658). In practice this worked as an intellectual property right "through the laws of nature" (Bugos 1992, 143), shielding genetics companies from competition by other actors and leading to today's extremely concentrated, in reality duopolistic broiler genetics market. Second, 'biological time lags' in the industry stem from the time it takes for 'market signals' of changing consumer demands to be transmitted through the supply chain to reach breeders, and for the changes made in the breed selection process to reach the consumers again. This latter part might take four to five years. In addition to these biological lags, other rigidities result from the imperative of slaughtering broilers at the intended time to avoid mounting feed costs, and from the impossibility of speeding up the growth process through intensifying human labour at this stage (Boyd and Watts 1997) – cf. Baglioni and Campling's (2017) inevitable 'idle-time'. Precise coordination of the various grow-out phases is required to confront these obstacles (Boyd and Watts 1997, 152).

Third, the "microbiological aspects of intensive broiler production and processing" shape the industry, as ever changing 'pathogenic regimes' might lead to infectious diseases in broiler flocks during grow-out phases, and contamination during processing that might threaten workers and consumers. Effects on the organisation of the industry include the transferral of the high risk of grow-out phases to farmers through contracting systems, strict food safety and quality control regimes in processing plants, and the necessity of situating broiler farms close to slaughterhouses to reduce transport of live broilers, due to their "perishability and feeding requirements" (Boyd and Watts 1997, 152-153). The poultry industry's main responses to the "particular risks, uncertainties and surprises" (Boyd, Prudham et al. 2001, 561) related to the microbiological systems of chickens and pathogens are generally termed 'biosecurity' measures.

Biosecurity and industrial broiler production as a pandemic breeding ground

Biosecurity is "an umbrella term for the technologies, governance mechanisms, institutions, and discourses that have emerged during the last couple of decades to manage and explain the knowns and unknowns (e.g. invasive species, zoonotic diseases, etc.) that are impacting and potentially threaten economy and society" (Dixon 2015, 91). This approach is based on strict delineations between 'insides' and 'outsides' (Nerlich, Brown et al. 2009), where "established and valued life" in the inside zone of production must be protected from "emergent, transgressive and undesirable life" outside (Clark 2013, cited in Dixon 2015, 92). Marion Dixon describes how the corporate-led growth and consolidation of the Egyptian poultry industry, especially from the 1980s, happened partly through the governance of emergent and recurrent zoonotic disease, where biosecurity institutions, protocols and technologies played an important role in the expansion of integrated poultry houses into the Egyptian desert (Dixon 2015, 91). She includes the factors of liberalisation and privatisation, state subsidies and international supports, often viewed as strictly political and economic phenomena, as constitutive aspects of agrifood intensification as an ecological process (92). For instance, the ecological landscape of the desert was decisive in this process because it was expected to offer protection from potential pathogens spread by 'wild' plants and animals. Further, the capital intensive agri-technologies required to operate biosecure, intensive poultry production in the desert favoured big actors (Dixon 2015).

Going deeper into the 2005-2006 HPAI H5N1 outbreak hitting Egypt in 2006, Dixon (2015) describes how the state, pressured by agribusiness, enacted strict biosecurity measures including vaccination of all industrial poultry, mass culling of backyard poultry that were not vaccinated nor could be confined, and temporary closing of live poultry markets. While this had devastating effects on small and medium scale poultry producers, the big, corporate actors and their poultry 'fortresses of gold' were largely saved (Dixon 2015, 99). However, challenging the conventional depiction of the non-biosecure or informal poultry market as the virus vector and the main problem, while the solution – and what indeed actually happened – would be the increased formalisation and biosecuritisation of the industry, Dixon designates the very model of intensive, 'purified' poultry production as a key driver of evolving pathogens. Dixon thus joins various scholars contending that biosecurity's promise of creating impenetrable borders is in fact impossible, and that the very crises biosecurity measures are supposed to prevent, might actually emerge partly from these very measures (Dixon 2015, 92).

Boyd argues that the incorporation of nature into the circuits of capital comes with the risk of inadvertently creating new ecological disruptions and undermining the very biological foundation of industrial production (Boyd 2001, 662). New virulent strains of virus and pathogenic bacteria, including emerging zoonoses, are an example of such ecological disruptions, a phenomenon that several critical scholars link directly to capitalist industrial agriculture (Boyd 2001, Boyd, Prudham et al. 2001, Davis 2005, Weis 2013, Wallace 2016, Akram-Lodhi 2021). Akram-Lodhi points at two structural and interlinked dimensions of the capitalist food system facilitating the spread of zoonoses. The first is the marginalisation of small-scale petty commodity producers, pushed to move or expand their production into 'wilder' habitats, possibly opening up new contact zones between humans and non-humans. The second is the expansion of industrial agriculture, which in addition to strengthening the first dynamic, "breeds its own diseases" (Akram-Lodhi 2021, 21).

In various works, Robert Wallace (Wallace 2009, Wallace 2016, Wallace, Liebman et al. 2020) makes clear connections between the evolution of more virulent pathogens and the intensification of commodity agriculture, including industrial poultry production, where genetic monocultures of animals with weakened immune systems are crowded together, facilitating quick transmission and recurrent infection. The high throughput of birds provides the virus with a steady supply of new susceptibles, while the slaughtering of chicken at a young age might contribute to the pathogens adapting to more robust immune systems (Wallace, Liebman et al. 2020). Identifying the very production model as central to the creation of virulent viruses, then, Dixon (2015, 92) argues that beyond simply stating that biosecurity's attempts to create impenetrable borders are impossible because of "nonhuman mobility", biosecurity itself changes in direct relation to changes in pathogens, their hosts, the wider environment, and the other way around.

Several scholars have discussed the pandemic potential of avian influenza. In the book *The Monster at Our Door* (2005, 7), Mike Davis warned of the "nightmarish virulence" of the H5N1 strain of HPAI, which he predicted would become the next pandemic, comparable to the extraordinarily deadly influenza pandemic of 1918. Davis argued that the central drivers of cross-species evolution of novel influenza and their transmission across the globe were the so-called 'livestock revolution' and its larger context of agro-capitalism transforming agriculture, the industrial revolution in South China and the following growth in trade and human travel, and the urban expansion in the Global South (Davis 2005, 155). Wallace shares the worry that H5N1 could evolve "a human-to-human phenotype that ignites a worldwide pandemic"

(Wallace 2009, 918). He has written extensively on the social context of the evolution and spread of the virus (Wallace 2009, Wallace 2016, Wallace, Liebman et al. 2020), characterising influenza as "the inadvertent biotic fallout of efforts aimed at steering animal ontogeny and ecology to multinational profitability" (Wallace 2009, 919).

John Allen and Stephanie Lavau (2015) pick up Boyd and Watts' (1997) description of the JIT broiler industry in the US to further theorise around disease risk in the British poultry industry. Similar to the US case, the British poultry industry is a tightly coordinated, vertically integrated JIT system with a constant, rapid throughput of uniform birds. In the UK case, however, instead of big industrial actors, big retailers became the leading firms, exercising an "arm's length control of the food supply chain, through management rather than ownership-style integration, to ensure that chickens bulk up at just the right time in the right numbers" (Allen and Lavau 2015, 345). These retailer-led integrated systems so efficiently producing chicken, also scale up surveillance and roll out comprehensive biosecurity measures beyond the requirements of government agencies, which they indeed have incentives to do given that their profitability depends on delivering safe, disease-free products systems (Allen and Lavau 2015, 347-349). However, argue Allen and Lavau (2015, 356), these various JIT pressures are not external to, but rather constitutive of, disease risk.

Studying the spread of the bacterium *Campylobacter* in poultry farms and processing plants, Allen and Lavau argue that disease risk is less an issue of contamination from an unhealthy outside than an embedded characteristic of the system itself. Disease is a "continuing, if virtual, presence/absence" (Hinchcliffe et al. 2013, cited in Allen and Laval 2015, 352), the concrete source of which it is difficult to identify. They largely align with the argument of, among others, Wallace (2009), Davis (2005) and Graham, Liebler et al. (2008), that the up-scaled, biosecure systems might in fact be of no use against disease risk, and even do more harm than good. Tightly cramped barns with genetically uniform birds in themselves might facilitate the transmission and development of new pathogenic strains (Allen and Lavau 2015, 349-350). However, the authors warn against making determinist connections between disease emergence and certain farm or factory environments, and against over-emphasising the instrumental power of retail corporates. They instead propose the concept of a 'relational economy of disease', "in which disease is a *contingent* outcome of intra-actions among pathogens, animals, equipment, capital and people in commercial, regulatory, farming and food production practices" (Allen and Lavau 2015, 356-357). While I take account of the caution against determinism and unduly simplifications, this argument could seem to potentially muddle an analysis of the actual power

hierarchies and unequal social relations of capitalist agriculture, based on insights from the literature discussed above. Nevertheless, Allen and Lavau's (2015) study, along with the other texts cited in this section, offer interesting insights into the complex relations between infectious diseases, biosecurity and industrial broiler production, that I will build upon in the following analysis chapters.

3.4 Chapter summary

The literatures that I have discussed in this chapter provide insights and concepts that I will use to analyse and discuss the case of Norsk Kylling's broiler supply chain. Bernstein's (2010) description of fundamental aspects of the political economy of capitalist agriculture will guide my examination of the dynamic class relations and power relations in the sphere of production in chapter 5. I will draw from literature on the hierarchical relations of contract farming schemes in globalised agrifood capitalism (Watts 1994, Vicol, Fold et al. 2022) when I examine the ambiguous class position of the contract farmers I interviewed, thus contributing to cover knowledge gaps about this phenomenon in the Norwegian context. Building on the abundant literature on the fragmented and exploitative labour relations in the agrifood industry (e.g. Striffler 2005, Tsing 2009, Arboleda 2020, Rye and O'Reilly 2021), I will examine whether the organisation of wage labour in my case study fits into this wider picture. Further in chapter 5, I follow Arboleda's (2020) suggestion and consider the spheres of circulation and exchange, and take with me the understanding of the strategic importance of logistical technologies and infrastructure when I examine how this plays out in a retailer-owned vertically integrated supply chain, in the context of increasing disease risk.

In chapter 6, I will draw particularly on insights from commodity frontier theory and the subsumption framework to discuss Norsk Kylling's accumulation strategies through fixing socioecological contradictions of industrial broiler production, and to relate these strategies to the regulatory context of the Norwegian agrifood system (Bakker 2009, Moore 2015, Carton, Jönsson et al. 2017, Cooper 2017, Ekers and Prudham 2017). The concepts of contradictions and fixes will also guide my analysis of the comprehensive biosecurity program along the supply chain, building on the critical political ecology scholarship on the connections between industrial broiler production, emerging infectious diseases, and biosecurity (Weis 2013, Allen and Lavau 2015, Dixon 2015, Wallace 2016). Finally, insights from GPN/GVC scholarship will inform my attention to how these socioecological fixes manifest in the particular supply chain organisation of broiler production (Baglioni and Campling 2017, Irarrázaval and Bustos-Gallardo 2019, Werner 2022).

Chapter 4 – Methodology and methods

In this chapter, I present my methodological framework and overall research design, before I describe the methods I used for collecting data and explain how I went about analysing this data. After considering some ethical issues, I discuss some challenges and limitations to the methodological choices of this study.

As this master's thesis is connected to the PANDEMEAT research project, I was able to draw inspiration from the methodological framework already elaborated by the research group. This pushed me in the direction of conducting a case study through multi-sited fieldwork. I also based some of my interview guides on already existing interview guides elaborated by the PANDEMEAT research group, however I contributed to edit them, and I also further adapted them to my case. The empirical fieldwork of the other PANDEMEAT participants has so far focused on Jæren in the South-West of Norway and on Jutland in Denmark. Here, sites were chosen because of the proximity to recent or ongoing HPAI outbreaks in commercial poultry flocks. My case differs both geographically and in this last respect, as there had not been any HPAI outbreaks in commercial poultry in Trøndelag when I conducted fieldwork (nor when I finish this thesis). The main motivation for choosing the case of Norsk Kylling was because the fully integrated supply chain model represents something quite special in the context of the Norwegian agrifood system.

4.1 Critical realism

Lynn P. Nygaard (2017) distinguishes between three general methodological approaches: positivist, interpretative and critical. This project fits into the latter, as it builds on qualitative, in-depth exploration of social phenomena, however with an aim to understand the phenomena within the larger social structures and power relations surrounding and shaping them (Nygaard 2017, 27). More specifically, it belongs to the tradition of critical realism, which represents a middle ground between the law-seeking positivist tradition with roots in natural sciences, and the purely constructivist tradition, reducing the social sciences to the interpretation of meaning (Sayer 2000). Critical realism combines a realist ontological position with a subjectivist epistemological position (Fryer 2022).

Critical realism accepts the realist view that there is an external reality independent of what we perceive (O'Leary 2017, 7), but it rejects the positivist assumption that this reality is made up by universal laws, or causal relations between events that can be found through objective knowledge. Critical realism assumes a different kind of causation that looks beyond the mere

association between two events, and rather seeks to identify causal mechanisms. These mechanisms cause events to occur, however they act as tendencies, meaning that the they are activated or not depending on the complex interplay of various causal mechanism in specific geohistoric contexts (Sayer 2000, Fryer 2022). Moreover, while assuming that reality exists independently of our empirical perception and/or adequate understanding of it, critical realism acknowledges that the social world is socially constructed and "includes knowledge itself" and that its existence therefore depends on "at least some knowledge" (Sayer 2001, 11). In addition to considering causes and social structures then, critical realism also regards social phenomena to be intrinsically meaningful, and interpretive understanding, or 'verstehen', is needed to make sense of meaning and discourse (Sayer 2000, 17, Fryer 2022).

The subjectivist aspect of critical realism implies a conviction that there is no neutral or objective way to research and produce knowledge about the world, as knowledge production is theory-dependent and grounded in personal experience. Reflecting around the theories, views and assumptions that might shape how one sees and makes sense of the world should therefore be a key aspect of all research (O'Leary 2017, 7, Fryer 2022, 16)

I find critical realism appropriate to this research project because it combines the possibility of making causal connections with the need for 'verstehen' or interpretative understanding. In this qualitative case study of a broiler production model, it allows for exploring how the specific way of organising food production might contribute to strengthen or lessen ecological challenges such as disease risk, and oppositely how disease risk might have specific consequences in this model because of the way it is organised. At the same time, however, the way actors conceive these ecological challenges influence how they act, which might affect the very way this industry is organised – with the uneven distribution of costs and benefits that comes with it.

4.2 A qualitative case study with multi-sited fieldwork

Benjaminsen and Svarstad (2021, 142) define a case study as "an in-depth study of a single example of a category of phenomena". Conducting a case study allows for and requires going deep into the case in question, whether it is an individual, an event, a community, a group or an organisation (O'Leary 2017), or in my case, a production model. By identifying and delimiting a relevant context and engaging thoroughly with it, a case study can be apt for building holistic understanding of particular social phenomena (O'Leary 2017). Case studies are widely used in political ecology because departing from a local site can allow for "nuanced, richly textured

empirical work" that provides insights into time and space specific processes of environmental change, and the social relations and power hierarchies shaping them (Helmcke 2022, 267). Though some political ecology research includes quantitative methods, qualitative methods dominate (Benjaminsen and Svarstad 2021, 21). My case study is purely qualitative, as what I have aimed for is depth and thick descriptions rather than quantity and statistical generalisability (Beuving and de Vries 2015, 57, 174).

The case study methodology is a good fit for the 'chains of explanation' approach central to political ecology, tracing how multiscalar contextual forces shape immediate outcomes, and how this is connected to value flows from local landscapes to accumulation sites far away (Blaikie and Brookfield 1987, Robbins 2020). On the other hand, political ecology's reliance on case studies has been criticised for overly emphasising the specificity of 'the local' and its context without explaining properly how it matters in a larger context. Without properly 'connecting the dots' between cases and tying them to broader processes of change, case studies offer little for general theory-building, the critique goes (Bakker 2015, Robbins 2020, Benjaminsen and Svarstad 2021, Helmcke 2022). Benjaminsen and Svarstad (2021, 142-143) counter this by arguing that certain in-depth insights can only be reached by studying a case thoroughly over time, that a case study can shed light on mechanisms also relevant for other cases, and that it can contribute to cumulative knowledge, by comparing different cases across sites and countries.

Against the historical backdrop of the social corporate Norwegian system, with strong farmers' cooperatives and public regulation of agricultural production, and a food industry with strong labour unions, the more deregulated and industrialised broiler industry, where contract farming and immigrant labour are the norm, represents broader changes in the agrifood system (Bjørkhaug, Almås et al. 2015). Within this sector, Norsk Kylling's broiler supply chain is worthy of particular focus. With a retailer controlling the entire supply chain from import of genetic material to supermarket shelves, it represents the global trend of supermarketisation (Konefal, Mascarenhas et al. 2005, McMichael 2005) to a degree not (yet) reached in other parts of the Norwegian food system, where this development has been resisted (Olsen 2010, Richards, Bjørkhaug et al. 2012, Vik and Bjørkhaug 2015). In addition to the specificity of the case, it might allow for fruitful comparison with the other cases in the PANDEMEAT project, as well as other research on industrial livestock production and infectious diseases.

This case study draws on the tradition of multi-sited fieldwork, in its aim to identify and analyse "chains, paths, threads, conjunctions" (Marcus 1995, 105). This is in line with the 'chains of

explanation' approach in political ecology (Blaikie and Brookfield 1987, Robbins 2020). In Marcus' (1995, 99) words, the goal of multi-sited fieldwork is not a holistic representation "of the world system as a totality", but of a cultural formation in the world system, and "an ethnography of a cultural formation in the world system is also an ethnography of the system". My hope was, then, that in addition to "mapping terrain" (Marcus 1995, 99) and providing insight into the relatively easily identifiable parts of this supply chain, the multi-sited fieldwork would allow me to say something more general about how social relations of production interrelate with the ecologies of chickens and pathogens in the capitalist political economy of broiler production.

I mapped my case and structured my fieldwork partly by 'following the chicken'. Tracing commodities across disaggregated stages of production and consumption has a long-standing tradition in global commodity chain (GCC) analysis (Marcus 1995, Schwartzman 2013). The vertically integrated broiler supply chain owned by Reitan Retail proved a fitting case for this method, as different parts of the supply chain (e.g. hatcheries, farms, transport, processing facilities, and management offices) readily offered themselves as sites to include in a multi-sited fieldwork.

In addition to the purposive factors mentioned above, some practical aspects also played into the case choice, as may be the case in situations with limited time and resources (O'Leary 2017, 211). The fact that my family lives in Trøndelag made it easier and cheaper to organise travel and accommodation during fieldwork. Additionally, a friend from high school who is also a future broiler farmer helped me gain access to some informants in the first round of fieldwork.

4.3 Data collection

I made three fieldtrips to Trøndelag between December 2022 and March 2023. The data I collected during these trips consists of transcripts of 14 semi-structured interviews and field notes from participant observation at two farms and a broiler slaughterhouse/processing plant. I have also used some secondary data to complement and validate my primary data.

Selecting informants

My population was largely defined by the case, in other words, by the criteria of direct involvement in the Norsk Kylling broiler supply chain. From this population, I used purposive or theoretical sampling to select informants. This strategy does not aim for representativeness or generalisability, but is guided by other criteria defined by the researcher (O'Leary 2017, 206). I wanted to cover a relevant range of people in relationship to my population (Byrne 2018, 228),

as I was interested in finding out how disease risk affected people working at various stages of the supply chain. Having identified situations relevant for the topic under study, namely work activities linked to different moments in the production of chicken meat, I then sampled individual informants relating to these situations (Beuving and de Vries 2015, 38), in my case people managing, organising or performing the specific work tasks. I also contacted a labour union representative not directly involved in the supply chain, but whom I hoped might be a key informant, that is an individual with some insider or expert knowledge beyond private experiences, beliefs and knowledge (O'Leary 2017, 212), in this case useful information about historic and current labour relations in the poultry industry. By gathering different perspectives, experiences and bits of knowledge, I hoped to get closer to the bigger picture (Benjaminsen and Svarstad 2021, 21).

Theoretical sampling allows for the possibility of adapting the sampling strategy as one goes, and according to findings from the field (Seale 2018, 169). Since I realised three fieldtrips, I was able to use insights from the former trip(s) when I planned the next one(s). For instance, an informant that I interviewed in the first round told me that hatching egg farmers had a very different and more labour-intensive production than the highly automated broiler farming systems. I was not aware of this, and this urged me to contact a hatching egg farmer in the next round. The final selection of informants was a result of a combination of handpicked sampling and snowball sampling (O'Leary 2017, 210-211). I identified several of my informants myself by searching the Internet, including Norsk Kylling's company website and various media sources, but I was also helped along the way by my high school friend and by other informants.

Due to restricted time and other resources, as well as some unexpected bumps in the road that I will discuss further on, my sample was not as big and did not cover as many of the supply chain stages as I had envisioned. For instance, I did not managed to access as many wage labourers that I had hoped for, and this affected the final focus of the thesis. Nevertheless, I ended up with enough data to explore some interesting topics, although with a somewhat different focus than I had at the beginning – in line with my partly inductive logic of building theory from the empirical material (Beuving and de Vries 2015, 162).

Semi-structured interviews

Qualitative interviews range from totally open-ended interviews parting from a single prompt to more structured interviews with reference to a relatively structured interview guide (Byrne 2018, 219). My interviews were at the more structured end of the spectrum. Common for all

qualitative interviews is the goal of accessing individuals' attitudes, values and interpretations, and through this achieve depth and complexity. The varying degree of open-endedness and flexibility makes qualitative interviews more apt for this than formal questionnaires or structured interviews (Byrne 2018, 219-221).

I conducted 14 semi-structured interviews with altogether 22 informants. Among these were six farmers, five people from the Norsk Kylling management, four workers at the slaughterhouse/processing plant, a company veterinary, a chicken harvester/barn cleaner, a manager of a chicken catching and cleaning company, a chicken transport driver, a chicken transport manager, and two employees in a regional food industry union (see also appendix I). Most interviews lasted between 45-60 minutes, a couple somewhat longer. I departed from a prepared interview guide adapted to the different informants, with a list of the topics I hoped to cover, while also being open to diverge from the guide if interesting topics emerged (O'Leary 2017, 240). Topics covered in the interviews varied somewhat between different informants, but included work activities and conditions, farm economy, logistics, farmers and workers' relations to chicken, HPAI and other infectious diseases, and biosecurity measures. Complete interview guides are included in appendix II, but more often than not, the conversations diverged from these exact questions.

Half of the 14 interviews were one-to-one interviews, and half were group interviews with between two and four people at the same time. While one-to-one interviews might allow the informants to express themselves more freely, the group interview can open up for interesting interactions between the informants, as they can discuss, fill each other in, and influence each other (O'Leary 2017, 240). However, unequal power relations between the informants might influence what they feel free to say (Tonkiss 2018, 251), which might have been the case in two of the interviews where an employee and their boss(es) were present. In some of the group interviews, I had not expected to meet more than one informant, and I sometimes found it a bit challenging to ask good questions and include everybody present, especially where I had planned different questions for different informants, such as the boss and the employee. In one interview, I was met with two people from the Norsk Kylling management in addition to the transport manager and a driver that I had expected to meet, and I was slightly set aback, making me less confident in the interview situation. However, I decided to stick to my interview guide, while also trying to improvise and include everybody present. Another challenge with group interviews was getting into depth while getting several people to speak in a short amount of time. Apart from one interview, where one of the informants did not speak Norwegian that well

and we therefore talked in a mix of English and Norwegian, all interviews were conducted in Norwegian. The translated quotes in the analysis chapters are my own.

Participant observation

I conducted my interviews in various offices, at a café, and in the control rooms at several farms. In addition to the words that were spoken during the conversations, some of these locations provided an opportunity to make casual observations of the surroundings of broiler production, sometimes offering prompts to use in the interview, and overall helping me make sense of this production model.

I also had the opportunity to accompany two farmers inside their barns, one producing broilers and the other hatching eggs. In addition to the walking interviews (Byrne 2018, 233) where they explained how things worked on the farms and described their everyday practices, I could see, hear and smell the realities of working with thousands of live birds. This added texture and depth to my understanding. I was also given an exhibition tour in the slaughterhouse/processing plant, first by one of the managers, and then again by one of the workers at a later interview. Walking the same tour with two people with different positions in the company allowed me to ask different questions. I have used field notes written down during and directly after these visits as observational data in my analysis.

Although far from being immersive in the sense of being or trying to become part of the 'system' that I studied (O'Leary 2017, 251), the walking along and talking with the informants justifies calling what I did participant observation. I used a rather unstructured observation technique (O'Leary 2017, 252), trying to be as open to different impressions as I could, and wrote down everything I remembered afterwards, from sensory impressions and things that were said, to associations and thoughts I had during and after the observation. Nevertheless, some 'sensitising concepts' (Blumer 1954, cited in Beuving and de Vries 2015, 60) from theory, my research questions, and previous data collection directed my attention to some things over others.

Secondary data

In addition to the interview transcripts and observation notes, my analysis draws upon a range of other sources of secondary data. These include Norsk Kylling's website and a responsibility report; various newspaper articles, press releases and advertisements relevant to the topic; national statistics about wage levels in the agrifood industry; and white papers (Meld.St.) from

the Norwegian government concerning the agrifood industry. I used these varied sources both before conducting fieldwork and afterwards, prompted by topics emerging in the empirical data. In addition to expanding and complementing the understanding of the topics under study, conferring with several sources of data is important to validate qualitative data, and in this way enhance the credibility of the research (O'Leary 2017, 269).

4.4 Data analysis

I explored my data using a combination of inductive and deductive reasoning, meaning that I both let my raw data 'tell the story', while also looking at the data with ideas and theories in mind (O'Leary 2017, 330). This dual, iterative process is useful in qualitative research, because it is impossible to plan for everything. For instance, I decided to tone down my preliminary focus on work and labour relations because I did not access as many informants as I had hoped. It is still part of my analysis, but in a different way than what I imagined at first. Additionally, other topics that I had not envisioned emerged from the data, such as the change of broiler breed and Norsk Kylling's work with 'greening' their supply chain.

I manually coded and analysed my data, by reading, rereading, highlighting and comparing printed copies of interview transcripts and observation notes, and complementing with secondary data sources. In the first rounds of coding, I tried to be open to concepts emerging from the data. However, sensitising concepts from the literature such as work and labour relations, interspecies relations, infection, unruly nature, power and biosecurity were with me from the first round, and these were also central topics in my interview guides. In later rounds of analysis, as I progressed in the grouping of categories, and as some topics appeared more interesting than others, I did a more focused analysis and looked for elements in the data material related to my main codes. Finally, I integrated my analysis more closely with concepts and theories from the literature review.

4.5 Ethical considerations

When conducting research about people and cultural and political processes, social researchers must consider potential ethical implications of their choices at all stages (Ali and Kelly 2018, 46). Most important is the general principle of non-maleficence (Ali and Kelly 2018, 48), or 'do no harm' (Watts 2008), meaning that social researchers have the obligation to avoid actions that might reduce the well-being or the ability to free expression and development of research participants or others who might be affected by the research (Ali and Kelly 2018, 48). I have

attempted to take all considerations common in our praxis with regards to informant access, informed consent and data management, and confidentiality.

Access

Decisions about how to access the research site can have important implications for what perspectives and information are made available to one as a researcher (Pachirat 2011, 282n19). Reflecting upon his choice to conduct covert ethnographic fieldwork in a US slaughterhouse, Timothy Pachirat (2011) discusses how trying to reach workers by going through management might seriously limit access, as the power relation between management and employees is inherently unequal. Pachirat considered that entering the research site with the full permission of the management would imply entering "on the side of management", with ethical implications related to his own situation as a researcher in the power hierarchy at the workplace (Pachirat 2011, 284n19). I never intended to go behind the back of the Norsk Kylling management, and I did tell them about my intent to talk to actors along the supply chain in my first meeting with them in December 2022. Nevertheless, with the power hierarchy of the supply chain in mind, I considered that trying to contact people directly, as independent actors associated to the supply chain, was the best way to access informants on a more even ground.

I gathered the contact information of my informants from contacts or from open online sources. The high school friend mentioned above provided me with some names and phone numbers to broiler farmers delivering to Norsk Kylling. I found other names on Norsk Kylling's website, in their 2021 responsibility report and in newspaper articles, and then searched for mail addresses or phone numbers online if they were not included in the first sources. I found contact information for people in the transport company, the chicken service company and the labour union on their respective websites. Contacting people via e-mail seemed the more professional way, however when I only had a number I sent a text message or called, offering to send more information by e-mail.

Getting in touch with factory workers proved rather difficult. Having read other studies of labour relations in the meat industry, including Pachirat's (2011) and Steven Striffler's (2005) covert ethnographies of slaughterhouse work, I had the impression that access to workers might be an issue. The regional union leader, whom I hoped might help put me in contact with some workers, told me that they were in a process of re-establishing contact and activity in the local union club at the factory, and advised me to try to contact them myself. However, he told me that language barriers and scepticism among workers might be an obstacle. Eventually, he gave

me a number for a unionised employee at the Norsk Kylling factory, and I managed to schedule a meeting with this person and two other employees. This interview was interrupted because the company management had not been informed. After a clarifying meeting with the management, however, they helped me schedule a new meeting at a later point. In hindsight, I realise that I could have gotten easier access by making it clearer to management why I wanted to talk to different actors in the entire chain, including factory workers, something I might not have communicated clearly enough in the first meeting. I will come back to this in the last chapter section.

Informed consent and data management

I have followed UiO's guidelines for informed consent and safe data storage, and those of the PANDEMEAT project, assessed by Sikt's Data Protection Services. All informants were informed about the aims of the project and about their rights to check, edit or delete data about them, and to withdraw their participation at any moment. I presented most of my informants with the information letter and consent form prepared for the PANDEMEAT project (see appendix III). In the cases where I did not ask for written consent, I obtained oral consent. Apart from names, and what was publicly available online such as their role in the value chain, I collected no personal information about the informants. I stored recordings, transcripts and field notes on my UiO OneDrive. With the informants' consent, I recorded all the interviews except for one with a sound recorder. I offered to send transcripts or quotes to the informants for them to read through and comment and/or edit if they wanted. I received some edits on three of the interviews, which I incorporated into the final transcripts used in the analysis.

Confidentiality

I have removed the names of all my informants, however keeping their work titles. Since I do name Reitan Retail and Norsk Kylling, this choice might make some informants identifiable in the thesis. Because there are only a handful leading and geographically concentrated companies in the Norwegian broiler industry, and because the geographical location of my field study is relevant to mention, I have considered it of little avail to not name the company. I do not consider that the findings presented in the thesis could have any negative consequences to the informants.

Infection risk

I conducted my fieldwork during a global HPAI outbreak, and although it had not reached Trøndelag yet, the general vulnerability of broiler production systems meant that I had to account for infection risk when visiting different chicken farms, sometimes with only a few days between each visit. To do what was in my power to reduce potential risk, I informed myself about the current infection risk level in the area and about which biosecurity measures I should take. These included leaving at least 24 hours between visiting different farms and following the producers' biosecurity procedures regarding clothing and hygiene. I also told my informants beforehand if I had been, or planned to go to other farms.

Positionality

The subjectivist epistemological position of critical realism assumes that there is no such thing as completely neutral or objective knowledge production (Fryer 2022). Researchers are part of the social world, and their work inevitably reflects its values, however depending on the position of the researcher in this social world. The situatedness of all knowledge does not imply that rigorous knowledge production is impossible, but it means that instead of claiming neutrality and complete objectivity, researchers should reflect on their positionality (Ali and Kelly 2018, 45). I am a White, Norwegian, female master's student with a middle class background, a social position that comes with certain privileges and biases that might shape how I perceive and understand the world. My academic background from interdisciplinary development and environmental studies, as well as political engagement on the left side of politics, have provided me with critical lenses and strengthened my interest in the power hierarchies that I understand to be inherent to the capitalist world system. While this might sharpen my gaze and allow me to see certain things, it surely makes me less aware of other aspects. Because all research is shaped by the researchers' positionality, there is no such thing as one truth, and research is therefore only ever partial (Haraway 1991, cited in Ali and Kelly 2018, 45). I have strived to present the experiences of my informants in an honest and fair way, use several data sources to validate the quality of the data, and be open about the limitations of my methodological choices. The interpretations are ultimately my own, shaped by my theoretical framework, and other potential biases rooted in my social position. This thesis represents one way of understanding the topic under study.

4.6 Challenges and limitations

During the second round of fieldwork, I experienced some unexpected challenges. As already mentioned, an interview with workers at the Norsk Kylling factory was interrupted during its course by a person from the administration, on demand from the management. My contact had informed the human resources department at the factory about the meeting beforehand, but the information had not reached the management, through which all meetings at the factory must pass. I was not aware of this before this incident. Some days later, a Norsk Kylling manager called, asking for a clarification of my research purposes. We agreed on a video meeting a couple of days later together with my supervisor, before which I also sent a more detailed project proposal and interview guides, better explaining my focus on work along the entire chain. After reading this, and talking during this meeting, the manager expressed an improved understanding for my project. I apologised that my conduct had led to this uneasy situation, and we parted on cordial terms. This incident led to a cancelled appointment with some other informantd and a general postponement of my fieldwork, and might have limited my final sample and the data I collected. In hindsight, I see that going through the Norsk Kylling management might have given an easier, direct access to informants, and we could have avoided the misunderstanding, which was probably uncomfortable for everybody involved. I of course regret this happening, but at the same time, I believe that my considerations for contacting informants directly were valid, as discussed above.

Other limitations to this study stem from the restricted timeframe of the fieldwork, the small sample of informants, and the limited data material that I managed to gather during this time. One way of doing it differently could have been to focus on only one or a few parts of the supply chain from the start, instead of my attempt to cover as much ground as possible. This might have given a deeper insight into certain aspects of the production model. Nevertheless, I do believe that exploring the different moments of broiler production and talking to people along the chain gave me insights, however partial and incomplete, into “chains, paths, threads, conjunctions” (Marcus 1995, 105) of the political economy of broiler production. As part of a bigger research project, my work is also an important contribution to making the larger picture more accurate and detailed.

4.7 Chapter summary

In this chapter, I have presented my methodological framework and research design, and described the choices I made before, during and after gathering my empirical data. I have discussed relevant ethical aspects, and some challenges and limitations to the project. I will now

move on to the next part of this thesis, where I analyse and discuss my findings in light of the historical and political context presented in the background chapter, and the concepts and theories presented in the literature chapter.

Chapter 5 – The agrarian political economy of Norsk Kylling's broiler supply chain

In this chapter, I describe and analyse the agrarian political economy of Norsk Kylling's broiler supply chain. I first map out the actors involved in the various processes of the production of chicken meat, as well as their relationships to the lead firm. Inspired by Bernstein's (2010, 22-23) 'key questions' regarding the social relations of production and reproduction in agrarian class societies, this section focuses on the capital-labour relation in different parts of the chain, specifically the questions *who owns what, who does what, who gets what,* and *what do they do with it*. Taking Arboleda's (2020) cue to expand the view of agriculture, the next section delves more into the details of the logistics and transport infrastructure of the supply chain, based on the observation that this area is of key importance for vertically integrated lead firms like Norsk Kylling to affirm their market position (Arboleda 2020, 353).

With this analysis I aim to begin to answer my first sub-question, namely, '*In what ways do responses to disease risk in the fully integrated broiler supply chain of Norsk Kylling affect social relations of production and power relations along the supply chain?*' Throughout this chapter, I will lay out two main arguments. First, I explore how formalising the social relations of production can legitimate and consolidate Norsk Kylling and Reitan Retail's roles in the broiler supply chain. By adjusting, but also adjusting to, the social corporate regulations and institutions of Norwegian agrifood capitalism, Norsk Kylling asserts their position, and this stabilises the retail-led accumulation regime. Second, I argue that the tightly knit relationships between Norsk Kylling and the other actors involved in the supply chain are part of a more comprehensive logistical effort that strengthens the lead firm's power in the management of the supply chain in its totality.

5.1 Following the chicken from grandparents to nuggets: Norsk Kylling's JIT system

In their 2021 responsibility report, Norsk Kylling illustrates their supply chain from grandparent stock to shop (Norsk Kylling 2021a). It begins in France, where the broiler genetics company Hubbard, subsidiary of Aviagen, part of the world's biggest poultry breeding and genetics company EW Group (Forbes 2023, Hubbard n.d.-b), breeds and grows what are to become the grandparent animals of the broilers slaughtered in Norsk Kylling's factory in Orkanger, Trøndelag (Norsk Kylling 2021a). The supply chain could have been traced further upstream and probably beyond France, to the opaque, oligopolistic and extremely concentrated market

of broiler genetics, largely outside the control of public authorities (Bjørkhaug, Vik et al. 2017). However, delving into what happens before the growing of the grandparent stock is beyond the scope of this thesis. In the following, I will therefore concentrate on the stages taking place in Norway, more precisely in Trøndelag, where almost all activities related to Norsk Kylling's broiler production take place – before the processed products are distributed to the over 700 Rema 1000 grocery stores across the entire country (Rema 1000 n.d.-a).

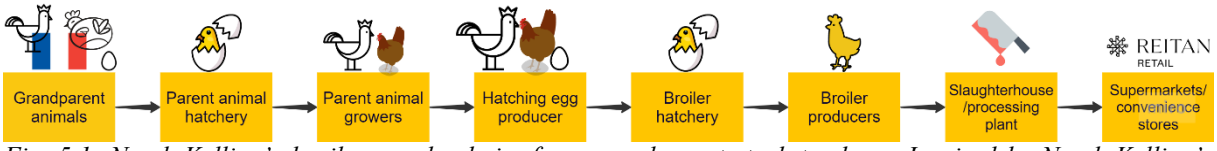

Fig. 5.1: Norsk Kylling's broiler supply chain, from grandparent stock to shops. Inspired by Norsk Kylling's responsibility report (2021).

Who does what? Work from France to farm to fork

Eggs from the grandparent stock in France are transported by car to Norsk Kylling's parent animal hatchery in Berkåk, south in Trøndelag, a delivery organised by Hubbard in response to an order made by Norsk Kylling.[8] These are eggs from the Hubbard M77 male line bred for quick growth, and the Hubbard JA87 female line bred for slower growth – which when crossbred become the hybrid broiler Hubbard JA787 (Fiskå Mølle n.d.). In the parent animal hatchery, the parent animal eggs are incubated and hatched in egg incubators. Despite ongoing research and development of new technology that can determine the chicks' sex before hatching (Rutt and Jakobsen 2022), Norwegian industry actors do not yet consider the technology mature nor economically viable (Animalia 2022a). This leaves the manual work of 'sexing' newly hatched chicks to some specialised workers, mostly Japanese, who also perform this task in another hatchery in Rogaland, according to one informant.[9] The use of Asian expertise is common for hatcheries all over the world (Løvlund 2012). Because only male chicks from the male line and only female chicks from the female line are needed in the parent animal flocks, about half of the chicks are disposed of.

After the three weeks that the incubation, hatching and sex sorting take,[10] the chicks are transported to a handful contracted farmers, the parent animal growers, who feed and monitor the growth of the future parent animals for 18 weeks. At this point, they are moved to a hatching egg farmer, in some cases the same person as the grower. In these farms, roosters (about 8.5% of the flock at the beginning, 5-6% in the end) and hens go together for 44 weeks to produce

[8] Interview IHS9 090223
[9] Interview IHS8 090223
[10] Interview IHS1 201222

the intended product, namely fertilised eggs.[11] In the hatching egg farm I visited, the barn was separated into three sections by two rows of sheltered laying nests on top of platforms 30-40 centimetres off the ground, from where the eggs were transported on a conveyor belt out of the barn and into the egg packing station in the room next door. The hens start laying eggs after a couple of weeks here, and continue for the rest of their lives, in total laying between 180-185 eggs each. The farmers sort, clean and pack the eggs at the farm, making them ready to be picked up and transported to the broiler hatchery in Soknedal, 20 km from the parent animal hatchery.[12] Towards the end of week 44 in a hatching egg farm, the hens' egg laying productivity is declining, and their life cycle is coming to an end. If there is capacity in the market, hens are slaughtered for meat, if not they are gassed in the barn along with the roosters and picked up by a company processing animal by-products into industrial protein and fat products.[13]

After three weeks at the broiler hatchery the fertilised eggs have incubated and hatched, and the day-old chicks are transported out to the 123 farmers growing broilers for Norsk Kylling (Norsk Kylling 2021a). On these broiler farms, the chickens live, eat and grow for 45-48 days along with between 10 000 – 30 000 other congeners in the same chicken house. The barns are vast, rectangular buildings with concrete littered floors and automated feeding and watering systems hanging from the ceiling and down to ground level along the buildings' longer sides. Scattered at regular distances are so-called environmental enrichments like perches, sandboxes, and pecking substrates. Hanging from the ceiling are also circular pendulums that the chickens can climb on and off, which register the weight of the birds. In addition to the chickens' weight, computers constantly register and regulate parameters like temperature, humidity, and CO_2 levels, to maintain the optimal conditions needed to maintain the chickens' health and steady growth. An important part of the farmers' daily work routine is to monitor these computers and correct whatever does not work optimally if some indicators show deviations. They also do at least two daily rounds inside the barn to check on the flock's health, and to remove sick and dead birds. All the farmers have an assigned veterinary from Norsk Kylling's own veterinary team, who visits each farm at least twice a year. On day 45-58, the chickens have grown to about 2.4 kilos (Engen 2023), and are ready for slaughter.

[11] Interview IHS8 090223
[12] Norsk Kylling is currently building a new hatchery in Støren, where their old slaughterhouse and processing plant used to be, scheduled to open during 2023 (Norsk Kylling 2022).
[13] Interview IHS8 090223

Industrial poultry production in Norsk Kylling's supply chain is an 'all in/all out' system, meaning that all the chickens in a 'batch' (*innsett* in Norwegian) arrive at a farm at the same time, and are also moved out at the same time, setting off time to clean and disinfect barns before the next chicken batch arrives. For broiler farmers, who grow the chickens for just under seven weeks, a continuous production entails six to seven batches per house per year, and between each batch, the goal is to 'reset' the barn conditions, which according to several farmers is the most work-intensive phase of broiler production. Some farmers do the cleaning and disinfecting themselves, while others hire the service from a 'chicken service' company, doing both catching of chickens and cleaning of barns. I talked to the company serving half of Norsk Kylling's production area, and here, all employees were of non-Norwegian descent: one group of Polish workers who mostly worked on a rotational basis, travelling back and forth between Norway and Poland, and one group of Afghan workers, living permanently in Norway. The manager emphasised that all of the employees had legal and permanent contracts in the company.[14] The practice of subcontracting is a usual way of organising production in the broiler industry (Allen and Lavau 2015). More generally, the dependence on networks of mobile, subcontracted labour is central in globalised, supply chain capitalism (Tsing 2009, Arboleda 2020).

The slaughter dates are planned by Norsk Kylling's logistics group well ahead of time, and the date and time for catching the birds in the barn are sent to the farmer, the transport company, and the chicken service company.[15] Although most batches have the same duration, the veterinary team keeps a close contact with the farmers allowing for slight modifications of the date, for instance if the birds have a quicker growth than expected.[16] The slaughter plan is part of Norsk Kylling's comprehensive logistical plans, planning production down to the order of parent animal eggs from France well in advance, while also responding to market demand. I am not aware of the exact time, but the manager of the chicken service company made a guess that the company planned production two-three years into the future. The managers of the transport company and the chicken service company, which are external actors with contracts with Norsk Kylling, operationalise the plans they receive, and take care of the details at the time of catching and transport.[17]

[14] Interview IHS4 030123
[15] Interview IHS4 030123
[16] Interview IHS13 220323
[17] Interview IHS4 030123, Interview IHS9 090223

The day before the slaughter date, the farmer takes extra rounds in the barn, and removes the feed, because the chickens are not supposed to have food in their gizzard at the time of slaughter, as this makes slaughtering messier.[18] At an agreed time in the evening or at night, chicken transport drivers and workers in the catching team arrive at the farm. After a short planning session together with the farmer, the catching begins. The catchers, certified through Norsk Kylling, catch the chicken either by its two feet or from under its chest, and put them in drawers in specially designed containers, which the drivers bring in from the truck with a forklift. So-called 'untransportable' birds – sick or dead – that have escaped the attention of earlier rounds are killed on-place and/or put aside by the catchers or the farmer, who is there mostly to oversee the process.[19] According to my informants, the catching takes between 3 and 9 hours depending on the number of chickens, ranging from 10 000 to 30 000 in one night. These fill between two and five chicken trucks, depending on the size of the chicken house.[20]

The chickens are transported to Norsk Kylling's slaughterhouse and processing plant in Orkanger, with an average transport time of 1.5 hours (Norsk Kylling n.d.-a), where they are placed, still in the drawers they were put in during the catching, in a quiet room with blue lights that calm the birds.[21] At 5 o'clock in the morning, the first slaughtering begins. The drawers, with the chicken still in them, are placed on a conveyor belt going into a stunner, where the birds are sedated with a biphasic gas consisting of O_2 and CO_2. A factor employee[22] explained how, unconscious, the chickens are manually hung by their feet on a line, before an automatically rotating knife cuts their heads off. A worker monitors that all heads are properly cut off and holds a manual knife ready in case something should have gone wrong. A camera registers the footpad conditions, a post-mortem animal welfare test. The carcasses pass by a scalding pot to the rotating rubber brushes plucking off their feathers and are then sent through the 7 km long cooling tunnel. Just over three hours later, the chickens are weighed and sorted accordingly, and sent to different parts of the meat processing plant, to be roasted whole, as clubs or wings, deboned and made into filets, or made into mince, sausages or nuggets, and in the end put into plastic containers and then cardboard boxes ready for delivery.

For many of the around 200 workers on the factory floor, of which a majority are of non-Norwegian origin, and very many from Eastern European countries, work tasks consist in

[18] Interview IHS3 020123
[19] Interview IHS9 090223
[20] Interview IHS4 030123
[21] Interview IHS1 201222
[22] Interview IHS10 100223

monitoring and quality checking the highly automated processes at the slaughterhouse and processing facility. The strong presence of immigrant workers is consistent with the general development in the Norwegian agrifood industry, especially after the EU enlargements in Central and Eastern Europe the last two decades (Rye and Slettebak 2020). According to a health, safety and environment (HSE) manager,[23] the modernisation of the facilities with the new factory in 2021 removed some of the heaviest manual tasks. Some manual tasks remain, such as putting chicken parts into the deskinning machine, trimming filets that do not come out perfect form the machine, making sausages, and shuffling about chicken wings in plastic boxes to make sure the packaging sits tight. A group of factory employees clean the factory every afternoon and night, a heavy, manual job involving strong chemicals and high-pressure water.[24]

Who owns what? Ownership and contract relationships

Reitan Retail, through the subsidiaries Rema 1000 and then Rema Industrier, owns 100% of the shares in Norsk Kylling, thus controlling the entire process from the import of genetic material from Hubbard/EW Group to the sales, exclusively in Rema 1000 supermarkets and Reitan Retail's convenience stores, which amount to a 30% market share in Norway (Norsk Kylling 2023a). Reitan Retail's portfolio also includes Rema 1000 supermarkets in Denmark, filling stations under the name Uno-X mobility, and a range of convenience shops in the Nordic and Baltic countries (Reitan Retail n.d.). Norsk Kylling's production model differs from others in the Norwegian context in the degree of supply chain integration (Bjørkhaug, Vik et al. 2017). The hatcheries and the slaughterhouse/processing plant are under Norsk Kylling's full ownership, but the relations to other actors in the supply chain are mostly contract based.

Catching and cleaning are to an increasing degree done by subcontracted workers. Judging from several interviews, this part of the supply chain used to be very little formalised. Farmers used to contract the catching team themselves, but quite recently, Norsk Kylling has urged the farmers to use the companies they have contracted. One broiler farmer, delivering to Norsk Kylling since the early 2000s, said that he and neighbouring broiler farmers helped each other do the catching when they first started the production, before they started hiring catching teams around ten years ago.[25] Another farmer had hired catchers since the mid-1990s, at first using people from the local sports club, who did the job to earn money for their club. This seems to have been a quite common practice, but gradually it ended, as more catchers became organised

[23] Interview IHS11 210323
[24] Interview IHS12 210323
[25] Interview IHS3 020123

in independent catching teams or in the local cooperative associations for farmer substitutes (*avløserlag* in Norwegian). This same broiler farmer said he had talked to catchers now incorporated into the company used by Norsk Kylling, who in their previously independent catching team had received extremely low wages, down to 40 NOK per hour. The manager of the chicken service company contracted by Norsk Kylling told me that permanent appointments and certifications are required for the catchers. It seems that work conditions have become much more formalised than before.

The development of the factory workers' situation is also one of gradual formalisation and improvement of work conditions, following the conflictive period between the 1990s and the 2010s. As mentioned in chapter 2, during this period, Norsk Kylling committed several violations of Norwegian labour legislation concerning overtime work, wages, working conditions and surveillance of workers (Almås 2015, 61), most of which were non-Norwegian workers. The pressure from media scandals and the ongoing conflicts with authorities proved untenable, and according to Almås (2015) the situation improved after Rema 1000's takeover in 2012. In this period, several of the workers unionised and demanded better wages and working conditions, and they obtained a collective agreement from 2014 (Østlie 2018). From widespread use of recruitment agencies and temporary employments, most workers now have permanent appointments. A unionised factory worker said that the conflict level was high between the union and the management when they first organised, but that this also improved with time. However, he said that it had become harder to make people join the union than in the beginning, when the bad starting point made the potential gains of joining obvious to many, while this was now more difficult to communicate.[26]

Farmers grow broilers or keep parent animals on a contract basis with Norsk Kylling. Broiler farmers negotiate their contracts through their producer associations (*produsentlag* in Norwegian), while parent animal growers and hatching egg farmers negotiate together in another producer association.[27] For the broiler farmers, there are different contracts for the deliveries of day-old chicks from the hatchery and for the delivery of full-grown broilers to the slaughterhouse; however as producers for Norsk Kylling they are committed to buy chicks from Norsk Kylling's own hatchery.[28] I did not get an insight into the details of the contracts, including their exact duration, apart from the fact that there is a one-year period of notice at the

[26] Interview IHS12 210323
[27] Interview IHS5 030123, Interview IHS8 090223
[28] Interview IHS5 030123

turn of the year.[29] However, several farmers indicated that they were long-term agreements, and that Norsk Kylling had agreed to support the expansion and upgrading of the current producers' farms rather than accepting new requests, of which there were several. This seemed to provide a feeling of security.

The use of contract farming schemes was spread and consolidated in the US poultry industry in the 1950s and 1960s (Boyd and Watts 1997, Striffler 2005), and is generally an increasingly common way of incorporating farmers into globalised circuits of trade in supply chain capitalism (Arboleda 2020). In the Norwegian social corporate agricultural system, however, this has not been a widespread practice (Steine, Vasaasen et al. 2011). The broiler industry did not really become an industry of considerable size before the 1990s (Almås 2015), but vertical integration happened very quickly, and contract production soon became what in practice regulated production, even before Nortura's role as a market regulator was demolished in 2007 (Steine, Vasaasen et al. 2011, Vik and Bjørkhaug 2015).

In principle, for farmers in other sectors, the social corporate market regulation provides a security net because the cooperatives are obligated to receive and store produce even in moments of market fluctuation, and farmers are secured an equal price for their products no matter their size or geographical location. Risk connected to seasonal variations or other market fluctuations is in this way carried collectively (Smedshaug, Olsen et al. n.d.). Broiler farmers, on the other hand, are completely dependent on proximity to a slaughterhouse with which they have obtained an individual contract (Vik and Bjørkhaug 2015). As almost all income comes from the market (Holmen, Hillestad et al. 2020), farmers might therefore be more vulnerable to fluctuations. However, the steady growth in the broiler market the last two decades, the only considerable interruption of which was a short period in 2014/2015 due to findings of antibiotic resistant bacteria in chicken meat (Holmen, Hillestad et al. 2020), seem to have spared farmers from such insecurity.

Who gets what? Distribution of income and profits

The third question Bernstein (2010, 22) lists is *who gets what?*, in other words, how income is distributed. Without access to concrete numbers of each actor involved, it is hard to describe the distribution of income in this supply chain in detail. Nevertheless, findings from my fieldwork and secondary sources do provide indications that contribute to the picture. I will start discussing the wage levels of employed labour in the chicken service and factory parts of

[29] Interview IHS9 090223

the supply chain, before I move on to the transport company. Finally, I discuss some aspects of the contractual relationship between the lead firm and the farmers that regard the distribution of income.

Workers in chicken services like catching and cleaning are categorised in national statistics[30] as 'agricultural, forestry and fishery labourers', a job that requires no formal education and is at the very bottom of national wage statistics (Statistics Norway 2022). In a 2022 national overview of the wages in a range of jobs, this category is further separated, and 'assistant workers in animal husbandry' had an average monthly salary of 29 300 NOK/month. The same year, the average full-time salary in Norway was 53 150 NOK/month (Statistics Norway 2022). Despite the increased formalisation of work conditions, catching and cleaning are physically hard and repetitive jobs. Catching is exclusively performed during the night. I do not have access to the paychecks, but from the prevalence of nonunionised immigrant workers, of which several work on a rotational basis, I think it is reasonable to assume that wages are not much higher than the national average for these kind of jobs, mentioned above.

Food industry factory workers also earn a fair share less than the average full-time salary in Norway, with an average monthly salary of 39 580 NOK in 2022 (Statistics Norway 2022). A regional union representative, although without access to the exact numbers, believed that the wages of workers at Norsk Kylling's factory were lying around the minimum wage level of the collective agreement, in addition to supplements connected to things like seniority, physical strain, and evening/night work. He compared the poultry industry to the salmon industry, both industries with a high degree of immigrant and/or non-Norwegian workers and with traditionally weak unions, compared to other parts of the food industry, especially those owned by the farmers' cooperatives. He described a general trend in the Norwegian food industry the last 20-30 years where local negotiations, traditionally important areas for improving wages and work conditions, had become devoid of any real possibilities of improvement. This had contributed to a development where the wage levels in the different sectors of the food industry all had gotten closer to a common minimum wage level, instead of local variations and real possibilities of negotiating a fairer distribution of profits. He explained that one important reason for this development was the increased ownership concentration through mergers and acquisitions in the food industry. Workers used to have more insight into the firm's results, information they could use in local negotiations to demand a bigger share of the profits. Lead

[30] Following the International Labour Organisation's (ILO) International Standard Classification of Occupations (ISCO 08) Standard for yrkesklassifisering (ssb.no)

firms had strengthened their position by buying up several processing plants. By mixing all results into one pot and moving profits around to different subsidiaries or putting them into various investments, they would even out variations, and the result for a local firm would end up at zero. In local negotiations, they would present this result to workers, thus leaving no room for asking for local wage increases.

> You don't get a result on your own factory. You're not rewarded based on your own performance. … It is like this everywhere. … At least in the private sector, that is maybe the biggest annoyance. You see the leaders' wages just growing and growing and growing. And then you get to wage negotiations yourself, and they are bragging in the newspapers about the business and how clever they are and everything, and then there are wage negotiations, and there's nothing. And that is why I am assuming that they don't have any … Right, Nortura, where there are really good union representatives, they are almost not getting anything either. And then I don't think they are getting anything at Norsk Kylling either. (Regional union representative).[31]

The regional union representative's description of the Norwegian food industry is consistent with Klimek and Hansen's (2017) analysis, where they point at mergers and acquisitions as a key aspect of the structural development that has characterised the Norwegian food industry since 1990s, in response to the neoliberal turn in the 1990s. My informant's account sheds light on how this development might have affected the distribution of income between owners, managers and employees, seemingly to the disfavour of the latter. More generally, this fits into the clear trend of increasing inequalities in Norway during the last decades (Aaberge, Mogstad et al. 2021).

All the farmers expressed that profitability in broiler production was quite good. Of course, judging what the relative term 'good' means is not a straightforward task without looking at the actual numbers, but some assessment can still be done. Measuring the economy of an agricultural production can be a quite complex task because it is quite common for Norwegian farmers to have several types of agricultural production (e.g. broilers, grain, and cattle), to own and maybe rent out land or sell timber, and in addition many have some off-farm work (Vestad 2022, Statistics Norway n.d). Of the six farmers I talked to, only two said they were full-time farmers, while the others had some off-farm work (one of these was retired, but had combined farming with off-farm work earlier) in addition to the farm activities. All of them had some combined production at the farm, at least grain or grass production, and two farmers had respectively goat and pork production in addition to chicken. Some also mentioned other types of capital income related to forestry and renting out land or production quotas.

[31] Interview IHS7 050123

The size of each farmer's chicken production also varied. The hatching egg farmer superseded the concession limit of 7500 laying hens with a concession of 9600 hens. None of the broiler farmers reached the concession limit of 280 000 broilers per year, but two of them were quite close, with two barns with between 12 000 and 30 000 chickens in each. One farmer reached the limit with a combined production of pork and chicken, which are regulated in the same concession category, and another had one barn with 10-11 000 chicken of Norsk Kylling's premium segment. In all this variation, however, there was a consensus about the relative profitability of chicken production compared to other types of agricultural productions. This is backed up by national statistics from 2021 listing poultry and pork production, often grouped together in these statistics, as the most lucrative agricultural productions (Statistics Norway n.d). These variations illustrate the ambiguous class positions of farmers in capitalist agriculture, where they might combine wage labour with their capitalist agricultural enterprises of different size – as differentiated classes of capital (Baglioni 2015, Campling 2021). The contract relationship with Norsk Kylling further complicates the picture. The farmers own the means of production, such as land, machinery and the animals; and they might also employ external labour, although this did not seem to be very common in automated broiler production according to my informants. However, they have often taken up huge loans to make necessary investments, and they are bound by their contract with Norsk Kylling, both when it comes to key inputs and other aspects of production and management and because they depend on it for the delivery of their products.

Several informants emphasised an aspect of the contracts between Norsk Kylling and the farmers that made this production model unique; namely that the prices that the farmers received for their products were adjusted several times a year to compensate for price fluctuations for feed and electricity, among other things. According to the Norsk Kylling management,[32] this was part of their particularly close cooperation with farmers, which they call "their partners" in their responsibility report (Norsk Kylling 2021a). One farmer mentioned this 'partnership' as something he appreciated with Norsk Kylling and called the financing model "absolutely outstanding."[33] However, he was very clear that this model would not have been in place without the negotiations between the company and the producer associations, because "they [Norsk Kylling] have as a starting point that they pay for what it costs. Not more than that." He explained how the hatching egg farmers would highlight their essential role in

[32] Interview IHS1 201222
[33] Interview IHS8 090223

the supply chain when they negotiated, as one sole hatching egg farm produces the basis for 10% of the company's total production.

The hatching egg farmer believed that the pay per working hour was higher in hatching egg production than in broiler production but added that the workload and risk was also much higher in the first production phase. One broiler farmer had her production bought out some years earlier during a period when there was fall in the market demand, i.e. she was paid to not produce broilers, and this led to bad economic results for a while: "At times, there has been no income at all. There have been some years of … We can call it a bit like a hobby."[34] Nevertheless, she said that she was for the most part content with the profitability of the production, as were the other farmers.

Industrial broiler production is a high-tech industry requiring considerable investments especially when barns are constructed or renewed. Several informants mentioned the currently high construction costs as a limiting factor for establishing new or expanding existing broiler farms, requiring very big loans. One of the broiler farmers, having recently built a second barn, somewhat jokingly expressed it this way: "I know what I'm going to do the next 20 years. The trick is to have such a big loan that the bank doesn't dare to bankrupt you."[35] The burden of loans varies among farmers, and several farmers talked about the current situation as one with extraordinary high construction costs. Those farmers having invested despite of this, nevertheless seemed assured both from the feeling of financial safety in the Norsk Kylling system, and in general from producing to a market that does not seem to demand less chicken in any near future, matter-of-factly summed up by a broiler farmer: "It looks promising, it does. … It's a popular meat to eat, white meat."[36]

Norsk Kylling also seems to be directly involved in some of the farmers' investments, especially in projects related to sustainability and animal welfare. A farmer shifted from 'normal' broiler chicken to Norsk Kylling's premium segment chicken, Stange Landkylling™, which requires an outdoor area enclosed with netting, an investment the company covered. Three barns with viewing solutions have also been built recently in a financial cooperation between the farmer and the company, one of which I visited, where visitors can see through large glass windows into the chicken room from a designated meeting area. In both of these cases, the farmers explained that Norsk Kylling had offered this opportunity to a handful of

[34] Interview IHS5 030123
[35] Interview IHS3 020123
[36] Interview IHS2 211222

farmers, who were chosen in an application process. The barns with viewing solutions seem to be used by Norsk Kylling as part of their communication strategy to enhance their reputation in the public and the media, by arranging farm visits and through the frequently updated Facebook pages of these farms.

The main transport company has transported broilers for Norsk Kylling during 20 years, starting two years after the establishment of the broiler company in 1991. In 2020 they renewed their contract for seven years (Meisdal 2020). In the interview with a manager and a driver in this company, together with the logistics manager and the value chain coordinator in Norsk Kylling, the informants described a close cooperation, or as the logistics manager said: "Even though it is a hired company, they are treated as if they were Norsk Kylling"[37]. This close cooperation included the design and construction of new vehicles equipped with innovative technology monitoring and optimising the climatic conditions for the broilers during transport. These considerable investments were incentivised by Norsk Kylling to increase animal welfare and to reduce mortality during transport, and according to the logistics manager, the deal with Norsk Kylling guarantees that the transport company is compensated for these investments with "the earnings that are needed". The manager of the transport company expressed the benefits of close cooperation in a fitting picture: "The entire value chain around Norsk Kylling is quite … tightly knit, and works closely together. You can say that an axle is never stronger than the weakest joints, so everything must be working."[38] As with the farmers, Norsk Kylling uses financial incentives to shape the activities of the transport companies after their standards, enhancing their "arm's length control of the food supply chain, through management rather than ownership-style integration" (Allen and Lavau 2015, 345).

What do they do with it? Retailer expansion and consolidation

The examples of the farms with visitor's facilities and the transport company's high tech chicken trucks show how Reitan Retail/Norsk Kylling use their profits to expand, improve and shape the supply chain to strengthen their market position and establish a reputation as a sustainable market actor. This also applies to the new processing plant and hatchery, where considerable investments have gone into technological solutions for renewable energy and waste management, among other things (Vikan 2021, Norsk Kylling 2022). Norsk Kylling is also investing in research and development projects about chicken feed, as the company has set

[37] Interview IHS09 090223
[38] Interview IHS09 090223

a goal of removing soy from their chicken feed by 2030. To achieve this goal, they have both entered as a partner in joint research projects (Norsk Kylling 2021b) and by buying into the company Pronofa, a spinoff of the Brazilian owned feed importer Denofa (Pronofa 2022, Denofa n.d.)

In addition to the investments within the broiler production network, Reitan Retail is expanding through mergers and acquisitions in the supermarket, convenience and mobility markets in the Nordic and the Baltic countries (Reitan Retail n.d.). In addition to about 700 supermarkets (Rema 1000 n.d.-a), Rema 1000 has another outlet for their products in Norway through the exclusive cooperation with the online grocery shopping concept Oda (formerly Kolonial.no) (Rema 1000 2014). In addition to the fully integrated broiler supply chain Norsk Kylling, Reitan Retail has also integrated upstream by buying shares in supply chains including organic products (Kolonihagen), beer and soft drinks (Grans), fruits and vegetables (Bama/BaRe), coffee (Kjeldsberg), and cured meats (Spekeloftet) (Lynum and Valvik 2017, Reitan Retail n.d.). Entering into exclusive deliverance deals with external suppliers is another way retailers ensure their position upstream. In Reitan Retail's case examples include the industrial bakery Mesterbakeren and the red meat supplier Nordfjord Kjøtt (Tollersrud and Bratlie 2022). The increasing use of 'own brands', a well-known strategy through which retailers expand and assert their consumer loyalty and market power (Richards, Bjørkhaug et al. 2012), has been connected to these exclusive deals, as critics claim that retailers demand insights into suppliers' recipes and sometimes copy them to make competing products under their own brands (Tranøy 2015, Lorvik 2021, Tollersrud and Bratlie 2022).

Since the first Rema grocery stores opened in the 1970s, the company has grown and evolved enormously, and has used their profits to expand into real estate and non-food sectors. In the current company organisation, Reitan Retail is one of three subsidiaries of the holding company Reitan AS, which in addition has an asset management branch called Reitan Kapital, and a real estate branch called Reitan Eiendom (Reitan AS n.d.-d). Reitan Eiendom's three main investment areas are city centre properties in Trondheim (where Reitan Kapital is the biggest private real estate actor), Oslo and Bergen; logistics and industry properties in Scandinavia – a considerable part of which consists of distribution centres for Rema 1000; and commercial property, more specifically retail properties for the Rema 1000 shops (Reitan AS n.d.-e). Reitan AS also owns the spa hotel Britannia hotel, and is opening a private theatre and a private art museum in Trondheim, respectively in 2024 and 2025 (Reitan AS n.d.-a, n.d.-c).

Reitan Retail's vertical integration in various food supply chains, as well as Reitan AS's diverse expansion strategies both inside and outside Norway, consolidate the retailer's position in the Norwegian agrifood industry. With a diversified portfolio they are able to make big investments and even manage some years of negative results in certain investment areas, which was the case for Norsk Kylling after the construction of the new slaughterhouse/processing plant (Kalle 2022). A white paper from 2016 describes how the growing vertical integration in the Norwegian agrifood industry might reduce the room for action in agricultural politics because retailers to an increasing degree can dictate which products are prioritised, where production is concentrated, and how it should be done (Norwegian Ministry of Agriculture and Food 2016). The retailers' increasing dominance adds to the competitive pressure on the farmers' cooperatives as well as on other, smaller actors in the agrifood industry (Olsen 2010), and has considerably contributed to the concentration and structural restructuring in the agrifood industry as a whole. Mergers and acquisitions across the agrifood industry has led to the abandonment of several local processing plants (Norwegian Ministry of Agriculture and Food 2016), with consequences for the goal of maintaining a diverse agricultural production across the entire country – which the very concentrated broiler industry illustrates.

Retailers will often justify their actions by claiming that they are first and foremost serving the consumers' interests (Rem 2008) – exemplified by Reitan AS's seventh point on their list of business values: "the customer is our ultimate boss" (Reitan AS n.d.-b). Nevertheless, vertical integration in the agrifood industry does not automatically strengthen consumer power. Less competition can lead to reduced product variation (Norwegian Ministry of Agriculture and Food 2016), and the huge profit margins captured by the retailers put into doubt the promises of keeping prices as low as possible (Tranøy 2015). Finally, the diminished room for agricultural politics might ultimately reduce consumers' – as citizens – possibility of affecting the political framework of the agricultural industry (Asdal and Moser 2008, Rem 2008).

Having sketched out and discussed several aspects of the social relations of production in Norsk Kylling's supply chain, I will now take a closer look at the importance of logistical control in this production model.

5.2 Logistical control and streamlining in a vertically integrated system: expanding the view of agriculture

Actors involved in the parts of the supply chain that I have focused my fieldwork on include farmers, chicken transport drivers, catchers, cleaners, workers at the factory, company

veterinaries, and people working in administration and management in Norsk Kylling. Others more or less involved in the supply chain include feed mills, pharmaceutical companies, by-product processers, the NFSA, the research and development organisation Animalia, the trade association KLF, research institutions, municipal authorities processing applications for manure spreading, banks giving out loans, insurance companies, barn system suppliers, people working with communication and marketing, employees at the supermarkets where most of the chicken products end up, and consumers buying the products – and probably many more. I will not consider all these actors in detail; yet, listing them still illustrates the complexity of this kind of food production. What is more, the mere number of all these actors and the processes they are involved in, all of which come together in the continuous production of the industrial bodies of broiler chickens, indicate the need for careful logistical planning, especially from the lead firm's side.

A lot has been written about the importance of logistical control in increasingly centralised and hierarchical food systems, and more specifically about the importance of information and communication technologies and transport technology in the supermarketisation of these systems (Tsing 2009, Olsen 2010, Arboleda 2020). This is clearly the case also here, as expressed by the manager of the catching and cleaning company:

> I think this logistics is planned … two-three years in the future. Because first they must start with the parent animals. They must have enough parent animals to get enough eggs for the chickens, and these chickens must go to the hatchery and must be born, and then transported out to the farmers, and … Yeah. I have never in my life been in an industry with so much logistics. … It's huge, how logistics is in the business. (Manager of chicken service company).[39]

Simply considering that from the import of parent animal eggs, to the supermarket sale of filets from the offspring of these parent animals, as much as 33 to 75 weeks[40] pass, it is obvious that meticulous planning is needed to make this lengthy and complex operation go smoothly. Informants pointed at direct ownership and close affiliations with other involved actors as an advantage for Norsk Kylling, both for the general communication flow, and more specifically regarding biosecurity and disease monitoring, which constitute an essential area of this business. Answering to a question about pros and cons with the company's production model compared to other Norwegian actors related to disease risk, a manager said:

[39] Interview IHS4 030123
[40] My (approximate) calculation. The variability is due to the fact that the parent animals lay eggs that become broilers continuously for about 42 weeks.

> Biologically there is no difference. Everybody has the same parts of the chain: they import animals from abroad, send them to the hatchery, parent animal growers, broiler producers, etc. But we can have a contingency plan that covers the entire chain, while it is separated into several companies for the others. (Upstream production director).[41]

This quote illustrates that the way ownership and contract relationships are structured in Norsk Kylling's fully integrated supply chain model gives them a logistical advantage that makes disease control easier to manage compared to other, possibly more fragmented production models. In this chapter section, I will discuss some elements from my fieldwork that illustrate the importance of logistical control to assert one's position as a leading actor in this business.

A logistical landscape

The centrality of a smooth logistical operation is reflected in the landscape of broiler production. Farmers depend on contracts with slaughterhouses and/or hatcheries in order to produce broilers, parent animals or hatching eggs, and the proximity to such operations is therefore decisive for where broiler production is found in the country. While short distances are positive with regards to reducing mortality rates and stress for the birds during transport, they represent a disadvantage when it comes to disease risk. This also affects logistical decisions, leading to compromises for instance in the placement of Norsk Kylling's hatcheries and slaughterhouse, which purposively are built far enough from each other and from more clustered poultry areas to reduce consequences in the possible event of a serious disease outbreak.[42]

Finally, facilitation of chicken deliveries is a central factor shaping the farm infrastructures. The barns are rectangular buildings with big doors on one side where forklifts can enter during catching, and having space for the big chicken transport trucks in the farmyard is a basic requirement. To a question about what was needed for broiler production, a farmer answered: "Yeah, one needs a building, for a start. And that [building] has to be placed in such a way, at least, that you can receive chicken and deliver chicken, with big trucks. With space for that stuff outside."[43] A flat landscape is another advantage in this respect, one farmer explained, talking about some nearby hills where they had wanted to expand the farm, but were not allowed to because they were historical burial mounds, and thus had to stay where they were:

> And that's both practical and unpractical. What's practical about it is that here, it is flat. You avoid that hill up there, and with regards to feed trucks and chicken trucks that are

[41] Interview IHS1 201222
[42] Interview IHS1 201222
[43] Interview IHS2 211222

> coming here to pick up chicken, we're flat and nice and alright, and during wintertime you avoid that sort of conflicts and stuff. (Broiler farmer).[44]

Although industrial broiler production to a much higher degree than other productions is disconnected from a local resource base and represents a "completely mobile" type of agricultural production, ""liberating" capital from land and specific locale constraints" (Bernstein 2010, 91), profitability depends on efficient and smooth transport and logistics. This has consequences for how production is located in the geographical landscape. The importance of flat, accessible and well-connected production facilities shows how locations in the sphere of production must be adapted to facilitate activities in the sphere of circulation. This gives support to Arboleda's (2020) point that transport and logistics in the sphere of circulation are an essential part of agrifood chains, without which it would be impossible to realise the value originating in the production process, because the commodities would never reach the market, and the exchange value would never be realised through sales.

Streamlining, monitoring and disciplining production

The success of the broiler industry lies in the unmatched speed and flexibility of a streamlined JIT production of a wide range of cheap and lean chicken products (Boyd and Watts 1997, Vik and Bjørkhaug 2015). This depends on the capacity to maintain a continuous production of uniform birds that can be slaughtered, processed, packaged and delivered on an industrial scale. The automated slaughtering method requires this uniformity: after stunning, the broilers' heads are cut off to ensure that all chickens are thoroughly euthanised (Animalia 2017). According to a factory worker, one reason why this might go wrong, and why a worker has to control and potentially correct it manually if it does, is different sized birds, complicating the task of the head-cutting machine. The need for uniformity also affects farmers, and a broiler farmer said that there could be a weight difference of 1-2 kilos between the chickens, but that the farmers receive the best pay for birds that are close to the ideal slaughtering weight of 1650 grams.

In addition to this economic incentive to keep the climatic conditions inside the barns at the optimal levels for uniform growth, several farmers talked about a comprehensive system of monitoring and reporting of the different production parameters. In Norsk Kylling's model there is a bonus system where farmers can earn 'stars' translated into more payment on their deliveries if they make extra investments in for instance animal welfare, renewable energy solutions and biosecurity measures beyond the basic requirements in the contract. Farmers with

[44] Interview IHS3 020123

particularly good results are awarded with "producer of the year" diplomas (Norsk Kylling 2023b). One farmer also mentioned that an opposite system of 'punishment' exists, where failures to deliver satisfactory production reports to the company could make them reduce the permitted chicken density of the farmer in question. He had his tricks for producing up the maximum concession limit, however:

> It's a damn strange way to punish. But for me it doesn't matter, because then I just put in 30 extra pigs. So for me it's nice to have less [birds] per square meter. In fact I might get better growth and more uniform birds and all that. That's not negative. (Broiler farmer).[45]

According to this farmer, who had almost 20 years in the chicken game, the demand for uniformity has increased considerably over the years, as the lead firm has gotten more involved in the details of production. All farmers are bound by contract to buy Norsk Kylling's own Solvinge feed, designed specifically for the Hubbard JA787 broiler hybrid, which all farmers have to use. This feed is developed through Norsk Kylling's cooperation with the three main feed mills in Norway: Fiskå Mølle, Felleskjøpet Agri and Norgesfôr. Additionally, farmers should write meticulous reports on their feed plans, light programs and other production details. The abovementioned farmer was not content with this development, as he considered these details "business secrets" that he wanted to control himself, and because writing these reports represented an extra workload to him. The collection of production data is made available to the farmers in a system where they can see other farmers' results, although without disclosing names, when it comes to for instance slaughter weight, footpad score and mortality rates, compare their own results with these and benchmark themselves.[46]

The same broiler farmer suggested that these production data were used by Norsk Kylling to calculate cost-cuts in the contracts that would ultimately affect the farmers' economy. He said he knew farmers that sometimes reported better growth rates than what they actually had, because they did not like reporting bad results. He said he would encourage them to do the opposite, and add rather than remove a couple of kilos of compound feed in their reports, because the business school people in the management might use the overly good results in the farmers' disfavour:

> And that's a bit stupid, so in those meetings I tell them, you shouldn't brag about yourselves in those e-controls, you know. Then we should rather add some kilos of compound feed, right? Make the development look a bit worse than what it is, because

[45] Interview IHS6 040123
[46] Interview IHS1 201222

> there are BI[47]-people sitting there. Reitan has BI-people, right, that sit and calculate the economy with this. So you shouldn't bluff the wrong way. … I mean, the best is of course that it is correct, but like, you mustn't in any case brag about a better result than what's normal. It is so stupid, you know. So they are paying attention. It's BI-people. (Broiler farmer).[48]

This system of reward and punishment might surely have a motivational effect on some farmers, but it also suggests how the lead firm aims to discipline the farmers in the supply chain, and in this way strengthen their control – although not without some resistance from farmers manoeuvring their position, as the quotes from the broiler farmer above show.

Another aspect of the lead company's streamlining and disciplining is the consolidation of the tight relationships with other actors such as transport and chicken service companies, which I touched upon in the previous chapter. The manager of the catching and cleaning company[49] talked about Norsk Kylling's efforts to reduce the number of actors in the catching and cleaning business and explained that their company had won the contract with Norsk Kylling three years earlier both because of their low price and because they fulfilled requirements related to permanent appointments and HSE. Catchers are now required to go through a certification course under the auspices of Norsk Kylling, as focus on animal welfare during catching has become stronger across the industry (Animalia 2020a). While some farmers were very happy with the professionalism of the catchers,[50] the broiler farmer mentioned above was not quite so happy that Norsk Kylling wanted him to change supplier to their chosen actor, because he was content with the ones he already knew. While the lead company also preferred that farmers use the chicken service company for cleaning, he wanted to do it himself, with the methods he knew worked. He mentioned a conflict around the use of disinfectants, where the company wanted the farmers to use certain products, which he found too expensive, as he had a much cheaper, but functional way of doing it.[51]

In addition to the economic aspect of his unwillingness to adopt the lead firm's expensive solutions, in all of the areas where he disagreed with Norsk Kylling's streamlining efforts, there seems to be a conflict of different knowledges and of not wanting to take orders. The farmer expressed a feeling of his knowledge and experience not being taken seriously, while top-down solutions were being imposed on him: "We were going to a cleaning meeting, a cleaning course.

[47] BI is Norway's biggest private business school.
[48] Interview IHS6 040123
[49] Interview IHS4 030123
[50] Interview IHS3 020123
[51] Interview IHS6 040123

I've cleaned barns since 1995, ain't that right?"[52] Most informants seemed content and even impressed with the professionalisation of the industry under Reitan's ownership. Nevertheless, it also seems to be the case that Norsk Kylling through this process uses their powerful position to discipline and control producers and other actors in the supply chain. This farmer's experience shows that it does not necessarily happen completely without conflict nor attempts at negotiating the hierarchy of power.

5.3 Chapter summary

In this chapter, I have sketched out the social relations of production of Norsk Kylling's supply chain. Through direct ownership and contracts that involve several aspects of production beyond the mere delivery of products and services, the lead company maintains a high degree of control over the various parts of the supply chain. This production model is typical of globalised supply chain capitalism when it comes to the fragmentation of the production process, the use of contract farming schemes and subcontracting of labour, and the reliance on immigrant workers (Striffler 2005, Tsing 2009, Arboleda 2020). Fully owned by a retailer with international business interests, Norsk Kylling is the most integrated supply chain in the Norwegian poultry industry, which moreover represents the most integrated part of Norwegian agrifood industry (Norwegian Ministry of Agriculture and Food 2016, Bjørkhaug, Vik et al. 2017). These features of Norsk Kylling's production model diverge from the Norwegian social corporate model as it was developed during the 20th century, and are illustrative of the challenges that internationalisation and increased market orientation, including supermarketisation, have posed to this model (Almås 2002, Olsen 2010).

However, and as Almås has argued before (2015), Norsk Kylling's model has not become a mere copy of the US 'southern model', but has adapted to the Norwegian regulatory context. Although there is an obvious hierarchical relationship between the lead company and the farmers, the latter seemed to be quite content with the financial conditions of the contracts, and seemed to use the producer associations to negotiate collectively. Vik and Bjørkhaug (2015, 164) highlight how, after Rema 1000/Rema Industrier took over the ownership, the new Norsk Kylling management resolved to improve the relatively weak trust relationship with the farmers, as this represented a reputational damage to the brand. This might be seen in the light of the social corporate tradition of strong farmers' cooperatives. Norsk Kylling's emphasis on the 'farmer as a partner' might be seen as an adjustment to the social corporate ideal of farmers'

[52] Interview IHS6 040123

involvement in questions directly influencing them, and thus contribute to legitimise the contract farming scheme, which has been resisted in the Norwegian context (Almås 2002). I have also argued, however, that the system of reward and punishment based on farmers' reports of production data may be seen as a mechanism to discipline farmers.

The formalisation of labour relations in other parts of the supply chain, both at the factory and more recently in the catching and cleaning business, can be seen from the same perspective as a way to adjust to the Norwegian regulatory context and the tradition of strong labour unions. At the same time, it can be viewed as a measure to smoothen operations and improve their competitiveness through increasing stability and control in all parts of the supply chain. I have further analysed the centrality of logistics in linking the sphere of production to the spheres of circulation and exchange, and showed how it is a key area both to uphold a continuous, predictable production line and to ensure swift communication and action in the case of disease outbreak. Based on this analysis, I argue that the formalisation of the social relations of production can legitimate and consolidate Norsk Kylling and Reitan Retail's role in the broiler supply chain. By adjusting, but also adjusting to, the social corporate regulations and institutions of Norwegian agrifood capitalism, Norsk Kylling asserts their position, and this stabilises the retail-led accumulation regime.

I further argue that the tightly knit relationships between Norsk Kylling and the other actors involved in the supply chain are part of a more comprehensive logistical effort that strengthens the lead firm's power in the management of the supply chain in its totality. The push from Norsk Kylling to make all farmers use the same suppliers of services, the same feed and cleaning equipment, and monitor all results, which is facilitated by the contract farming scheme, can be interpreted as part of logistics as the integrated management of the supply chain in its totality (Danyluk 2018). This appears to be a central part of Norsk Kylling's production model, and an obvious advantage in a vertically integrated system designed to facilitate the smooth coordination of people and processes happening at the right place at just the right time. The degree to which the company succeeds in their efforts to be in control affects their relations to other actors within their value chain, and probably also their position vis-à-vis competitors in the poultry industry.

These arguments contribute to answering my sub research question regarding '*in what ways responses to disease risk in the fully integrated broiler supply chain of Norsk Kylling affect social relations of production and power relations along the supply chain'*. As I have suggested in this chapter, increased disease risk demonstrates the key role that logistical management

plays in the supply chain. In addition to facilitating rapid and coordinated action in the case of an outbreak, a smooth logistical apparatus seems to be a competitive advantage also in a 'normal' situation. Moreover, adopting a perspective of agrifood systems that expands the view of agriculture, which has been an attempt in this chapter, suggests that potential outbreaks of a serious disease could have consequences far beyond the affected farms. When taking seriously the zoonotic potential of diseases emerging in industrial meat production, such outbreaks could have even wider societal consequences. What this begins to show, is that not only do big corporate actors such as Norsk Kylling exert considerable power over what and how food production should be; they are also situated in a critical position in what could be the governance of new zoonoses.

Chapter 6 – Fixing broken-hearted chicken: ecological indeterminacies of poultry and pathogens stabilising retailer rule

In this chapter, I will analyse and discuss some challenges inherent to the industrial production of broiler chicken that I argue stem from capital's attempts to control and simplify biophysical processes, and some of the strategies that Norsk Kylling employs in order to overcome these. The analytical lens builds on the rich literature especially in political ecology on capitalism's fixes to its self-induced limitations and crises, (Bakker 2009, Moore 2015, Ekers and Prudham 2017, Guthman 2019, Rutt and Jakobsen 2022), including Weis' (2013) work on the biophysical instabilities and overrides of industrial livestock industries. Building on findings from my fieldwork, I will focus upon three topics, namely the dependence on complex technological systems to uphold the lives of broiler chicken; Norsk Kylling's change of broiler breed and feed ingredients as socioecological fixes; and finally conventional biosecurity as a fix to the potential crisis of infectious diseases.

With this analysis I attempt to answer my second sub research question: '*How do socioecological fixes related to ecological challenges including disease risk manifest in Norsk Kylling's supply chain, and with what effects to the organisation of nature and the distribution of work, profits and power?'* I argue that the technological infrastructure on which the chickens' lives depend illustrates how the broiler industry is based upon the real subsumption of nature, but that this process is ultimately incomplete. I develop this argument further by analysing Norsk Kylling's change of breed and feed as examples of intensifying and expanding commodity frontiers; and together with their work to enhance biosecurity along the supply chain, as socioecological fixes to overcome contradictions arising from the very logic of this industry. By providing a solution to such contradictions – at least temporarily – Norsk Kylling and Reitan Retail consolidate their position in the Norwegian agrifood industry through these socioecological fixes. Nevertheless, this development of accumulation strategies does not happen in a vacuum, but is facilitated and/or limited by the Norwegian regulatory and institutional framework.

6.1 Technological lives

Weis (2013) describes how the poultry industry has been at the forefront of developing techno-scientific innovations, first to overcome limitations to capital accumulation from the biophysical characteristics of the animals themselves, and consequently to respond to problems originating from these very innovations. He argues that the "mechanization, standardization,

and simplification" (2013, 92) behind the industrial monocultures owing to the logics of economies of scale lead to instabilities, and attempts to override them that are hardly more than short-term fixes and do not address the contradictions at the root of the instabilities. Boyd's account of the role of technology and science in the development of the industrial chicken points in the same direction, warning against the unintended consequences of techno-scientific programs of biological intensification, in the broiler industry aimed at pressing "avian biology … into the service of industry and made to operate as a productive force" (2001, 662).

In this first chapter section, I will analyse some of the comprehensive technological infrastructures of industrial broiler production as examples of the real subsumption of nature, that is innovations aimed at biological intensification, as well as responses to unintended consequences of such intensification (Boyd, Prudham et al. 2001). With empirical examples from my fieldwork, I will sketch out an analytical understanding of the broiler industry as dependent upon technical fixes to keep alive birds rendered so vulnerable that they cannot survive without them – at least not live and grow the way that justifies their brief existence in this production system. This might not be a new insight, but the conceptualisation of the real subsumption of nature forms an important part of the basis upon which I will build the following sections of this analysis chapter, as I will go on to discuss how the incompleteness of the subsumption process leads to contradictions and crises that require new fixes.

Optimal conditions for fragile birds

The entire lives of the chickens in Norsk Kylling's supply chain – and in industrial broiler production in general – take place inside so-called Concentrated Animal Feeding Operations (CAFOs)[53] made up of sophisticated machines and buildings, and are transported in specially designed trucks. This technological infrastructure is developed to produce and protect the lives of these birds for as long as needed for them to fulfil their purpose in this system, either producing fertile eggs or growing to the size decided as fit for slaughter. A lot of scientific and technological development lies behind the feat of keeping thousands of uniform birds alive and (relatively) healthy inside such intensive confined systems, which according to Boyd (2001,

[53] Unlike Norsk Kylling's conventional Hubbard broilers, chickens in the premium segment Stange Landkylling™ have access to an outdoor area from day 21 of their 53 days of life; however, it is still a flat, concrete space closed off from the outside by a thick netting. They are all the same Hubbard JA787 breed, but the Stange chickens live for about eight days longer than the conventional Hubbard broilers, they get a less energy rich feed, and have some more space inside the barn in addition to the outdoor area (Interview IHS5 030123). This still qualifies as a CAFO system, and it serves to show the relatively small differences behind terms such as conventional, premium, free ranging, etc., often extensively used in the marketing of differentiated – but maybe not so different – products.

638) was “a critical first step in the process of industrialization”, taken in the US in the interwar period. Although there are important political, institutional and regulatory differences between the Norwegian and the US context (Vik and Bjørkhaug 2015, Bjørkhaug, Vik et al. 2017), the US broiler industry is arguably the technological cradle of global industrial poultry production (Boyd and Watts 1997), and therefore relevant to the Norwegian case.

In the US in the first half of the 20th century, important research advancements made this intensive confinement of chickens possible. Adding vitamin D to the chicken feed compensated for health problems resulting from confinement, and with the increasing electrification of rural societies, the road was paved for the complete confinement of birds in houses where temperature, ventilation and sanitation could be under careful control (Boyd 2001, 638-639). Nevertheless, contagious diseases represented a recurrent threat, driving large-scale public-private research on disease control and breeding, establishing industry standards for uniformity and reliability of eggs and chicks. Some diseases were combatted, but others emerged, and challenges with managing disease stuck with the poultry industry (Boyd 2001, 640-643), up to this day. In Boyd’s (2001, 643) words, “[i]ntensive confinement, geographic concentration and the increased genetic uniformity of broiler flocks have created a fertile environment for the emergence and spread of infectious diseases”.

Compared to many other countries, there is a low prevalence of infectious poultry diseases in Norway (Animalia 2020b, Norwegian Veterinary Institute n.d.). One explanatory factor is the smaller average size of chicken flocks on Norwegian farms than most other systems of industrial livestock production (Bagley 2016). Whereas a typical broiler flock in a US chicken house counts between 36 000 and 52 000 chickens (Brothers 2022), the average is 23 000 in Norway (Animalia 2020c), and probably a bit less among Norsk Kylling producers, because of the lower density required in their farms.[54] The relatively smaller farm sizes are directly connected to the concession limits, however considerably expanded in recent decades to the current level of 280 000 chickens per year (Holmen, Hillestad et al. 2020), a regulation meant to hinder the concentration of pork and poultry production in too big entities (Bagley 2016, Bjørkhaug, Vik et al. 2017). The geographical concentration of farms in Trøndelag is also lower than in many other poultry regions, both abroad and in Rogaland, which together with Trøndelag is the most important poultry producing county (Holmen, Hillestad et al. 2020), and the only place in Norway where HPAI has been registered in commercial poultry flocks up to

[54] Max 30 kg/m^2 vs. 36 kg/m^2 in national regulations (Norsk Kylling, n.d.-a).

now (Granstad, Rømo et al. 2023). The use of antibiotics in Norway is also very low compared to many European countries, hindering the development of antibiotic resistant bacteria (Bagley 2016), which is a contentious issue for the poultry industry worldwide (Boyd 2001, Weis 2013). These are important contextual differences; however, this does not mean that infectious diseases are not an issue in Norway, as the recent HPAI outbreaks show.

For someone who had little previous knowledge about the realities of broiler production, I found visiting broiler and parent animal farms an impressive experience. Especially interesting was the complex digital systems allowing for complete, 24/7 remote control of the in-barn conditions. Feeding, watering, heating and ventilation are all automatic processes, constantly monitored and available to the farmer on the computer systems in the control rooms. One farmer also said he could access everything on his mobile phone:

> The first one does when waking up in the morning is to check the phone. Because everything is on the phone. Has the feed been sent out, has water been sent out, is the temperature correct, is the air quality correct? Do you have growth on the chicken? (Broiler farmer).[55]

The level of sophistication of the computer systems on the different farms differed somewhat, as some farms had recently invested in new systems, while others had older equipment. It was clear that these were expensive systems requiring big investments. Nevertheless, several informants said that they did not need to reinvest a lot in equipment once it was operative, and that it could last for quite a while. The farmers that could get big enough loans to make these investments, and who managed to pay them off, could then accumulate profits from their capital investments after some time.

As mentioned in the previous chapter, broiler producers still go into the barn at least twice a day, and more often if needed, for instance when the computer systems send out alarms that something is not working as it should. Despite the high level of automation, all the farmers talked about the 24/7-hour duty and responsibility of keeping live animals as an aspect that made broiler production more laborious than what it might seem like. If some part of the automated operation was malfunctioning, it was the farmer's responsibility to take immediate action, because, as a broiler producer said, "It is critical if something happens. Then you have to be there right away."[56] The importance of always functioning systems is indicative of the

[55] Interview IHS3 020123
[56] Interview IHS3 020123

vulnerability of a production system where uniformity and control over biophysical processes is the central element. One broiler farmer expressed it this way:

> You need electricity to run it, the ventilation and the heat and water. [So] that all those things are working. … If one only had grains, right, and the electricity is gone for two hours, yeah, it's like, "there the grain dryer stopped", but that's not a major crisis. If the electricity is gone for two hours and you don't get it started … A couple of minutes can be enough, on warm summer days at least, when it comes to chicken.
>
> And it is like, I feel, either or: either you sort of have to go all in, you must have everything tip-top. It's no good to go halfway, because then the production is bad, and then it's no fun to be doing this. And then the economy is worse. So, you have to keep the equipment shipshape. (Broiler farmer).[57]

Hatching egg producers do more barn rounds than the broiler producers do, and the monitoring system in the hatching egg barn I visited was also the most sophisticated of those I saw. A double computer screen was used to stream the constant video surveillance of the birds – live, or up to one week back in time – and to update a range of digital diagrams of different parameters of the production and the birds' development. This development is quite different for the hens and the roosters, as the parent animals of the Hubbard JA787 consist of so-called Hubbard JA87 dwarf hens bred for their egg-laying capacity at low feed levels, and the bigger M77 roosters, bred for quick growth. This production is particularly vulnerable because of the different biological particularities of roosters and hens that should work together as a productive force, to paraphrase Boyd (2001). A quote from the hatching egg producer illustrates this point:

> [Y]ou have two types of animals that you have to make cooperate to get the product – a fertilised egg – that we are looking for. And it is a big difference between how you control the hens and the roosters. They are in a common room: the same lighting, the same environment and things like that, so then you just have the feed left that you can modify a bit. And everything else becomes quasi-solutions, sort of. Because the roosters, they respond to the amount of light, the lux, that is, while the hens, it is the length of day that is important to them. (Hatching egg farmer).[58]

In the poultry manual *Fjørfeboka*, the recommended temperature development (calculated for maximum production, and subject to climatic changes in each farm) for broiler chickens starts with an air temperature of 34 °C the first day and then gradually lowers to 22 °C towards the slaughter date. A too high temperature leads to a lower feed intake and slower growth, while a too low temperature leads to higher feed uptake, both cases economically inefficient for the producer (Bøe and Bagley 2016, 244-245). One broiler producer argued that it was really not that complicated, you could just go into the barn and check with your own senses if the

[57] Interview IHS2 211222
[58] Interview IHS8 090223

conditions felt alright – if they did, then it was probably alright for the chickens as well. Conversely, if something was off, you would notice it at once. He described a problem with some cold air seeping into his barn from an emergency ventilation system installed in the ceiling. As the isolation turned out not to be efficient enough, cold air streamed down, and the chickens avoided this area.

> It was five meters, right, a circle where there was no damn chicken. A bit of cold air came down there. It's clear, those guys, you know, they are hatched in 37-38 °C, right, and then they have 33-34°C in the car on their way here, right, and then they come to us to a floor with 30 °C. Because they adapt to the system, right, so they notice those things very quickly. (Broiler farmer).[59]

The sophisticated technological systems in industrial broiler houses reveal the contradictory logic of this industry. On the one hand, it represents an outstanding case of a scientifically informed, capital-intensive and efficient type of agricultural production based on the real subsumption of the broiler biology. On the other, it discloses the fragility of these uniform chicken bodies that have come out of this necessarily incomplete subsumption process.

Smoothing operations

The transportation of broilers from the farms to the slaughterhouse is a critical moment potentially linked to bird mortality and injuries that represent animal welfare issues and a source of economic loss (Schwartzkopf-Genswein, Faucitano et al. 2012). As described in the previous chapter, the transport company contracted by Norsk Kylling had recently invested in brand new trucks with "the most modern you can get" of technological solutions for controlling and monitoring the climatic conditions inside the trucks during transport, as the manager explained.[60] A broiler farmer confirmed the strengthened focus on transport equipment, and a development from a situation with a lot of injuries and high mortality rates because of cramped conditions, to one with much better containers and consequently less injuries and deaths. The chicken trucks represent another example of the sophisticated technological innovations aimed at optimising conditions for the fragile birds in the production process, and are illustrative of the great efforts, considerable economic investments and material resources that go into the smooth operation of the hens, roosters and broilers as generators of surplus value.

Several of the broiler farmers said that the change from Ross 308 to Hubbard JA787 had been very positive and had reduced health problems and mortality rates in the chicken flocks. The

[59] Interview IHS6 040123
[60] Interview IHS9 090223

robustness of the Hubbard JA787 compared to the Ross 308 was also emphasised by the Norsk Kylling management and the company veterinary, as well as in comprehensive marketing campaigns from Norsk Kylling's side. A recently published study[61] compares Hubbard JA787 and Ross 308 with regards to the causes of condemnation at the point of slaughter, i.e. chickens deemed unfit for meat production because of signs of disease or injury. The authors find that especially ascites, connected to the birds' cardiac health, was much less common for Hubbard JA787 (Forseth, Moe et al. 2023). This is related to the slower growth of Hubbard JA787, which Norsk Kylling characterises as a slow-growing hybrid, with an average life cycle of 45 days, against the 31-32 days of Ross 308 (NAPA 2018). I will return to the discussion of slow versus fast later in this chapter. My aim is not to dismiss these findings or the farmers' experiences of a more pleasant production, but to illuminate further the complexities in this change, presented as no less than a "revolution" in a Rema 1000 newsletter (Rema 1000 n.d.-b).

The change of breed does not deindustrialise this type of broiler meat production (Bjørkdahl and Syse 2021). The reduced mortality rates and health improvements are of course a positive thing, but it does not change the basic logic of industrialised broiler production, which after all is about subsuming the biology of hens, roosters and chicken to the logic of maximising capital accumulation (Boyd, Prudham et al. 2001). To grow flocks of Hubbard JA787 to the size and uniformity required for mass production of chicken meat, capital intensive, complex technological infrastructures are still necessary. The improvements indicate that the change of breed contributed to 'fix' the obstacles that morbidity and mortality rates represent. Moreover, in addition to the change of breed, in 2020 Norsk Kylling committed to accomplishing the animal welfare standard European Chicken Commitment (ECC), with requirements including a lower bird density, environmental enrichments and natural lighting/light in the daylight spectrum (Norsk Kylling 2021a, Norsk Kylling n.d.-b). What these efforts at improving animal welfare might also mean is that other goals than simply biological intensification shape strategies of capitalisation, including the quest for sustainability, as Carton et al. (2017) suggest. This is the topic I will turn to in the next section.

6.2 Changing breed and feed: socioecological fixes for 'sustainable' accumulation

Reitan Retail and Norsk Kylling have invested a lot in 'greening' their business model and getting rid of their bad reputation from earlier scandals, mentioned in the chapter 2. In 2017, their efforts to reduce pollution, cut greenhouse gas emissions, and improve work conditions

[61] The first author being an employed veterinary at Norsk Kylling.

earned them a price called the "Turnaround of the Year" from the eco-certification foundation Eco-Lighthouse (Miljøfyrtårn 2018). Norsk Kylling's goal is nothing less than to become "the world's best value chain for food production" (Norsk Kylling 2021a). This includes always letting animal welfare come first, setting new environmental standards for "the food industry of the future", social responsibility vis-à-vis employees and contracted farmers, supplying high-quality, low-price food to consumers, and – yes, it is still a business – increase profitability (Norsk Kylling 2021a).

In this section, I will critically analyse two aspects of Norsk Kylling's strategy towards "sustainable growth" (Norsk Kylling 2021a), namely the change of chicken breed from Ross 308 to Hubbard JA787, and the quest for new protein sources in the chicken feed, as part of their strategy to become carbon neutral by 2030 is to find alternatives to soybeans. I will analyse the changes in breed and feed as socioecological fixes, meaning that issues of socionatural degradation can represent new sources of profit for capital (Bakker 2015). My argument is that socioecological controversies related to and challenging global food systems, such as poor animal welfare and emissions contributing to climate change, can also represent opportunities for capitalist actors in the food system that manage to, at least temporarily, fix their internal contradictions and crises by expanding or intensifying commodity frontiers, thus spurring new rounds of accumulation. I also argue that these accumulation strategies take place within the changing regulatory framework of the Norwegian agrifood industry, where public deregulation has led to private reregulation and a consumer turn that retailers have known to use in their favour.

Replacing Frankenchicken – 'revolution' as business strategy

In 2017, Norsk Kylling decided to change from the broiler breed Ross 308 to Hubbard JA787, both breeds owned by the world leading genetics company EW group. Ross 308 is one of the most used in the global broiler industry because of its extraordinarily quick growth, high feed utilisation, and extreme uniformity (Bjørkhaug, Vik et al. 2017), reaching its slaughter weight in 29-35 days (Animalia 2022b). Object of widespread criticism from animal welfare groups, health problems like bone fractures and heart failures related to the quick growth have made campaigners name the breed 'Frankenchicken' (Ungoed-Thomas 2022), and the equivalents 'monster chicken' (NAPA 2020) and 'turbo chicken' (Dydland 2022) in the Norwegian context. Norsk Kylling's change from Ross 308 to Hubbard JA787 in 2018 was accompanied by an intense advertisement campaign on television screens, in newspapers, magazines, physical take-away ads at stores, personalised letters sent to consumers, and on their website, boasting about

the revolutionary changes represented by the change to Hubbard JA787 (Bjørkdahl and Syse 2021).

The Hubbard JA787 broiler lives for about 46 days and reaches a slaughter weight of 1.7 kilos, while Ross 308's 10-14 days' shorter life results in a slaughter weight of 1-1.5 kilos (Animalia 2022b).[62] Hubbard JA787 has a 15% lower daily growth rate than Ross 308 (Norsk Kylling 2021a), and is classified as a medium slow-growing hybrid, however the boundaries between standard, medium and slow growing hybrids are not clearly defined (Animalia 2022b). In advertisements, interviews, in their responsibility report and on their website, Norsk Kylling repeatedly writes about Hubbard JA787 that it "grows slower and lives longer" – this is of course true compared to the most used broiler hybrid in Norway, Ross 308.

Nevertheless, these are clearly relative categories defined by an industry where lifespans and growth rates in the first place have been respectively shortened and sped up to an astonishing degree. In the US in 1935, broilers reached a market weight (live weight) of 1.3 kilos in 112 days, in 1955 the numbers were 1.4 kilos in 73 days, and in 1995 2.1 kilos in 47 days (Boyd 2001). In comparison, the ancestor of the modern broiler chicken, the red jungle fowl, can live for 3-11 years in captivity, and has a growth rate only a third of modern broilers (Bennett, Thomas et al. 2018). Some might find it banal to compare modern broilers with their ancestor, as domestication of chickens might date 8000 years back (Bennett, Thomas et al. 2018), and as one informant said, the broilers *are not* jungle hen: they have never seen anything else than the inside of incubators, boxes and barns, and live their lives in optimised inside conditions. I would rather argue that this striking difference illustrates the incredible efforts to intensify the chicken's biology, especially during the 20th century, which help to further contextualise the industry's categories of 'standard, medium and slow growing' hybrids, and the 'revolutionary' aspect of Norsk Kylling's change to Hubbard JA787.

The health problems and high mortality rates with Ross 308 can be understood as biophysical feedbacks of an intensive commodity-deepening, or capitalisation of nature taken 'too far' (Boyd, Prudham et al. 2001, Moore 2011), in the sense that the feedbacks represented obstacles to the production process and subsequent capital accumulation. A broiler farmer explained how the weakness of the breed affected production:

> When I started, we produced a 700 … - 750 gram chicken in 34 days. And when we quit the Ross, then … they were 1.4 kilos, that is, twice as heavy, in 34 days. And then it

[62] The slaughter weight refers to the animal carcasses when the blood has been drained, the entrails removed, and the head and limbs have been removed. The live weight of broilers refers to their weight at the point of catching.

> quite simply went in the wrong direction. We used to be the best in the world. We *were* the best in the world at producing chicken. With growth rates and … And that was partly because we had feed mills that were good, and we had very good routines on cleaning, disinfection, we kept it disease-free … But the hybrid became too weak, he couldn't do it, right? He simply grew himself to death. (Broiler farmer).[63]

Some informants mentioned that Norsk Kylling at some point tried a Cobb chicken subtype as well, which is very similar to Ross 308, but that they did not see particular improvements. With the Hubbard JA787, however, the broiler producers were very content, and confirmed that mortality rates were much lower, that the birds were more active and robust, leading to a lower infection pressure. A chicken service employee also appreciated the change of breed in his catching job. He described that Ross 308 had showed worsening health conditions over time. Their broad chest grew so heavy that the birds would not move when the catchers came to catch them, but the stress from the sound of the engine and the strong lights would lead to "a lot of chicken with a broken heart". Hubbard JA787, on the other hand, was stronger, more mobile, and did not show the same signs of stress during catching.[64] As mentioned, a comparative study confirms the relative improvements especially of cardiac health with the change from Ross 308 to Hubbard JA787 (Forseth, Moe et al. 2023).

The actual genetics development is a part of the supply chain that is extremely concentrated and quite opaque (Bugos 1992, Bjørkhaug, Vik et al. 2017). However, a hatching egg farmer explained that people from the Norsk Kylling management and some farmers did sometimes attend meetings with Hubbard. They would inquire about the company's breeding objectives to "know a little about what awaits us in 1-2-3 years", and were "cheeky enough to put in some wishes" about what these objectives should be:

> But I think they have – what was it that was said – 50 different things that they select for. Parameters … that is, and then they have to have some priority on that, but it differs somewhat according to the feedback they get. … They are shooting far, so they must aim very high. And be very ahead of themselves. (Hatching egg farmer).[65]

This shows that Hubbard JA787 is as much a result of capitalisation as the Ross 308, however in addition to the goal of (re)making nature to "work harder, faster, and better" (Boyd, Prudham et al. 2001, 555), other demands related to animal welfare and sustainability have shaped the process. The hybrid is developed by the EW Group owned Hubbard company, committed to "offer you the widest range of products covering all your needs, ranging from fast growing and

[63] Interview IHS6 040123
[64] Interview IHS4 030123
[65] Interview IHS8 090223

cost efficient broilers (Conventional range) to high value specialty (Premium range) chickens" (Hubbard n.d.-b). Hubbard JA787 is one such 'Premium chicken' developed to respond to "additional quality guidelines, increased consumer demand for high(er) animal welfare standards and production of poultry sold under strong brand names" (Hubbard n.d.-a). In addition to arguably being important goals in themselves, societal concerns related to the animal welfare and socioecological sustainability of food production are taken up by capital and turned into niches for further accumulation. In this case, the process of capitalisation, i.e. the development of chicken genetics, seems to be steered towards a greater symbolical and material distance to unethical commodities, thus adding extra value to the commodity of 'premium chicken' (Werner 2022).

The change of breed was done in collaboration with the Norwegian Animal Protection Alliance (NAPA). The unlikely alliance of an animal welfare organisation and a broiler company was often mentioned in the accompanying media campaign hailing the superiority of the new breed and their improved living conditions (Westrum-Rein and Toftaker 2022, Rema 1000 n.d.-b). The campaign stirred a lot of debate and dissatisfaction, including among farmers delivering to other companies who felt unfairly attacked (Engen 2023). The animal rights organisation NOAH dismissed the change of breed as representing any substantial improvements to the lives of industrial chicken, arguing that a real change towards more sustainable food practices would entail "substituting mass-produced animals with plant-based alternatives" (Halmøy and Dydland 2021).

In their analysis of the media campaign around the shift to Hubbard JA787, Bjørkdahl and Syse (2021, 15) argue that as long as nothing is done to the fact that it is still meat production on an industrial scale, Norsk Kylling are presenting "a revolution where there was arguably nothing more than reform". Nevertheless, the campaign seems to have been quite successful, at least judging from the Sustainable Brand Index's market investigation of consumer perceptions of the sustainability of different brands, where Norsk Kylling's Solvinge brand ranks as number 14 of all brands in Norway in 2023 (Sustainable Brand Index 2023). Bjørkdahl and Syse (2021, 15), however, point at the "systemic failure to understand improvements beyond the status quo as necessary, obligatory, acute, or important. Rather, improving animal welfare beyond the current norm is voluntary and, one might say, just for fun." It might well be that Norsk Kylling are having fun, but this is arguably also a serious strategy to increase the company's market share and profitability.

In addition to the change to a more slow-growing breed, which is one of the requirements of the ECC standard, Norsk Kylling has also, as mentioned, accomplished the rest of the ECC requirements regarding bird density, lighting in the daylight spectre, environmental enrichments and third-party inspection of the implementation of the requirements (Norsk Kylling 2021a). Animalia, the industry-owned research and development organisation, does the third-party inspection. Such private standards, which often go beyond those prescribed by the government, might increase retailers' power in the agrifood chain as they can dictate more details of the production process (Richards, Bjørkhaug et al. 2012). They have been less prevalent in the Norwegian agrifood sector compared to other contexts, but for some time there have been signs that this is changing (Richards, Bjørkhaug et al. 2012, Bjørkhaug, Almås et al. 2015). Norsk Kylling's commitment to the ECC standard, affecting all of the farmers in their supply chain, is an example of this, potentially contributing to the consolidation of Norsk Kylling's power in the supply chain.

Introducing Hubbard JA787 was a socioecological fix to the high morbidity and mortality rates in Norsk Kylling's supply chain. In addition to potentially reducing costs directly related to disease, injuries and death, the new bread and other investments in animal welfare measures through the ECC standard also represent a fix to the problem of bad reputation, as the horror story about Frankenchicken is replaced with revolutionary promises to "metabolize nature differently" (Werner 2022, 241).

In search of new commodity frontiers: alternatives to soy

A central idea of Moore's (2011, 2015) commodity frontier theory is that as capitalism has developed and expanded *through* nature, it has resolved its own contradictions and crises by expanding into new, uncommodified spaces with high ecological surplus. As long as the rate of appropriation in new commodity frontiers was faster than in the existing zones of commodification, continuous cycles of accumulation have been possible (Moore 2015, Baglioni and Campling 2017). The expansion of soybean plantations in existing arable land and recently deforested areas in Latin America is a classic example of this extensive primary commodity frontier (Moore 2015, 265). However, it is also an example of a 'mature' commodity frontier where the ecological surplus gradually deteriorates (Baglioni and Campling 2017), as increasing ecological contradictions like 'superweeds' and rapidly exhausted soils have reduced labour productivity and thus the accumulation of value in this production (Moore 2015). Faced with falling ecological surplus, capitalism's 'double movement' includes the extensive quest for new frontiers, the commodity-widening strategy, and the intensive strategy

of commodity deepening (Moore 2015, Baglioni and Campling 2017). In this section, I explore how Norsk Kylling's ambition to replace soy in their chicken feed can illustrate both aspects of this double movement, an ambition rooted in capital's "theology of endless substitutability" (Moore 2015, 73).

Soybeans are a central ingredient in industrial livestock feed (Weis 2013), and in the feed given to Norwegian broilers, soy, mostly imported from Brazil, represents approximately 75% of the protein sources and 20 % of the total ingredients (Holmen, Hillestad et al. 2020). This is a contentious issue, as these massive monocultures are associated with socioecological issues including rainforest deforestation, displacement of indigenous people and peasants, greenhouse gas emissions, controversies around genetically modified crops, negative consequences of extensive agrochemical use, and the development of 'superweeds' (Weis 2013, Moore 2015, Ezquerro-Cañete 2016, Oliveira and Hecht 2016). All of the soy used in animal feed in Norway is ProTerra-certified, guaranteeing that the soy is not genetically modified and has not contributed to deforestation (Smedshaug, Olsen et al. n.d.). The Norwegian Rainforest Alliance contends that this certification scheme lacks transparency, that buying certified soy does not mean that the same company does not sell uncertified soy in other markets, and that the overall increasing demand of soy – certified or not – increases the risk of deforestation, at least indirectly (Regnskogfondet n.d.).

A decreasing ecological surplus on the soy frontier led to rising production costs and increasing prices worldwide, especially in the decade after 2002 (Moore 2015). After a period of some decline, prices have between 2021 and 2023 again approached the record highs of 2012 (Trading Economics 2023). This is of course a complex issue, but is safe to say that the enormous global demand for soybeans as human food, animal feed, and as an input in biofuels and other industrial markets, makes the price quite volatile (Norwegian Agriculture Agency 2021). This makes it a source of insecurity for Norwegian broiler producers, as chicken feed represents between 2/3 to 3/4 of the total production costs (Holmen, Hillestad et al. 2020). In addition to rising prices, the public awareness of the increasing socioecological contradictions in soy production has contributed to making it a highly politicised topic. These two issues could potentially represent obstacles to the broiler industry's profitability, and the search for new commodity frontiers is thus under way.

Norsk Kylling emphasises that although all their soy is certified and traceable, they still "see a need to innovate" into new raw protein ingredients, and as 80% of their carbon footprint comes from the chicken feed, they are looking to develop "short-travelled, sustainable feed

ingredients" (Norsk Kylling 2021a, 40). Their goal is to produce soy-free feed within 2030. This quest for alternatives to soy includes the involvement in joint projects with the feed mill Norgesfôr, the public research institution NIBIO and some alternative protein companies in developing new feed types with alternative protein sources to soy, namely insects, marine tunicates and microalgae (Norsk Kylling 2021b, Pronofa 2021, Tegnander 2022). These efforts are not unique to Norsk Kylling, as also other actors in the industry are increasing the use of local ingredients and are trying out protein sources like other protein-rich crops, blue mussels, slaughter by-products, seaweeds, and yeast cells from spruce trees (Landbruk24 2021, Retailmagasinet 2021, Nortura 2022).

Pronofa, a spinoff company from Norway's biggest producer of vegetable proteins and oils to the agrifood industry, Denofa, leads the project with soldier fly larvae and marine tunicates. In addition to the partnership between Pronofa and Norsk Kylling, Reitan Retail entered as a strategic owner in 2022 with 10% of the Pronofa shares (Pronofa 2022). The larvae live off bio waste and compost, and the tunicate plantations are said to contribute to reducing the harms of agricultural runoffs as they grow by filtrating plant phytoplankton from seawater (Valmot 2021, Pronofa 2022). The microalgae project is a cooperation between Norsk Kylling, Norgesfôr, NIBIO, and the company Algæ, with the ultimate goal being industrial scale microalgae biomass production (NIBIO 2022). This should happen in big, land-based plants, and ideally use CO_2 from carbon capture and storage technologies in the production (Tegnander 2022). These projects seem to offer 'win-win' solutions that could reduce greenhouse gas emissions and land use outside Norway, contribute to water filtration and the upcycling of waste products, produce healthy animal feed, and ensure profitability for the actors involved while offering cheap food to consumers.

Through the lens of commodity frontier theory, these projects are examples of capital's extensive commodity-widening strategy, as new, relatively uncommodified 'natures', like insects, microalgae and marine tunicates in Norsk Kylling's case, are appropriated and exchange value is created through the labour process (Baglioni and Campling 2017, Banoub, Bridge et al. 2021). However, this appropriated nature does not necessarily lend itself easily to industry-scale production with the potential of substituting soy. In the description of the microalgae project, NIBIO recognises that the "reduction of production costs throughout the production line" is "an important challenge in the project" (NIBIO 2022). A lot of research and development of technology and infrastructure is probably needed to find economically profitable solutions. Although I have not been able to find many details about these projects, it

seems clear that they involve capital-intensive, high-tech solutions, and that the planned large-scale production serves as an example of commodity-deepening and the production of 'capitalised nature' (Moore 2015).

Moore argues that the idea of endless substitutability rests on the illusion of an interminable world and argues that although capitalism is a "relentlessly" flexible way of organising nature, the commodity frontier strategy does not "unfold through infinite time and space", but is ultimately based on unrepeatable events (Moore 2015, 73-74). The extensive and intensive strategies of the search for new protein sources might well lead to new ecological contradictions. It is hard to judge these projects at this early stage and without more information. However, Guthman and Biltekoff's (2021) study of alternative protein companies in the US puts into question the industry's promise of hardly any ecological impact, for instance when it comes to land and energy use. They also add that the industry's lack of transparency forecloses democratic insight and decision-making and contributes to the insecurity of how ecologically sustainable this kind of protein production really is (Guthman and Biltekoff 2021).

The quest for alternatives to soy in the chicken feed represents capitalism's double movement. The search for new 'natures' to be appropriated and commodified as protein sources is combined with research into how the production of these natures can be done on an intensive, industrial scale. If successful, this could result in fixing some of the controversies of the soy dependence. Interestingly, local, alternative protein production could represent a spatial fix in the opposite direction of the typical case of firms fixing a problem of pollution or high production costs by outsourcing activities to countries with looser regulation and/or cheaper labour power and resources (Ekers and Prudham 2017, Gómez-Baggethun 2020). In this case, the dependence on land outside Norway is one of the problems that needs fixing, and the very level of globalisation of the production network could be reduced through a kind of 'backsourcing'. Potentially, this could allow Norsk Kylling to tap into the ideals of the local food movement, where 'short-travelled' (*kortreist* in Norwegian) resources are highly valued, a discourse that seems to be growing in popularity in the Norwegian context, although mostly associated with small, alternative food actors (Vittersø 2012, Hvitsand 2016).

Norsk Kylling's accumulation strategies and changing modes of regulation in the Norwegian agrifood system

Norsk Kylling's changes of chicken breed and feed in the name of sustainability show how processes of subsumption, or expansion and intensification of commodity frontiers,

increasingly take into account emerging societal concerns for socioecological issues like animal welfare and climate change. Recent debates about capitalism's subsumption of nature highlight how public regulation (or lack thereof) facilitates and challenges firms' accumulation strategies, as these kind of accumulation strategies must adapt to dominant modes of regulation, including rules, institutions and patterns of conduct (Carton, Jönsson et al. 2017, Cooper 2017). As described in the background chapter, the Norwegian broiler industry has been increasingly deregulated in recent decades. Since 2007, the industry is exempt from the social corporate market regulation system, and due to the level of vertical integration, regulatory aspects have been transferred from the hands of the state and the farmers' cooperatives to the lead firms and/or retailers. Concession limits still regulate the size of farms, but these have been considerably enlarged in recent years. Likewise, NFSA's role is increasingly one of monitoring the industry's self-regulation (Vik and Bjørkhaug 2015, Bjørkhaug, Vik et al. 2017). This has happened in a wider context of increased market-orientation and weakened public control in the agrifood industry (Almås 2002, Olsen 2010, Bjørkhaug, Almås et al. 2015), as well as a strengthened discourse of consumer power (Asdal and Moser 2008, Rem 2008).

Increasing societal concern about issues of sustainability might pose a threat to future capital accumulation, as regimes of accumulation depend on social modes of regulation to maintain stability (Cooper 2017). The strengthened importance of consumers in the mode of regulation in the Norwegian agrifood industries thus shapes how Norsk Kylling pursues renewed accumulation through expanding and intensifying commodity frontiers. The authorities' assignment of responsibility and power into consumers' hands have effects in the supply chain, as Norsk Kylling has clearly picked up on the consumer turn. In their quest to become "the world's best value chain for food production", they pursue "sustainable growth" by doing "what's right, because it's profitable and because the consumers of the future will demand" it (Norsk Kylling 2021a, 3). Following Ekers and Prudham (2017), although capitalist fixes may indeed lead to environmental improvements, they are also strategies to reproduce the capitalist system, with consequences for distribution of power in production systems. In the case of the Norwegian broiler industry, it is highly debatable whether the consumer turn actually leads to a real power shift in consumers' favour (Asdal and Moser 2008, Rem 2008, Tranøy 2015). Rather, the retailer-led market-orientation might reduce the room for agricultural politics, including the ability of public authorities, citizens and farmers to influence this (Rem 2008, Richards, Bjørkhaug et al. 2012, Norwegian Ministry of Agriculture and Food 2016).

6.3 "You can sleep at night, at least, because you know you've done what you can": biosecurity as a fix to living with risk

Although the Norwegian poultry industry has been spared some of the infection pressure compared to other countries, infectious diseases and efforts to combat and avoid them are entangled with the industrial production of chicken meat, also in Norway. The current global outbreak of HPAI is an unprecedented situation given its geographical expansion and the enormous number of sick and dead wild and domestic birds, a situation aggravated by the zoonotic potential (EFSA 2022, NIPH 2023). As of May 2023, HPAI has not been registered in commercial poultry flocks in Trøndelag, but the outbreaks in commercial poultry flocks in Rogaland 2021 and 2022, along with registrations among wild birds along the entire coast, including Trøndelag (Granstad, Rømo et al. 2023), led to a nation-wide tightening of biosecurity and monitoring measures. However, an impression from my fieldwork was that HPAI was experienced by many as one new risk within a broader 'disease context', both because living with risk is not something new for the industry, and because other diseases could be higher on the agenda in the immediate situation for farmers. This means that biosecurity has been a central topic in the industry for a long time, and that new measures related to HPAI are developed within an already existing framework.

In this section, I will therefore analyse what my informants said about HPAI, but also about the wider disease context in the broiler industry in Trøndelag, with a focus on experiences of living with risk. Further, I will explore what biosecurity implies for the different actors in the supply chain in the sense of actual consequences in the activities related to broiler production. Finally, I will discuss how the rollout of biosecurity measures, the conventional response to increased disease risk by attempting to demarcate safe insides from dangerous outsides, can be analysed as a fix to overcome contradictions partly of the industry's own making.

"We must hope that we're spared": HPAI in a wider disease context

While recognising the severity of the current HPAI outbreak, several of the informants explained that the prevention of infectious diseases was something the industry was constantly working with. From this perspective, and perhaps especially since it had not hit poultry producers in Trøndelag yet, HPAI did not seem to represent something completely new. Although there was a broad agreement that things mostly worked quite well, farmers with several years of experience in the industry talked about the various challenges related to bird health and diseases throughout the years. Examples from the interviews of this wider disease

context included bacterial infections from *E. coli* that could lead to high mortality rates for chicks, the regular testing by all farmers for salmonella, and the increased risk of chicken carrying *Campylobacter* every summer season. Findings of the antibiotic resistant ESBL bacteria in Norwegian chicken meat led to public outrage in 2014, and in 2016 the industry decided to phase the antiparasitic and antibiotic agent narasin, routinely added to the chicken feed (Øvreberg 2017). Used to prevent the intestinal diseases of coccidiosis and necrotic enteritis (Norwegian Veterinary Institute 2021), some farmers connected this phase-out with an increase in cases of these diseases. However, phasing out narasin had also led to strengthened hygiene and biosecurity measures like infection sluices and barn cleaning and disinfection.

First registered in a broiler flock in Trøndelag in the summer of 2022, some months before my fieldwork, an outbreak of infectious bursal disease, an immunosuppressive viral disease also known as Gumboro, spread among broiler producers in Trøndelag and other regions (Norwegian Veterinary Institute 2023b), affecting some of my informants. Some broiler producers delivering to another company had to cull entire flocks because of Gumboro, but no Norsk Kylling producers had to do this. As the other producers had longer transport distances to the slaughterhouse, the flocks were not deemed healthy enough to tackle the long drive, while a shorter transport distance reduced the losses for Norsk Kylling producers. Some informants also explained that they had been less affected because of the new and more robust breed. The outbreak led to overall strengthened biosecurity measures including more disinfection and reduced visits between farms. Within a couple of months, the industry actors initiated a vaccination program (Svendsen 2022b). Broilers got vaccines via their drinking water until vaccination of parent animals was organised, in order to obtain hereditary immunity. The catching team had assisted the parent animal vaccination, and an employee acclaimed Norsk Kylling's quick action in this regard: "Norsk Kylling cancelled this very fast. I was impressed."[66] This was the first big outbreak of Gumboro in Trøndelag ever (Svendsen 2022a), illustrating what several informants described as a situation of changing infection pressure.

There seemed to be a shared understanding that infection pressures were changing, and that the broiler industry in Norway in general, and Trøndelag in particular, which for a long time had been spared many of the diseases affecting other regions, might be in for some new threats. Compared to Rogaland, Trøndelag has a smaller density of farms, less migratory birds, colder winters hindering the spread of microorganisms, and a greater distance to the big outbreaks in

[66] Interview IHS4 030123

Europe. A broiler producer emphasised the favourable climatic conditions of Trøndelag compared to Rogaland and Denmark:

> They don't have as strong, cold winters. You know, the winter we've had now, minus 10, 12, 15 [°C], right, and ground frost – it's great stuff. We can reset to an enormous degree. But if you're at plus [°C] all the time, like Denmark, right? They are at … favourable conditions for bacteria and virus and the whole package, right? … So we're quite well located in that respect. That's why we've had partially better results for chicken up in Trøndelag than in Rogaland. (Broiler farmer).[67]

Although the infection pressure in general might have increased in recent years, the coming and going of different diseases was something they were quite used to in the industry. One broiler producer said: "There will be these waves, I'd think, with different diseases and stuff. It is a very big concentration of birds in one place".[68] A company veterinary expressed a similar prediction about future development:

> I think that one will always get some more new types of diseases, maybe some more exotic diseases that have not been in the North before. And that is not unique to poultry; it will probably be like that across the board, that new diseases emerge. So in a way, biosecurity is a bit threatened anyway, when people travel a lot, and there is import and export and climate change. (Company veterinary).[69]

One of these new threats is HPAI, registered in Norway for the first time in 2020 (Norwegian Veterinary Institute 2022a). HPAI is a so-called 'list 1-disease' on NFSA's ranking of monitored animal diseases. Diseases are classified as list 1, list 2 or list 3 diseases according to their severity and infection potential, list 1 being the most severe (NFSA 2022a). Newcastle disease is another list 1 disease that was registered in Norway during the autumn of 2022, among wild birds in Eastern Norway and in one commercial poultry flock in Rogaland, the second registration in commercial poultry flocks ever in Norway (Norwegian Veterinary Institute 2022c, NFSA 2023). This outbreak contributed to the impression among some farmers that big outbreaks, which used to be something far away, were getting closer:

> If you look at what happened in Rogaland: you had avian influenza and then you had Newcastle disease. And then the pigeons in Oslo. That is not so far away! And yeah, now maybe two years have passed since it [HPAI] was discovered for the first time here, in Norway. And then we know that it has been in Sweden, in Southern Sweden, at least. So I think those things just get closer.
>
> Especially the last two years we have been reminded of how bad it can really get. Before, it was like something that they were doing down in Denmark or Sweden or Germany,

[67] Interview IHS6 040123
[68] Interview IHS3 020123
[69] Interview IHS13 220323

> the Netherlands. It won't happen to us. But now it is so close that many people are talking about it. (Hatching egg farmer).[70]

Nevertheless, despite an awareness of the very serious consequences an HPAI outbreak could have, most producers said that it was not something they were constantly afraid of:

> I am worried about getting it; I don't want to get it into the house, of course. But that I walk around looking up for birds every day, no, I don't do that. I don't walk around and worry every day about avian influenza. (Broiler farmer).[71]

When HPAI emerged and spread in Norway from 2020, poultry producers all over Norway including Trøndelag were encouraged by the authorities to strengthen their attention to biosecurity measures. Apart from this, my informants mentioned few noteworthy consequences in their daily farm work lives. A broiler farmer answered to whether his biosecurity routines were affected:

> We follow the same [contingency plan] all the time. … we get some e-mails about it when there is an outbreak, … we are notified about it. Just that we have to be even more attentive, but we run the same strict line all the time … So there are no changes, that now we all of a sudden have to start doing something completely different. That kind of thing doesn't happen.
>
> *Are there other ways that the infection risk affects the producers? (Interviewer)*
>
> No, perhaps not, at least not as long as one avoids it. But one can surely ask, if one had been a neighbour or come across it in Rogaland, there they probably have a different answer. But as long as one hasn't experienced it, then there aren't. (Broiler farmer).[72]

An exception was a producer of the premium broiler Stange Landkylling™, which unlike the rest of the broilers had an outdoor area that was closed off because of a curfew imposed by NFSA in 2020 (Stokdahl 2020). Although there was no NFSA imposed curfew at the time of the interview in January 2023, Norsk Kylling still maintained it for this broiler farmer: "It is still in place, yes. I guess they are working to find out how contagious it is. … I think maybe they don't know enough about it, that that is where the matter lies. They don't dare to … Before they have found out more."[73]

Wild birds were widely regarded as the biggest threat, and several informants expressed some worry about changing migration patterns that led to more wild birds passing through Trøndelag. However, apart from keeping the vegetation down around the farm, avoiding contact with dead wild birds, keeping the farmyard free from feed scraps and other things attracting wild animals,

[70] Interview IHS8 090223
[71] Interview IHS3 020123
[72] Interview IHS2 211222
[73] Interview IHS5 030123

there seemed to be a shared sentiment that there was not much else to do about the wild birds. A broiler farmer discussed the possibility of regulated hunting reducing the population of pink-footed geese migrating through the area: "You have no chance, no possibility. ... I think that is completely impossible, really, shooting her down. It won't work. … It is an impossible task."[74]

Another potential source of infection that some farmers identified was fomites, i.e. objects or materials imported to the farm that can carry infection. In this regard, you just had to trust that proper measures were also taken further upstream the chain, where they came from. Two farmers mentioned special haystacks used as environmental enrichments imported from Europe as a potential risk:

> It is heat-treated so that we are sure it doesn't come with any of that filth up to us. Well, we hope that is the case. … And then you can say, let's say they heat-treated this Lucerne hay, but then it is packed on pallets, and then it is left in storage. And then you can say a mouse comes in, which joins [the hay] upwards. And then we don't see that when we spread it out in the house. No, there are a thousand ways of getting it. It is scary to be doing this. (Hatching egg farmer).[75]

HPAI is a serious threat to the broiler industry, but the current outbreak seemed to be experienced and interpreted by my informants within a frame of a wider disease context. This illustrates what was discussed in the previous section about the ecological indeterminacy of an industry like this, which works by enhancing the productivity of biophysical processes, but must constantly deal with the obstacles and surprises arising in the production process (Boyd 2001, Boyd, Prudham et al. 2001). The range of infection-related challenges that the actors in the broiler industry deal with makes disease control a constant issue, and an integral part of the normal operation of broiler production. This might lessen the feeling of urgency among the involved actors, especially as none of my informants had experienced a HPAI outbreak in close proximity. This quote by a farmer exemplifies the widespread impression of actors who kept their composures: "No, we must hope that we're spared. [That we] stay on the level that we are at now, yes, that there won't be any more."[76] Moreover, as I will discuss as follows, all informants expressed a strong belief in the biosecurity measures that were implemented along the supply chain.

[74] Interview IHS6 040123
[75] Interview IHS8 090223
[76] Interview IHS5 030123

Biosecurity along the supply chain

Biosecurity is a fundamental aspect of industrial broiler production, and my informants explained that they always maintained a minimum, basic level that includes sluicing in and out of barns, and strict hygiene and disinfection routines in all parts of the supply chain. Several informants argued that the all in/all out principle in broiler production, i.e. that all birds in a batch arrive at the farm, and are transported out of it, at the same time, is a great advantage for the poultry industry, because this allows for "resetting" conditions between each batch. According to both managers and farmers, the poultry industry has been working with biosecurity for many years, and the all in/all out principle makes it easier to establish sluices and hygiene zones compared to other meat industries. A broiler former was confident of the industry's good routines: "I would maybe say that we in the poultry industry at the basis have very good routines for infection sluices and all that. On that point, I think we are at the very top. … There have always been clean and unclean zones and the whole package, right?"[77]

A central element of the biosecurity program are contingency plans, both at the overall level and for the individual farms. With rules and demands from the NFSA and Animalia as a basis, Norsk Kylling elaborates their own routines. Farmers can base their individual contingency plans on templates from Animalia but need to adapt them to include the specific infrastructure of their farms.[78] The contingency plans say which biosecurity measures are to be realised according to the different contingency levels. In the case of HPAI, there are four levels depending on the presence and proximity of HPAI observations, both in wild and domestic birds. Measures include alerts to producers, the NFSA and other actors in the poultry industry, and changes in the routines at hatcheries, for farm visits, transfer of birds, and egg transport. A leader group including several people from the management and company veterinaries hold the chief responsibility of the contingency plans and decide which level they should lie on, based on the monitoring of the infection situation.[79] The impression from the interviews with the Norsk Kylling management was that quite a lot of time and resources were invested in monitoring the infection situation, developing action plans, and keeping all actors informed at all times.

Across the line, informants stressed the importance of efficient information flow along the supply chain. For instance, the Norsk Kylling management uses the business communication

[77] Interview IHS6 040123
[78] Interview IHS8 090223
[79] Interview IHS1 201222

platform Workplace to continuously update producers, drivers and others associated in the broiler chain about the current infection situation, in addition to e-mails about particularly urgent information.[80] Information also flows the other way around:

> When they get new information, we who are working with this also receive it at once. So then measures are introduced as soon as they come. … We have this platform where we communicate both ways. If we have something to comment to them, then, it goes back and forth. … It flows very well. (Chicken transport driver).[81]

Several informants said that both sharpened biosecurity standards and the change to a more robust broiler breed countered the increasing infection risk, like this hatching egg farmer: "The risk of infection in our surroundings is bigger, but then the way we operate our houses has improved, so then maybe the risk is not that much bigger in the end, if we just do what we are supposed to."[82]

All informants expressed a quite strong belief in their biosecurity routines, both their own and that of other actors in Norsk Kylling. Strict biosecurity routines were already in place before the current HPAI outbreak, but a couple of producers said that the current situation had made them more aware. As one farmer said: "Now we are maybe *doing* it a bit more, what we *said* we did before. Yes, it has sharpened up."[83] There also seemed to be an understanding among all the informants that no matter how strict the biosecurity measures, one could never be entirely sure that HPAI or another infectious disease would not hit. The best thing to do, then, was to follow the biosecurity routines and hope that they worked, so that if an outbreak were to occur, at least one had done what was in one's power.

> Of course, one is worried … Quite big things could quickly come from it. It could be more consequential than what you imagined beforehand, if it should occur. So one does what one can to try to avoid it. But they surely did that too, where they got it, they didn't take it in on purpose, like, they didn't let wild birds in – so it can come without one understanding why, too. … But one must at least make sure that one does what one can, that one feels that one has done that and has not been sloppy with the biosecurity advice we have, and the measure plan. So, like, if one has a good conscience about that, then at least one knows that one has done one's best. (Broiler farmer).[84]

> We focus on doing this how it is expected of us, spending our energy following the rules, rather than trying to avoid them, at least. Then one can sleep well during the night,

[80] Interview IHS13 220322
[81] Interview IHS9 090223
[82] Interview IHS8 090223
[83] Interview IHS8 090223
[84] Interview IHS2 211222

> at least, because you feel that you have done what you can. And then it can happen anyway, but that, that's how it is. (Hatching egg farmer).[85]

Several informants said that the focus on biosecurity had increased during recent years, independently of and since before the current HPAI outbreak. One farmer connected it to a broader effort to enhance quality initiated from Norsk Kylling:

> How is it now contra how it was when I started? … Quite a big change and a lot of focus on this with infection control and quality and climate footprint and the whole package. Huge difference. But it is partly because Norsk Kylling has put the focus on it themselves, and then it sort of spreads downwards, because it doesn't help that those at the top focuses on it if they don't get the whole value chain with them. (Hatching egg farmer).[86]

The two informants from the chicken service company confirmed the importance of biosecurity routines in their activities, and the manager explained that Norsk Kylling gave them "strict rules to adhere to"[87] that always included changing clothes and showering between different farms, and then some extra measures like increased disinfection and sluice use during disease outbreaks. For the transport company, cleaning and disinfecting cars between each farm was the most important biosecurity measure. A chicken transport driver said, "We follow that line all year, really. Whether there is infection around us or not, we have a line that we follow, and then … we have another notch to prevent even more. So we're actually quite ahead of infection, you could say."[88]

In the case of outbreaks of severe infectious diseases in the poultry industry, the common procedure is to demarcate a protection zone with a minimum radius of 3 km and a surveillance zone of 10 km (Dyresykdomsbekjempelsesforskriften art. 21 2022), within which there are designated measures. Norsk Kylling's upstream production director explained that they had maps on which potential protection and surveillance zones around farms, hatcheries and the slaughterhouse were drawn. As mentioned in the previous chapter, the hatcheries and the slaughterhouse were located with these zones in mind, to reduce the consequences of a potential outbreak. He also explained that independently of the different contingency stages for HPAI, the slaughterhouse and the hatcheries maintained the strictest biosecurity level at all times. [89]

Because of regular monitoring of the chickens' health at the farms, the concern for HPAI and other infectious diseases is mostly relevant up to the point of slaughter. In principle, sick birds

[85] Interview IHS8 090223
[86] Interview IHS8 090223
[87] Interview IHS4 030123
[88] Interview IHS9 090223
[89] Interview IHS1 201222

should be taken out before, or during catching, and not reach the slaughterhouse.[90] At the point of the factory, the current HPAI outbreak did not seem to be a source of worry. Veterinaries check the birds' general health status at arrival, as other pathogens might be a concern. Salmonella bacteria is one such potential risk, however factory employees explained that regular tests at the farms mostly captured this before the broilers came this far.[91] *Campylobacter* and *E.coli* are other bacteria that can contaminate the meat, and regular tests were done at the in-factory lab. In the case of *Campylobacter*, infected birds were slaughtered at the end of the day to hinder further contamination, and the line workers would wear facemasks and be extra cautious, but it did not have big consequences beyond this. Hygiene standards seemed to be very strict in general, with regular quality controls at the different factory departments, for, as workers at the factory explained, the quality demands of consumers allowed for no sloppiness.

High hygiene and food safety standards are of course of key importance in the meat industry in general (Prestvik and Rålm 2014), and as a regional union representative with a background in the red meat industry said in an interview, the detection of a tiny amount of unwanted bacteria would lead to the disposal of tons of meat.[92] Regular quality controls and the meticulous separation of clean and unclean zones indicate that the production of meat comes with risks along the entire supply chain. This illustrates that the ecological indeterminacy of producing chicken does not end once the birds are slaughtered, as different pathogens might also thrive in the raw meat, potentially hindering the realisation of the value created in the production process.

Demarcating dangerous outsides from safe insides: biosecurity as a fix

Infectious diseases like HPAI could have serious economic consequences for actors in the supply chain (Tullis 2022), and biosecurity can be viewed as an attempt to fix this potential problem by preventing, managing and controlling outbreaks. Confronted with this unpredictability, demarcating clear boundaries between clean and unclean zones, 'wild' and domestic nature, characterises the measures that are proposed and implemented in Norsk Kylling's supply chain, in line with advice from veterinary authorities (Granstad and Rømo 2022, NFSA 2022b, WOAH 2023a). Strengthened measures include adding another level in the sluicing in and out of barns and covering the ground outside chicken houses with a fixed material to facilitate cleaning. Other potential measures discussed during interviews included vaccination and technologies that could reduce the transport of live birds, like a new technology

[90] Interview IHS9 090223
[91] Interview IHS10 100223
[92] Interview IHS7 050123

allowing for the hatching of eggs directly in broiler houses instead of transporting day-old chicks. As many of the informants admitted, complete control is impossible, and the best you could do as a farmer was follow the rules and recommendations coming from those with authority, and hope for the best. While NFSA is still an important public authority in this regard, Norsk Kylling in many cases works as a node spreading information to the actors in the supply chain. The upstream production director expressed something similar from the point of view of management, confirming their opinion of being in control of their own supply chain – but they couldn't know what other actors in the industry were doing.[93]

Biosecurity measures are characterised by the demarcation of safe 'insides' from unsafe 'outsides' (Nerlich, Brown et al. 2009), and the protection of "established and valued life from emergent, transgressive and undesirable life" (Clark 2013, cited in Dixon 2015, 92). The understanding of diseases as coming from an 'outside' was apparent in many of the interviews. Discussing the potential sources of HPAI, informants mentioned wild birds, rodents, insects, fomites such as feed and imported haystacks, hobby poultry, and people moving between different sites along the supply chain including catchers, drivers and veterinaries. Several farmers worried about wild birds flying over or grazing close to the farms, and some mentioned changing migratory patterns as a potential source of concern, sometimes connecting it with climate change. Although a couple of informants mentioned the vulnerability of keeping several thousand birds concentrated in one place, no one questioned the production model itself. There is a possibility, however, that biosecurity cannot offer much more than a temporary fix.

Taking seriously the many warnings that infectious diseases including HPAI emerge and increase their virulence within intensive livestock farming systems like industrial broiler production (Davis 2005, Weis 2013, Dixon 2015, Wallace 2016, Gilbert, Xiao et al. 2017, Mourkas, Taylor et al. 2020, Wallace, Liebman et al. 2020), implies recognising that part of the problem is the industrial production model itself. This does not mean, of course, that HPAI outbreaks will inevitably reach broiler producers in Trøndelag, or that HPAI is determined to evolve into a human pandemic. Nevertheless, there is broad consensus that there will be new human pandemics in the future (IPBES 2020, Marani, Katul et al. 2021, Smith 2021), and although there are differing views about the pandemic potential of HPAI (Wallace 2009, The Economist 2023), it would not be the first time that an avian influenza virus developed into a zoonotic epidemic (NIPH 2023). From this perspective, increasing biosecurity standards across

[93] Interview IHS1 201222

the supply chain can be seen as a fix to the internal contradictions of industrial broiler production, possibly keeping away outbreaks, at least temporarily, but failing to address the systemic contradictions within the production model of the broiler industry. Of course, the problem of infectious diseases is global in scale, and the same goes for the industrial livestock industry as a potential driver. This makes it difficult, if not impossible to 'do something' with the problem at the supply chain level, or even at a national level. Abandoning industrial livestock production in Norway would not stop a pandemic from spreading across the globe, precisely because it is a global problem.

6.4 Chapter summary

I have now analysed Norsk Kylling's broiler supply chain through the lenses of commodity frontier theory and socioecological fixes, within the context of the consumer turn and the deregulation of the Norwegian broiler industry. I asked, '*how do socioecological fixes related to ecological challenges including disease risk manifest in Norsk Kylling's supply chain, and with what effects to the organisation of nature and the distribution of work, profits and power?'* As way of responding to this question, I have argued that the complex technological systems in broiler production systems reveal the fragility of this kind of capitalised food production, as the broilers' lives, and ultimately the production and realisation of value, depend on this sophisticated infrastructure. I have further shown that Norsk Kylling's change of broiler breed represents a socioecological fix to obstacles stemming from this very vulnerability, and to the controversy surrounding related animal welfare issues. Analysing the quest for alternative feed ingredients as another socioecological fix to the controversial dependence on imported soy, served to illustrate how increasing societal concerns about sustainability shape firms' accumulation strategies, as the stability of the regime of accumulation in which they operate depends on the mode of regulation. As Norwegian authorities and farmers' cooperatives have seen their regulatory power weakened under increasing pressure from internationalisation and market orientation, firms like Norsk Kylling have adapted their accumulation strategies to respond to consumer concerns about the sustainability of the food system. Retailers' dominant position in the agrifood chain seems to allow them to shape this process in their fashion. Finally, I have argued that biosecurity measures along the supply chain can be seen as a fix to the potential crisis of infectious diseases like HPAI, as the very production model contributes to this increased disease risk. Following Irarrázaval and Bustos-Gallardo (2019), firms' abilities to overcome obstacles linked to infectious diseases, including reputational aspects of this, could strengthen their competitiveness vis-à-vis actors in the same sector. With their comprehensive

biosecurity program, Norsk Kylling appears to take this challenge seriously, an effort acknowledged by actors in the supply chain. Within a global situation of unpredictability, for the time being this might further consolidate their position in this industry and thus stabilise the retailer rule in the Norwegian agrifood industry.

Chapter 7 – Conclusion

In the preceding chapters, I have presented my case study of Norsk Kylling's fully integrated broiler supply chain. Against the backdrop of ongoing political and regulatory changes in the Norwegian agrifood system, I have explored how various socioecological issues that are rising on the global political agenda, including emerging infectious diseases like the current HPAI outbreak, push firms like this retailer-owned broiler company to adapt their accumulation strategies. I have further discussed what consequences this might have for the social relations of production in the supply chain, and for power relations in the wider Norwegian agrifood system. In this final chapter, I will summarise my main findings and reiterate how they have allowed me to answer my research questions. Finally, I show how my findings contribute to fill research gaps identified in the literature review, and point at implications for further research.

The research presented in this thesis has been guided by my main research question of how corporate responses to socioecological issues including disease risk, in particular related to avian influenza, interrelate with the social relations of production in a fully integrated broiler supply chain in Norway. I have sought to answer this question by conducting a qualitative analysis of data from my multi-sited fieldwork along Norsk Kylling's supply chain, leaning on relevant concepts and insights from agrarian political economy, political ecology, human geography and GPN/GVC scholarship.

I formulated two sub-questions that guided my two analysis chapters. First, I asked in what ways responses to disease risk in Norsk Kylling's supply chain affect social relations of production and power relations along the supply chain. To answer this question, I first analysed the distribution of work, ownership and income among actors in the different parts of the supply chain, focusing particularly on the contractual relationship between farmers and the lead company, and on the reliance on low-wage, often immigrant labour at various stages in the supply chain. I then described and discussed the importance of logistical technologies and infrastructures for the efficient operation of the JIT system of broiler production.

By dictating many of the production conditions for the contracted farmers, in addition to demanding a thorough insight into their performances, Norsk Kylling exerts considerable power over the production process. Nevertheless, despite the unequal power relation given farmers' dependence on their contract with the lead company to deliver their products, they seemed to enjoy a relatively favourable economic situation, helped by the growing demand

for chicken meat in the Norwegian market. Farmers negotiate their conditions in producer associations, and Norsk Kylling seems to have both the capital and the will to meet producers' demands, something which I analysed both as a response to former negative media attention and as an adjustment to the social corporate tradition where farmers have held a relatively powerful position through the cooperatives. The negative media attention had also contributed to the improvement of factory workers' situation, as the new management under Rema 1000's ownership wanted to reduce the reputational risk. Workers unionising was also important in this regard, however, factory work is still characterised by relatively low wages and repetitive, monotonous work tasks. Recently, Norsk Kylling has attempted to tidy up in the previously informal catching and cleaning business. My findings point to an increasing formalisation of the social relations of production that might legitimate the lead company's powerful role in the broiler supply chain, and further strengthen the holding company Reitan AS' expansion into the retail, convenience and mobility markets in Norway and beyond. By adjusting, but also adjusting to, the social corporate regulations and institutions of Norwegian agrifood capitalism, Norsk Kylling asserts their position, and this contributes to stabilising the retail-led accumulation regime.

A range of actors are directly and indirectly involved in the fragmented process from the import of parent animal eggs to the sales of chicken meat in Rema 1000 supermarkets, and making this work efficiently requires tight logistical control. I described how the need to coordinate transport between various sites in the supply chain shapes the geographical locations of farms and other production sites, and how disease risk plays into these logistical decisions, as the benefits of short transport distances are weighed against the danger of contagion between concentrated production sites. Through engaging in close cooperation with actors like farmers and the transport company, but also by employing techniques of monitoring and disciplining, Norsk Kylling maintains tightly knit relationships between themselves and the other actors involved in the supply chain. I interpreted this as part of a more comprehensive effort at logistical control, and I argued that this strengthens the lead firm's power in the management of the supply chain in its totality.

In the second sub-question, I asked how socioecological fixes related to ecological challenges including disease risk manifest in Norsk Kylling's supply chain, and with what effects to the organisation of nature and the distribution of work, profits and power. I developed my answer to this question through an analysis of the sophisticated technological systems required to maintain the fragile lives of broiler chickens. I then examined Norsk Kylling's responses to

the problems arising from this fragility, and from the dependence on soy in chicken feed, before I critically discussed biosecurity as the main response to increasing disease risk.

Broiler chickens are the outcome of intensive breeding to make them operate as a productive force. This capitalisation of the nature of chickens has made them depend on the capital-intensive, complex technological infrastructure on chicken farms to survive and grow in the way required by the industry logic. While allowing for astounding degrees of control and efficiency in the production process, the technological systems also reveal the inherent fragility in this type of meat production, as small deviations from optimal conditions can have serious consequences for the growth rate and the general health of the chickens. High levels of mortality and morbidity in the fastest-growing broilers have led to both direct economic losses and negative attention from activists and the media, pushing some firms, including Norsk Kylling, to change broiler breed to the slower-growing and more robust Hubbard JA787.

I interpreted this as real subsumption or capitalisation of nature leading to obstacles to further accumulation, and the change of breed as a socioecological fix to overcome these obstacles. This fix is also pursued through real subsumption of nature, but in addition to intensified biological productivity, subsumption is also aimed at responding to concerns about animal welfare and sustainability. Norsk Kylling's pursuit of alternative protein sources to substitute the controversial soybean is another attempt at a socioecological fix to the falling ecological surplus at soy frontiers, and to societal concerns related to this production. In this case, the extensive strategy of appropriating new 'natures' – specifically, insects, marine tunicates and microalgae – that can be commodified, is combined with intensive capitalisation in the research projects aimed at scaling up the production of alternative protein sources.

The importance of societal concerns about sustainability as drivers of the changes of broiler breed and feed shows how firms' accumulation strategies through appropriation and capitalisation must adjust to the changing modes of regulation. In the context of the Norwegian agrifood system and the broiler industry more specifically, the weakened regulatory role of the state resulting from internationalisation, increased market orientation and active deregulation, has been accompanied by a transfer of power and responsibility to consumers. Norsk Kylling's adaptation of their accumulation strategies to respond to consumers' concern about the sustainability of industrial broiler production thus illustrates the importance of the mode of regulation in stabilising the regime of accumulation in which the company operates.

Parting from the critical literature claiming that the very production model of industrial broiler production contributes to the emergence of new and more virulent infectious diseases, including HPAI, the comprehensive biosecurity program along Norsk Kylling's supply chain can be seen as a fix to living with the risk of disease outbreaks, without questioning the production model. At the same time, the global scope of both the production model and the HPAI outbreak makes it difficult if not impossible to change the situation on a supply chain level. Biosecurity measures may thus work as a fix by reducing infection risk at the local level, although the impossibility of completely separating clean and safe insides from dirty and dangerous outsides makes it a highly insecure strategy, as illustrated by disastrous outbreaks also on farms with strict biosecurity routines. Nevertheless, Norsk Kylling's strict biosecurity measures might strengthen their competitiveness in the industry, at least temporarily.

To sum up, I have argued that Norsk Kylling's increased control over and legitimacy in the social relations of production, and their robust logistical infrastructure, represent advantages that help successfully monitor disease risk and implement disease prevention. Increased disease risk and responses to this, then, might strengthen the lead company's efforts to consolidate their powerful position in the supply chain. Socioecological fixes related to ecological challenges including disease risk manifest in Norsk Kylling's supply chain as attempts at making accumulation strategies more sustainable, because socioecological controversies represent both direct economic costs and potentially negative reputation among consumers and in the media. The changing mode of regulation in the Norwegian context has both pushed Norsk Kylling to respond to such societal concerns, and at the same time, the retailer-led market orientation has strengthened the company's possibilities to shape this response in its own fashion and reap considerable profits along the way. A likely consequence is that Norsk Kylling and Reitan Retail consolidate their dominance vis-à-vis public authorities, consumers, farmers and other actors in the supply chain.

I hope that the insights presented in this thesis might contribute to fill research gaps concerning the dynamic class relations in the Norwegian agrifood industry, especially when it comes to contract farming. Further, by identifying logistics as a key area where firms like Norsk Kylling exert and consolidate their power in the agrifood industry, especially faced with increasing disease risk, I have pursued an agrarian political economy analysis beyond the farm and the sphere of production. My examination of the relations between socioecological fixes and a changing Norwegian regulatory context is a contribution to the debate about the

relationship between firms' subsumption strategies and modes of regulation. This thesis has also shed light on how firms' abilities to respond to ecological obstacles might affect power relations in production networks.

Nevertheless, a project of such limited scope can only say so much, and there is still much to be explored in all the areas mentioned above. Socioecological challenges like climate change and emerging infectious diseases show no signs of disappearing in the near future. Rather, they will continue to pose new challenges, undoubtedly affecting global food production networks. As I have aimed to demonstrate in this thesis, how dominant actors respond to such challenges has implications for the distribution of costs and benefits for actors in these food production networks. Moreover, there can be wider consequences, for instance when it comes to the space for democratic control over food production. In the possible event of a new human pandemic, even more comprehensive economic, political, ecological and social consequences could follow. In globalised capitalism, such consequences will be distributed in an uneven fashion. If nothing else, the absence of any easy or permanent fixes to these existential challenges make them highly relevant topics for further research.

Bibliography

Agüero, M., I. Monne, A. Sánchez, B. Zecchin, A. Fusaro, M. J. Ruano, M. del Valle Arrojo, R. Fernández-Antonio, A. M. Souto and P. Tordable. 2023. "Highly pathogenic avian influenza A (H5N1) virus infection in farmed minks, Spain, October 2022." *Eurosurveillance* 28(3): 1-6. https://doi.org/10.2807/1560-7917.ES.2023.28.3.2300001.

Akram-Lodhi, A. H. 2021. "Contemporary pathogens and the capitalist world food system." *Canadian Journal of Development Studies/Revue canadienne d'études du développement* 42(1-2): 18-27. https://doi.org/10.1080/02255189.2020.1834361.

Ali, S. and M. Kelly. 2018. "Ethics and social research." In *Researching culture and society*, edited by C. Seale, 43-61. London: SAGE.

Allen, J. and S. Lavau. 2015. "'Just-in-time' disease: Biosecurity, poultry and power." *Journal of Cultural Economy* 8(3): 342-360. https://doi.org/10.1080/17530350.2014.904243.

Almås, R. 2002. *Norges landbrukshistorie IV 1920-2000: Frå bondesamfunn til bioindustri*. Oslo: Det norske samlaget.

Almås, R. 2015. "Regional samhandling, nyskaping og utviklingsbanar i tre matklynger: Gauldalen, Frøya og Kvitamarka." In *Norsk matmakt i endring*, edited by H. Bjørkhaug, R. Almås and J. Vik, 51-86. Bergen: Fagbokforlaget.

Animalia. 2017. "Bedøving og avliving av kylling på slakteri." Last modified 26.05.2017. Retrieved 29.04., 2023. https://www.animalia.no/no/Dyr/fjorfe/avliving-av-fjorfe/bedoving-og-avliving-av-kylling-pa-slakteri/.

Animalia. 2020a. "Plukking av fjørfe." Last modified 09.09.2020. Retrieved 22.05., 2023. https://www.animalia.no/no/Dyr/fjorfe/slaktekylling---helse-og-velferd/plukking-av-fjorfe/.

Animalia. 2020b. "Slaktekylling - helse og velferd." Last modified 09.09.2020. https://www.animalia.no/no/Dyr/fjorfe/slaktekylling---helse-og-velferd/.

Animalia. 2020c. "Tall og fakta - Norsk fjørfeproduksjon." Last modified 02.07.2020. Retrieved 10.10., 2022. https://www.animalia.no/no/Dyr/fjorfe/tall-og-fakta--norsk-fjorfeproduksjon/.

Animalia. 2022a. "Etiske og praktiske utfordringer i konsumeggproduksjonen - avliving av hanekyllinger." Last modified 11.04.2022. Retrieved 04.05., 2023.

https://www.animalia.no/no/Dyr/fjorfe/helse-og-velferd-hos-verpehons/etiske-og-praktiske-utfordringer-i-konsumeggproduksjonen---avliving-av-hanekyllinger/.

Animalia. 2022b. "Slaktekylling - informasjon om hybrider." Last modified 14.03.2022. Retrieved 25.10., 2022. https://www.animalia.no/no/Dyr/fjorfe/slaktekylling---helse-og-velferd/slaktekylling--informasjon-om-hybrider/.

Arboleda, M. 2020. "Towards an agrarian question of circulation: Walmart's expansion in Chile and the agrarian political economy of supply chain capitalism." *Journal of Agrarian Change* 20(3): 345-363. https://doi.org/10.1111/joac.12356.

Asdal, K. and I. Moser. 2008. "Ekspertkunnskap, brukermakt og forbrukerdemokrati. Introduksjon." In *Ekspertise og brukermakt*, edited by K. Asdal and I. Moser, 7-40. Oslo: Unipub.

Bagley, M. F. 2016. "Norsk fjørfeproduksjon." In *Fjørfeboka*, edited by M. F. Bagley, 13-28. Bergen: Fagbokforlaget.

Baglioni, E. 2015. "Straddling contract and estate farming: Accumulation strategies of Senegalese horticultural exporters." *Journal of Agrarian Change* 15(1): 17-42. https://doi.org/10.1111/joac.12032.

Baglioni, E. and L. Campling. 2017. "Natural resource industries as global value chains: Frontiers, fetishism, labour and the state." *Environment and Planning* 49(11): 2437-2456. https://doi.org/10.1177/0308518X17728517.

Baglioni, E., L. Campling, N. M. Coe and A. Smith. 2022. "Conclusion: Mapping a Research Agenda for Labour Regime Analysis." In *Labour Regimes and Global Production*, edited by E. Baglioni, L. Campling, N. M. Coe and A. Smith, 317-330. Newcastle Upon Tyne: Agenda Publishing.

Bakker, K. 2009. "Neoliberal nature, ecological fixes, and the pitfalls of comparative research." *Environment and Planning A* 41(8): 1781-1787. https://doi.org/10.1068/a4277.

Bakker, K. 2010. "The limits of 'neoliberal natures': Debating green neoliberalism." *Progress in human geography* 34(6): 715-735. 10.1177/0309132510376849.

Bakker, K. 2015. "Neoliberalization of Nature." In *The Routledge Handbook of Political Ecology*, edited by G. B. Tom Perreault, James McCarthy, 446-456. Oxon: Routledge.

Banoub, D., G. Bridge, B. Bustos, I. Ertör, M. González-Hidalgo and J. A. de los Reyes. 2021. "Industrial dynamics on the commodity frontier: managing time, space and form in mining, tree plantations and intensive aquaculture." *Environment and planning E: nature and space* 4(4): 1533-1559. http://dx.doi.org/10.1177/2514848620963362.

Benjaminsen, T. A. and H. Svarstad. 2021. *Political Ecology: A Critical Engagement with Global Environmental Issues*. Cham: Palgrave Macmillian.

Bennett, C. E., R. Thomas, M. Williams, J. Zalasiewicz, M. Edgeworth, H. Miller, B. Coles, A. Foster, E. J. Burton and U. Marume. 2018. "The Broiler Chicken as a Signal of a Human Reconfigured Biosphere." *Royal Society open science* 5(12). https://doi.org/10.1098/rsos.180325.

Bernstein, H. 2006. "Is there an agrarian question in the 21st century?" *Canadian Journal of Development Studies/Revue canadienne d'études du développement* 27(4): 449-460. https://doi.org/10.1080/02255189.2006.9669166.

Bernstein, H. 2010. *Class Dynamics of Agrarian Change*. Rugby, UK: Practical Action Publishing.

Beuving, J. and G. de Vries. 2015. *Doing Qualitative Resarch: The Craft of Naturalistic Inquiry*. Amsterdam: Amsterdam University Press.

Birke, P. and F. Bluhm. 2020. "Migrant labour and workers' struggles: The German meatpacking industry as contested terrain." *Global Labour Journal* 11(1): 34-51. https://doi.org/10.15173/glj.v11i1.3875.

Bjørkdahl, K. and K. V. L. Syse. 2021. "Welfare washing: Disseminating disinformation in meat marketing." *Society & Animals* 1(aop): 1-19. https://doi.org/10.1163/15685306-bja10032.

Bjørkhaug, H., R. Almås and J. Vik. 2015. "Nyskaping og maktforhold i den norske matvarekjeden." In *Norsk matmakt i endring*, edited by H. Bjørkhaug, R. Almås and J. Vik, 391-410. Bergen: Fagbokforlaget.

Bjørkhaug, H., J. Vik and C. Richards. 2017. "The Chicken Game – organization and integration in the Norwegian agri-food sector." In *Transforming the Rural*, edited by M. Miele, V. Higgins, H. Bjørkhaug and M. Truninger, 45-69: Emerald Publishing Limited.

Blaikie, P. and H. Brookfield. 1987. *Land Degradation and Society*. London: Routledge.

BNO News. 2023. "More than 1,500 sea lions in Chile die of H5N1 bird flu." Last modified 01.04.2023. Retrieved 17.05., 2023. https://bnonews.com/index.php/2023/04/more-than-1500-sea-lions-in-chile-die-of-h5n1-bird-flu/.

Boyd, W. 2001. "Making meat: Science, technology, and American poultry production." *Technology and Culture* 42(4): 631-664.

Boyd, W. and S. Prudham. 2017. "On the themed collection,“The formal and real subsumption of nature”." *Society & Natural Resources* 30(7): 877-884. https://doi.org/10.1080/08941920.2017.1304600.

Boyd, W., W. S. Prudham and R. A. Schurman. 2001. "Industrial dynamics and the problem of nature." *Society & Natural Resources* 14(7): 555-570.

Boyd, W. and M. Watts. 1997. "Agro-industrial just-in-time: The chicken industry and postwar American capitalism." In *Globalising Food: Agrarian Questions and Global Restructuring*, edited by D. Goodman and M. Watts, 139-165. London: Routledge.

Brothers, D. 2022. "New Farmer's Guide to the Commercial Broiler Industry: Poultry Husbandry & Biosecurity Basics." Last modified 20.10.2022. Retrieved 22.05., 2023. https://www.aces.edu/blog/topics/farming/new-farmers-guide-to-the-commercial-broiler-industry-poultry-husbandry-biosecurity-basics/.

Bugos, G. E. 1992. "Intellectual Property Protection in the American Chicken–Breeding Industry." *Business History Review* 66(1): 127-168. https://www.jstor.org/stable/3117055

Bunger, A. and T. Tufte. 2016. Den norske landbruksmodellen (1894-1899). Oslo: AgriAnalyse. https://www.agrianalyse.no/publikasjoner/den-norske-landbruksmodellen-article307-856.html

Byrne, B. 2018. "Qualitative interviewing." In *Researching society and culture*, edited by C. Seale, 217-235. London: SAGE.

Bøe, K. E. and M. F. Bagley. 2016. "Bygninger og inneklima for fjørfe." In *Fjørfeboka*, edited by M. F. Bagley, 237-262. Bergen: Fagbokforlaget.

Campling, L. 2021. "The corporation and resource geography." In *The Routledge handbook of critical resource geography*, edited by M. Himley, E. Havice and G. Valdivia, 188-200. London and New York: Routledge.

Campling, L. and E. Havice. 2019. "Bringing the environment into GVC analysis: antecedents and advances." In *Handbook on global value chains*, edited by S. Ponte, G. Gereffi and G. Raj-Reichert, 214-227. Cheltenham: Edward Elgar Publishing.

Carton, W., E. Jönsson and B. Bustos. 2017. "Revisiting the “subsumption of nature”: Resource use in times of environmental change." 30(7): 789-796. https://doi.org/10.1080/08941920.2017.1320176.

Chan, P. K. S. 2002. "Outbreak of avian influenza A (H5N1) virus infection in Hong Kong in 1997." *Clinical Infectious Diseases* 34(Supplement 2): S58-S64. https://doi.org/10.1086/338820.

Constance, D. H. 2008. "The southern model of broiler production and its global implications." *Culture & Agriculture* 30(1-2): 17-31. https://doi.org/10.1111/j.1556-486X.2008.00004.x.

Cooper, M. H. 2017. "Open up and say “baa”: Examining the stomachs of ruminant livestock and the real subsumption of nature." *Society & Natural Resources* 30(7): 812-828. http://dx.doi.org/10.1080/08941920.2017.1295494.

Danyluk, M. 2018. "Capital’s logistical fix: Accumulation, globalization, and the survival of capitalism." *Environment and Planning D: Society and Space* 36(4): 630-647. https://doi.org/10.1177/0263775817703663.

Daugbjerg, C. and P. H. Feindt. 2017. "Post-exceptionalism in public policy: Transforming food and agricultural policy." *Journal of European Public Policy* 24(11): 1565-1584. https://doi.org/10.1080/13501763.2017.1334081.

Davies, J. 2019. "From severe to routine labour exploitation: The case of migrant workers in the UK food industry." *Criminology & criminal justice* 19(3): 294-310. https://uk.sagepub.com/en-gb/journals-permissions.

Davis, M. 2005. *The Monster at Our Door: The Global Threat of Avian Flu*. New York: The New Press.

de Campos Silva, A. R. 2020. "Health risks for poultry workers in Brazil in the COVID-19 pandemic." *Bulletin of Latin American Research* 39(S1): 88-91. https://doi.org/10.1111/blar.13217.

Delgado, C., M. Rosegrant, H. Steinfeld, S. Ehui and C. Courbois. 2001. "Livestock to 2020: The next food revolution." *Outlook on Agriculture* 30(1): 27-29. https://doi.org/10.5367/000000001101293427.

Denofa. n.d. "Eierskap." Retrieved 21.05., 2023. http://www.denofa.no/?ItemID=1171.

Dixon, M. W. 2015. "Biosecurity and the multiplication of crises in the Egyptian agri-food industry." *Geoforum* 61: 90-100. https://doi.org/10.1016/j.geoforum.2015.02.016.

Dybesland, S. B. 2006. "Grisen og det jærske jordbruket." In *Sjå Jæren*, 106-131. Jæren: Jærmuseet.

Dydland, J. S. 2022. "Utfordrer Coop: - Vis oss kyllingene". 18.02.2022. https://www.nrk.no/norge/ber-coop-fjerne-turbokyllinger-fra-hyllene-1.15851620

Dyresykdomsbekjempelsesforskriften art. 21. 2022. Forskrift som utfyller dyrehelseforskriften med bestemmelser om forebygging og bekjempelse av smittsomme dyresykdommer https://lovdata.no/dokument/SF/forskrift/2022-04-06-634/*#*

EFSA (European Food Safety Authority). 2022. "Avian influenza: unprecedented summer cases in Europe." Last modified 03.10.2022. Retrieved 24.04., 2023. https://www.efsa.europa.eu/en/news/avian-influenza-unprecedented-number-summer-cases-europe.

Eisen, J. 2019. "Down on the Farm: Status, Exploitation and Agricultural Exceptionalism." In *Animal Labour: A New Frontier of Interspecies Justice?*, edited by C. E. Blattner, K. Coulter and W. Kymlicka, 139-159. Oxford: Oxford University Press.

Ekers, M. and S. Prudham. 2017. "The metabolism of socioecological fixes: Capital switching, spatial fixes, and the production of nature." *Annals of the American Association of Geographers* 107(6): 1370-1388. https://doi.org/10.1177/0308518X15617573.

Emel, J. and H. Neo. 2011. "Killing for profit: global livestock industries and their socio-ecological implications." In *Global Political Ecology*, edited by R. Peet, P. Robbins and M. Watts, 67-83. Oxon and New York: Routledge.

Engen, R. V. 2023. "Kyllingkrigen raser mellom Hubbard og Ross". *VG*, 02.04.23. https://www.vg.no/nyheter/i/Q7aBW8/kylling-krigen

Ezquerro-Cañete, A. 2016. "Poisoned, dispossessed and excluded: a critique of the neoliberal soy regime in Paraguay." *Journal of Agrarian Change* 16(4): 702-710. https://doi.org/10.1111/joac.12164.

FAIRR. 2022. "Meat industry performs poorly on pandemic prevention." Last modified 16.02.2022. Retrieved 13.11., 2022. https://www.fairr.org/article/meat-industry-performs-poorly-on-pandemic-prevention/.

FAO (Food and Agriculture Organization of the United Nations). 2021. "Yearly number of animals slaughtered for meat, World, 1961 to 2021." Retrieved 12.05., 2023. https://ourworldindata.org/meat-production#number-of-animals-slaughtered.

FAO (Food and Agriculture Organization of the United Nations). 2023. "Chickens." Retrieved 18.05., 2023. https://www.fao.org/poultry-production-products/production/poultry-species/chickens/en/.

Farsund, A. A. 2021. "Politicization strategies in domestic trade policy making: Comparing agriculture and seafood sectors in Norway." *Journal of Comparative Policy Analysis: Research and Practice* 23(5-6): 576-591. https://doi.org/10.1080/13876988.2020.1755839.

Fiskå Mølle. n.d. "Hubbard: den nye kyllinghybriden." Retrieved 04.04.23, 2023. https://www.fiska.no/kunnskap/2018/august/hubbard-den-nye-kyllinghybriden/.

Forbes. 2023. "Erich Wesjohann & Family." Retrieved 04.04.23, 2023. https://www.forbes.com/profile/erich-wesjohann/?sh=2e0e9130e2c7.

Forbord, M., H. Bjørkhaug and R. J. F. Burton. 2014. "Drivers of change in Norwegian agricultural land control and the emergence of rental farming." *Journal of Rural Studies* 33: 9-19. http://dx.doi.org/10.1016/j.jrurstud.2013.10.009.

Forseth, M., R. O. Moe, K. Kittelsen, E. Skjerve and I. Toftaker. 2023. "Comparison of carcass condemnation causes in two broiler hybrids differing in growth rates." *Scientific Reports* 13(1). https://doi.org/10.1038/s41598-023-31422-0.

Foss, B., N. Rishovd and I. Skaufel. 2004. *Matglede gjennom 75 år: Prior Norge 1929-2004*. Oslo: Prior Norge BA.

Fryer, T. 2022. *A short guide to ontology and epistemology: why everyone should be a critical realist*.

Gamarra-Toledo, V., P. Plaza, G. Inga, R. Gutiérrez, O. Garcia-Tello, L. Valdivia-Ramirez, D. Huaman-Mendoza, J. Nieto-Navarrete, S. Ventura and S. A. Lambertucci. 2023. "First Mass Mortality of Marine Mammals Caused by Highly Pathogenic Influenza Virus (H5N1) in South America." *bioRxiv* Preprint. https://doi.org/10.1101/2023.02.08.527769.

Gilbert, M., X. Xiao and T. P. Robinson. 2017. "Intensifying poultry production systems and the emergence of avian influenza in China: a 'One Health/Ecohealth'epitome." *Archives of public health* 75(1): 1-7. https://doi.org/10.1186/s13690-017-0218-4.

Gómez-Baggethun, E. 2020. "More is more: Scaling political ecology within limits to growth." *Political Geography* 76: 1-6. https://doi.org/10.1016/j.polgeo.2019.102095.

Graham, J. P., J. H. Leibler, L. B. Price, J. M. Otte, D. U. Pfeiffer, T. Tiensin and E. K. Silbergeld. 2008. "The animal-human interface and infectious disease in industrial food animal production: rethinking biosecurity and biocontainment." *Public health reports* 123(3): 282-299. https://doi.org/10.1177/003335490812300309.

Granstad, S. and G. Rømo. 2022. Høypatogen aviær influensa (HPAI) i Norge: Statusrapport og anbefalinger per 25.08.2022: Norwegian Veterinary Institute.

Granstad, S., G. Rømo, M. Helberg, B. Gjerset and J. Åkerstedt. 2023. Statusrapport 11. januar 2023: Fugleinfluensa (høypatogen aviær influensa – HPAI) i Norge og Europa: Norwegian Veterinary Institute.

Guthman, J. 2019. *Wilted: Pathogens, Chemicals, and the Fragile Future of the Strawberry Industry*. Oakland: University of California Press.

Guthman, J. and C. Biltekoff. 2021. "Magical disruption? Alternative protein and the promise of de-materialization." *Environment and Planning E: Nature and Space* 4(4): 1583-1600. https://doi.org/10.1177/2514848620963125.

Halmøy, A. H. and J. S. Dydland. 2021. "Fjerner "turbokylling" fra hyllene". *NRK*, 11.08.21. https://www.nrk.no/norge/fjerner-_turbokylling_-fra-hyllene-1.15604399

Hansen, A., J. Jakobsen and U. Wethal. 2021. "New Geographies of Global Meatification: The BRICS in the Industrial Meat Complex." In *Changing Meat Cultures: Food Practices, Global Capitalism, and the Consumption of Animals*, edited by A. Hansen and K. L. Syse, 35-58. London: Rowman & Littlefield.

Hansen, A. and K. L. Syse. 2021. "New Meat Engagements: Cultures, Geographies, Economies." In *Changing Meat Cultures: Food Practices, Global Capitalsim, and the Consumption of Animals*, edited by A. Hansen and K. L. Syse, 1-16. London: Rowman & Littlefield.

Harvey, D. 2001. "Globalization and the "spatial fix"." *Geographische Revue: Zeitschrift für Literatur und Diskussion* 3(2): 23-30.

Harvey, D. 2020. "Value in motion." *New left review*(126): 99-116. https://newleftreview.org/issues/ii126/articles/david-harvey-value-in-motion

Hautefeuille, C., G. Dauphin and M. Peyre. 2020. "Knowledge and remaining gaps on the role of animal and human movements in the poultry production and trade networks in the global spread of avian influenza viruses – A scoping review." *Plos one* 15(3): 1-21. https://doi.org/10.1371/journal.pone.0230567.

Hegrenes, A. and S. O. Borgen. 2005. Marknadstilpassing gjennom nye kontraktsformer i jordbruket. Oslo: Norsk institutt for landbruksøkonomisk forskning (NILF).

Helmcke, C. 2022. "Ten recommendations for political ecology case research." *Journal of Political Ecology* 29: 266-276. https://doi.org/10.2458/jpe.2842.

Holmen, B. I., M. E. Hillestad, V. Haarsaker, A. Bunger and C. A. Smedshaug. 2020. Fjørfenæringen i Norge. Oslo: AgriAnalyse.

Hubbard. n.d.-a. "Premum females." Retrieved 26.04., 2023. https://www.hubbardbreeders.com/premium/premium-females/.

Hubbard. n.d.-b. "Welcome to Hubbard." Retrieved 2022. https://www.hubbardbreeders.com/about-us/welcome-to-hubbard/.

Hundstad, D. 2015. "Det store hamskiftet." Last modified 02.11.2020. Retrieved 17.05., 2023. https://www.norgeshistorie.no/industrialisering-og-demokrati/1522-det-store-hamskiftet.html.

Hvitsand, C. 2016. "Community supported agriculture (CSA) as a transformational act—distinct values and multiple motivations among farmers and consumers." *Agroecology and Sustainable food systems* 40(4): 333-351. https://doi.org/10.1080/21683565.2015.1136720.

IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services). 2020. Workshop Report on Biodiversity and Pandemics https://zenodo.org/record/7432079

Irarrázaval, F. and B. Bustos-Gallardo. 2019. "Global salmon networks: unpacking ecological contradictions at the production stage." *Economic Geography* 95(2): 159-178. https://doi.org/10.1080/00130095.2018.1506700.

Kalle, L.-C. 2022. "Smell for kyllinggiganten". *Nettavisen*, 20.06.2022. https://www.nettavisen.no/okonomi/smell-for-kyllinggigant/s/12-95-3424284925

Katz, C. 1998. "Whose nature, whose culture? Private productions of space and the 'preservation' of nature." In *Remaking reality: Nature at the millenium*, edited by B. Braun and N. Castree, 46-63. London and New York: Routledge.

Kevany, S. 2022. "Avian flu has led to the killing of 140m farmed birds since last October". *The Guardian*, 09.12.22. https://www.theguardian.com/environment/2022/dec/09/avian-flu-has-led-to-the-killing-of-140m-farmed-birds-since-last-october

Kjeldstadli, K. 2015. "Arbeiderbevegelsen – reform, revolusjon og ny reformisme." Last modified 27.10.2020. Retrieved 17.05., 2023. https://www.norgeshistorie.no/forste-verdenskrig-og-mellomkrigstiden/1614-arbeiderbevegelsen-reform-revolusjon-og-ny-reformisme.html.

Kjørstad, E. 2023. "Fugleinfluensa smittet mellom mink i Spania. – Bekymringsfull utvikling." Retrieved 07.03., 2023. https://forskning.no/dyreverden-fugleinfluensa-sykdommer/fugleinfluensa-smittet-mellom-mink-i-spania-bekymringsfull-utvikling/2146277.

Klimek, B. and H. O. Hansen. 2017. "Food industry structure in Norway and Denmark since the 1990s: Path dependency and institutional trajectories in Nordic food markets." *Food Policy* 69: 110-122. https://doi.org/10.1016/j.foodpol.2017.03.009.

Konefal, J., M. Mascarenhas and M. Hatanaka. 2005. "Governance in the global agro-food system: Backlighting the role of transnational supermarket chains." *Agriculture and human values* 22(3): 291-302. https://doi.org/10.1007/s10460-005-6046-0.

Kristoffersen, D. A. 2015. "Norges nei til EF i 1972." Last modified 03.11.2020. Retrieved 17.05., 2023. https://www.norgeshistorie.no/oljealder-og-overflod/1945-norges-nei-til-ef-i-1972.html.

Landbruk24. 2021. "Kyllingfôr med 75% mindre soya." Last modified 08.11.2021. Retrieved 27.04., 2023. https://landbruk24.no/kyllingfor-med-75-mindre-soya/.

Leibler, J. H., J. Otte, D. Roland-Holst, D. U. Pfeiffer, R. Soares Magalhaes, J. Rushton, J. P. Graham and E. K. Silbergeld. 2009. "Industrial food animal production and global health risks: exploring the ecosystems and economics of avian influenza." *Ecohealth* 6: 58-70. https://doi.org/10.1007/s10393-009-0226-0.

Little, P. D. and M. Watts. 2022. "The afterlife of living under contract, an epilogue." *Journal of Agrarian Change* 22(1): 197-206. https://doi.org/10.1111/joac.12467.

Little, P. D. and M. J. Watts. 1994. *Living under contract: contract farming and agrarian transformation in sub-Saharan Africa*. Madison The University of Wisconsin Press.

Lorvik, N. 2021. "Nordfjord må punge ut 70-80 millioner kroner i året til Rema: - Utpressing". *Nettavisen*, 25.09.2021. https://www.nettavisen.no/okonomi/nordfjord-ma-punge-ut-70-80-millioner-kroner-i-aret-til-rema-utpressing/s/12-95-3424181995

Lynum, F. and M. E. Valvik. 2017. "Rema og Kiwi er erkerivaler i frukt og grønt-disken. Men på bakrommet er de partnere". *Aftenposten*, 08.02.2017. https://www.aftenposten.no/okonomi/i/O5MwV/rema-og-kiwi-er-erkerivaler-i-frukt-og-groent-disken-men-paa-bakrommet-er-de-partnere

Løkeland-Stai, E. and S. A. Lie. 2012. *En nasjon av kjøtthuer. Ni myter og en løgn om norsk landbrukspolitikk*. Oslo: Forlaget Manifest.

Løkeland-Stai, E. and S. A. Lie. 2019. *Mellom bakkar og kjøttberg. Oppskrift på en ny matpolitikk*. Oslo: Forlaget Manifest.

Løvlund, B.-F. 2012. "Jobben ingen nordmenn får til". *Østlendingen*, 17.07.2012. https://www.ostlendingen.no/solor/nyheter/nyheter/jobben-ingen-nordmenn-far-til/s/2-2.2757-1.7444019

Mann, S. A. and J. M. Dickinson. 1978. "Obstacles to the development of a capitalist agriculture." *The Journal of Peasant Studies* 5(4): 466-481. https://doi.org/10.1080/03066157808438058.

Marani, M., G. G. Katul, W. K. Pan and A. J. Parolari. 2021. "Intensity and frequency of extreme novel epidemics." *Proceedings of the National Academy of Sciences* 118(35). https://doi.org/10.1073/pnas.2105482118.

Marcus, G. E. 1995. "Ethnography in/of the world system: The emergence of multi-sited ethnography." *Annual review of anthropology*: 95-117. https://www.annualreviews.org/doi/abs/10.1146/annurev.an.24.100195.000523.

MatPrat (Information Office for Eggs and Meat). 2020. "Hvordan lever norsk kylling?" Retrieved 07.03., 2023. https://www.matprat.no/artikler/matproduksjon/hvordan-lever-norsk-kylling/.

McMichael, P. 2005. "Global development and the corporate food regime." In *New directions in the sociology of global development*, 269-303: Emerald Group Publishing Limited.

McMichael, P. 2013. "Value-chain agriculture and debt relations: Contradictory outcomes." *Third World Quarterly* 34(4): 671-690. https://doi.org/10.1080/01436597.2013.786290.

Meisdal, S. 2020. "Gildset Transport og Norsk Kylling fortsetter samarbeidet". *Trønderbladet*, 03.07.2020. https://www.tronderbladet.no/nyheter/i/qRP3r0/fortsetter-samarbeidet-dette-betyr-alt-for-oss

Melamed, J. 2015. "Racial Capitalism." *Critical Ethnic Studies* 1(1): 76-85. https://doi.org/10.5749/jcritethnstud.1.1.0076.

Milbourne, P. and H. Coulson. 2021. "Migrant labour in the UK's post-Brexit agri-food system: ambiguities, contradictions and precarities." *Journal of Rural Studies* 86: 430-439. https://doi.org/10.1016/j.jrurstud.2021.07.009.

Miljøfyrtårn. 2018. "Norsk Kylling er kåret til Årets Snuoperasjon 2017." Last modified 15.01.2018. Retrieved 20.04., 2023. https://www.miljofyrtarn.no/norsk-kylling-er-karet-til-arets-snuoperasjon-2017/.

Moi, Ø. 2022. "Hva er egentlig et jordbruksoppgjør." Last modified 05.04.2022. Retrieved 21.10., 2022. https://www.bondelaget.no/agder/nyheter/hva-er-egentlig-et-jordbruksoppgjor.

Monbiot, G. 2023. "Be warned: the next deadly pandemic is not inevitable, but all the elements are in place". *The Guardian*, 08.02.23. https://www.theguardian.com/commentisfree/2023/feb/08/next-pandemic-bird-flu-mink-farms-transmission

Moore, J. 2015. *Capitalism in the Web of Life: Ecology and the Accumulation of Capital*. London: Verso Books.

Moore, J. W. 2011. "Transcending the metabolic rift: a theory of crises in the capitalist world-ecology." *The Journal of Peasant Studies* 38(1): 1-46. https://doi.org/10.1080/03066150.2010.538579.

Mourkas, E., A. J. Taylor, G. Méric, S. C. Bayliss, B. Pascoe, L. Mageiros, J. K. Calland, M. D. Hitchings, A. Ridley and A. Vidal. 2020. "Agricultural intensification and the evolution of host specialism in the enteric pathogen Campylobacter jejuni." *Proceedings of the National Academy of Sciences* 117(20): 11018-11028. https://doi.org/10.1073/pnas.1917168117.

Myhre, J. E. 2015a. "Husmannsvesenet." Last modified 21.10.2020. Retrieved 19.05., 2023. https://www.norgeshistorie.no/bygging-av-stat-og-nasjon/1413-husmannsvesenet.html.

Myhre, J. E. 2015b. "Norge blir et industriland." Last modified 02.11.2020. Retrieved 17.05., 2023. https://www.norgeshistorie.no/industrialisering-og-demokrati/1504-norge-blir-et-industriland.html.

NAPA (Norwegian Animal Protection Alliance). 2018. "FAQ om Hubbard JA787." Last modified 13.01.2018. https://dyrevern.no/landbruksdyr/faq-om-hubbard-ja787/.

NAPA (Norwegian Animal Protection Alliance). 2020. "Bytt ut monsterkyllingen Ross 308 med sunnere rase!" Last modified 16.06.2020. https://dyrevern.no/landbruksdyr/bytt-ut-monsterkyllingen-ross-308-med-sunnere-rase/.

Nerlich, B., B. Brown and N. Wright. 2009. "The ins and outs of biosecurity: bird 'flu in East Anglia and the spatial representation of risk." *Sociologia ruralis* 49(4): 344-359. https://doi.org/10.1111/j.1467-9523.2009.00488.x.

NFSA (Norwegian Food Safety Authorities). 2022a. "Dyresykdommer deles inn i nasjonal liste 1-, liste 2- og liste 3-sykdommer." Last modified 14.07.2022. Retrieved 24.04., 2023. https://www.mattilsynet.no/dyr/dyresykdommer/sykdommer-pa-nasjonal-liste-1-2-og-3.

NFSA (Norwegian Food Safety Authorities). 2022b. "Slik kan du unngå smitte til anlegget ditt." Last modified 05.10.2022. Retrieved 23.05., 2022. https://www.mattilsynet.no/dyr/dyresykdommer/smittevern-for-fuglesykdommer.

NFSA (Norwegian Food Safety Authorities). 2023. "Status Newcastlesyke." Last modified 21.03.2023. Retrieved 24.04., 2023. https://www.mattilsynet.no/dyr/dyresykdommer/newcastle-disease.

NIBIO. 2022. "Microalgae contributions to future protein and fatty acid rich feed for Norwegian chicken at industrial scale - ALGEKYLLING." Last modified 20.01.2022. Retrieved 27.04., 2023. https://www.nibio.no/en/projects/microalgae-contributions-to-future-protein-and-fatty-acid-rich-feed-for-norwegian-chicken-at-industrial-scale-algekylling.

NIPH (Norwegian Institute of Public Health). 2023. "Om fugleinfluensa." Last modified 31.01.2023. Retrieved 25.04., 2023. https://www.fhi.no/sv/influensa/fugleinfluensa/fakta-om-fugleinfluensa/#influensapandemier-epidemier-med-nye-influensavirus-hos-mennesker.

Norges Bondelag. n.d. "Konsesjonsloven " Retrieved 06.03., 2023. https://www.bondelaget.no/bondelaget-mener/eiendomspolitikk/konsesjonsloven/.

Norsk Kylling. 2021a. Responsibility report 2021

Norsk Kylling. 2021b. "Slik kutter vi soya i kyllingfôret." Last modified 26.06.2021. Retrieved 26.04., 2023. https://www.norsk-kylling.no/no/aktuelt/liste/slik+kutter+vi+soya+i+kyllingforet.html.

Norsk Kylling. 2022. "Markering av byggestart for vårt nye rugeri." Last modified 18.05.2022. Retrieved 18.10., 2022. https://www.norsk-kylling.no/no/aktuelt/liste/nytt+rugeri+i+norsk+kylling.html.

Norsk Kylling. 2023a. "Norske forbrukere mener at Solvinge er Norges mest bærekraftige merkevare for kylling." Last modified 21.03.2023. https://www.norsk-kylling.no/no/aktuelt/liste/solvinge+er+norges+mest+barekraftige+kylling.html.

Norsk Kylling. 2023b. "Årets produsenter 2022." Last modified 13.02.2023. Retrieved 21.05., 2023. https://www.norsk-kylling.no/no/aktuelt/liste/arets+produsenter+2022+.html.

Norsk Kylling. n.d.-a. "Dyrevelferd." Retrieved 19.04., 2023. https://www.norsk-kylling.no/no/om/dyrevelferd.

Norsk Kylling. n.d.-b. "Vår historie - våre spor." Retrieved 18.10., 2022. https://www.norsk-kylling.no/no/om/var+historie.

Norsk Landbrukssamvirke. 2019. "Hva er egentlig RÅK?" Last modified 17.12.2019. Retrieved 07.11., 2022. https://www.landbruk.no/internasjonalt/hva-er-egentlig-rak/.

Nortura. 2022. "Kan norske blåskjell erstatte soya i kyllingfôr?" Last modified 08.12.2022. Retrieved 27.04., 2023. https://www.nortura.no/nyhetsartikler/kan-norske-blaskjell-erstatte-soya-i-kyllingfor.

Nortura. n.d. "Nortura, et historisk tilbakeblikk." Retrieved 07.11., 2022. https://medlem.nortura.no/tilbakeblikk/nortura-et-historisk-tilbakeblikk-article15748-16126.html.

Norwegian Agriculture Agency. 2021. "Rekordhøye råvarepriser kan gi høyere pris på kraftfôr." Last modified 18.06.2021. Retrieved 22.05., 2023.

https://www.landbruksdirektoratet.no/nb/nyhetsrom/nyhetsarkiv/rekordhoye-ravarepriser-kan-gi-hoyere-pris-pa-kraftfor.

Norwegian Agriculture Agency. 2022. Markedsrapport 2021 - Markeds- og prisvurderinger av sentrale norske landbruksvarer og RÅK-varer. Oslo: Norwegian Agriculture Agency. https://www.landbruksdirektoratet.no/nb/nyhetsrom/rapporter/markedsrapport-2021-markeds-og-prisvurderinger-av-sentrale-norske-landbruksvarer-og-rak-varer

Norwegian Agriculture Agency. n.d. "Prissystemer i jordbruket." Retrieved 21.10., 2022. https://www.landbruksdirektoratet.no/nb/jordbruk/regulering-og-kvoter/markedsregulering-i-jordbruket/malprissystemet.

Norwegian Ministry of Agriculture. 1999. "Om norsk landbruk og matproduksjon." In *St.meld. nr. 19 (1999-2000)*. Oslo: Norwegian Ministry of Agriculture. https://www.regjeringen.no/no/dokumenter/stmeld-nr-40-1998-99-/id470379/?ch=1

Norwegian Ministry of Agriculture and Food. 2016. "Endring og utvikling: en fremtidsrettet jordbruksproduksjon." In *Meld. St. 11 (2016 –2017)*. Oslo: Norwegian Ministry of Agriculture and Food. https://www.regjeringen.no/no/dokumenter/meld.-st.-11-20162017/id2523121/?ch=2

Norwegian Ministry of Labour and Social Affairs. 2005. "Om jordbruksoppgjøret 2005 - endringer i statsbudsjettet for 2005 m.m." In *St.prp. nr. 69*. Oslo: Norwegian Ministry of Labour and Social Affairs. https://www.regjeringen.no/no/dokumenter/stprp-nr-69-2004-2005-/id211024/

Norwegian Veterinary Institute. 2021. "Fôrets sammensetning er avgjørende i oppdrett av kylling uten bruk av antibiotika." Last modified 2021. Retrieved 24.04., 2023. https://www.vetinst.no/nyheter/forets-sammensetning-er-avgjorende-i-oppdrett-av-kylling-uten-bruk-av-antibiotika.

Norwegian Veterinary Institute. 2022a. "Fugleinfluensa påvist i fjørfebesetning i Rogaland." Last modified 22.10.2022. Retrieved 24.04., 2023. https://www.vetinst.no/nyheter/fugleinfluensa-pavist-i-fjorfebesetning-i-rogaland.

Norwegian Veterinary Institute. 2022b. "Høypatogen fugleinfluensa-virus påvist hos rødrev." Last modified 16.02.2023. Retrieved 17.05., 2023. https://www.vetinst.no/nyheter/hoypatogen-fugleinfluensa-pavist-hos-rodrev.

Norwegian Veterinary Institute. 2022c. "Newcastlesyke (ND)." Last modified 23.10.2022. Retrieved 24.04., 2023. https://www.vetinst.no/sykdom-og-agens/newcastlesjuke-nd.

Norwegian Veterinary Institute. 2023a. "Fugleinfluensa hos fjørfe i Norge." Last modified 19.04.2023. Retrieved 18.05., 2023. https://www.vetinst.no/dyr/fjorfe/hoypatogen-fugleinfluensa-h5-pavist-i-norsk-fjorfebesetning.

Norwegian Veterinary Institute. 2023b. Årsrapport 2022 (16/2023): Norwegian Veterinary Institute,.

Norwegian Veterinary Institute. n.d. "Fjørfe." Retrieved 26.04., 2023. https://www.vetinst.no/dyr/fjorfe.

Nygaard, L. P. 2017. *Writing Your Master's Thesis: From A to Zen*. London: SAGE Publications.

O'Leary, Z. 2017. *The essential guide to doing your research project*: Sage.

OECD (Organization for Economic Co-operation and Development). 2021. "The agricultural policy environment in Norway." Retrieved 07.11., 2022. https://www.oecd-ilibrary.org/sites/da42a3d4-en/index.html?itemId=/content/component/da42a3d4-en#section-d1e10424.

OECD/FAO (Organization for Economic Co-operation and Development/Food and Agriculture Organization of the United Nations). 2022. OECD-FAO Agricultural Outlook 2022-2031. Paris: OECD Publishing. https://www.oecd.org/publications/oecd-fao-agricultural-outlook-19991142.htm

Oliveira, G. 2022. "Political ecology of soybeans in South America." In *Political ecology of industrial crops*, edited by A. A. a. A. Gasparatos, 201-220. London and New York: Routledge.

Oliveira, G. and S. Hecht. 2016. "Sacred groves, sacrifice zones and soy production: globalization, intensification and neo-nature in South America." *The Journal of Peasant Studies* 43(2): 251-285. https://doi.org/10.1080/03066150.2016.1146705.

Olsen, P. I. 2010. *Norsk mat etter supermarkedsrevolusjonen*. Oslo: Unipub.

Otsuka, K., Y. Nakano and K. Takahashi. 2016. "Contract farming in developed and developing countries." *Annual Review of Resource Economics* 8: 353-376. https://doi.org/10.1146/annurev-resource-100815-095459.

Our World in Data. n.d. "Population, 10,000 BCE to 2021." Retrieved 18.05., 2023. https://ourworldindata.org/grapher/population.

Pachirat, T. 2011. *Every twelve seconds: Industrialized slaughter and the politics of sight*. New Haven and London: Yale University Press.

Prestvik, A. S. and P. C. Rålm. 2014. Kartlegging av arbeidskrafts- og kompetansenehov i matindustrien (978-82-7077-893-5). Oslo: Norsk institutt for landbruksøkonomisk forskning (NILF).

Prinzi, A. and R. E. Rohde. 2022. "Avian Influenza: Past, Present, Future." Last modified 05.07.2022. Retrieved 18.05., 2023. https://asm.org/Articles/2022/July/Avian-Influenza-Past,-Present,-Future.

Pronofa. 2021. "Surf 'n' turf for kyllinger". 16.06.2021. https://kommunikasjon.ntb.no/pressemelding/surf-n-turf-for-kyllinger?publisherId=17847778&releaseId=17910315

Pronofa. 2022. "Pronofa henter inn 150 millioner for videre vekst, med Reitan Kapital som strategisk eier". 13.01.2022. https://kommunikasjon.ntb.no/pressemelding/pronofa-henter-inn-150-millioner-for-videre-vekst-med-reitan-kapital-som-strategisk-eier?publisherId=17847778&releaseId=17924147

Puryear, W., K. Sawatzki, N. Hill, A. Foss, J. J. Stone, L. Doughty, D. Walk, K. Gilbert, M. Murray and E. Cox. 2023. "Highly Pathogenic Avian Influenza A (H5N1) Virus Outbreak in New England Seals, United States." *Emerging Infectious Diseases* 29(4). https://doi.org/10.3201/eid2904.221538.

Reardon, T., J. A. Berdegué and C. P. Timmer. 2005. "Supermarketization of the" Emerging Markets" of the Pacific Rim: development and trade implications." *Journal of Food Distribution Research* 36(1): 3-12. http://dx.doi.org/10.22004/ag.econ.26754.

Reardon, T. and A. Gulati. 2008. The supermarket revolution in developing countries: Policies for "competitiveness with inclusiveness": International Food Policy Research Institute.

Regnskogfondet. n.d. "Problemet med soya." Retrieved 26.04., 2023. https://www.regnskog.no/no/om-regnskogfondet/dette-mener-regnskogfondet/problemet-med-soya.

Rehber, E. 2007. "A Global Overview of Contract Farming." In *Contract Farming: International Experiences*, edited by B. V. S. Prasad and S. Mohanty, 3-38: ICFAI University Press.

Reitan AS. n.d.-a. "Nye Hjorten teater." Retrieved 21.05., 2023. https://reitan.no/no/merkevare/1893/nye-hjorten-teater.

Reitan AS. n.d.-b. "Our values." Retrieved 21.05., 2023. https://reitan.no/en/article/1132/vare-verdigrunnlag.

Reitan AS. n.d.-c. "Posten Moderne." Retrieved 21.05., 2023. https://reitan.no/no/merkevare/4704/posten-moderne-.

Reitan AS. n.d.-d. "Reitan AS." Retrieved 21.05., 2023. https://reitan.no/no/artikkel/1124/holdingsselskapet-reitan-as.

Reitan AS. n.d.-e. "Reitan Eiendom." Retrieved 21.05., 2023. https://reitan.no/no/selskap/171/reitan-eiendom.

Reitan Retail. n.d. "Vår virksomhet." Retrieved 19.05., 2023. https://www.reitanretail.no/om-oss/var-virksomhet.

Rem, S. 2008. "Å stemme med gaffelen: vendingen mot forbrukerne i norsk matpolitikk." In *Ekspertise og brukermakt*, edited by K. Asdal and I. Moser, 41-67. Oslo: Unipub.

Rema 1000. 2014. "REMA 1000 inngår avtale med Kolonial.no." Retrieved 21.05., 2023. https://www.rema.no/nyheter/rema-1000-inngar-avtale-med-kolonial/.

Rema 1000. n.d.-a. "Finn butikk." Retrieved 04.04., 2023. https://www.rema.no/butikker/.

Rema 1000. n.d.-b. "Innfører ny og bedre kylling til Norge: - En revolusjon." Retrieved 20.04., 2023. https://www.rema.no/laermer/innforer-ny-og-bedre-kylling-til-norge-en-revolusjon/.

Rema 1000. n.d.-c. "Vår historie." Retrieved 07.03., 2023. https://www.rema.no/om-oss/historien/.

Retailmagasinet. 2021. "Først ut med 100% soyafritt fôr til kylling". Retailmagasinet, 10.05.2021. https://www.retailmagasinet.no/notis/forst-ut-med-100-soyafritt-fr-til-kylling/701331

Richards, C., H. Bjørkhaug, G. Lawrence and E. Hickman. 2012. "Retailer-driven agricultural restructuring - Australia, The UK and Norway in comparison." *Agriculture and human values* 30(2): 235-245. https://doi.org/10.1007/s10460-012-9408-4.

Robbins, P. 2020. *Political ecology: A critical introduction*. Hoboken: John Wiley & Sons.

Rogaly, B. 2008. "Intensification of workplace regimes in British horticulture: the role of migrant workers." *Population, space and place* 14(6): 497-510. https://doi.org/10.1002/psp.502.

Rutt, R. L. and J. Jakobsen. 2022. "The 'brother layer problem': Routine killing, biotechnology and the pursuit of 'ethical sustainability'in industrial poultry." *Environment and Planning E: Nature and Space*: 1-19. https://doi.org/10.1177/25148486221131195.

Rye, J. F. and K. O'Reilly. 2021. "New perspectives on international migration to Europe's rural regions." In *International labour migration to Europe's rural regions*, edited by J. F. Rye and K. O'Reilly, 3-21. Oxon and New York: Routledge.

Rye, J. F. and M. H. Slettebak. 2020. "The new geography of labour migration: EU11 migrants in rural Norway." *Journal of Rural studies* 75: 125-131. https://doi.org/10.1016/j.jrurstud.2020.01.014.

Rye, S. K. P., E. Jenssen and Y. Q. Wenstøp. 2019. Økonomien i produksjon av slaktekylling. Trondheim: NIBIO.

Rønning, L., J. Vik and T. Magnus. 2013. Kontraktsproduksjon i landbruket: en annen hverdag for bonden. Trondheim: Norsk senter for bygdeforskning.

Sayer, A. 2000. *Realism and social science*. London: SAGE.

Schwartzkopf-Genswein, K., L. Faucitano, S. Dadgar, P. Shand, L. González and T. Crowe. 2012. "Road transport of cattle, swine and poultry in North America and its impact on animal welfare, carcass and meat quality: A review." *Meat science* 92(3): 227-243. https://doi.org/10.1016/j.meatsci.2012.04.010.

Schwartzman, K. C. 2013. *The Chicken Trail: Following Workers, Migrants, and Corporations across the Americas*: Cornell University Press.

Scott, S. and J. F. Rye. 2021. "Praised, prized, yet penalised: a critical examination of low-wage hiring queues in the global strawberry industry." *Journal of Rural Studies* 88: 473-481. https://doi.org/10.1016/j.jrurstud.2021.04.014.

Seale, C. 2018. "Sampling." In *Researching society and culture*, edited by C. Seale, 155-174. London: SAGE.

Sidik, S. M. 2023. "Bird flu outbreak in mink sparks concern about spread in people." *Nature* 614: 17. https://www.nature.com/articles/d41586-023-00201-2

Skarstad, G. Å. 2008. "Å setje pris på dyr: Om dyrevelferd, matprisar og forbrukarrettinga av norsk landbruk." In *Ekspertise og brukermakt*, edited by K. Asdal and I. Moser, 69-91. Oslo: Unipub.

Sleipnes, P. A. 2022. "- Smittevern viktigere enn noensinne!" Retrieved 07.03., 2023. https://kjottbransjen.no/smittevern-viktigere-enn-noensinne/?hilite=fugleinfluensa.

Slettebak, M. H. and J. F. Rye. 2022. "Social (Im)mobility in Low-skilled and Low-wage Immigrant Niches." *Nordic Journal of Working Life Studies* 12(4): 23-47. https://doi.org/10.18291/njwls.132265.

Smedshaug, C. A., P. I. Olsen and M. H. Inderhaug. n.d. Markedsregulering: Hva er det, og hva er Norturas rolle? Oslo: AgriAnalyse.

https://www.agrianalyse.no/publikasjoner/markedsregulering-hva-er-det-og-hva-er-norturas-rolle-article1291-856.html

Smith, J. 2021. "Q&A: Future pandemics are inevitable, but we can reduce the risk". Horizon: The EU Research & Innovation Magazine, 16.12.2021. https://ec.europa.eu/research-and-innovation/en/horizon-magazine/qa-future-pandemics-are-inevitable-we-can-reduce-risk

Smith, N. 2007. "Nature as accumulation strategy." In *Socialist register 2007: coming to terms with nature*, edited by L. Panitch and C. Leys, 16-36. London: Merlin Press. 43. https://socialistregister.com/index.php/srv/article/view/5856

Smith, N. 2008. *Uneven development: nature, capital and the production of nature*. Athens, Georgia: The University of Georgia Press.

Statistics Norway. 2022. "Lønn." Retrieved 15.05., 2023. https://www.ssb.no/statbank/table/11418/tableViewLayout1/?loadedQueryId=10066123&timeType=top&timeValue=1.

Statistics Norway. n.d. "Fakta om jordbruk." Retrieved 04.05., 2023. https://www.ssb.no/jord-skog-jakt-og-fiskeri/faktaside/jordbruk.

Steine, G., A. Vasaasen, A. Nordlund and I. Pettersen. 2011. Regulering for organisering – markedsregulering i kjøttsektoren. Oslo: Norsk institutt for landbruksøkonomisk forskning (NILF).

Stiftelsen Norsk Mat. n.d. "Om Stiftelsen Norsk Mat." Retrieved 16.05., 2023. https://stiftelsennorskmat.no/no/omstiftelsennorskmat.

Stokdahl, K. 2020. "Fugleinflusensa sprer seg - nå må hønene være inne". *Innherred*, 09.12.2020. https://www.innherred.no/nyheter/i/X6oR9E/fugleinflusensa-sprer-seg-na-ma-honene-vaere-inne

Strauss, K. and S. McGrath. 2017. "Temporary migration, precarious employment and unfree labour relations: Exploring the 'continuum of exploitation'in Canada's Temporary Foreign Worker Program." *Geoforum* 78: 199-208. https://doi.org/10.1016/j.geoforum.2016.01.008.

Striffler, S. 2005. *Chicken: The Dangerous Transformation of America's Favorite Food*. New Haven: Yale University Press.

Sustainable Brand Index. 2023. "Sustainable Brand Index Norway." Retrieved 26.04., 2023. https://www.sb-index.com/norway.

Svendsen, R. M. 2022a. "Måtte avlive 20 000 kyllinger: – Hvordan smitten først kom i hus, blir bare spekulasjoner.". *Innherred*, 27.09.2022.

https://www.innherred.no/nyheter/i/VP1V6r/virus-ga-sykdom-i-kyllingflokken-bonden-maatte-slakte-hele-besetningen

Svendsen, R. M. 2022b. "Virusutbrudd i kyllingflokken: Smitter verken mennesker eller andre dyr". *Innherred*, 27.09.2022. https://www.innherred.no/nyheter/i/O83vdb/virusutbrudd-i-kyllingflokken-smitter-verken-mennesker-eller-andre-dyr

Svensson, E., H. R. Amundsen, I. Holm, H. Hulling, A. Johansson, J. Löfgren, P. Nilsson, S. Nilsson, S. Pettersson and V. Stensby. 2018. "Empowering marginal lifescapes: the heritage of crofters in between the past and the present." *International Journal of Heritage Studies* 24(1): 17-34. https://doi.org/10.1080/13527258.2017.1362579.

Tegnander, P. 2022. "Vil skreddersy alger som fôr til kylling". *NRK*, 29.10.2022. https://www.nrk.no/sorlandet/vil-erstatte-soya-med-alger-i-kyllingfor-1.16144747

The Danish Veterinary and Food Administration. 2023. "Latest News about the Avian Influenza (bird flu)." Retrieved 18.05., 2023. https://www.foedevarestyrelsen.dk/english/Animal/AnimalHealth/Animal%20diseases/Avian_influenza/Pages/default.aspx.

The Economist. 2023. "Will avian flu be the next human pandemic?". *The Economist*, 14.02.23. https://www.economist.com/the-economist-explains/2023/02/14/will-avian-flu-be-the-next-human-pandemic

Tollersrud, E. and T. H. Bratlie. 2022. "Matkontrollen". *Klassekampen*, 13.08.2022. https://klassekampen.no/utgave/2022-08-13/matkontrollen/yCXW

Tonkiss, F. 2018. "Focus groups." In *Researching society and culture*, edited by C. Seale, 237-255. London: SAGE.

Trading Economics. 2023. "Soybeans." Retrieved 22.05., 2023. https://tradingeconomics.com/commodity/soybeans.

Tranøy, B. S. 2015. "Makt i matkjeden." In *Norsk matmakt i endring*, edited by H. Bjørkhaug, R. Almås and J. Vik, 23-49. Bergen: Fagbokforlaget.

Tsing, A. 2009. "Supply Chains and the Human Condition." *Rethinking Marxism* 21(2): 148-176. https://doi.org/10.1080/08935690902743088.

Tullis, P. 2022. "Is the next pandemic brewing on the Netherlands' poultry farms?". *Bulletin of the Atomic Scientists*, 26.09.2022. https://thebulletin.org/2022/09/is-the-next-pandemic-brewing-on-the-netherlands-poultry-farms/

Ungoed-Thomas, J. 2022. "'Frankenchicken' at the centre of fight for animal welfare". *The Observer*, 16.04.2022. https://www.theguardian.com/world/2022/apr/16/cheaper-than-chips-frankenchicken-at-the-centre-of-fight-for-animal-welfare

Ursin, L., B. K. Myskja and S. G. Carson. 2016. "Think global, buy national: CSR, cooperatives and consumer concerns in the Norwegian food value chain." *Journal of Agricultural and Environmental Ethics* 29: 387-405. https://doi.org/10.1007/s10806-016-9609-8.

USDA APHIS (U.S. Department of Agriculture Animal and Plant Health Inspection Service). 2022. "US Poultry Industry Manual - Broilers: breeding flocks." Last modified 12.08.2022. Retrieved 10.05., 2023. https://www.thepoultrysite.com/articles/fad-broilers-breeding-flocks.

USDA APHIS (U.S. Department of Agriculture Animal and Plant Health Inspection Service). 2023. "2022-2023 Detections of Highly Pathogenic Avian Influenza in Mammals." Last modified 16.05.2023. Retrieved 17.05., 2023. https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian/avian-influenza/hpai-2022/2022-hpai-mammals.

Valmot, O. R. 2021. "Soldatfluer og tunikater skal komplettere soyaprotein til dyrefôr". Teknisk Ukeblad, 25.08.2021. https://www.tu.no/artikler/soldatfluer-og-tunikater-skal-komplettere-soyaprotein-til-dyrefor/512660

Vestad, O. 2022. "Økte inntekter blant bønder, men mindre kommer fra jordbruket." Retrieved 15.05., 2023. https://www.ssb.no/inntekt-og-forbruk/inntekt-og-formue/artikler/okte-inntekter-blant-bonder-men-mindre-kommer-fra-jordbruket.

Vicol, M., N. Fold, C. Hambloch, S. Narayanan and H. Pérez Niño. 2022. "Twenty-five years of Living Under Contract: Contract farming and agrarian change in the developing world." *Journal of Agrarian Change* 22(1): 3-18. https://doi.org/10.1111/joac.12471.

Vik, J. and H. Bjørkhaug. 2015. "Kyllingens politiske økonomi - et bilde av det fremtidige landbruket?" In *Norsk matmakt i endring*, edited by H. Bjørkhaug, R. Almås and J. Vik. Bergen: Fagbokforlaget.

Vikan, J. I. 2021. "Kyllingfabrikk Norsk Kylling." Retrieved 21.05., 2023. https://www.bygg.no/kyllingfabrikk-norsk-kylling/1462245!/.

Vittersø, G. 2012. "*Ren idyll? Forbrukets betydning for bygdeutvikling med utgangspunkt i lokal mat og hytteliv* ". Ph. D. thesis, University of Oslo.

Wallace, R. G. 2009. "Breeding Influenza: The Political Virology of Offshore Farming." *Antipode* 41(5): 916-951. https://doi.org/10.1111/j.1467-8330.2009.00702.x.

Wallace, R. G. 2016. *Big Farms Make Big Flu: Dispatches on Infectious Disease, Agribusiness, and the Nature of Science*. New York: Monthly Review Press.

Wallace, R. G., A. Liebman, L. F. Chaves and R. Wallace. 2020. "COVID-19 and Circuits of Capital." *Monthly review* 72(1): 1-13. https://doi.org/10.14452/MR-072-01-2020-05_1.

Watts, J. H. 2008. "Integrity in qualitative research." In *The Sage Encyclopedia of Qualitative Research Methods*, edited by L. M. Given, 440-441. Thoursands Oaks, California: Sage Publications.

Watts, M. J. 1994. "Life under contract: the social impacts of contract farming in West Africa." *The Ecologist* 24(4): 130-134. https://link.gale.com/apps/doc/A15705609/AONE?u=oslo&sid=bookmark-AONE&xid=5368ce6a

Weis, T. 2013. *The Ecological Hoofprint: The Global Burden of Industrial Livestock*. London: Zed Books.

Werner, M. 2019. "Geographies of production I: Global production and uneven development." *Progress in Human Geography* 43(5): 948-958. https://doi.org/10.1177/0309132518760095.

Werner, M. 2021. "Placing the state in the contemporary food regime: Uneven regulatory development in the Dominican Republic." *The Journal of Peasant Studies* 48(1): 137-158. https://doi.org/10.1080/03066150.2019.1638367.

Werner, M. 2022. "Geographies of production III: Global production in/through nature." *Progress in Human Geography* 46(1): 234-244. https://doi.org/10.1177/03091325211022810.

Westrum-Rein, J. and J. Toftaker. 2022. "Kyllingprodusent får ros av dyrevernere: Har vært i tvil om det overhodet var mulig". *NRK*, 08.06.2022. https://www.nrk.no/trondelag/norsk-kylling-har-innfort-standarden-ecc-for-a-bedre-dyrevelferden-til-kyllingen-1.15990137

WHO (World Health Organization). 2023a. Human infection with avian influenza A(H5) viruses: World Health Organization. https://apps.who.int/iris/bitstream/handle/10665/365675/AI-20230505.pdf?sequence=355&isAllowed=y

WHO (World Health Organization). 2023b. Influenza at the human-animal interface summary and assessment, 24 April 2023: World Health Organization.

https://www.who.int/publications/m/item/influenza-at-the-human-animal-interface-summary-and-assessment-24-april-2023

WOAH (World Organisation for Animal Health). 2023a. "Avian influenza." Retrieved 23.05., 2023. https://www.woah.org/en/disease/avian-influenza/#ui-id-3.

WOAH (World Organisation for Animal Health). 2023b. High Pathogenicity Avian Influenza (HPAI) - Situation Report 39 https://www.woah.org/en/document/high-pathogenicity-avian-influenza-hpai-situation-report-39/

WOAH (World Organisation for Animal Health). 2023c. "Statement on avian influenza and mammals." Last modified 13.02.2023. Retrieved 18.05., 2023. https://www.woah.org/en/statement-on-avian-influenza-and-mammals/.

Østlie, J.-E. 2018. "Miljøfyrtårnet Norsk Kylling." Last modified 20.04.2018. Retrieved 04.05., 2023. https://fagpressenytt.no/artikkel/milj%C3%B8fyrt%C3%A5rnet-norsk-kylling.

Øvreberg, E. 2017. "Nå er norsk kylling nesten helt fri for narsin." Last modified 2017. Retrieved 24.04., 2023. https://forskning.no/landbruk-mat-partner/na-er-norsk-kylling-nesten-helt-fri-for-narasin/314218.

Aaberge, R., M. Mogstad, O. L. Vestad and A. Vestre. 2021. Økonomisk ulikhet i Norge i det 21. århundre: Statistics Norway. https://ssb.brage.unit.no/ssb-xmlui/handle/11250/3039587

Appendices

Appendix I
List of interviews and informants

Interview code and date (ddmmyy)	Informants' role in value chain	Gender	Number of informants
IHS1 201222	Norsk Kylling management: director of sustainable innovation and upstream production director	Female, male	2
IHS2 211222	Broiler farmer	Male	1
IHS3 020123	Broiler farmer	2 male	2
IHS4 030123	Manager and employee in chicken service company (catching and cleaning)	2 male	2
IHS5 030123	Broiler farmer	Female	1
IHS6 040123	Broiler farmer	Male	1
IHS7 050123	Regional union representative*[94]	Male	1
IHS8 090223	Hatching egg farmer	Male	1
IHS9 090223	Chicken transport company: manager and driver Norsk Kylling management: logistics manager and value chain coordinator	4 male	4
IHS10 100223	Factory workers** (slaughterhouse/processing plant)	2 female, 1 male	3
IHS11 210323	HSE manager and senior safety representative/factory worker	2 female	2
IHS12 210323	Factory worker**	Male	1
IHS13 220323	Company veterinary	Female	1
IHS14 240323	Regional union representatives*	Male, female	2
Total			22

[94] Asterisks indicate that the same informant was interviewed several times.

Appendix II

Samples of semi-structured interview guides (translated from Norwegian to English)

Poultry farmers

About the informant(s) and their role(s)

1. Can you tell me about the size and type of production on your farm?
2. How long have you been working on this farm?
3. Has the production on this farm changed over the years? If yes, how?

Work at the farm

4. Can you describe a normal workday with its various work tasks?
    a. How many hours/week do you spend on farm-related work, and how much on poultry production?
    b. Do you have an off-farm job? How about others in your household?
    c. Are other family members involved in the production?
    d. Do you have other farm employees?
5. Can you describe the phases of poultry production, and the nature and distribution of the work tasks in each of them?
6. How do delivery and catching of poultry happen, and who are involved in this?
7. What does working with live animals entail in your workday?
    a. Are there particular challenges compared to non-biological productions?

Farm economy

8. What is needed (land, buildings, machines) to maintain a production of your size?
    a. What are the main inputs, and costs related to these? How do these vary?
    b. Where do you buy animal feed, and under which conditions?
    c. What do you do with the manure and other biproducts?
9. What have been the most important investments in your production?
    a. Does it require a lot to maintain/develop/expand the production?
    b. Has it required big loans? How are credit conditions for poultry production?
10. Is poultry production profitable?
    a. Has it changed over time? How?
    b. How is profitability in poultry compared to other agricultural productions?
    c. How is your income distributed between poultry and other farm or off-farm economic activities?
    d. Which other actors than farmers earn money from poultry production?
        i. What are your thoughts about the distribution of profits between different actors? Has this changed over time?

HPAI/Infectious diseases

11. What is your experience of the recent and ongoing outbreaks of HPAI?
    a. How does the risk of HPAI affect poultry producers in general and you in particular?
    b. What could be the consequences of an HPAI outbreak in Trøndelag?

12. What (other) infectious diseases make up the most important challenges to the industry?
13. What does biosecurity entail on your farm?
    a. Who decides what should be done?
    b. Has it changed over time?
14. Have you experienced the culling of animals because of disease?

Relation to Norsk Kylling

15. Can you tell me about the relation and the contract between you and Norsk Kylling?
    a. Has it changed over the years? How?
    b. What kind of contact and interaction is there between you and the company?
16. How is your relation to other Norsk Kylling producers?
    a. Do you have insight into the production on their farms?
    b. How is the interaction between the producer association and Norsk Kylling?
    c. Do the economic conditions for producers differ in different parts of the value chain? How?

Closing remarks

17. How do you consider the future of poultry production, in Norway in general, and for you in particular?
18. Would you like to add anything?

Company veterinary

About the informant and their role(s)

1. Can you tell me about your background and your position as a company veterinary?
2. Can you describe a normal workday?
    a. What are the different tasks
        i. At farms?
        ii. At the hatchery?
        iii. At the slaughterhouse?
    b. Can you tell me about interaction and/or cooperation
        i. Within the veterinary team?
        ii. With factory workers?
        iii. With poultry producers?
        iv. With the poultry?

Infectious diseases and biosecurity

3. What are the main challenges to poultry production when it comes to infectious diseases?
    a. Has this changed over time? How?
4. Does HPAI affect your work? How?
    a. Has this changed over time?
5. What do you think would have been the consequences of an HPAI outbreak in Norsk Kylling's value chain?
6. What does biosecurity entail in Norsk Kylling the way it is organised today?
    a. What are the main challenges and strengths to this work?
    b. Who develops biosecurity routines?
    c. How do you work to coordinate biosecurity efforts along the value chain?
7. What do you think about the future of poultry production, in light of the ongoing HPAI outbreak?
    a. What are your thoughts on the proposal of vaccinating poultry to hinder HPAI infection?
8. Would you like to add anything?

Transport/logistics

About the informants and their role(s)

1. Can you tell me about your background and your role in this company?
2. How long have you worked with this?
    a. Has there been any changes to the industry during that time?

About the company and their activities

3. Can you describe the organisation of the company?
    a. How many works here?
    b. What services do you offer?
4. Where in Norsk Kylling's value chain are you involved?
5. What does the work of chicken transport entail?
6. How is your relationship with Norsk Kylling?
    a. Has it evolved over time?
7. Are there particular requirements related to chicken transport, e.g. training, equipment, hygiene, etc.?
    a. Have these changed over time?

Logistics

8. How is the logistics around chicken transport organised?
    a. Who decides what?
    b. What is the role of Norsk Kylling in this work? Has this changed over time?
    c. What are the biggest challenges in this work?

Infectious diseases and biosecurity

9. How does disease risk (of HPAI and other diseases) affect your work?
    a. Has this changed over time?
10. What does biosecurity mean in your work?
    a. Who decides what to do?
    b. How is training in biosecurity routines organised?

Closing remarks

11. How do you consider the future of poultry production, in Norway in general, and your role in this?
12. Would you like to add anything?

Management Norsk Kylling

1. Can you tell me about your position(s) in Norsk Kylling?
2. Trøndelag is one of three areas in Norway where broiler production is concentrated. Is this region particularly apt for this industry? If so, why?
3. The production is more dispersed than in other places, such as Rogaland. What consequences does this have, e.g. for transport along the value chain?
4. Can you tell me about the different work activities in the different stages of the value chain?
5. Can you tell me about the operation of the slaughterhouse and processing plant?
    a. How many works here?
    b. What tasks do they perform?
    c. How do you recruit workers?
6. Since 2021, there has been a wave of HPAI outbreaks, including three registered outbreaks in commercial poultry flocks in Rogaland. Are you worried this might also happen in Trøndelag?
7. Does the increased disease risk affect you in Norsk Kylling? How?
    a. Who decides what should be done?
    b. Where in the value chain do changes take place?
    c. Who does what (differently)?
8. What would be the consequences of an outbreak in your value chain?
    a. What would be done, and which actors would be involved?
9. The fully integrated value chain of Norsk Kylling differs from the organisation of the two other main actors in the Norwegian broiler industry.
    a. What are the biggest differences in your opinion?
    b. Are there any pros/cons of this model with regards to disease risk?
10. How is the interaction with Hubbard?
    a. Is this an area of potential disease risk?
    b. If yes, what do you do to deal with this risk?
11. What are your thoughts about the future of poultry production, in light of the ongoing HPAI outbreak and generally increased disease risk?

Management chicken service (catching and cleaning) company

1. Can you tell me about yourself and your background, and your position in the company?
2. Can you tell me about the chicken service of the company?
    a. How has the industry changed in recent years?
3. What is your relation to Norsk Kylling?
    a. Has this changed over time?
4. What is your relation to the producers?
    a. Has this changed over time?
5. How are the processes of catching and cleaning organised?
    a. Are the same employees engaged in both cleaning and catching?
    b. How do you coordinate with the transport company?
6. How do you recruit employees?
7. Many of your employees do not speak Norwegian as their first language. How do you overcome possible language barriers?
8. Do infectious diseases such as HPAI affect you in your work?
    a. Does it affect the work tasks of the cleaners and catchers?
    b. How is biosecurity training organised?
    c. Who decide which measures to follow?
9. What are your thoughts about the future of poultry production in Norway?

Employed labour (factory and chicken service)

1. Can you tell me about yourself, your background and your position in the company?
2. How long have you worked here?
    a. What did you do before coming here?
3. Are you employed on a temporary or permanent basis?
4. How did you get this job?
    a. Why did you apply for a job here?
5. Are you living in Norway on a permanent basis?
    a. If yes, how long have you lived here?
    b. If no, how often do you travel to/from the country?
6. Can you describe how the company works?
    a. How many are working here?
    b. Is there a high turnover of people?
    c. What are the different jobs people have?
7. Can you describe a normal workday?
    a. What are your work tasks? Do they vary – how?
    b. Are there particular formal requirements for doing your job?
8. Does disease risk (HPAI and/or other diseases) affect the work here?
    a. If yes, how?
9. What does biosecurity entail in your work?
    a. Who decides what should be done?
    b. How is training in biosecurity routines organised?
10. Has working in the industry changed in recent years? If so, how?
11. Which language(s) do you use in your workday?
12. What are pros and cons with working here?
13. Are you member of a labour union? Why, why not?
14. How do imagine the future of poultry production in Norway?
    a. How do you imagine your own future in the industry?

Labour union representatives

1. What are the most important changes taking place in the industry in recent decades?
2. How is the unionisation rate in the industry?
    a. Where do workers organised in your union work, within Norsk Kylling?
3. Do you face any challenges when recruiting workers? In that case, what kind?
4. How is the interaction with management?
5. What are the main challenges regarding working conditions in this industry?
6. How are wage levels?
7. What are common recruitment practices and contractual relationships?
8. Do you know anything about biosecurity in this industry?
    a. Do you know how it affect the employees?
9. Do you know if avian influenza affects the workers at Norsk Kylling's factory?
10. Do you work/have you worked in this industry yourself?
    a. If yes, can you tell me about your experiences?
    b. If no, can you tell me what workers in the industry tell about their experiences?
11. Would you like to add something?

Appendix III

Information letter and consent form (translated from Norwegian to English)

Do you want to participate in the research project

Pandemic Entanglements: The Political Ecology of Industrial Meat Production in the 'Pandemic Era' - **PANDEMEAT**

This is a question for you about participating in a research project where the purpose is to better understand how avian influenza affects poultry production. In this document, we provide you with information about the aims of the project and about what participating will mean for you.

Purpose
The project aims to develop new concepts and theories to understand the complex conditions involved in the production and emergence of diseases with pandemic potential, as well as the varied response among farmers and producers in adapting to a pandemic era.

Who is responsible for the research project?
The Centre for Development and the Environment (SUM) at the University of Oslo and the Institute for Food and Resource Economics (IFRO) at the University of Copenhagen are responsible for the project. The PANDEMEAT research group consists of Mariel Aguilar-Støen (project manager), Jostein Jakobsen (Centre for Development and the Environment) and Rebecca Rutt (Institute for Food and Resource Economics). Inga Haugdahl Solberg is associated with the project as a master's student at the Centre for Development and the Environment.

Why are you being asked to participate?
You have been chosen to participate because your experience and knowledge are relevant to the project. We will talk to several others who work in relevant professions in both Norway and Denmark. We have identified you as a relevant person on the basis of publicly available information, personal contact or recommendation.

What does participating mean for you?
If you choose to participate in the project, this means that you will be interviewed. The interview will take you approx. 45-60 minutes. In the interview, we will talk about your job and your experiences with poultry production.

Participation is voluntary
Participation in the project is voluntary. If you choose to participate, you can withdraw your consent at any time without giving any reason. All your personal data will then be deleted. There will be no negative consequences for you if you do not want to participate or later choose to withdraw.

Your privacy - how we store and use your information
We will only use the information about you for the purposes we have described in this article. We treat the information confidentially and in accordance with the privacy regulations. Your information will never be published.

What happens to your personal data when the research project ends?

The project is scheduled to end in 2025. All personal data will be anonymised by your interview being given a code number that is not recognisable to anyone other than the person who interviewed you. Anonymised information can be reused for research.
The data material will be stored further for research purposes. The data material will be stored at the Centre for Development and the Environment. Only members of the project have access to the data material. The data will be stored until 2035.

What gives us the right to process personal data about you?
We process information about you based on your consent. On behalf of the Centre for Development and the Environment, the Data Protection Services has assessed that the processing of personal data in this project is in accordance with the privacy regulations.

Your rights
As long as you can be identified in the data material, you have the right to:

- access to the information we process about you, and to be given a copy of the information
- to have information about you corrected that is incorrect or misleading
- to have personal data about you deleted
- to send a complaint to the Norwegian Data Protection Authority about the processing of your personal data

If you have questions about the study, or want to know more about or exercise your rights, please contact:

- Centre for Development and the Environment, Professor Mariel Aguilar-Støen
- Data protection officer at the University of Oslo, Roger Markgraf-Bye: personvernombud@uio.no

If you have questions related to the Data Protection Services' assessment of the project, you can contact:

- Data Protection Services by email (personverntjenester@sikt.no) or by phone: 53 21 15 00.

Sincerely,

Inga Haugdahl Solberg
Master's student in PANDEMEAT
Centre for Development and the Environment

Mariel Aguilar-Støen
Professor and project manager
Centre for Development and the Environment

Declaration of consent

I have received and understood information about the PANDEMEAT project and have had the opportunity to ask questions. I agree to:

- participate in individual or group interviews that are recorded
- that my anonymised personal data is stored after the end of the project, for research purposes

I agree to my information being processed until the project is finished

---

(Signed by project participant, date)