15 *Adaptability of the High-Value Egg and Broiler Production in Sweden*

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15.1 Introduction

Swedish egg and broiler farms produce high-value products. Production is located in the Southern part of Sweden, which is recognized for its fertile plain districts and agricultural activity which allows farms easy access to fodder and to grow their own fodder. The region covers approximately one third of the country's land surface, but the contribution to gross agricultural output is about 88 per cent, representing approximately 80 per cent of the regular labour employed in agriculture (Eurostat 2018). Family farms are very common, and they own and manage approximately 90 per cent of the total agricultural land (Jordbruksverket 2015).

In Sweden, intensive egg and broiler farming started in the late 1950s with the introduction of cage systems, based on new veterinary drugs and systematic disease control. This model soon become dominant due to its economic efficiency. Over the past decades, animal welfare concerns have been a main driver for changes in the production system. A ban on keeping laying hens in conventional cages was ratified in 1988 and became effective in 1999. Ever since, animal welfare concerns, high food quality standards, and consumer preferences have been a key driver of dynamic technology adoption and adaptation in the sector, causing continuous economic pressure.

Swedish egg and broiler farms produce mainly for the domestic market, especially eggs, breast meat, legs, and wings. The broiler meat market is growing fast and since 2010 has increased by 36 per cent in volume (Jordbruksverket 2020a). There is potential for further development of local markets, as in 2019, 71.6 per cent of consumed poultry meat was domestically produced. Self-sufficiency is high for eggs at 97.5 per cent (Jordbruksverket 2020b). Egg production has increased by approximately 34 per cent since 2010, and import regulation related to salmonella has contributed to this trend. Poultry meat and egg processing

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are rather concentrated. A few large companies contract several farmers, often for long term. While egg producers can sell eggs in on-farm shops, broiler producers must adhere to slaughter regulations.

In this chapter, we focus on the farming system and synthesize findings from five methods applied within the SURE-Farm project to assess the resilience capacity of the farming system. Following Meuwissen et al. (2019), we define resilience of farming systems as the ability to ensure the provision of the system functions in the face of economic, social, environmental, and institutional shocks and stresses, through the capacities of robustness, adaptability, and transformability (see Chapter 1).

The methods included: (i) the FoPIA participatory method (Paas et al. 2019), see Chapter 1; (ii) risk management focus groups (Soriano et al. 2020), see Chapters 1 and 2; (iii) learning interviews (Urquhart et al. 2019), see Chapters 1 and 2; (iv) farm demographic interviews (Coopmans et al. 2019), see Chapter 1; and (v) the policy assessment tool ReSAT (Termeer et al. 2018), see Chapters 1 and 4. The methods are fully described in Chapter 1, but the analysis is based on a multi-stakeholder approach, including farmers (intensive and organic producers) and representatives from farmer associations, the Swedish egg association, the poultry meat association, and value chain actors, such as processors, NGOs, government bodies, and researchers. The chapter is based on interaction with approximately 130 people (~100 surveys and/or interviews with farmers, ~30 stakeholders including farmers and other actors who contributed to workshops, focus groups, and the stakeholders' validation of the policy assessment). Data were collected during 2018–2020.

The main actors and the resilience characteristics were identified for the farming system, including: challenges, essential functions, resilience attributes, strategies, and the overall current resilience capacity. These are summarized in Annex 15.1. Whenever possible, we have included references in Annex 15.1 to guide the reader towards more detailed descriptions of the methods and results.

15.2 Synthesis of Results

15.2.1 Economic Challenges Prevail: The Consequence of Regulation, Changing Market Needs, and Climate Change

The high-value egg and broiler production in Sweden faces long- and short-term challenges, demanding continuous change from farming

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system actors. Table 15.1 summarizes the challenges identified in the farming system, across four sustainability dimensions (environmental, economic, social, and institutional). Wider analysis identifies other challenges, e.g., dependence on continuous deliveries and transports, but these challenges were not identified within the SURE-Farm project. Following SURE-Farm, the farming system is represented by farms, non-farm actors, and context actors, mutually (bilaterally or unilaterally) influencing each other, while delivering private and public goods (Meuwissen et al. 2019). Annex 15.1 shows the main actors representing, and the challenges faced by, the egg and broiler production in Sweden.

Economic challenges are scored highly by respondents as evident by the synthesis in Table 15.1. These challenges are interrelated and to a large extent a consequence of the institutional and environmental challenges. A major economic challenge is high input prices vs. low output prices, high production costs (often due to investments into new technology), and low bargaining power of producers, all of which lead to low profitability. Economic challenges put forward by stakeholders, often arise from strict animal welfare and environmental standards. Yet, stakeholders representing the farming system have not voiced concerns over strict regulation *per se*. Rather, in their perception, problems occur if standards are different and lower across the EU and other markets. Producers also perceive national regulation as poorly aligned with sector needs. It was stated that consultation with farms in the policy process is underdeveloped, leading to a legal framework that does not adequately account for its implications on the sector (Reidsma et al. 2019). It should be noted that we have not investigated the impact of animal welfare regulation on competitiveness, costs, or revenues.

The institutional challenges on high standards are generally supported by society, i.e., there is wide support for facilitating food safety, high animal welfare, health, and environmental standards (Reidsma et al. 2019). These general attitudes also result in a high demand for high-value products and organic eggs, but the demand is more erratic for broiler meat. In addition, there are often short-term demand fluctuations driven by media reports on animal welfare issues or the overall economic outlook. These challenges push the sector towards constant technological change in spite of continued low profitability, as well as price and other risks.

Table 15.1. *Summary of challenges identified with FoPIA, ReSAT, and risk management focus groups, across four sustainability dimensions: environmental (ENVM), economic (ECON), social (SOC), and institutional (INST) at the farming system level*

			Challenges			
		Method	**ENVM**	**ECON**	**SOC**	**INST**
Farming system	**Shocks**	FoPIA 1 and FoPIA 2		Scandals: social media and activists influencing the sale	Animal welfare activists	
		ReSAT (experts views)				High standards to prevent risks
	Long-term stresses	FoPIA 1 and FoPIA 2	Technology adaptation; Knowledge management;	Prices (inputs, output); High production costs; Changing technology; Changing consumer preferences; Different standards for Swedish and EU products; Knowledge;	Changing consumer preferences; Work load; Skilled labour; Succession; Gender issues; Social life;	Bureaucracy; High standards and strict regulation
		ReSAT (experts views)	Nutrient balance; Soil erosion; Climate change;	Different standards for Swedish and EU products; High production costs; Changing consumer preferences; Low value added at the farm level; Creditors do not support projects for high-value-added products;	Labour renewal; Gender structure; Skilled/educated labour; Social life; Changing consumer preferences	High standards and strict regulation

	Focus groups	Farm profitability; Market power of processors; Changing consumer preferences	High standards and strict regulation;. Activists/media convey a negative image of the sector and shape long-term consumer preferences

Source: Reidsma et al. (2019); Manevska-Tasevska (2018); Karlsson and Rommel (2019)

Environmental challenges highlighted by the respondents result from extreme weather events and disease outbreaks. The frequency of heat waves has increased, making ventilation and cooling of barns a major concern. Droughts, heavy rains, and storms can damage crops, affecting crop prices and leading to a shortage in fodder. Low precipitation has in some parts of the country led to low levels of ground water, which is a major production factor. Heat risks decrease animal welfare, as the hens and chickens suffer in hot barns; heat waves reduce the quality of eggs, as hotter barns lead to more hens laying their eggs on the floor, where it is cooler, instead of the warmer egg-laying compartments designed to keep eggs undamaged and clean; heat waves reduce the intake of food and water in animals; in a heat wave there is greater risk for the spread of pathogenic microbes (and other animal diseases).

Animal rights activists were identified by respondents as a risk. Activists can affect consumer demand, but they can also transmit diseases following illegal entry into barns. Last but not the least, poor attractiveness of job openings in agriculture can lead to difficulties in finding qualified labour and in the farm succession process.

15.2.2 Results from the FoPIA Participatory Assessment: The Farming System Focuses on Viable and High-Quality Production

The identity of a farming system is linked to the provision of functions, and workshop participants ranked the importance and the performance of essential functions with respective indicators (Paas et al. 2019). In SURE-Farm, functions relate to the question "resilience for what purpose?" and are subdivided towards the provision of private goods, including healthy and affordable food products, as well as other bio-based resources for the processing sector. Other functions are to ensure economic viability, to improve the quality of life in farming areas by providing employment and offering decent working conditions, and to provide public goods, such as, maintaining natural resources (water, soil, air) in good condition and protecting the biodiversity of habitats, genetic diversity, and species. Functions are also to ensure that rural areas are attractive places of residence and for tourism and to achieve high animal health and welfare (Meuwissen et al. 2019). The essential functions of the Swedish high-value egg and broiler production are presented in Annex 15.1.

The FoPIA workshop with stakeholders (Paas et al. 2019) revealed that 'viable income', 'animal health and welfare', 'protecting of natural resources' and 'maintaining food production' are among the most essential functions of the egg and broiler farming system in Sweden. Although highly important, the performance of 'viable income' and 'animal health and welfare' was assessed as medium. Indeed, challenges for the resilience of the farming system that relate to the economic performance and the need for fulfilling animal welfare requirements are emphasized by stakeholders (see Table 15.1 and Annex 15.1). The performance of protecting of natural resources and maintaining food production were assessed as medium to high (Reidsma et al. 2019).

Stakeholders also evaluated the importance and the performance of the indicators related to the respective functions. "Profit per m^2, product price, total production, nutrition loss, and "number of farms" fulfilling the criteria for animal welfare standards" were selected as the most important for delivering the main functions and thus the resilience of the farming system. The performance of the main indicators varies from low for the economic indicators, medium for the environmental indicator, to high for the production potential, and the fulfilment of criteria for animal health and welfare (Reidsma et al. 2019).

Following the specifications of the FoPIA model (Paas et al. 2019), the importance of the selected functions and indicators, and the assessed performance depends on stakeholders participating in the workshop. This subjective assessment relates to the resilience of the farming system, and how different stakeholders (producers, representatives from the Swedish egg association and the Swedish poultry meat association, NGO, value chain) perceive the importance of the functions and the indicators. For instance, the group of stakeholders did not include environmental activists, and the performance of the environmental indicators might be over-scored as a result.

15.2.3 Insights from Risk Management Focus Groups: Greater Cooperation to Address Power Imbalances in the Value Chain

Challenges, associated risks, and risk management strategies were discussed in focus groups (Soriano et al. 2020). Although risks from animal diseases were viewed as a major challenge in the farm survey (Spiegel et al. 2019), participants in the focus group agreed that risk management practices in this area are advanced and do not offer a lot

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of room for further improvement. The challenge herein lies mostly in the adoption of new technologies and related training of farm employees, as well as strict monitoring of fodder quality.

Low profitability and changing consumer preferences were viewed as challenges that offer more potential in terms of improved risk management. Broiler producers perceive upstream market power of slaughterhouses as problematic, and there were news reports on mergers and acquisitions among slaughterhouses at the time of the focus groups, creating worries among farmers about further market power imbalances. Consumer demand was perceived as erratic, especially for high-value organic broiler meat. Media reports and consumer perceptions – the increasing role of influencers and social media debates was explicitly mentioned – oscillating between a view of poultry meat and eggs as a healthy and climate-friendly alternative to pork and beef on the one hand. On the other hand, there are repeated episodes of negative news about animal welfare or food safety concerns. For both risks, an increased cooperation along the food value chain was viewed as critical. Consumer awareness and knowledge are one aspect; greater diversity and modularity in terms of product lines and marketing channels are another aspect mentioned as crucial to increasing the resilience of the system. It was mentioned that the collaboration of value chain actors should also be extended to banks who appear to have lost their sector-specific expertise over the past years, creating problems with loan allocation and financial risk management. Chapter 2 provides more details on the importance of risk management in European agriculture.

15.2.4 Adaptability as an Inevitable Process? Focus on Relevant Attributes, Strategies, and Policies

The farming system is adaptable, continuously implementing incremental change, in line with technological, legislative, and market developments. The great need for adaptability emerges from newly imposed regulation and changes in consumer preferences. Adaptability of the farming system is maintained via knowledge exchange and structural change.

Tightness of feedback, openness, functional diversity, and system reserves are among the main attributes characterizing the resilience of this farming system (see Annex 15.1). Tightness of feedback and openness are related to farmers' actively seeking out knowledge to support and build networks, and to the farmers' openness to learn

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from different knowledge sources. System reserves can be linked to strategies where knowledge is shared with family members and employees to ensure that the farm does not depend on a single person (Manevska-Tasevska and Rommel 2020; Reidsma et al. 2019).

Adaptation strategies imply structural adjustments in production, including: an increase in farm size, functional diversification (higher self-sufficiency of fodder or alternative businesses for income diversification to manage risks), and technological development for greater productivity and disease management (Manevska-Tasevska and Rommel 2020; Reidsma et al. 2019). Farms must often expand to benefit from economies of scale and to compete with foreign players via imports. Currently there is heterogeneity in the system, with most broiler farms having between 50,000 and 500,000 birds, whereas most farms specializing in egg production have between 10,000 and 100,000 birds. Larger farms often find it easier to integrate fodder production into the farm's activities. Larger farms can also adopt advanced technology more easily, allowing them to coordinate activities more efficiently.

Adaptation strategies also rely on knowledge management, access to skilled labour, as well as access to land and capital (Manevska-Tasevska and Rommel 2020; Reidsma et al. 2019). For the system to evolve, different kinds of knowledge and wide competences are required, including technical knowledge in daily operations, strategic planning of the different business activities, optimization of labour, knowledge on new trends, legislation, and regulation. Stakeholders cooperate along the value chain to make the soft components of these competencies and the knowledge widely available at the farm level. However, in some instances, new work routines or the implementation of new regulation demand more substantial and idiosyncratic change at the farm. The Swedish egg association and the Swedish poultry meat association take responsibility in addressing these demands by facilitating knowledge exchange. At the same time, the Swedish egg association and the poultry meat association act as interest groups to shield farms from stricter regulation and other external pressures.

Multiple policies impact the resilience of farming systems in Europe (Feindt et al. 2019). The results of the Swedish case study show that organic production support, investment support, knowledge development and support for cooperation and pilot projects, young farmers support, and support for re-structuring and modernizations of farms can strengthen the link between primary production and processors (Manevska-Tasevska 2018). The policy framework mostly supports

the sector's adaptability. The main policy objectives are environment- and climate-friendly practices and technologies, a generational shift successors, and social learning. Policy support encourages high-quality products, which is highly appreciated by the consumers. The current policies and regulations are criticized for ignoring the extra costs they can cause for farms, while international competitors often operate under more liberal laws and regulations (Manevska-Tasevska 2018).

The robustness of the farming system mainly relates to processes at the farm level, including family support, family labour availability, labour division (including gender issues), off-farm employment, generational shift, and social networks (Reidsma et al. 2019). Functional diversification, i.e., not being dependent on a single income source of the farm enterprise, is among the most common solution for keeping the farm both robust and adaptable. For example, shaping the activities of the farm to fit the profile of the environment (fodder production, renting out holiday lets or making use of the wider consumer market found in towns and cities, forestry, etc.) were some of the mentioned strategies. Robustness has been associated with experience and learning by doing as well as learning from others (other farmers, consultants, and advisors in particular). In line with the Swedish CAP orientation towards "as long term as possible" objectives (Regeringskansliet 2014, p. 9), with a liberal, market-oriented, and competitive agricultural sector, taking into account the climate, environment, and rural development (Regeringskansliet 2014, p. 112), the policy support provided to enable the robustness of the poultry sector is very limited. As farms self-assess their robustness as relatively high (Spiegel et al. 2019), the policy focus on adaptability might be warranted.

Transformability remains a major challenge to be addressed across all actors in the farming system. There was no clear indication of transformative change in the farming system. Changes applied at different levels across the system are continuous and incremental, and the transformation of the farming system is gradual. Rapid transformation of the farming system was not identified as an option due to the large investments needed. Farmers have also made substantial livestock-sector-specific human capital investments, and it would be unrealistic to expect a shift to other activities without a major support system in place. Farmers exhibit entrepreneurial spirit, and they test and experiment, for instance with alternative energy sources. However, such small-scale experimentation does not trigger a greater transformation of the system. In many instances, changing to organic farming was pointed out as transformability. However, the conversion from conventional to

organic egg and broiler production takes less than five years, and these changes can also be interpreted as adaptability to changing consumer preferences. From a policy perspective, transformability is supported with non-productive investments, support for vocational training and advisory services, support for agri-environment-climate commitments, cooperation, and building innovation groups and innovation projects, all with a focus on long-term social benefits.

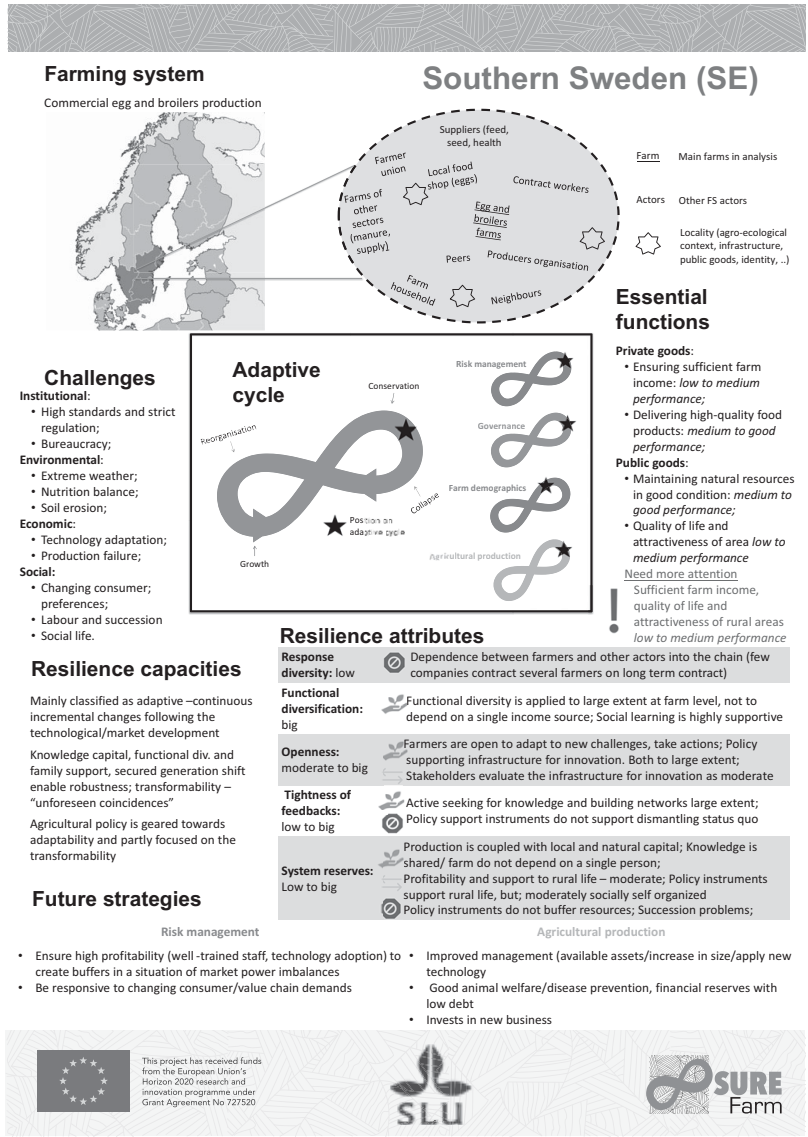
15.3 Concluding Remarks

In this chapter, we synthesize findings on the current resilience of the high-value egg and broiler production in Sweden. The focus in this chapter is on the farming system.

Swedish egg and broiler farms produce high-value livestock products predominantly for the domestic market. The farming system faces a number of challenges but also fulfils important functions. The economic performance, strict regulation, changing consumer demand, animal welfare concerns of civil society, and power imbalances in the value chain are among the main challenges as subjectively perceived by stakeholders in the egg and broiler farming system. These challenges require change in technology as well as cooperation and a reorganization of the value chain. Production cost and subsequent farm profitability are considered the key performance indicators for keeping the sector resilient.

Overall, the current resilience capacity of the farming system is moderate to high, with high levels of adaptability, based on the perceptions of the representatives of the system. The potential for transformability is low, primarily due to the necessary investments in technology and human capital. The Swedish egg association and the Swedish poultry meat association play a key role in catalysing resilience. Tight networks among processors and primary producers, facilitated by the egg and poultry meat associations, should ensure sufficient information flows and feedbacks. Greater modularity and diversity in terms of processing channels and production lines, as well as openness to new technology, knowledge, and networks (e.g., peers, advisors), are among the identified pathways towards future resilience.

Future research should make an effort to understand better the role of social media as a driver of short- and long-term changes in consumer demand. An in-depth industrial organization study of the sector could also yield important insights to address increasing concerns about power imbalances of different value chain actors especially for broiler production.



Annex 15.1 Factsheet synthesizing resilience of the current farming system in Southern Sweden.

Source: Reidsma et al. (2019)

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