Report on “beacon systems”:

Best sustainable practice examples on pig farms

Deliverable 6.3

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Introduction

Pig farmers are working in a difficult field. Prices paid for pigs are low and fluctuating. Society has increasing expectations regarding environmental impact and animal welfare. Therefore, pig farmers need recommendations on how to optimise all pillars of sustainability (economy, environment, society, animal) in a balanced way. Yet, there is very little on-farm data to support informed holistic decisions.

The ERA-Net project “Sustainable pig production systems” (SusPigSys) aimed at collecting, summarising and disseminating evidence-based information on successful strategies for improving sustainability across all pillars in various pig production systems across the EU.

This report presents pig farms in order to generate ideas and inspiration. The farms had good SusPigSys sustainability analysis results in two or three pillars. No farm ranked high in all four pillars. This represents the fact, that many aspects of sustainability may be conflicting. In order to achieve long term viability of a farm it will be more important to have a certain level of sustainability in all pillars rather than being the top in one or two but bottom in others.

Farm assessment and selection

Between April and November 2018 two assessors visited a total of 63 farm in seven countries: 10 each in Austria, Italy, and Poland, 9 in Germany and The Netherlands, 8 in Finland and 7 in the United Kingdom. Out of those farms, 13 were breeding farms, 23 finishing farms and 26 breeding-to-finishing farms.

Farmers had responded to a call for participating in the project, and the farms were selected to represent typical production systems as well as few promising new systems.

The assessors collected data on economy, environmental impact, animal health and welfare and social sustainability with the SusPigSys data collection protocol[1]. Sustainability was then analysed with the SusPigSys Analysis Toolbox for integrated system analysis[2]. The analysis results are at theme level within pillar (Table 1), because further summary calculation lose valuable information. Farms were then ranked according to the theme within pillar results, and farms selected who were among the best 20% in at least two pillars.

Analysis details will be published in an articles which will be linked at https://www.researchgate.net/project/SusPigSys-Sustainable-pig-production-systems-ERA-Net-SusAn

[1] DOI:10.13140/RG.2.2.17828.09605, https://www.researchgate.net/publication/348466379_Condensed_protocol_from_Era-Net_SusAn_project_Sustainable_pig_production_systems_SusPigSys

[2] DOI:10.13140/RG.2.2.35444.17288, https://www.researchgate.net/publication/348466123_EMBEDDING_SUSTAINABLE_PIG_PRODUCTION_IN_AGRICULTURAL_POLICIES_A_polic_brief_based_on_experiences_from_the_SusPigSys_project

Table 1: Overview of themes and subthemes for the four sustainability pillars animal health and welfare, environmental impact, economy and social and farmer wellbeing.

Theme	*Subtheme*
Animal health and welfare (AHW)	
Absence of hunger and thirst	Clinical finding Water provision Feeding system Roughage Management Pasture
Comfort (thermal, physical, when resting and during locomotion)	Clinical findings Creep area Floor quality Space allowance Pasture Hospitalisation Husbandry system Slaughter remarks Treatments
Absence of injuries and disease	Biosecurity Clinical findings Hospitalisation Mortality Pasture Slaughter remarks Treatments
Absence of pain by management	Clinical findings Hospitalisation Mutilations Castration
Possibility to perform appropriate behaviour	Behaviour Clinical findings Enrichment Pasture Space allowance Restricted normal behaviour Slaughter remarks
Good human-animal relationship	Negative characteristics One welfare Positive characteristics
Economy (ECO)	
Technical efficiency	Feed Efficiency Reproductive Efficiency Health Management
Economic resilience	Entrepreneurship (qualitative) Profitability Risk Management Labour Productivity Resilience of Resources (qualitative)

Environment (ENV)	
Atmosphere	Greenhouse gas emissions Air quality
Water	Water Withdrawl Water Quality
Soil	Soil Quality Land Degradation
Biodiversity	Ecosystem Diversity Species Diversity Genetic Diversity
Material & Energy	Material use Energy use Waste Reduction
Social and farmer wellbeing (SOC)	
T1 Decent Livelihoods	ST1.1 Quality of life ST1.2 Succession ST1.3 Capacity Building ST1.4 Fair access to means of production
T2 Fair Trading Practices	ST2.1 Responsible buyers ST2.2 Right of suppliers
T3 Labour Rights	ST3.1 Employment relations ST3.2 Child labour
T4 Equality, non-discrimination, gender equality, vulnerable groups	ST4.1 Non-discrimination ST4.2 Gender equality ST4.3 Vulnerable groups
T5 Human health & safety	ST5.1 Safety and health training/safety at workplace
T6 Good governance	ST6.1 (Negative) Impact on society and environment ST6.2 Positive contribution

Overview of presented farms

This report presents two breeding-to-finishing farms, one breeding farm and one finishing farm from different countries. Farms and differ in several characteristics, including herd size, land use, or other production lines on the farm (Table 2) and they have different patterns in their sustainability scores (Figure 1).

None of the farms is certified organic. Only few organic farms had been assessed because proportions of pig farms that are organic are very low in all participating countries. All farmers represented highly motivated future-oriented entrepreneurship.

Table 2: Basic parameters of farms presented in this report (n pigs = mean number during calendar year)

Farm	**FI009**	**UK310**	**DE009**	**FI003**
Country	Finland	United Kingdom	Germany	Finland
Type of farm	Breeding-to-finishing	Breeding-to-finishing	Breeding	Finishing
n sows	190	174	1767	0
n weaners	1374	838	2771.5	0
n growing-finishing pigs	1004	1085	0	1483
Other production lines besides pigs contribute to income?	pigs only	dairy cows	crops + sheep	Contract work for other farms, blueberries, crops.
Production system	conventional	conventional certified	conventional certified	conventional
Production certification name and type	none	QMS (Quality Meat Scotland)	QS (food safety standard)	none
Breed(s) present on farm	Finnish landrace, Yorkshire	Large white & Landrace x	Topics70 x Select	Yorkshire, Finnish landrace
From how many sources (farms) you do buy in pigs? [n]	2	0	0	2
Total utilised farm land [ha]	168	809	610	444
Total land rented [ha]	22	202	480	205
Total agricultural land [ha]	100	769	600	272
Total land used for growing crops for pig feed production [ha]	100	0	0	89.5
Total arable land [ha]	96	0	450	168
in top 20% AHW	yes	no	no	yes
in top 20% ENV	yes	yes	yes	yes
in top 20% SOC	no	no	yes	no
in top 20% ECO	yes	yes	yes	no

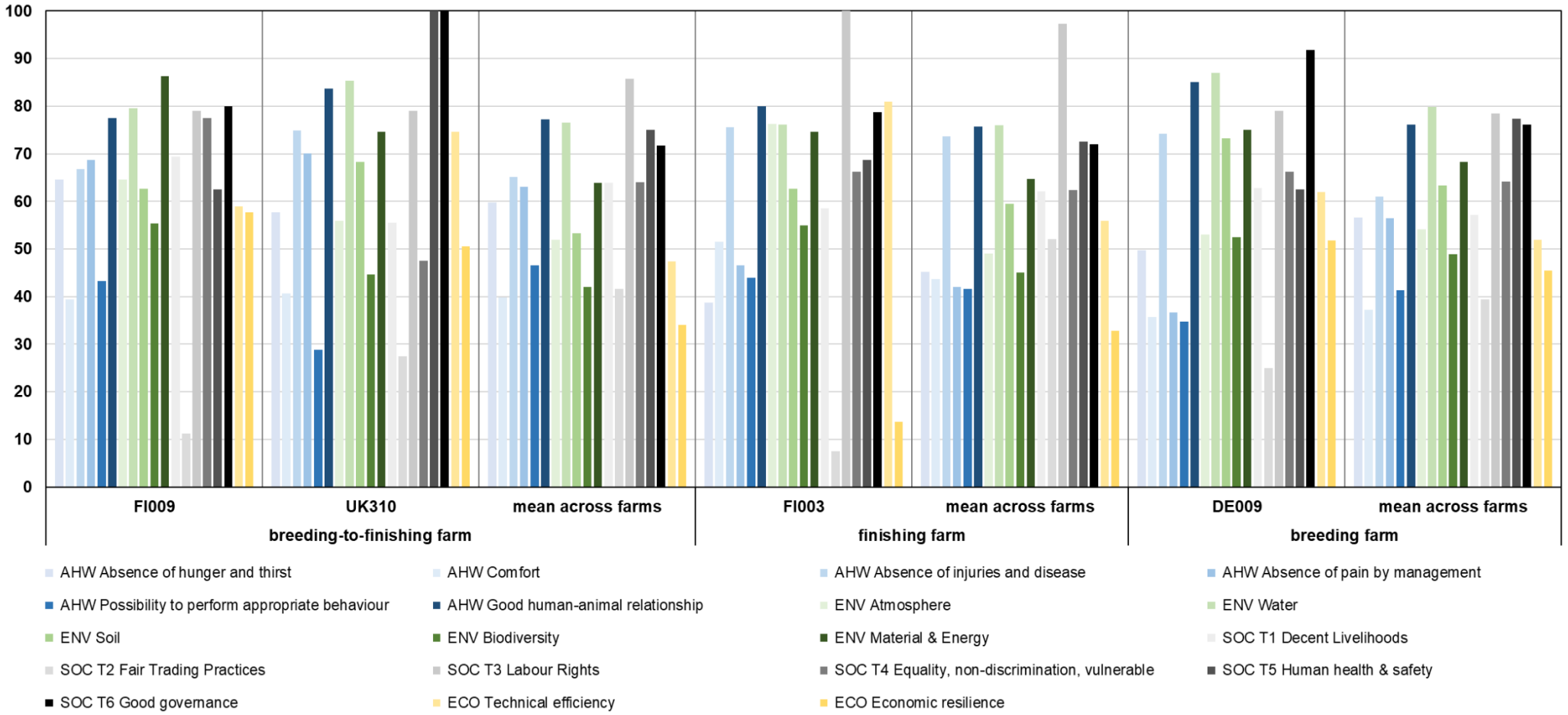
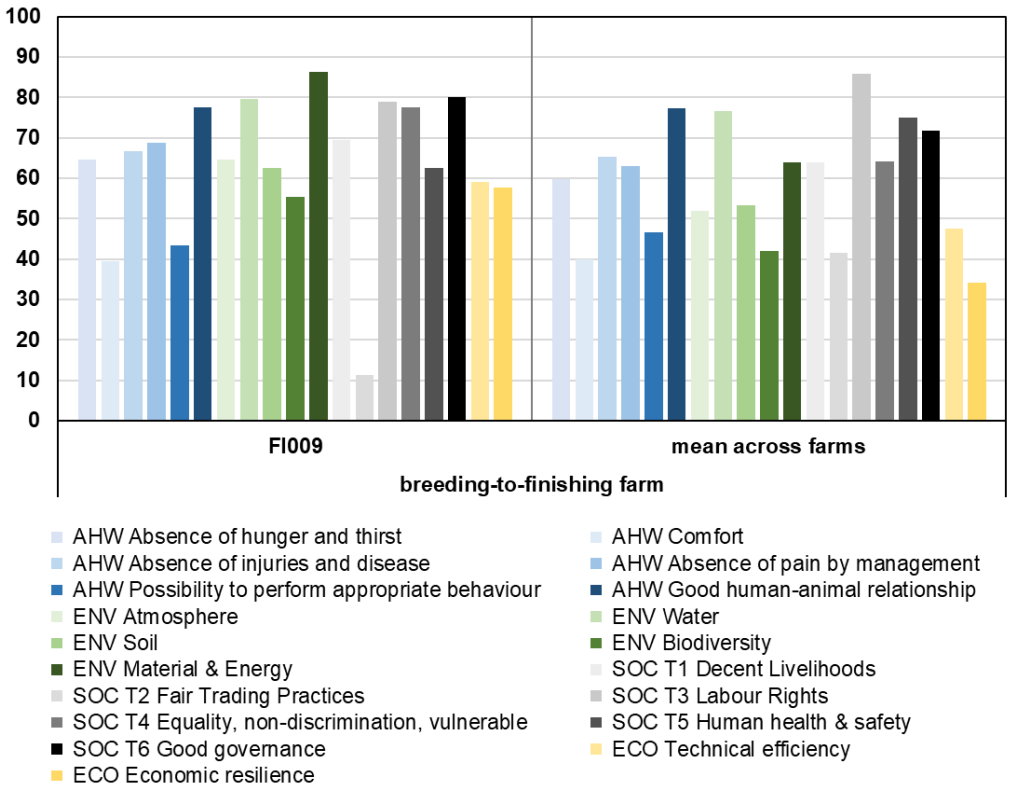


Figure 1: Values for all themes for the selected farms and theme (higher is better). Means across farms are based on 26 breeding-to-finishing farms, 13 breeding farms, or 23 finishing farms, respectively.

Breeding-to-finish farm FI009

The Finish breeding-to-finishing farm FI009 was built in 1930. Since then, the pig barns were renovated and extended several times, including additional buildings. It is a family farm run by a young couple who took it over in 2004. They are still using the old buildings and installed several innovative solutions in order to keep the pigs to current standards. The farm was among the top 20% in the pillars animal health and welfare, environment and economy.

n sows	190
n weaners	1374
n growing-finishing pigs	1004
Other production lines besides pigs contribute to income?	pigs only
Production system	conventional
Production certification name and type	none
Breed(s) present on farm	Finnish landrace, Yorkshire
From how many sources (farms) you do buy in pigs? [n]	2
Total utilised farm land [ha]	168
Total land rented [ha]	22
Total agricultural land [ha]	100
Total land used for growing crops for pig feed production [ha]	100
Total arable land [ha]	96



Animal health and welfare (AHW)

On this breeding-finishing farm, scores for AHW parameters were generally very similar to the mean across all farms, with the exception of **Absence of hunger and thirst** and **Absence of pain by management** which were higher than average. This farm ranked high in AHW because several scores were slightly above average. Pigs were provided with a lot of **organic enrichment**, so that most of the pigs had access to a rack with hay/straw and the floor was covered with sawdust. The farm also scored highly for **Clinical findings**, reflecting low levels of ear, tail and shoulder lesions. These two factors contributed to the high score for Absence of hunger and thirst. Similarly, for the sub-theme of **hospitalisation**, there were no pigs identified during the visit which would have benefited from being in a hospital pen. Coupled with low levels of ear, tail and shoulder lesions, this contributed to the high score Absence of pain by management. Initially the farm may not appear to be a 'model' system, since many of the buildings were old and were partly dirty. Yet the young couple now responsible for running this family-run farm clearly have a high regard for AHW, and their positive attitude towards the animals compensates to some degree for the quality of the housing system.

Environment (ENV)

The best environmental theme score was for **Material & Energy** with 86 from 100%, comprising of subthemes material use, energy use and waste reduction. This is mainly due to **water-saving** technologies in the barn, no irrigation of fields and a targeted application of fertilisers with high precision technology. The amounts of **fertilisers** (N, K, P) are based on plant and soil analyses. Furthermore, energy is saved by 100% of arable land without tillage. Only 8% of inputs were discarded during the last 5 years.

In the **Water** theme this farm reaches to 79%. Two water-subthemes are relevant in this context: water withdrawal and water quality. The farm uses water-saving technology in the barn, has sufficient water supply and storage capacities and does not irrigate fields. As a result, it reached 100% for water withdrawal. The following practices contribute to water quality (59%): The amounts of N, K and P fertilizers are based on soil and/or plant analyses and application is carried out with high precision technology. There was no conversion of grassland and deforestation of woodland on the farm in the past 20 years and arable land was not ploughed. But, chemical synthetic pesticides are applied on all arable land twice a year.

Atmosphere scored 65%. Some indicators contribute to several themes and subthemes, in this case the preservation of grass- and woodland, all arable land without tillage as well as fertiliser amounts based on plant and soil tests as well as a high precision application of fertilisers contribute positively to **air quality** and **greenhouse gas emissions**. Related to the latter, the LCA-indicator "**kg CO_2-eq per ha"** scored well, even though no energy-saving technologies are used on the farm, and the feed is not certified and thus may be related to deforestation. Besides, 8% of the crop land is on drained moorland which reduces the emissions score.

Soil, consisting of soil quality and land degradation, reached 63%. Main factors accounting for this were, among others, the preservation of grassland and woodland in the past 20 years, a share of woodland (50 ha), targeted fertiliser application with high precision technology, and no indication for land degradation by wind/water erosion or soil compaction.

The theme of **Biodiversity** reached 55 %. Most of the farms tended to reach lower scores in this theme. We differentiated the subthemes ecosystem diversity, species diversity and genetic diversity. The farm in question had no ecological focus area but it did not cultivate GMO crops on farm or used it as feed. The share of woodland, preservation of grass- and woodland as well as targeted fertilisation with high precision technology are the key contributors to biodiversity on this farm. The farm did not use endangered pig breeds or cultivated rare or endangered crop species/varieties, thus resulting in a low genetic diversity score.

Economy (ECO)

This pig farm is characterized by a high **number of litters per sow** and a comparatively high **weaning age** of 33 days post-partum. The genetic efficiency, expressed by the numbers of **piglets born per litter**, is at rather discrete levels, which explains the rather low number of **piglets weaned per sow per year** (25.3). The farmer does not spend more than 59 € per sow for **veterinary and medicine costs** which may indicate good health management. Probably this is due to the high weaning age of the piglets, which makes the piglets more robust and resilient in the subsequent phases of growing and finishing.

The **gross margin over non-factor costs** is high and is almost 20% higher than the average of Finnish pig farms. This pig farm is able to reach this level of **profitability** not so much by pointing at high revenues, but primarily by focusing on the reduction of operational costs. Regarding the **economic resilience** of the farm, the excellent profitability is able to partially compensate a weakness in form of the high recourse (100%) to wage labour.

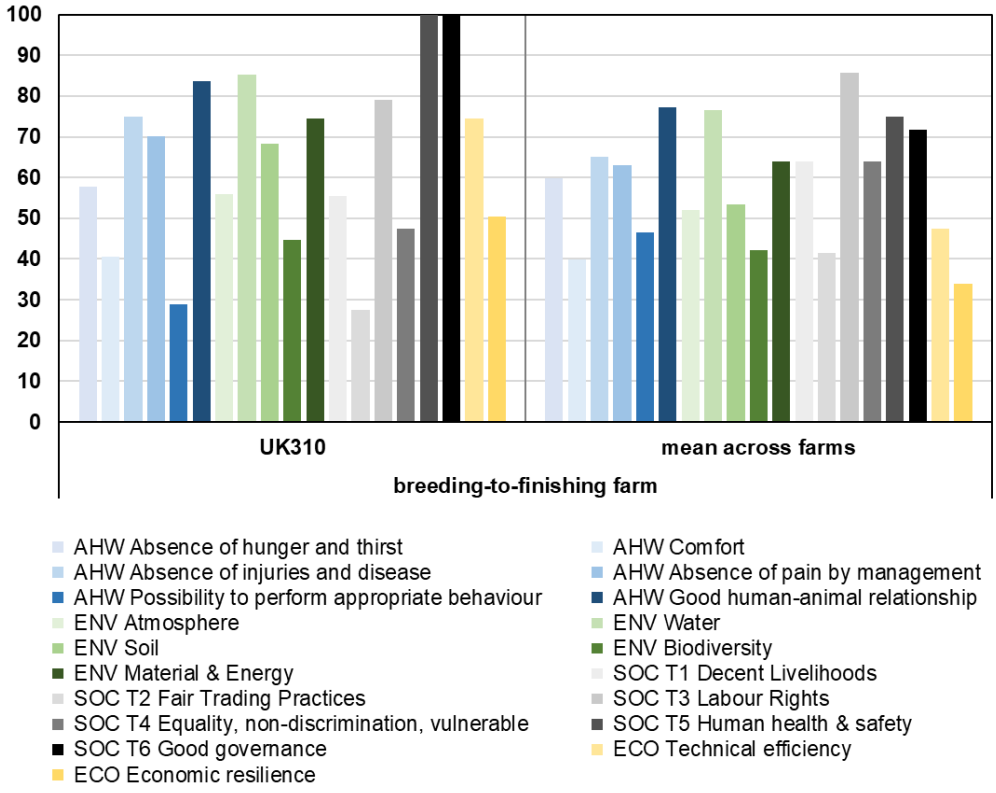
Social and farmer wellbeing (SOC)

Although more difficult to quantity as compared to the other three pillars, the analysis of the social indicators reveals some interesting insights. This farm scored higher than the average farm in the themes Decent Livelihood, Equity (fairness) and Good Governance, whereas Fair Trading Practices scored less. The high scores are supported by several indicators. For example, **Decent Livelihood** includes quality of life, succession, capacity development and fair access to means of production (including capital, equipment and knowledge) which scored almost 10 percentage points higher than the mean. Succession and capacity development (through training and education) for the farmer, his/her family members and other workers are particularly important for this farm, with scores well above the average. These indicators reflect the importance of having a successor but also the opportunities and resources available to acquire skills and knowledge that will help to maintain a sustainable farm business. Farmer's motivation for being a pig farmer, job satisfaction, acceptable workload and good health status, and also a manageable level of stress and very good relationships with his/her close neighbours have also scored above the average. Interestingly, and similar to FI003 in this report, the theme **Fair Trading Practices** scored lower amongst the themes but also much lower than the mean across all farms. This indicator focuses on the extent to which the farmer perceives his/her relationships with buyers with regards to the price received for his/per products (so to reflect the full cost of production), market information, access to market and mutually agreed contracts. All of these are particularly important for a business to remain sustainable. The **Equity** theme also scored well above the average (79%), thus reflecting the importance that this farmer attributes to non-discrimination policies to be applied consistently to all employees on the farm, including support for vulnerable groups. The farmer also considered that in order to achieve a sustainable business, good governance, i.e. the implications that a farm business may have on the environment, the local economy and the local community, is vital. This theme has the highest score (80%), hence demonstrating that a farm business cannot act on its own, isolated from the rest of the community and its impacts cannot be ignored.

Breeding-to-finish farm UK310

The British breeding-to-finish farm UK310 uses advanced technical solutions for effective indoor farming. The farmer is very interested in using state of the art building design and management practices on the farm. The farm is located some distance away from other pig farms. It was among the top 20% in the pillars environment and economy.

n sows	174
n weaners	838
n growing-finishing pigs	1085
Other production lines besides pigs contribute to income?	dairy cows
Production system	conventional certified
Production certification name and type	QMS (Quality Meat Scotland)
Breed(s) present on farm	Large white & Landrace x
From how many sources (farms) you do buy in pigs? [n]	0
Total utilised farm land [ha]	809
Total land rented [ha]	202
Total agricultural land [ha]	769
Total land used for growing crops for pig feed production [ha]	0
Total arable land [ha]	0



Animal health and welfare (AHW)

Although this breeding-finishing farm was not ranked among the top 20% for AHW scores for AHW themes were markedly above average for Absence of injury & disease, Absence of pain by management, and Good human-animal relationship. For **Absence of injury & disease**, the farm had high scores for almost all sub-themes, except for clinical findings. For example, the sub-themes mortality and treatments scored well, indicating that the farm had very low mortality rates and use of antibiotic treatments. Biosecurity was also very high. For **Absence of pain by management**, the farm is quite interesting, since it scored 100% for mutilations and castration, indicating that the farmer does not shorten piglets' teeth or tails and does not use nose rings for sows. However, the sub-theme **clinical findings** had a very low score, reflecting a lot of pigs with lesions. With **Good human-animal relationship**, the farmer scored 100% for "one welfare", comprising two questions: whether the farmer thinks that if his/her well-being is at risk so is the welfare of the pigs at risk, and whether good overall farm performance is directly linked to good sow/pig welfare. However, scores for **Possibility to perform appropriate behaviour** were substantially lower than the mean across all farms, because this farm was based on a fully-slatted system with limited opportunity to provide bedding material to allow for display of appropriate behaviours, pigs did not have access to pasture, there was limited enrichment, relatively low space allowance and higher levels of **clinical findings** (i.e. lesions to ear, tail and shoulders).

Environment (ENV)

This breeding-to-finish farm had no arable **land**. 95% of the land was permanent grassland and 5% woodland. Its scored highest for **Water** (85%) due to water-saving technology in the barn, sufficient water supply and storage capacities and no field irrigation (100% in subtheme **water withdrawal**). **Water quality** scored 71% due to test-based application of N, K and P **fertilizers** and additional use of high precision application technology. In the past 20 years there was no grassland conversion or deforestation of woodland on the farm. The LCA-Indicator "**P_2O_5-eq per kg** piglet / fattening pig live-weight" reached a good 85%, but twice-yearly chemical synthetic pesticides application on all grassland reduced water quality on this farm.

Material & Energy had the second-best score of 75%. The result was mainly due to low water withdrawal, precise application of fertilisers, the preservation of grassland and woodland in the past 20 years as well as almost zero discarded inputs (0,5 %) during the last 5 years. The LCA-indicator "**m^2 land use per kg** piglet / fattening pig live-weight" reached a score of 100%.

Soil, consisting of soil quality and land degradation, scored 68%. Main influencing factors were the preservation of grassland and woodland in the past 20 years and targeted fertiliser (N, K, P) use. No part of the land is degraded by wind/water erosion or soil compaction, but use of chemical synthetic pesticides on all agricultural areas caused risks for the soil.

Greenhouse gas emissions (GHG) and air quality are the subthemes related to **Atmosphere** (56%). Main contributing indicators on this farm were: the preservation of grass- and woodland and the precise fertiliser application based on plant and soil analyses. The farm had no agricultural land on drained moorland (thus reduced emissions). The LCA-indicator "**kg CO_2-eq per kg** piglet / fattening pig live-weight" was good (87%). Related to air quality, the LCA-indicator "**kg SO_2-eq per kg** piglet / fattening pig live-weight" reached 94%.

Biodiversity, with the subthemes ecosystem diversity, species diversity and genetic diversity, scored rather low on this farm (45 %). Supporting factors were no on-farm cultivation of GMO crops, precise fertilising of N, P, K and the preservation of grassland and woodland. Decreasing factors were the large-scale treatment with chemical synthetic pesticides twice a year and absence of ecological focus areas. The farm did not use endangered pig breeds or cultivated rare or endangered crop species/varieties, thus resulting in a low genetic diversity score.

Economy (ECO)

This small breeding-to-finish farm reached very good results in terms of **reproductive efficiency** by weaning 33 piglets per sow. This is the result of good genetic performance combined with a well-balanced health management: the pre-weaning mortality rate of 5.6% is low. Thus, sow management of this farm is at high levels. The low pre-weaning mortality is reached despite a conservative **weaning age** of 25 days.

The good sow management exerted its positive effect on the **profitability**. The **gross margin over non-factor costs** per sow was € 2.030/sow, which is 22% higher than average of the UK pig farms of the sample. Regarding growing-finishing, the farm had good results in terms of **feed conversion** rate (2.5), but presumably this can be attributed to the rather low slaughter weight of finisher pigs of UK farms. The **economic resilience** of this farm is further enhanced by the labour productivity, as this farm raises 129 sows and 1 365 finisher pigs per annual labour unit.

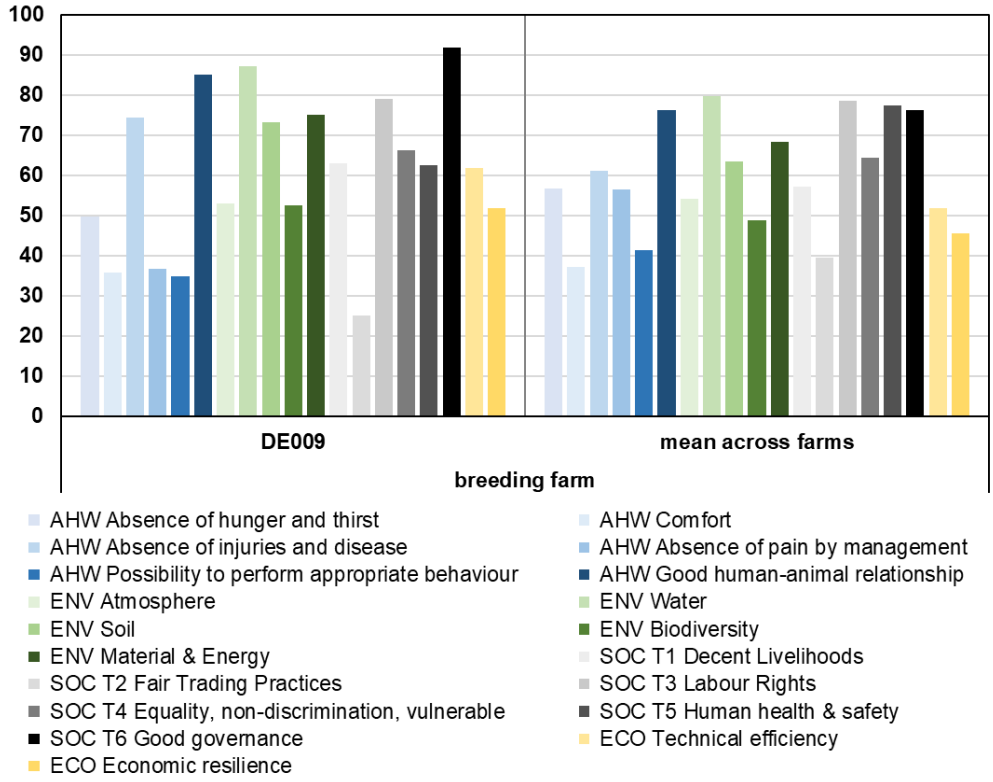
Social and farmer wellbeing (SOC)

This farms' scores for **Human Health and Safety** and **Good Governance** reached the full 100%. These very high scores emphasise the paramount importance of a safe and healthy workplace for everybody on the farm (including the farmer and his family members) to achieve social sustainability. This is particularly important in a sector which is in general characterised by a high suicidal rate, high numbers of accidents, strenuous physical work, exposure to harmful substances (e.g. chemicals, pesticides and dust), work with machines, equipment and animals. As above, **Good governance** was good. **Labour rights** (regular employment on the farm that is fully compliant with national and international laws, labour and social security) score was also high (79%) although a few percentage points less than the mean across all farms. To ensure sustainability, farmers needs sufficient labour force to cover the day-to-day duties on the farm and they have to ensure that their workers have a good understanding of their rights, particularly in terms of wages and working conditions. This farm scored lower than the average for the themes **Decent Livelihood** (55.5% as opposed to 62%) and **Fair Trade Practices** (22.5% compared to 41%). For the former, the indicator that affected the score is succession. As pointed out, succession is an essential indicator for social sustainability, hence the lack of a successor may affect in long term the existence of the farm per se. **Fair trade** practices score reflects very much the negative perception of this farmer regarding fairness of prices throughout the supply chain and access to market information but also the low scores attributed to fairness of prices paid for his /her products paid by buyers and the difficulty in the process of establishing a fair contract/agreement with input (e.g. feed) suppliers.

Breeding farm DE009

This German breeding farm kept 1767 (average in 2018) which is more than the German average. It was a former German Democratic Republic socialist co-operative farm which is now run by Dutch owners. The farm was among the top 20% in the pillars environment, farmer / social and economy.

n sows	1767
n weaners	2771.5
n growing-finishing pigs	0
Other production lines besides pigs contribute to income?	crops + sheep
Production system	conventional certified
Production certification name and type	QS (food safety standard)
Breed(s) present on farm	Topics70 x Select
From how many sources (farms) you do buy in pigs? [n]	0
Total utilised farm land [ha]	610
Total land rented [ha]	480
Total agricultural land [ha]	600
Total land used for growing crops for pig feed production [ha]	0
Total arable land [ha]	450



Animal health and welfare (AHW)

AHW was not the strength of this farm. It had lower than average scores for **Absence of hunger & thirst** (due to lack of roughage provision) and particularly for **Absence of pain by management** (again reflecting scores for clinical findings and the use of castration). Even though the farrowing pens contained enrichment for sows and piglets **Possibility to perform appropriate behaviour** also scored lower (no pasture access, space allowance drawbacks and clinical findings indicative of ear, tail and shoulder lesions.

However, the farm clearly had some AHW merits, since scores for Absence of injuries & disease and **Good human-animal relationship** were higher than average. **Absence of injuries & disease** reflects relatively low levels of mortality and antibiotic treatments and good standards of biosecurity.

At the time of visit gestating sows scored were kept in pens with electronic sow feeders (ESF) with liquid feed. At the same time construction was on the way to improve gestation sow housing to provide group housing with straw blown onto the lying areas which could potentially help address welfare shortcomings.

Environment (ENV)

The highest theme value on this farm was for **Water** with 87%. The farm used **water-saving technology** in the barn, had sufficient **water supply and storage** capacities and **did not irrigate** fields. As a result, it reached 100% for water withdrawal. **Water quality** reached 74% based on the following practices: The application of N, K and P fertilizers was based on soil and/or plant tests, no grassland conversion or deforestation in the last 20 years, and three quarters of arable land not being ploughed. The LCA-Indicator "**P_2O_5-eq per kg** piglet / fattening pig live-weight" reached a good score.

Material & Energy scored 75%. This was mainly due to low water withdrawal, targeted application of fertilisers, energy saving by no tillage on arable fields and almost zero discarded inputs.

The **Soil** theme reached 73%. Main factors accounting for this were the preservation of grassland and woodland in the past 20 years, targeted fertiliser application and use of chemical pesticides on only 22% of total land. Parts of the land were degraded by wind/water erosion or soil compaction.

The **Atmosphere** score of 53% also depended on the preservation of grass- and woodland, 75% arable land without tillage, as well as fertiliser amounts based on plant and soil tests, which all contribute to air quality and greenhouse gas emissions. Related to the latter, the LCA-indicator "**kg CO_2-eq per kg** piglet / fattening pig live-weight" was good. Suboptimal aspects were, that no energy-saving technologies were used on the farm and feed was not certified and thus potentially related to deforestation.

Biodiversity reached 52 %. Overall, this was the theme, where most of the farms tended to reach lower scores. We differentiated the subthemes ecosystem diversity, species diversity and genetic diversity. This farm had 70 ha extensive pasture which counts as ecological focus area and contributed to ecosystem and species diversity. Furthermore, there was no cultivation of GMO-crops. The preservation of grass- and woodland as well as the restricted use of chemical pesticides on a low proportion of land were also important contributors. The farm did not use endangered pig breeds or cultivated rare or endangered crop species/varieties, thus resulting in a low genetic diversity score.

Economy (ECO)

This breeding farm is characterized by **weaning** at 22 days which explains the higher number of **litters per sow** (2.5). With this strategy the farm attained just over 31 **piglets weaned per sow**. Potentially, with this high number of litters per sow and piglets born per litter, the overall result of the number of piglets could have been even higher, however the early age at weaning pays its toll in the **pre-weaning mortality** of 11%, but even more so in the **sow mortality** of 9.9%, which is quite high. In terms of **economic resilience,** the farm is rather vulnerable, as it has high **explicit costs** related to wage labour, because only 11% is family labour, and to rents for land, as only 21% is owned by the farmer.

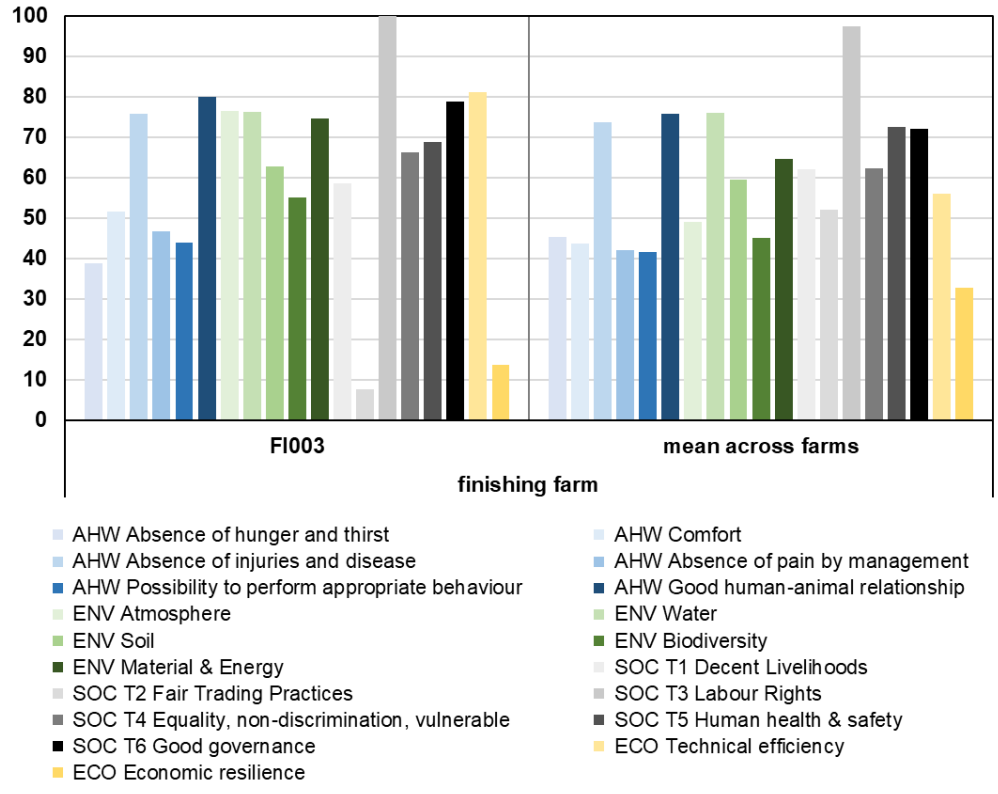
Social and farmer wellbeing (SOC)

As with the other two farms above, this farm scored also very high for **Good Governance** (91.9%) reflecting the importance that farming is playing within the community as a whole but also his impact on the environment and economy. The farm did also score above the mean for **Decent Livelihood**, with indicators such as job satisfaction and motivation for being a pig farmer scoring high (75% and 85%, respectively) within the theme. **Labour rights** score is similar to the average, whereas **Fair Trade Practices** (25%) and **Human Health and Safety** (62.5%) scores are below the average. As above, fairness regarding producer's prices, input prices and access to market information have a low score, hence reinforcing the rather negative/pessimistic perception that farmers in general have with regards to these issues no matter the type of farm or country. For a farm to be sustainable is vital that farmers should be able to sell their products so to cover at least their costs of production, but also to have access to market information (e.g. price) and to be able to negotiate fair contracts both upstream and downstream.

Finishing farm FI003

This Finish finishing farm built a new, much bigger, piggery in 2008 and are planning future extensions. Even though the pigs are only one of several income lines, management in the barn was well organised. The farm was among the top 20% in the pillars animal health and welfare and environment.

n sows	0
n weaners	0
n growing-finishing pigs	1483
Other production lines besides pigs contribute to income?	Farmer does contract work for other farmers, e.g. harvesting. Blueberry production. Crops.
Production system	Conventional
Production certification name and type	--
Breed(s) present on farm	Yorkshire, Finnish landrace
From how many sources (farms) you do buy in pigs? [n]	2
Total utilised farm land [ha]	444
Total land rented [ha]	205
Total agricultural land [ha]	272
Total land used for growing crops for pig feed production [ha]	89.5
Total arable land [ha]	168



Animal health and welfare (AHW)

AHW themes which scored higher than the mean for all farms were: **Comfort**, due to good floor quality, space allowance and low levels of clinical findings (ear, tail and shoulder lesions) or need for antibiotic treatments; **Absence of injuries & disease**, due to very low levels of mortality, pigs needing hospitalisation or antibiotic treatments and high biosecurity; **Absence of pain by management**, due to low levels of clinical findings or pigs needing hospitalisation; **Possibility to perform appropriate behaviour**, scoring highly for the sub-theme enrichment since every day pigs were given a quantity of fresh bedding comprising sawdust and straw, which was reflected in the low levels of clinical findings; and finally **Good human-animal relationship**. The only AHW score in this farm which was lower than the average was that for **Absence of hunger & thirst**.

Environment (ENV)

This finishing farm had 168 ha arable land, no grassland and 172 ha woodland. In comparison to the other 3 farms presented in this report, this farm grew crops for own pig feed production on 50% of arable land.

The themes **Atmosphere** (76%), **Water** (76%) and **Material & Energy** (75%) were on similar levels.

Atmosphere subthemes Greenhouse gas emissions and air quality were good based on the preservation and share of woodland, 100% arable land without tillage as well as mineral fertiliser amounts based on plant/soil analyses and the application of fertilisers with high precision technology. Furthermore, the farm used energy-saving technologies and its feed is not related to deforestation. The LCA-indicator for GHG "**kg CO_2-eq per kg** piglet / fattening pig live-weight" was very good (95%).

Regarding **Water,** the farm had no access to communal water and insufficient water supply and storage capacities. The fields were irrigated but water-saving technology used in the barn and for irrigation. The **farm used information about local precipitation and evaporation** rate to adapt the irrigation quantities. To **water quality** was improved by amounts and application of N, K and P fertilizers being based on soil/plant tests and applied with high precision technology. In the past 20 years there was no deforestation of woodland on the farm. Arable land (100%) was not ploughed, but 50% of arable land was treated twice a year with chemical synthetic pesticides, which affects water quality. The farm used techniques for reducing emissions to soil, water and air from pig barns. The LCA-Indicator "**P_2O_5-eq per kg** piglet / fattening pig live-weight" reached a good 87%.

The **Material & Energy** relied on low water withdrawal, precise application of mineral fertilisers, no tillage on arable fields, non-deforestation of woodland and the use of water- and energy-saving technologies on the farm. Discarded inputs during the last 5 years were almost only 0.5% and the LCA-indicator "**m^2 land use per kg** piglet / fattening pig live-weight" scored 100%.

Soil reached 63% due to the preservation and share of woodland, precise fertiliser application and the use of techniques reducing emissions to air, soil and water from the pig barn. No land is degraded by wind/water erosion or soil compaction. The treatment with chemical synthetic pesticides on 50% of arable land, however, bears risks for soil quality.

Biodiversity reached a score of 55 % in case of this farm. The farm had 5 ha ecological focus area which contributed to ecosystem and species diversity. There were additional small-scale measures, such as nesting boxes etc. which supported species diversity. The share of woodland, precise fertiliser application, absence of GMO crops and feed not related to deforestation were positive factors. The farm neither used endangered pig breeds nor cultivated rare or endangered crop species/varieties, from which genetic diversity would benefit.

Economy (ECO)

This was a family farm with 1 483 finisher pigs and 444 hectares of utilised farm land, of which 46% were rented. The **feed conversion rate** was rather low (2.8) compared to many other finisher farms in Europe, but also at national level (Finnish average 2.7 kg of feed needed to produce 1 kg pf pig meat; Interpig database). The **mortality rate** of 0.7% had to be considered as a good outcome of health management of this farm. Also, the **economic resilience** was good, as this farm only used family labour and its **labour productivity** of 0.49 working hours per finisher pig ranges among the best results of finisher pig farms. Also, the **gross margin over non-factor costs** (€105/pig) exceeds the average of the sample of Finnish farms.

Social and farmer wellbeing (SOC)

This farm scored above the average for three themes, **Labour Rights**, **Equity** (fairness) and **Good Governance**. The former theme scored maximum (100%) demonstrating the importance that this farmer perceives regarding employment compliance with regulations, social security, the employment of children but also worker rights, particularly in terms of wages and working conditions. This also links to the high score for **Equity** reflecting the non-discriminatory treatment against any employee or prospective employee based on race, religion, ethnicity, gender, age, handicap or disability, political activity, immigration status, marital status, or sexual orientation in hiring, job allocation, training, advancement, or firing. As with the other three farms **Good Governance** is also perceived as playing an essential role in social sustainability. **Human health and safety** scores similar to the average whereas **Decent Livelihood** score just below the average. As above, whereas indicators such succession and capacity development were perceived as essential (score 100), quality of life scores much less (39%) with indicators such as demotivation to be a pig farmer, working conditions and the volume of work and level of stress contributing to this lower score. This farm also records the lowest score (amongst the four) for the **Fair Trade** Practices theme which might have contributed to the low motivation to be a pig farmer.