Sustainable Pig Production Systems Deliverable 2.1

Publishable report on development of detailed and condensed protocols

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1. Content

2. Introduction

SusPigSys is a European research project looking at how profitability on pig farms can be sustained, while maintaining animal health and welfare and promoting farmer wellbeing, all without compromising environmental resources. In contrast to many other projects and studies, SusPigSys aims at addressing all relevant sustainability dimensions. Especially animal health and welfare, a dimension particularly important for livestock farms, is rarely considered in sustainability studies as an extra dimension. SusPigSys aims at collecting, summarising and disseminating objective information on successful strategies for improving sustainability in various EU pig production systems and increasing resilience at the farm level. Working with the industry it assesses sustainability across a range of pig production systems in seven EU member states (Austria, Germany, Finland, Italy, Poland, the Netherlands and the United Kingdom). Specifically, it aims to develop an integrated sustainability assessment tool that farmers can use to assess the performance of their own farm and benchmark their business with other pig production farms, which can support the implementation of specific improvement measures. Thereby the development and implementation of sustainable farming methods across different production systems will be supported for the benefit of farmers, animals, the environment and wider society. It is expected that this tool would contribute to improved productivity and competitiveness of EU pig production as well as environmental sustainability. Moreover, consumer acceptability could be enhanced by addressing societal concerns such as animal welfare, product quality and safety.

Deliverable 2.1 contributes to the achievement of these objectives. Specifically, it focuses on the design and the development process of a standardised questionnaire, called “the protocol”, for data collection at farm level (Deliverable D5.1: DOI:10.13140/RG.2.2.17828.09605). The protocol had to be comprehensive, covering all the important aspects of each sustainability dimension. At the same time, it had to be suitable for collecting a large amount of farm-specific data preferably within a short time (e.g., half a day). Last not least, it should be self-explanatory and simply designed so to be included in a software application for smartphone or mobile device (i.e. an App) for farmers. Hence, assessment protocols were developed for each sustainability dimension: economic, environmental impact, animal health and welfare, as well as social impact, i.e. farmer’s professional and personal wellbeing. The evolution of the protocols followed some well determined steps.

First, following the kick-off meeting which took place at the end of August 2017 (the first month of the project) several attributes were identified by the project team as important for each of the four individual dimensions. For example, production cycle, farm size, ownership, inputs and capital for the economic pillar; outdoor access, floor and straw, stocking density, loose farrowing and mutilations for animal welfare; feed conversion, land for feed stuffs and for manure, CO_2 emission and water use for environmental impact; quality of life, farm employees, job satisfaction and farmers’ integration within the community for social wellbeing.

Second, the identification of these attributes was enhanced by a thorough literature review regarding EU systems of pig production, aspects of sustainability of these systems, and societal concerns. The literature review allowed for the evaluation of the state-of-the-art regarding the sustainability of different pig production systems in the countries included in this project and beyond, focusing also on trade-offs between dimensions, different existing protocols and data collection systems, and the identification of knowledge gaps. In general, assessment protocols and elements within these protocols were evaluated using a common system based on elements of feasibility, reliability and validity.

Third, a series of national workshops with a variety of stakeholders were carried out within the first four months of the project (November 2017 - January 2018). The goal was to discuss and agree on what the stakeholders considered to be their sustainability priorities in relation to the four dimensions, and to identify the most suitable pig production systems for each country. Overall, 80 participants (e.g. farmers, vets, processors, retailers, consumers, NGO representatives and policy makers) joined our national workshops (D5.1: DOI:10.13140/RG.2.2.17828.09605).

Specific attention during the workshops was paid to the social implications for farmers themselves and the stress that can arise for farming families when production is economically unsustainable, but also the disconnect between the industry and the consumer, the importance of consumers' power within the supply chain and societal acceptance or public image of pig production and the farming profession. The national workshops revealed inter alia that most EU pig farmers relate to animal welfare and environmental impacts as well as the economic survival of their businesses, juggling a whole range of demands. However, the aim of these national stakeholder workshops was furthered by establishing a reciprocal dialogue and an interactive forum for exchanging knowledge that continued throughout the project. This is another strength of the SusPigSys project.

Based on these three steps, four protocols (one for each sustainability dimension) were drafted. After a draft protocol has been prepared and thoroughly discussed within the project team and across the groups, the protocols were then discussed with various stakeholders who were invited to review them. This process was assisted by Advocates (one project member per dimension) to ensure equal consideration of each dimension.

The four protocols were combined into a detailed collection protocol (the SusPigSys detailed protocol) which was used for the first round of farm visits (referred to as Farm Visit 1). The complete list of indicators in the detailed protocol is given in the Appendix. The detailed protocol, results and insights from Farm Visit 1 formed the basis for the "condensation" process and the development of the final condensed SusPigSys protocol (D5.1: DOI:10.13140/RG.2.2.17828.09605) This was used for data collection in the second round of farm visits (referred to as Farm Visit 2) and constitutes the base for the software application.

3. Protocol development

1.4 2.1 ECONOMIC PROTOCOL

1.5 2.1.1 Development of the detailed economic protocol

In some Member States fiscal accountancy data are collected, because farmers are paying income tax on actual incomes, but in other countries flat income rates are used on estimated incomes. When developing the detailed protocol for the economic sustainability assessment, we started from the principle that the pig farmer would not have detailed accountancy data at his/her disposal in order to consider the differences in fiscal accountancy systems and create a homogeneous way of data collection.

The detailed economic protocol was based on a one-day farm visit with a preparatory phone call of what is expected from the pig farmer. We have designed the detailed economic protocol according to the structure illustrated below:

Table 1. Structure of the detailed economic protocol

	Categories
General	General characteristics
Building facilities	Housing systems
	Outdoor pig facilities
Revenues and efficiency	Inventories, sales and technical efficiency parameters
Labour	Labour time and input
Characteristics of pig feeding	Inputs for homegrown feeds
	Purchased feeds
	Composition of feeds
	Feed diets per category of pigs
Variable inputs	Purchases of variable farm inputs
Farm equipment	Investments in feed silos, slurry tanks
	Feed mills and mixing equipment

Based on this protocol, a series of key economic indicators can be calculated, such as for example:

- Technical efficiency parameters of the sow breeding and finisher farms
- Gross margins per sow and finisher pig (€/pig)
- Full production costs per kg pig meat (€/kg)
- Profit/Loss account.

1.5.1 Condensation of the economic protocol

In order to arrive at the condensed protocol, we have made the following steps. In analogy with the other protocols we have adopted a scheme of analysis structured according to the Sustainability Assessment of Food and Agriculture Systems (SAFA) system, an initiative created by the Food and Agriculture Organisation (FAO, 2014) of the United Nations. This was divided into themes, subthemes, indicators and variables. The result of this approach is reported in Table 2.

Table 2. Sustainability themes and subthemes for the economic analysis

Theme	Subtheme
Technical efficiency	Feed efficiency
	Reproductive efficiency
	Health management
Economic resilience	Bargaining power in the chain
	Horizontal cooperation
	Profitability
	Risk management
	Labour productivity
	Resilience of resources

Each subtheme is composed of a series of key indicators and the calculation of the indicators are based on variables that are directly recorded by the protocol. We have reduced the detailed protocol in the following way:

a. Historical investment value

The question about the historical investment value has been eliminated, because the estimate of the interests and depreciation costs will start from the estimated new value of the pig buildings. For SusPigSys, the real linear depreciation method was used instead of nominal depreciation, as the latter will result in an underestimation of the costs of depreciation. Therefore, in order to estimate the value of the pig buildings, we

assumed an average book value of 50% of the new value and calculate depreciation and interest costs on this value.

b. Home grown feed at market prices

In the detailed protocol we have valued the home grown feeds at production costs. This implied questions about the use of the technical means of production for the different feed crops such as the costs of seeds, fertilizers, pesticides, machinery for all types of field operations, rents of land, contract labour and labour time of family and hired labour dedicated to the field operations.

In order to reduce the protocol in the condensed version we have valued the home grown feeds at market prices under the assumption that market prices cover the costs of producing the different types of homegrown feeds. This assumption has led to the elimination of all questions related to the technical means of producing feed crops. However, in the condensed protocol for each of the feed crops produced on the farm, it was necessary to collect information about the quantities of home grown feeds.

c. Feed composition

For the economic analysis, there is no need to collect information about the composition of the administered feedstuffs. Hence, questions related to this issue have been eliminated.

d. Investments

In order to calculate the annual costs of buildings and barn equipment, a standard value per sow place, per weaner and per finisher pig place was used. This representative building value includes estimates of the investment in related equipment such as feed silos, slurry tanks and feed mills. In this way in the condensed protocol questions related to the value of barn equipment have been eliminated.

In addition, we have introduced three new subthemes inherent to the economic resilience of the farm:

2. Entrepreneurship
3. Risk management
4. Resilience of resources

For *entrepreneurship,* two indicators have been identified:

a. Bargaining power of the pig farmer in the chain. This indicator is measured by means of several qualitative questions, using Likert scale.

b. Horizontal cooperation, for which questions concerning the degree of cooperation of pig farmers in cooperatives and producer organizations have been added.

For *risk management,* indicators have been added related to the degree of specialization of the pig farm (1), the percentage of rented land (2) and the percentage share of family labour in the total labour input of the farm (3).

For the *resilience of resources,* four indicators have been identified:

a. Degree of modernity of the pig farm
b. Capital intensity
c. Investment potential
d. Innovation potential

For all these four indicators questions have been inserted in the condensed protocol concerning the age of the farm buildings, the invested value of the farm compared to other pig farms, the financial condition of the farm for new investments and the attitude of the pig farmers towards innovative technologies.

4.4 ENVIRONMENTAL PROTOCOL

4.4.1 Development of the detailed environmental protocol

For the development of the environmental themes, subthemes and indicators within the detailed protocol, we used the SAFA guidelines. This allowed for a comprehensive and internationally approved guide on sustainability themes and subthemes. Table 3 describes the themes and subthemes covered and analysed within the environmental protocol.

Table 3. Sustainability themes and subthemes for the environmental analysis

Themes	**Subthemes**
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

For a comprehensive assessment of the environmental dimension of sustainability we combined qualitative or semi-quantitative key performance indicators (KPIs) with quantitative Life Cycle Analysis (LCA) indicators. The KPIs selection was based mainly on SAFA indicators (FAO 2013) and SMART indicators (see Annex of Schader *et al.,* 2016), literature and experts (including the SusPigSys project team) so to derive a detailed set of 25 KPIs. Regarding the LCA indicators, their development and selection was also based on literature (i.e. typical indicators for livestock LCA studies; de Vries & de Boer, 2010) and experts.

The following five selected LCA indicators (impact categories) were used both in the detailed and the condensed protocol:

- Cumulative energy demand (MJ)
- Global warming potential (CO_2-eq)
- Acidification potential (SO_2-eq)
- Eutrophication potential (N-eq, P-eq)
- Land use (m^2).

Each indicator (except Land use) is expressed for two functional units: “kg product” and “hectare of farmland utilised” (on- and off-farm). The selection of indicators formed the basis for the interview questions and input-parameters in the detailed protocol.

4.4.2 From detailed to condensed protocol

In order to condense the environmental protocol, we reduced approximately 20% of KPIs and their questions as well as input parameters from the detailed protocol due to the follwing reasons:

- No variance between farm results (e.g. all farmers declared they dispose of all waste correctly)
- Little impact and a high variance between farms for indicators, which are not easy to be answered (e.g. a question on “additional measures to protect and promote biodiversity, such as insect hotels and nesting boxes.)
- Parameters not existing on (most) pig farms (e.g. results for humus balances).

Furthermore, we managed to reduce the detailed protocol by combining questions and input parameters for KPIs.

For LCA analysis we decided not to reduce the number of indicators, however, we substantially condensed input parameters needed for the LCA calculation by approximately 25%. The reduction concerned calculation procedures and related input parameters where guidelines such as IPCC (2006)[1] and EMEP-EEA (2016)[2] do not provide detailed methods and/or emission factors. A few nationally applied methodologies and emission factors, used in national inventories to calculate GHG and air pollutant emissions, e.g. to assess an effect of the dirtiness of animals on emissions from manure management, which were partly integrated in detailed protocol, were removed in the condensation phase. Further condensing

[1] Guidelines for National Greenhouse Gas Inventories, published in 2006 by IPCC (International Panel on Climate Change)
[2] EMEP/EEA Air Pollutant Emission Inventory Guidebook, published in 2016 by the EEA (European Environment Agency)

was applied to the bedding frequency, the duration of storage in slurry tank or farmyard manure stores before spreading to field or disposal or frequencies of slurry aeration.

To simplify the LCA data collection, we replaced some farm-specific data (in the detailed protocol) by default values. These were used for parameters, which

- have little impact on overall LCA results
- do not increase uncertainties of assessed impact categories and
- for data, which is related to time-consuming interview sections.

Specifically, we managed to reduce the workload for data acquisition in case of on-farm feed production: crop- and field-specific amounts of plant protection substances, potassium- and limestone-fertilisation, seed amounts, nutrient levels in manure (which were estimated for about 40 % of all farms with a high variation or uncertainty).

Table 4 shows the exemplary list of indicators included in the condensed protocol and related to Greenhouse Gas Emissions (Global Warming Potential).

Table 4. List of indicators for the environmental subtheme Greenhouse Gas Emissions

kg CO_2-eq per kg piglet and per fattening pig live-weight (LCA)
kg CO_2-eq per ha (LCA)
Certified feed not related to deforestation/ land use change in the past 20 years: e.g. self-grown, certified organic or WWF Basel Criteria for Responsible Soy Production
Energy-saving technologies on farm (e.g. for pumping, ventilation, transportation)
Fertilising nitrogen with high precision by using e.g. variable rate application methods, drip irrigation with mineral fertilisers or others
Calculating N-fertiliser demand based on soil or plant analyses
Arable land not ploughed (= zero / reduced tillage)
Arable land with leguminous crops or leguminous grassland
Conversion of substantial proportion? of permanent grassland or pasture to arable land (in the past 20 years)
Share of woodland on farm
Woodland deforested and converted to grassland, arable land or buildings (in the past 20 years)
Share of catch crops
Ecological focus areas (e.g. flower stripes, fallow land)
Agricultural land on drained moorland
Techniques for reducing emissions to air, soil or water from pig barns (e.g. specific filters, biogas production or slurry separation)

4.5 ANIMAL HEALTH AND WELFARE PROTOCOL

4.5.1 Development of the detailed animal health and welfare protocol

The detailed animal health and welfare (AHW) protocol was based on existing animal welfare assessment systems, most importantly the ProPig system (Rudolph *et al.,* 2018) and the Welfare Quality® assessment system for pigs (Welfare Quality® Consortium, 2009). Different systems tend to have much in common, which made it relatively straightforward to collect a comprehensive set of animal-based (e.g., lesions) as well as environmental (describing the immediate environment of the animals) indicators (e.g., amount of bedding). The detailed protocol was thus developed according to a process of alternating discussions and on-farm pilot testing. Information from stakeholder workshops was also taken into account (see process described in Introduction). The detailed protocol was not only longer than the condensed protocol, but included more time consuming indicators or indicators requiring more assessor training, given that it would be applied by trained assessors and due to the goal to cover as many different aspects of animal health and welfare as possible. The detailed protocol also included several variables which measured similar things, but using a different approach, e.g. animal-based (e.g., lesions) and environment-based (e.g., equipment causing the lesions) questions. The anticipation was, that according to the analyses and experience from farm visits, the indicator considered to be less feasible for on-farm use by the end user would then be removed for the condensed protocol. The AHW protocol was also designed so to capture the variety of production systems seen across Europe. The summary of production systems identified in the consortium countries (e.g., indoor, straw and pasture systems) was used in order to ensure this.

The protocol comprised different sets of indicators for four animal categories, including dry sows, lactating sows with litters, weaners and growing-finishing pigs. The aim was to include measures from the Five Freedoms (Webster, 2001) and the 12 criteria included in the Welfare Quality assessment system for pigs (Welfare Quality® Consortium, 2009). The complete list of indicators in the detailed protocol is described in Deliverable D5.1: DOI:10.13140/RG.2.2.17828.09605.

4.5.2 Condensation of the AHW part in the detailed protocol

The data collected according to the detailed protocol were analysed as the basis for the condensation process. The process included removal of variables, rephrasing of questions and formation of new answer categories. We removed or changed indicators due to excessive missing data, unclear phrasing of questions, redundancy, reliability (based on results from reliability testing during observer training) or feasibility problems during data collection. The latter included lack of available information on farms, or practical problems including questions being too time consuming or laborious. This was especially the case for collection of animal-based data, as pen prevalence turned out to be too time consuming since all animals need to be assessed. Therefore, for most indicators, the decision was made to change this to a binary system (pen affected yes/no) using different thresholds (one animal, >5%, >20%). The use of default values, which was adopted for other dimensions of sustainability (e.g. economic and environment), was not possible for any of the animal welfare parameters.

The condensation process included statistical analyses and group discussions in several steps. Certain questions considered to be important were included although the criteria listed

above were not fulfilled. For example, although external parasites were very rarely detected during the farm visits, we still considered the indicator to be important in terms of animal welfare and thus it was retained in the condensed protocol. On-farm medications were discarded, since there were issues with data accessibility and quality. Lameness in dry sows was also discarded due to practical problems with examining the animals. The possibility to observe sows walking were very variable from farm to farm, making the observations incomparable. Table 5 describes the themes and subthemes covered within the condensed animal health and welfare protocol.

Table 5. Sustainability themes and subthemes for animal health and welfare analysis

Themes	**Subthemes**
Absence of hunger	Conditions with multiple causes
	Hunger in sick pigs
	Hunger, animal-based
	Performance
	Treatments
	Hunger, environment-based
Absence of thirst	Thirst in healthy pigs
	Thirst in sick pigs
Comfort around resting	Comfort around resting, sick pigs
	Environment, animal-based
	Floor quality
	Floor quality, outdoor
	Quality of resting area, environment-based
	Quality of resting area, animal-based
	Quality resting area, outdoor
	Space allowance outdoor
Thermal comfort	Possibilities for exploratory behavior, environment-based
	Floor quality
	Floor quality outdoor
	Quality of resting area
	Quality of resting area, outdoor
	Thermal comfort, animal-based
	Medical treatments

Table 5 continued. Sustainability themes and subthemes for animal health and welfare analysis

Themes	Subthemes
Ease of movement	Environment, sick pigs
	Floor quality
	Floor quality outdoor
	Lameness
	Outdoor access
	Quality of bedded area
	Space allowance
	Space allowance, total
	Space allowance, total, outdoor
Absence of injuries	Conditions with multiple causes
	Environment, sick pigs
	Skin lesions
	Physical environment
	Social environment, environment-based
	Tail docking
Absence of disease	Biosecurity
	Disease symptoms
	Mortality
	Performance
	Medical treatments
Pain by management	Pain by management
Social behaviour	Abnormal behaviour, animal-based
	Social environment, animal-based
	Social environment, environment-based
Other behaviour	Abnormal behaviour, animal-based
	Possibilities for exploratory behavior, environment-based
	Conditions with multiple causes
Human-animal relationship	Human-animal relationship

4.6 SOCIAL PROTOCOL

4.6.1 Development of the detailed social protocol

Sustainable development is a complex and multidimensional concept which incorporates three key dimensions, i.e. social (people), economic (profit) and environmental (planet). Hence, achieving sustainability is difficult as it requires an integrated approach and the consideration of trade-offs between these components. This is particulalry challenging for livestock production, which posseses several challenges in relation to sustainability of food production, including its disproportionate contribution to the environmental cost of agriculture (Leip *et al.,* 2010, Kastner *et al.,* 2012, Garnett, 2013), through resource use (e.g., water, soil, air) and biodiversity (Steinfeld, 2004), the environmental impacts of its waste (Tilman *et al.,* 2002), and the increasing amounts of feed for animals (Bruinsma, 2003). However, while research into farming sustainability has flourished in recent years, an aspect of sustainability which has been overlooked is the human aspect of the pig production system. There are hardly any studies regarding the social implications, including mental health issues, that can arise for farmers themselves and their families when production is economically unsustainable. Issues like farmers' job satisfaction, quality of life, attitudes and involvement in decision making processes, and the impact of pig farming on the local community have been overlooked.

Equally there is a perception that farmers are primarily financially motivated and concerned with their livelihoods (Hubbard and Scott 2011). Clearly, there is more involved in running a farming business than just profit-maximisation, since farmers are influenced by other considerations such as "attitude to risk, maintaining a way of life, farm succession, … peer pressure, concern for their animals, concern for the environment and pride in their farm" (FAWC, 2011:8). Moreover, most farmers are interested in supplying "high quality products, to have a satisfying job and establish a more positive image of agricultural and livestock production" (Vanhonacker *et al.* 2008: 127). Additionally, "people [farmers] do not necessarily indulge in economically optimal decision-making, but instead may optimise social, intrinsic and/or expressive goals" (Burton 2004:360). van der Ploeg (1993) also argued that when it comes to information and regulations farmers are influenced by different value systems. In contrast, farming style/production system is influenced by structural circumstances (Gravsholt-Busck, 2002). However, although "farmers may experience the same overall structural conditions, it is possible for each farmer to choose very different strategies, depending on his/her individual values and priorities as well as on the specific physical conditions on the farm" (ibid: 236). Therefore, there is little doubt that overall, there is a single, decisive (economic) factor that influences farmers' attitudes, behaviour and decision-making regarding sustainable development, but a combination of factors, that act in "an intricate interaction of contingencies affected by locality and specific context" (Siebert *et al.,* 2006: 319).

These aspects can not be ignored and farmers' views and perspectives need to be understood and acknowledged if sustainable development is to be achieved. The SusPigSys project aimed to address this gap by giving pig farmers the opportunity to express their views in the so-called "Social Dimension".

As noted in the introduction, sustainable development within the livestock sector requires an integrated approach by looking at how profitability can be sustained, while maintaining animal health and welfare and promoting farmer wellbeing, all without compromising environmental resources.

A starting point for integration is provided by the SAFA guidelines (FAO, 2014). SAFA includes a detailed framework of 58 subthemes to assess governance, environmental integrity, economic resilience and social wellbeing. The Social Wellbeing as presented in SAFA (Table 6) comprises six major themes (e.g., Decent livelihood and Cultural Diversity), divided in sub-themes (e.g., Quality of life, Gender equality, Food sovereignty).

Table 6. Social wellbeing themes and subthemes. Sources: SAFA-Guidelines (version 3.0), FAO (2014) , SAFA-APP, SMART

Themes	**Subthemes**			
Decent Livelihood	Quality of life	Capacity development	Fair access to means of production	
Fair trading practices	Responsible buyers		Rights of suppliers	
Labour rights	Employment relations	Forced labour	Child labour	Freedom of associaton and Right of bargaining
Equity	Non-discrimination	Gender equality	Support to vulnerable people	
Human safety & health	Workplace safety and health provisions		Public health	
Cultural diversity	Indigenous Knowledge		Food security	

Although, the SusPigSys “Social Dimension” protocol was mainly based on the SAFA guidelines for social wellbeing, an important role in its design lied with the project advocate designated for this particular dimension (the same for the other dimensions). Furthermore, researchers across the consortium, contributed g in a collective action, to the development of the protocol. Additionally, an external expert (Prof. Christopher Ritson at Newcastle University) had commented several times on the initial and final drafts of the Social protocol.

Thus, the final version of the detailed Social protocol (used for Farm Visit 1) comprised seven themes considered relevant to (pig) farmers and their workers. Five themes (i.e., Decent livelihood; Fair trading practices; Labour rights; Equity; Human health and safety) followed mainly the SAFA guidelines. In addition, the research group decided to add two more themes (not included in SAFA), i.e. Good governance and Animal-human relationships, considered important from a social point of view. The themes were then divided in sub-themes as follows (Table 7).

Table 7. Sustainability themes and subthemes for the social analysis

Themes	Subthemes
Decent Livelihood	Quality of life Succession Capacity development Fair access to means of production
Fair trading practices	Responsible buyers Right of suppliers
Labour rights	Employment relations Child labour
Equity	Non-discrimination Gender equality Vulnerable groups
Human health & safety	Safety and health trainings/Safety at workplace
Good governance	Impact on society and the environment Positive contribution to local economy; local Environment; and local culture; local society as a whole
Animal-human relationships	Impact on animals Impact on humans

To measure these (subthemes and themes), we then designed a set of questions (indicators) that aimed to capture respondents' opinions by choosing an option from a range of values (e.g., between 1 and 5) or binary choices. Although, the numbers themselves are not meaningful *per se,* the ordering is important. For example, consider a scale from 1 to 5 with the following options: strongly disagree, disagree, neutral, agree, and strongly agree. Someone who chooses 'agree' (score 4) does not agree twice as much as someone who chooses 'disagree' (score 2). So, the answer provided by a respondent measures the degree to which he/she agrees or disagrees with a statement.

The subthemes/indicators' meaning and their importance for a socially sustainable farm business (mostly based on SAFA guidelines, FAO, 2014) are described as follows:

Quality of life. Usually associated with job and life satisfaction, it refers to the standard of (mental and physical) health, comfort, and happiness experienced by an individual or a group. However, what constitutes a good quality of life is subjective and relative and difficult to quantify in one single measurement. So, we defined quality of life using a set of questions related to job satisfaction; motivation and demotivation to be a pig farmer; working conditions and the volume of work; level of stress; health status, time spent with family and for recreation, and relationships with family and neighbours.

Capacity development. Through training and education, all farmers, their family members and other workers (if any) should have opportunities and resources to acquire skills and knowledge that will help them to undertake current and future tasks required by the business. For a farm business to be sustainable, producers need to provide conditions for stable employment, internal advancement and capacity development not only for themselves but their family members and other workers on the farm.

Fair access to means of production. Farmers' rights to access means of production (including capital, equipment and knowledge) are critical to achieve a decent standard of living for themselves and their families. When farmers have access to the means of production, they are able to purchase equipment and materials that will help run their businesses efficiently. They are also able to implement training or other knowledge transfer regarding best practices that will support their business.

Fair trading practices. This indicator focuses on the extent to which the farmer understands how his/her buyer(s) establishes prices paid to the producer and the market information available regarding the price paid to farmers by their buyers and prices paid to farmers across the entire supply chain. Prices should reflect the full costs of production, including a decent wage level for workers. Access to markets where fair prices are negotiated, based on true costs, agreements are long-term and where contracts (written or verbal) are mutually agreed, are vital for a business to remain sustainable.

Labour rights. It refers to regular employment on the farm that is fully compliant with national law and (international) agreements on contractual arrangements, labour and social security. To ensure sustainability, farmers need sufficient labour 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, and the business does not accept child labour that may harm them physically or mentally or interfere with their education.

Equity. A sustainable business has clear policies of non-discrimination and applies those policies consistently to all employees and pro-actively supports vulnerable groups. Hence, it does not discriminate 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.

Human health and safety. Occupational safety and health are of paramount importance for the social sustainability of the farm business, particularly given the specific nature of farming characterised by hazards and risks, the high numbers of accidents, strenuous physical work, exposure to harmful substances (e.g., chemicals, pesticides and dust), work with machines, equipment and animals. Hence, providing a safe and healthy workplace for everybody on the farm (including the farmer and his family members) is essential for long-term business success.

Good governance. It focuses on both the negative and positive implications that a farm business may have on the environment, the local economy and the local community. To be socially sustainable, a farm business should avoid negative impacts and increase its contribution to the society as a whole.

Human-animal relationships. Livestock farming can be both physically challenging and mentally stressful. Recent literature shows some association between animal care and the ability of farmers to cope with the day-to-day management of their livestock, as a result of physical or psychological difficulties. A better understanding of these relationships and greater awareness and recognition of farmer wellbeing are particularly important for the sustainability of any farm.

4.6.2 Condensation of the social part in the detailed protocol

In the detailed protocol, there were 108 questions across all seven themes. However, following the comments provided by the researchers who collected the data during Farm Visit 1, reactions from the national workshops, and the discussion within the social task group, there was agreement to slightly reduce the number of questions across all sub-themes. Hence, based on these and following some simple statistical analysis (e.g., mean, mode, standard error) we excluded those questions for which the mode (the most frequently acquiring answer) indicated that the question was unimportant. For example, if the mode is 1 and 1 represents not important at all, then there is a good case for excluding that question. Nevertheless, giving that the Social protocol has been very accessible to most respondents across countries, we eliminated 15 questions overall. Hence, the condensed Social protocol was very similar to the detailed protocol. In order to avoid confusion/misunderstanding regarding the interpretation of questions, particularly for those which proved to be more difficult to understand during Farm Visit 1, more suggestions, comments and examples were provided in a separate column in those cases where a farmer was unsure how to respond.

3. Conclusions and recommendations

4.7 Scope

- Deliverable 2.1 aimed to report on the design and development process of a standardised questionnaire, called “the protocol”, for data collection at farm level. The protocol had to be comprehensive, covering all the important aspects of each of the four sustainability dimensions, namely environmental, economic, social and animal health and welfare.
- The conclusions and recommendations consider data collection and sustainability assessment both, for scientific purposes and for non-scientific use in the form of an app aimed for farmers and stakeholders.

4.8 Process of designing and developing the protocol

- Harmonising the four protocols was a learning process within the interdisciplinary team.
- Synergies between dimensions (certain topics and aspects) could be detected and considered in formulating the interview questions and condensing the protocol. Synergies could have been emphasised more throughout the process.
- The process of involving stakeholders could be improved, particularly regarding communication during the project. Though the expected input at which stage of the project was defined beforehand, the practical implementation by all partners was different, so to fit with the specificity of each partner involved in the project.

4.9 Challenges in methodology: science vs practice

- One of the major challenges of this project was reconciling the conflicting requirements of having a ‘condensed protocol’ that had scientific validity as well as being feasible for on-farm data collection. Increasing suitability for one requirement risked compromising the other. Finding a balance between science and practice may be challenging, especially in the planning stage of the process, because many of the encountered problems only became evident at a later stage.
- However, in the real world, a protocol to assess sustainability of commercial pig production within the EU has to be both scientifically valid and feasible for practical use. All stakeholders in the pig supply chain, from consumers to farmers, demand that an assessment scheme is both practical and scientifically valid. SusPigSys has taken an important step forward to achieve this balance, but more can be done in the future.
- Examples of problems that were experienced during data collection, included for example:
  - Farmers had difficulties answering some questions, usually due to missing information or information being spread out. Most of the difficult questions were related to the environmental and, economic (e.g. feeding) pillars.
  - Some of the terminology was too difficult for farmers (despite a glossary provided that explained terms across the four sustainability dimensions. Therefore, finding a common language to express complex scientific terms is important when communi-cating science to a non-academic audience.

- Some questions were considered sensitive by the farmers, particularly those involving personal thoughts or opinions, and those considering financial performance of their business. This is true especially when having to give the answer to an interviewer during the farm visit, however, inserting sensitive information in the app this may be problematic as well, if the farmer questions data anonymity.
- The large amount of questions and detail required for scientific analysis made data provision (on farm visits) or inserting (in the app) laborious.

4.10 Data collection on-farm

- Data collection on-farm is extremely time-consuming. This refers not only to the actual farm visit, but to the process of recruiting farms to take part in the study, communication with farms pre and post visit and scheduling the farm visits during a period of African Swine Fever spread in some countries.
- It is advisable to inform the farm before the visit about information that will be asked during the interview. Some farms will collect the data in advance. However, some farms perceive such lists as overwhelming, which may decrease the motivation to participate in the study.
- Some farmers were surprisingly willing to share sensitive information, such as financial data. It is imperative to ensure anonymity of the collected data.
- It is advisable to actively motivate the farmer to participate. This can be done by emphasising the benefits of taking part, keeping in mind that the benefits may be different for different farmers. One motivator which appears to attract a large proportion of farms is to get feedback of the collected data including benchmarking with farmers within the same country/production system as well as with other countries.

4.11 Conclusion

- On balance, the project team considers that the aim of developing a comprehensive protocol that covered all four sustainability dimensions of environmental, economic, social and animal health and welfare was achieved. The project thus represents a significant step forward in the goal of eventually developing a truly integrated measure of sustainability of pig production, against which progress in pig production can be judged.

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4.12 Economy protocol

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5. Appendix: List of questions in detailed SusPigSys protocol (first protocol)

The final SusPigSys protocol questions are published in D5.1:

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https://www.researchgate.net/publication/348466379_Condensed_protocol_from_Era-Net_SusAn_project_Sustainable_pig_production_systems_SusPigSys

Procedure

Carefully read each sheet. For translation, remove the protection of the sheet (no password). Line break in cell: press Alt + enter. After you have translated it you should protect it again to avoid entering data in wrong cells. Do not merge any cells, even if it might look better!

After you have translated a column, hide the English column to prevent it from printing (right mouse button on column header (the letter on the top) > hide). You might want to make additional adjustments for printing > check the print preview!

Cells with grey filling = column-row combination not needed (e.g. MMA treatments for weaners)
Cells with light yellow filling or no filling = enter data
Except for Int1, Int3, Int4 and Int5 you can add rows or columns by inserting. Always insert an entire row or entire column, never just insert cells (it will wreck the table structure)!

Where there are answers to choose from, you enter the number in front of the answer. If several answers apply, enter all numbers. Example:
Which fruit do you like?
1) apples
2) pears
Famer sais "both" > you enter "1, 2" in the answer cell.

For numbers: in many cases you can specify mean values (preferable) or the smallest (min) and largest (max) value. If you only have the mean value, enter it in the [min] fields.
If there is no answer available choose or enter "NA" (e.g. farmer does not want to or cannot answer, or m^2 of an outdoor run if there is no outdoor run). There is a difference between NA and zero: Weaner losses if there are weaners and none died = 0, weaner losses if there are no weaners on the farm = NA

All questions refer to the calendar year of 2017. Except for environmental Key Performance Indicators (KPI) they only refer to things related to pig production or production of own pig feed.

For farrow-to-finish farms we would like to attribute resources to the piglet production part and the growing-finishing part for separate calculations. E.g. tractor 1 is used 3 days per week in the sow barn, 2 days per week in the finishing barn and 1 day per week for the combustion plant > % used for sows = 50, % used for finishing = 33. If you only know: tractor 1 is used 5 days per week for the pigs and 1 day per week for the combustion plant "% used for pig production" = 83. If in doubt: describe in remarks.
Production records:
a) if possible: split information for sows (piglet production), weaners and rearer-finishers
b) if (a) not possible: split for [sows + weaners] vs [finishers]
c) if a + b not possible: overall values

You have to make your own list with which farm ID means which farm.
If after the interview you notice that something is different than the farmer said: Discuss it with the farmer and change answer depending on discussion. Add a remark.

Some mixed questions & answers based on pilot visits

Q: Why do we neet from kg-to kg feed was fed? It complicates; it is better in days of feeding?
A: Economy need to know, from which weight to which weight a feed was fed.
Q: How should we deal with solar panels on the roof of the finishing farm? He does not use the electricity for himself but sells it.
A: Please register the receipts of the sales of electricity
Q: Our pilot farm separated the farm in two farms (one belongs only him and the other partly his wife) to decrease the taxes?
A: Treat the farm as one farm
Q: We should also include the family members working salary from other jobs (teacher, …). What is the percentage of the income from the farm to the total income?
A: Do not collect income from other jobs

Q: The feed amounts fed per pig: the farmer knew how much feed was consumed but did not know how much feed was actually eaten by the animals. Is all the feed given = eaten? Shall we try to estimate the wastage?
A: We need to assume that the feed that is administered is also eaten
Q: The farmer also could not say how many days and how much exactly different types of feeds are fed, only an approximated mean. Therefore we had problems calculating the kg/pig/day values. Shall we use this estimated period of time? Or Leave this empty if the farmer does not know exactly?
A: Use the approximated mean and try not to leave the cell empty. A best guess of the farmer is better than "no information".
Q: The farm does not weigh the animals at all. Shall we take the Finnish mean values for weights? Or the mean values estimated by the farmer? Or leave table 5 empty?
A: Take the mean values estimated by the farmer

Q: What do we do if the farmer has only data for the financial year (July 2016-June2017)?
A: Collect data for the entire year July 2016 - June 2017. Data about feed and animal prices will be updated to the calendar year using market prices of reference market places.

Q: Why do we assess m^2 solid/slatted etc concrete twice (Int2H2 + directObs)?
A: Economy needs total m^2 solid or slatted per building (use construction plans). Animal needs to know m^2 per animal and because construction plans and real life sometimes differ, we do additional measurements.
Q: Int5: Why do we need mean weight 01.01.2017 AND 31.12.2017 - they will be the same?
A: For each pig category the average weight at 1.1 and at 31.1 is needed for economic calculation of the pig meat production. In some cases they may be the same, but in others (i.e. growing pigs) they might be different. Most management information systems will contain this information.
Q: Tab1: What if family member (future successor) works and receives as reward part of the ownership of the farm? (Or an employee gets free room and board etc.?)
A: Crucial is the number of working hours of the family workers (or employees reimbursed with room and board etc.). In order to calculate full production costs, we attribute a value to these working hours of family labour based on the salary cost of employees.

topic	term	definition	source
barn / field	feed type	liquid, pelleted, meal	SusPigSys
barn / field	outdoor run	Pigs are housed in a building and can access an area with concrete (slatted) floor which has outdoor climatic conditions, has at least 1 completely open side (so that sund and wind can reach pigs). May be covered 100% by a roof.	SusPigSys
barn / field	slatted, fully	The complete area of a pen is covered by perforated concrete or plastic flooring	SusPigSys
barn / field	slatted, partly	>30 % of the pen area is covered by solid flooring (water tight surface), the other part by perforated flooring. Flooring with >5% of openings (e.g. drainage holes) = perforated.	SusPigSys
economy	average, mean	statistical mean	SusPigSys
economy	complete renewal	Substantial (= more than equipment inside) changes of buildings, or similar for solios etc.	SusPigSys
economy	costs for maintenance of buildings or equipment	Will not be collected. Instead we will calculate 1.5% on the value of buildings or equipment, respectively.	SusPigSys
economy	Exchange rate, local currency per 1 Euro	Based on 1 year mean January to December. http://sdw.ecb.europa.eu/	InterPIG
economy	Historical investment	Economic value of the first investment of a building. In the case of renovation please replace the original investment with the latest investment amount for each part of the renovated buildings.	SusPigSys
economy	local taxes	Local taxes include taxes on land, on water distribution or protection bodies, municipality taxes. They do NOT include income taxes.	SusPigSys
economy	social contributions	Social contributions are payments by the employer for each employee (hired or family) to the national pension service, outside the gross salaries. Key points: It's for people currently working on the farms and it's money which goes to the nation's social fund.	SusPigSys
envi-econ	Biogas produced in an anaerobic digester	An anaerobic digester (which is within a biogas plant) uses biodegradable material (e.g. a waste or maize silage, etc.), which is degraded by microorganisms, to produce bio-energy (and the co-product of a digestate).	SusPigSys
environment	arable land with zero/ reduced tillage	Reduced or no tillage of arable land leads to a better soil environment (less soil disturbance). It prevents erosion and thereby reduces phosphorus and nitrogen loss. GHG emissions are decreased and reduced tillage diminishes the use of fuel per ha.	SusPigSys

environment	direct seeding	Direct seeding, like no-till, is a cropping system which aims to improve soil and soil moisture conservation. Direct seeding allows some tillage to solve immediate weed problems and to deal with high moisture and heavy clay soil conditions. Direct seeding is to conserve soil moisture in the seedbed. Most of the crop residue remains on the surface with at least half the stubble remaining upright and anchored to trap as much snow as possible. The crop residues are needed for further soil fertility improvement.	SusPigSys
environment	drained agricultural land on moorland	Drained peatlands are by far the biggest source of GHG emissions from crop land (nitrous oxide, carbon). Peatlands are habitats for very specialised plant and wildlife species and they have an important influence on local water balance.	SusPigSys
environment	Ecological compensation areas	Ecological compensation areas create habitats for plants and wildlife. Examples are: extensively managed grassland, wildflower strips, crop-rotation fallow land, crop margins, wild herb borders, etc.	SusPigSys
environment	GMO crops	Member States decide whether to prohibit or restrict the cultivation of authorized GMOs. At present only GMO-maize (MON810) is commercially cultivated in the EU, mainly in Spain, small areas in Portugal and Czech Republic, Slovakia. Worldwide cultivated GMOs are soya, maize, oilseed rape and cotton.	SusPigSys
environment	Management of riparian (buffer) stripes	The management of riparian (buffer) stripes regarding cultivation (grassland, arable land etc.), use of pesticides and fertilisation is decisive to avoid erosion and the pollution of water with pesticides and fertilizers. Therefore legal obligations exist in EU states regarding the management of riparian stripes within a certain width (often 3 meters).	SMART / national legislations
environment	manure	(farmyard) manure = solid faeces, with bedding where applicable overall manure = any excrements, with bedding where applicable slurry = liquid manure	SusPigSys
environment	Number of active substances used in insecticides/herbicides /fungicides	Plant protection products (e.g. insecticides, herbicides, fungicides etc.) contain at least one active substance. An active substance is any chemical, plant extract, pheromone or micro-organism that acts against plants or "pests". Active substances must be approved by the EC.	SusPigSys
environment	permanent grasslands, leguminous grasslands in crop rotations and leguminous crops	The cultivation of leguminous grassland or leguminous crops enhances soil fertility through biological N-fixation. Leguminous crops improve crop rotation diversity and are an important source of protein for animal production.	SusPigSys
environment	Promote on-farm biodiversity	On-farm measures to promote biodiversity can be: nesting boxes, insect hotels, piles of stones, dead wood, natural water bodies, etc.	SusPigSys

environment	Rare / endangered crops	Problem for a list of rare and endangered crops: no European list! --> search at national level!	SusPigSys
environment	SAFA	Sustainability Assessment of Food and Agriculture systems. Universal framework provided by the Food and Agriculture Organization of the United Nations (FAO)	SusPigSys
environment	SMART	Sustainability Monitoring and Assessment RouTine. A tool for farms and food companies to assess and compare their sustainability based on SAFA Guidelines.	SusPigSys
environment	Usage of mineral P- and K-fertilisers	Mineral P- and K-fertilizers can contain heavy metals (e.g. lead, cadmium, nickel, mercury, arsenic and uranium). Intensive fertilization can lead to accumulation in soil. Via plant uptake they end up in the food chain or pollute groundwater.	SusPigSys
farm / system	building, room, pen	Building = largest contructional unit which separates pigs from the outside world (like a house) Room = sections within the building which are separated by floor-to-ceiling walls (air does not mix between rooms) Pen = sections within a room separated by grids or "walls" which prevent pigs mixing between pens but allow free air flow across pens	SusPigSys
farm / system	certification	Certified organic = complies with European organic standards. May include other organic standards. Conventional certified = labels / assurance schemes with quality criteria on top of national basic legislation.	SusPigSys

farm / system	contract farms	Category 1: Farms where contracts (e.g. with feed company) determine the delivery of pig feed for all pig categories, veterinary assistance and medicines, bedding material, piglets and a fixed price for the pigs produced by the contract farmer. The farmer may own the stables and the equipment and provide labour at his own cost. The contract leaves limited space for independent and free entrepreneurship, with the only exception of the organization of labour, the control of mortality rates and the achievement of better technical performance during the rearing and finishing period. Category 1 farms are excluded from SusPigSys, as the pig farmer is nearly an employee and can give little feedback on how the farm individual reports help improve his management. Category 2: Farms with contracts where the terms of contract are not affecting the management on the farms that much. The contract may control genetics of the animals, selected procedures (e.g. castration with NSAID), or quality and source of incoming animals. Contract may advise on but does not impose the purchase / use of any particular feed, bedding material etc. Category 2 farms are included in SusPigSys, as the pig farmer has sufficient entrepreneurial freedom to optimize its level of sustainability. Category 3: Farms with contract between two agricultural enterprises (e.g. owner of sows contracts growing-finishing farm or vice versa). The contractor owns buildings and equipment and decides which feed and other inputs to use (primary entity responsible for decision making). Category	SusPigSys
farm / system	farm	General definition: A plot of land devoted to the raising of pigs (= "real farms"). Several farms can have the same production system (see there). From kick-off: We will include farrow-to-finish as well as breeder farms (stage 1) and growing-finishing farms (stage 2). Calculations will be done separately for the first and second stage, also on farrow-to-finish farms. Therefore, in analysis one farrow-to-finish farm counts as two "analysis farms" (one stage 1 + one stage 2). During farm visits 1 (2018) we assess 10 real farms per country (at least two per system).	SusPigSys
farm / system	farm: breeder farms, finisher farms	breeder farms: piglets are born on the farm; finisher farms: pigs are sold for slaughter from the farm	SusPigSys

farm / system	land	farm land = overall land area utilised by the farm, including agricultural or forest land, semi-natural structures such as hedgerows, water bodies within a farm's land, pile of stones and timber yards,... agricultural land = grasslands, pastures and arable land land used for production of food, feed, bio-energy and fibres arable land = land, which is ploughed at least every few years; (the land may have a specific status regarding legal possibilities and subsidies (see EU-related agricultural subsidies: Integrated Administration and Control System)	SusPigSys
farm / system	outdoor (system)	Pigs spend (part of) their time on fields / paddocks with shelters (e.g. hut) directly on soil. completely outdoor: All pigs are on fields year round partly outdoor: Only certain production stages are on fields, the rest in a building, or pigs spent part of the year (usually summer) on fields and the rest of the year in a building. The building may have outdoor runs.	SusPigSys
farm / system	production system	Common definition: Manufacturing subsystem that includes all functions required to design, produce, distribute, and service a manufactured product. SusPigSys definition: A production system is a certain combination of farm characteristics such as closed barn vs. outdoor. Many farms can have the same production system, i.e. combination of characteristics (housing, breed, feed, management).	SusPigSys
farm / system	rare / endangered livestock breeds	ELBARN = European Livestock Breeds Ark and Rescue Net; www.elbarn.net (with national contacts to institutions / lists for rare / endangered livestock breeds)	SusPigSys
farm / system	slurry aeration	slurry aeration leads to (substantially) reduced CH4 emissions but to higher NH3 and N2O emissions; those aerators were introduced mainly in the 1990ies to improve the slurry quality, also about odour emissions; in general greenhouse gas emissions could be reduced by using aeration techniques (see e.g. http://www.boku.ac.at/fileadmin/data/H03000/H93000/H93100/AmonPublikationen/emissions_during_storage_slurry.pdf)	SusPigSys
farm / system	total utilised agricultural area	Agricultural area of the entire farm utilised in 2017. Includes owned and rented land, pastures, arable crops and forests.	SusPigSys
observations	group	Animals kept together in one pen or one paddock at one time. (Over time, several groups will be kept in the same pen.)	SusPigSys
observations	litter (of suckling piglets)	Narrow sense: all piglets born by the same sow on the same day. Practical definition: all suckling piglets kept with one sow or weaned from one sow.	SusPigSys
observations	sick pen	Suitable sick pen requires: soft lying area (rubber or bedding), clean and dry lying area, free access to water and feed, animals not shivering from cold. Available = free or occupied by sick pigs.	SusPigSys

pig life cycle	farrowing	sow gives birth	SusPigSys
pig life cycle	pigs: (replacement) gilt	Female pig intended for breeding: until 1st insemination. Usually we mean this type of gilt when we only write gilt.	SusPigSys
pig life cycle	pigs: barrow	Castrated male growing-finishing pig (surgically or immunocastrated)	SusPigSys
pig life cycle	pigs: breeding boar	Male for insemination or oestrus stimulation + detection (teaser boar): 1st service to culling	SusPigSys
pig life cycle	pigs: gestating sow	Female after 1st insemination, pregnant or to be inseminated	SusPigSys
pig life cycle	pigs: growing-finishing boar	Uncastrated (entire) male growing-finishing pig	SusPigSys
pig life cycle	pigs: growing-finishing gilt	Female growing-finishing pig (if pigs are finished in sex-separated groups)	SusPigSys
pig life cycle	pigs: growing-finishing pig: 1) grower, 2) finisher, 3) heavy pigs	Pigs raised for slaughter: 1) ~ 25 - 50 kg, 2) 50 to 110 kg, 3) >110 kg	SusPigSys
pig life cycle	pigs: lactating sows	Sows providing milk to their own or fostered suckling piglets	SusPigSys
pig life cycle	pigs: sow	Breeding female from the very first insemination in her life, until death on the farm or sale for slaughter	InterPIG, SusPigSys
pig life cycle	pigs: suckling piglets	Piglets living off milk (from mother, nurse sow or artificial nursing system), usually until ~ 7 kg (conventional) or ~ 15 kg (organic)	InterPIG, SusPigSys
pig life cycle	pigs: weaner	First stage after weaning (rearing period, "weaned piglet"); conventional: ~ 7 to 30 kg (4-10 weeks); organic: ~ 15 to 30 kg	SusPigSys
pig life cycle	suckling period (lactation)	Sow and piglet kept together	SusPigSys
pig life cycle	weaning	sow and piglets are separated; conventional: ~ 7 kg, ~ 3 to 4 weeks old; organic: ~ 15 kg, ~ 6 weeks old	SusPigSys
records	diarrhoea	Faeces are more liquid in consistency than normal. May also have a different colour.	SusPigSys
records	Finishing Mortality (%)	Deaths as a % of the number of pigs entering the system, not the number leaving it. Relates to pigs on farms, and therefore excludes post-farm gate mortality, e.g. mortality in transport to abattoir, and discarded pigs at the abattoir.	InterPIG
records	Litters/sow/year	The actual number of litters in a 365-day period. This will therefore include “empty” or waste-feeding days. Based on mean present sows.	InterPIG
records	mean present sow	mean daily number of sows in the year	SusPigSys
records	Pigs born alive per litter	Excludes pigs born dead.	InterPIG
records	Pigs born dead per litter	Pigs born dead per litter, excludes mummified pigs (approx. 0,3 per litter)	InterPIG
records	Pigs reared per sow/year	Based on mean present sow. =Pigs weaned per sow/year * (1 - Rearing Mortality (%))	InterPIG
records	Pigs sold per sow/year	Based on mean present sow. =Pigs weaned per sow/year * (1 - Rearing Mortality (%)) * (1 - Finishing Mortality (%))	InterPIG

records	Pigs weaned per litter	Based on: Total wean for a period/ Total number of farrowings = excluding nurse sows. =IF (Pigs born alive per litter > 0;Pigs born alive per litter * (1 - Pre Weaning Mortality (%));"")	InterPIG
records	Pigs weaned per sow/year	Based on mean present sow. =Pigs born alive per litter * (1 - Pre Weaning Mortality (%)) * Litters/sow/year	InterPIG
records	Pre Weaning Mortality (%)	Deaths as a % of the number of pigs born alive, not the number leaving it.	InterPIG
records	Rearing Mortality (%)	Deaths as a % of the number of pigs entering the system, not the number leaving it.	InterPIG
records	Sow mortality (%)	Sows that die on the farm, and where no payment is received. As a % of mean present sows.	InterPIG
records	Sow replacement rate (%)	Sow deaths plus sow culling during the year, as a % of mean present sows.	InterPIG
records	treatments	Giving medicine to one or several pigs (injection or oral application). General rule: If one animal is treated repeatedly ("course of treatment") for e.g. 3 consecutive days = one treatment; if more that 7 days between two doses= new treatment. 1) Antibiotic treatment: includes all kind of antibiotics and coccidiostatica treatments independend from length of withdrawal period and method (e.g. injection, by food/water). Includes combinations with other drugs (e.g. antiinflammatory) when given at same time. 2) Other treatments = not combined with antibiotics: antiinflammatory, analgesics, steroids, NOT including homeopathic drugs, phytotherapy or minerals	SusPigSys
SusPigSys	advocates	Promote equal consideration of all sustainability priorities throughout the SusPigSys project: Kees (economy), Stefan (environment), Tina (animal health & welfare), Carmen (farmer and social).	SusPigSys
SusPigSys	stakeholder	Anyone with interest in pig production: farmers, pig producer organisations, slaughterers, retailers, allied industries (feed, breeding, barn equipment/technology …), consumers (= anyone who buys pig products), NGO, scientists, policy makers	SusPigSys

SusPigSys	sustainability	Sustainability is the ability to maintain certain rate or level and avoid the depletion of natural resources in order to maintain an ecological balance (The Oxford English Dictionary). Sustainability is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland et al, 1987). Agricultural sustainability is the ability to maintain productivity, conserve the land resource base without degradation, is economically viable and socially acceptable (Convey 1985). Recent definition of sustainable agriculture consider the conservation of natural resources, genetic diversity, animal welfare, appropriate technologies, continued supply of food, quality of rural life, farmer welfare and a healthy environment.	SusPigSys
SusPigSys	sustainability pillars	Definition by SusAn for the call: economy, environment, society	SusPigSys
SusPigSys	sustainability priorities	SusPigSys definition, where we split the “society” pillar: Economy, Environment, animal health & welfare, and farmer & social (which focusses on farmers but includes all human stakeholder interest, e.g. from society). Economy: Economic sustainability is an obligation to preserve the present-day economic opportunities for the future. Profitability as main requirement for economic sustainability should not exclude the other two pillars. In fact, profit should not be at any cost. The economic pillar and profit makes it possible for businesses to develop sustainability strategies. Sustainability considers time dimension, rather than only considering healthiness of the business at a certain point of time. Environment: define animal health & welfare: define farmer & social: define	SusPigSys

sheet	content
howto	Hints and instructions for filling in data
glossary	Definitions of terms
Int1	Basic farm information. Farmer opinion on sustainability
Int2H1	List of Buildings
Int2H2	Units within buildings
Int2H3	Outdoor pigs
Int3	Animal management, slurry/manure, land, KPI
Int4	Farmer questionnaire (Likert scales)
Int5	Production data per animal category. Treatment. Outoot pig management.
Tab1	Labour
Tab2	Crop and forage for own feed production
Tab3	Overall feed consumed in 2017 which was bought
Tab4	Composition of feeds mixed on farm
Tab5	Feed amounts fed per pig in 2017
Tab6	Land rents, labour, energy costs and other costs paid to external entities
Tab7	Fertilisers used for own pig feed production
Tab8	Silos for feed, slurry tanks
Tab9	Big equipment for pig farm and own feed production
end	Questions at the end of the visit for farmer and observer.

Question	choice answer / [unit]	definition / hints	answer or min answer (no answer = NA)	max answer	remarks
Country	[text]				
Date	[date]				
SusPigSys Farm ID	[text]	(made by observer: format = e.g. DE001)			
Interview partner: role on farm	[text]				
Observer	[text]				
Farmer: sustainability					
When you think of a sustainable pig farm, how does this farm look like or what characteristics does it have?	[text]				
SusPigSys investigates sustainability in the areas economy, environment, animal health & welfare, and farmer & social interests.					
Which specific aspects regarding - farmer & social - economy - animal health & welfare - environment come to your mind, when you think of a sustainable pig farm?		(allocate answer to priorities, don`t push farmer to list something for all four)			
- farmer & social	[text]				
- economy	[text]				
- animal health & welfare	[text]				
- environment	[text]				
Farm					
Type of farm	1) Breeding farm 2) Finishing farm 3) Breeding-to-finishing farm	(breeder farms: piglets are born on the farm; finisher farms: pigs sold for slaughter from the farm)			

Besides pigs, what other production lines contribute to your income?	1) crops production 2) dairy cows 3) beef cattle 4) broilers 5) laying hens 6) other, please specify 7) none: pigs only				
other production lines (specify):	[text]				
Production system	1) Conventional 2) Conventional certified 3) Organic certified	(Certified organic = complies with European organic standards. May include other organic standards. Conventional certified = labels / assurance schemes with quality criteria on top of national basic legislation.)			
Production certification name and type	[text]				
Breed(s) present on farm	[text]	(e.g. Landrace, Large White, Duroc*Landrace)			
(Observer internal: Do breeds include rare or endangered breeds?)	1) yes 2) no	(see glossary for link; needed for environmental KPI)			
From how many sources (farms) you do buy in pigs?	[number]	(Enter 0 if not buying in. Enter 99 if buying from dealer with unknown no. of sources.)			

Buildings	enter fencing in Int2H3					(see glossary)	(if mixed: enter e.g. "sows: 1, weaners: 2")	
	Building ID	**Housed in building:**	**Structure**	**Year of construction**	**or complete renewal**	**Historical investment**	**data are:**	**Remarks**
	[text] (use farm name)	1) Gestating sows 2) Lactating sows 3) Weaners 4) Growing-finishing pigs 5) Replacement gilts	1) brick walls 2) prefab in wood 3) prefab concrete 4) prefab metal 5) concrete poured on site	[year]	[year]	[$]	1) exact 2) extrapolated 3) guessed	[text]
building 1								
building 2								
building 3								
building 4								
building 5								
building 6								
building 7								
building 8								
building 9								
building 10								
building 11								
building 12								
building 13								
building 14								
building 15								
...								

Units within buildings	(if you need more columns, add them to the right)		(if mixed: enter e.g. "sows: 1, weaners: 2")				
Question	**choice answer / [unit]**	**definition / hints**	**data are:** 1) exact 2) extrapolated 3) guessed	**unit 1**	**unit 2**	**unit 3**	**unit 4**
Building ID (from Int2H1)	[text]						
Housed in the system:	1) Gestating sows 2) Lactating sows 3) Weaners 4) Growing-finishing pigs 5) Replacement gilts						
Total capacity in the system	[number of pigs]						
For Weaners, Growing-finishing pigs and Replacement gilts: weight when leaving the system	[min kg]						
For Weaners, Growing-finishing pigs and Replacement gilts: weight when leaving the system	[max kg]						
For lactating and gestating sows: confinement	1) loose housing 2) stall / crate 3) farrowing in crate which is opened (some time) after farrowing						
Feeding system	1) manual 2) automatic 3) both						
Remarks	[text]						
Indoor			**data are:** 1) exact 2) extrapolated 3) guessed	**unit 1**	**unit 2**	**unit 3**	**unit 4**
All-in-all-out per room (air-space)	1) yes 2) no	(there is a (short) period with no pigs inside before new pigs enter; "sometimes" or not sure = "no")					
Area with solid concrete flooring	[total m^2 in the unit]	(based on construction plans)					
Area with slatted flooring	[total m^2 in the unit]	(based on construction plans)					
Removal of slurry from pen by means of pumps	1) manual 2) automatic 3) other						
How often is manure moved to manure storage (pens cleaned)? (min)	1) several times per day 2) daily 3) several times per week 4) weekly 5) monthly 6) less often than monthly						
How often is manure moved to manure storage (pens cleaned)? (max)	1) several times per day 2) daily 3) several times per week 4) weekly 5) monthly 6) less often than monthly						
Bedding frequency (0= less often than daily) (min)	1) no bedding 2) several times per day 3) daily 4) several times per week 5) weekly 6) monthly 7) less often than monthly						
Bedding frequency (0= less often than daily) (max)	1) no bedding 2) several times per day 3) daily 4) several times per week 5) weekly 6) monthly 7) less often than monthly						

Question	choice answer / [unit]	definition / hints	data are: 1) exact 2) extrapolated 3) guessed	unit 1	unit 2	unit 3	unit 4
Type of bedding material 1	1) NA (no bedding) 2) straw 3) sawdust or similar 4) other [specifiy]						
Type of bedding material 1: other	[text]						
Amount of bedding material 1 (min)	[kg per pig per day]	(How many straw bales bought per year? kg per bale? Approx. no of bales used in age category or unit? Calculate.					
Amount of bedding material 1 (max)	[kg per pig per day]						
Type of bedding material 2	1) NA (no bedding or only one material) 2) straw 3) sawdust or similar 4) other [specifiy]	(if different bedding materials are used)					
Type of bedding material 2: other	[text]						
Amount of bedding material 2 (min)	[kg per pig per day]						
Amount of bedding material 2 (max)	[kg per pig per day]						
Remarks	[text]						

Outdoor run			data are: 1) exact 2) extrapolated 3) guessed	unit 1	unit 2	unit 3	unit 4
(some) pigs have access to an outdoor run	1) yes (continue) 2) no						
Outdoor run: use (min)	[% time / yr.]						
Outdoor run: use (max)	[% time / yr.]						
Area with solid concrete flooring	[total m^2 per unit]	(based on construction plans)					
Area with slatted flooring	[total m^2 per unit]	(based on construction plans)					
Area with permeable floor (soil, gravel etc)	[total m^2 per unit]	(based on construction plans)					
Removal of slurry/ manure	1) manual 2) automatic 3) other 4) not outdoor run						
How often is manure from the outdoor runs moved to manure storage? (min)	1) several times per day 2) daily 3) several times per week 4) weekly 5) monthly 6) less often than monthly 7) no outdoor run						
How often is manure from the outdoor runs moved to manure storage? (max)	1) several times per day 2) daily 3) several times per week 4) weekly 5) monthly 6) less often than monthly 7) no outdoor run						
Type of bedding material 1	1) no bedding 2) straw 3) sawdust or similar 4) other [specifiy]						
Type of bedding material 1: other	[text]						

Question	choice answer / [unit]	definition / hints	data are: 1) exact 2) extrapolated 3) guessed	unit 1	unit 2	unit 3	unit 4
Amount of bedding material 1 (min)	[kg per pig per day]						
Amount of bedding material 1 (max)	[kg per pig per day]						
Type of bedding material 2	1) no bedding 2) straw 3) sawdust or similar 4) other [specifiy]						
Type of bedding material 2: other	[text]						
Amount of bedding material 2 (min)	[kg per pig per day]						
Amount of bedding material 2 (max)	[kg per pig per day]						

Outdoor pigs	(if you need more columns, add them to the right)	(if mixed: enter e.g. "sows: 1, weaners: 2")							
Shelter		**data are:** 1) exact 2) extrapolated 3) guessed	**shelter type 1**	**shelter type 2**	**shelter type 3**	**shelter type 4**	**shelter type 5**	**shelter type 6**	**shelter type 7**
material of shelters	1) metal 2) wood 3) plastic 4) mixed materials								
construction type	1) prefabricated shelters 2) self-made 3) both								
number of huts	[total n per type]								
bought / buildt in	[year]								
size of shelters	[m^2 per shelter]								
used for	1) Gestating sows 2) Lactating sows 3) Weaners 4) Growing-finishing pigs 5) Replacement gilts								
Fencing		**data are:** 1) exact 2) extrapolated 3) guessed	**fence type 1**	**fence type 2**	**fence type 3**	**fence type 4**	**fence type 5**	**fence type 6**	**fence type 7**
fence is	1) single 2) double								
material of fence type	1) electric wire 2) non-electric wire 3) metal lightweight / simple 4) metal solid 5) other: please specify								
	other [text]:								
total length of fence type	[km]								
remarks	[text]								

Other investments	(machinery --> Interview3)		
type (e.g. watering system)	**description**	**data are:** 1) exact 2) extrapolated 3) guessed	**amount** (e.g. 2 km)

Question	choice answer / [unit]	definition / hints	answer or min answer (no answer = NA)	max answer	remarks
Animal management					
Do you immunocastrate male pigs?	[% of male pigs]	(if needed explain that it's allowed and even common in some parts of Europe)			
Do you surgically castrate male piglets?	[% of male piglets]				
Surgical castration: Age at castration	[days]	(mean 2017; NA if no surgical castration)			
Surgical castration: anaesthesia is used	[% of litters]	(NA if no surgical castration)			
Surgical castration: analgesia (NSAID) is used	[% of litters]	(NA if no surgical castration)			
Surgical castration: anaesthesia type (injection, gas, local) OR product name	[text]	(NA if no surgical castration)			
Surgical castration: analgesia product name	[text]	(NA if no surgical castration)			
Do you clip teeth of suckling piglets?	[% of litters]				
Do you grind teeth of suckling piglets?	[% of litters]				
Do you dock tails?	[% of litters]	(for farrow or farrow-finish farms)			
or: What proportion of weaners or grower-finishers arrives with docked tails on your farm?	[% of pigs]	(for growing-finishing farms)			
Do you use hormones to synchronise births?	[% of births used]				
Do you use hormones to trigger births?	[% of births used]				
Do you use oxytocin during birth (not after)?	[% of births used]	(does NOT include post partum)			
Do you use hormones to synchronise estrus in gilts?	[% of gilts used]				
Do you use proper quarantine for breeding animals?	1) yes 2) no	(proper quarantine = seperate building, seperate clothes; separated building but same clothes = no)			
Age of piglets at weaning	[days]				
Piglet weight at weaning	[kg]				
Weight of pigs when they are moved from weaner housing and management to growing-finishing housing and mangement	[kg]				
Which proportion of overall manure is used in an anaerobic digester to produce biogas?	[%]	(overall = any manure or slurry)			
Which proportion of farmyard manure is composted?	[%]				
How long is farmyard manure stored before application?	[number of months]	(farmyard manure = solid faeces, with bedding where applicable)			
Which proportion of farmyard manure is covered by concrete covers?	[%]				

Which proportion of farmyard manure is covered by semi-permeable plastic foils, tents, roofs, …?	[%]				
How long is slurry stored before application?	[number of months]				
How many times is slurry aerated during storage?	[number per storage time]				
Which proportion of slurry is covered by concrete cover?	[%]				
Which proportion of slurry is covered by semi-permeable plastic foils, tents, roofs, …?	[%]				
Which proportion of stored slurry is not covered but has a stable natural crust?	[%]	(exclude times without natural crust, e.g. after mixing)			
Land					
Total utilised farm land	[ha]	(overall land area utilised by the farm, incl. pastures, arable or forest land, semi-natural structures such as hedgerows, water bodies, pile of stones, timber yards etc.; incl. owned and rented land)			
Total land rented	[ha]	(rented farm land)			
Total agricultural land	[ha]	(grasslands, pastures and arable land land used for production of food, feed, bio-energy and fibres)			
Total land used for growing crops for pig feed production	[ha]				
Total arable land	[ha]	(land, which is ploughed at least every few years; see glossary)			
Key environmental performance indicators (KPI)					
> All "% of agricultural area" questions refer to the total farm land (incl. not for pig or pig feed production). > If farmer gives "proportion of land" in %: use main answer column. If farmer gives "proportion of land" in [ha]: use max answer column. > The answer codes alternate between 1/2/3 and 100/50/0!		(riparian strips are strips along surface water bodies to prevent emissions into water; if crops are grown or pigs kept directly beside water = no strip)			
KPI-1a: Do you have surface water bodies (e.g. creeks, rivers, lakes) on your agricultural land, which contain water all the year round (no drainage channels)?	1) yes (continue) 2) no (skip to KPI-2) 3) NA	(NA only if there is no farmland, just pigs)			
KPI-1b: Do you cultivate and harvest crops there?	1) yes 2) no 3) NA				
KPI-1c: Do you fertilize the riparian strips or use pesticides (on grassland or arable land)?	1) yes 2) no 3) NA				

KPI-1d: Do your animals have access to freshwater bodies (creeks, rivers, lakes) and/or riparian strips?	1) yes 2) no 3) NA				
KPI-2a: Do you always use water-efficient techniques (e.g. high-pressure cleaner, re-use of clean cleaning water,...) for cleaning pig houses or equipment?	1) yes 2) partly 3) no 4) NA	("NA" if no wet cleaning cleaning)			
KPI-2b: Do you have technical measures in place to avoid water wastage through e.g. dripping drinkers?	1) yes 2) partly 3) no 4) NA				
KPI-3a: Do you have access to communal (tap) water with sufficient water supply?	1) yes > skip to KPI4 2) no				
KPI-3b: Do you have sufficient water supply or storage capacities (e.g. wells, retention bassins) to always ensure sufficient water supply for livestock and for feed production (incl. demands for e.g. cleaning)?	1) yes 2) no	(if no during any season = no)			
KPI-5a: Do you cultivate GMO crops (e.g. soybeans, maize)?	1) yes 2) no 3) don't know				
KPI-5b: Do you feed GMO crops (e.g. cake or extracted meal from genetically modified soybeans)?	1) yes 2) no 3) don't know				
KPI-6: Do you use feed which is certified to not come from land related to deforestation (land use change) in the past 20 years (includes self-grown, regionally grown, certified organic or WWF Basel Criteria for Responsible Soy Production)?	100) all feed is not related to deforestation 50) not all but most feeds are as in previous answer 0) there is a risk that feeds are related to deforestation (e.g. soybean from South America)	100%: Yes, the risk of deforestation with inputs can be fully excluded due to regional feed inputs only or due to certified inputs (incl. organic) 50%: not all but most inputs (especially protein feeds based on soybeans, palm-based products or cereals) are certified or from regional production 0%: There is a risk that the farm uses imported feeds (e.g. soybean-based feeds or cereals)			
KPI-7a: What proportion of your inputs did you have to discard during the last 5 years (e.g. throw away spoilt feed, seeds, fertilizers etc.)?	[%]				
KPI-8: Do you dispose your waste (especially veterinary medicine, oil, batteries, tyres and livestock cadavers) separately and with a public or private service?	100) yes 50) partly 0) no	interview only; according to law = good; 100%: yes, all; 50%: there is a risk that some waste is not correctly disposed but most are 0%: most wastes are not disposed correctly			

KPI-9a: Do you irrigate your fields?	1) yes 2) no (skip) 3) NA (skip)	if "no" or "NA" (no farmland, just pigs) skip to KPI-10)			
KPI-9b: Do you use information about local precipitation and evaporation rate in order to adapt your irrigation quantities?	1) yes 2) no 3) NA				
KPI-9c: Do you use a water-saving technology such as drip irrigation?	1) yes 2) no 3) NA				
KPI-9d: Do you use energy-saving pumping technology?	1) yes 2) no 3) NA				
KPI-10a: Do you fertilize nitrogen with high precision by using e.g. variable rate application methods, drip irrigation with mineral fertilisers or others?	1) yes 2) no 3) NA	("NA" in case of the farm does not have any land for feed production.)			
KPI-10b: Do you base the fertilizer demand on soil or plant analyses?	1) yes 2) no 3) NA	("NA" in case of the farm does not have any land for feed production.)			
KPI-11a: Do you use mineral P- and K-fertilizers on-farm?	1) yes 2) partly 3) no	(They are potentially connected to risks for potentially toxic elements such as uranium or heavy metals and are fossil resources.)			
KPI-11b: If yes, do you apply them based on the results of soil or plant tests?	1) yes 2) partly 3) no 4) NA				
KPI-12a: On which proportion of total agricultural land does the farm use chemical synthetic insecticides / herbicides / fungicides?	[%] in min column or [ha] in max column				
KPI-14a: Do you calculate humus balances for your farmland?	1) yes 2) no (skip) 3) NA	(If yes: Ask for humus balance documents)			
KPI-14b: What is the average farm level humus balances result in kg C per hectare and year?	[kg C / hectare / year]	optimal range, i.e. on average (on farm level) -75 to +100 kg C per hectare and year			
KPI-14c: What is the range of humus balances (minimum and maximum rates)?	[kg C / hectare / year]				
KPI-15: What proportion of arable land (in crop rotation, not pasture or grassland) is not ploughed (= zero / reduced tillage)?	[%] in min column or [ha] in max column	(Do not ask in case of 100% direct seeding; see glossary)			
KPI-16a: What proportion (in %) of your agricultural land is permanent grassland (leguminous or not)?	[%] in min column or [ha] in max column	("NA" only if farm does not have any farmland, only livestock houses; KPI-16 only concerns permanent grasslands or anything leguminous, ignore other crops)			

KPI-16b: What proportion (in %) of your agricultural land is leguminous grassland in crop rotation?	[%] in min column or [ha] in max column	("NA" only if farm does not have any farmland, only livestock houses; KPI-16 only concerns permanent grasslands or anything leguminous, ignore other crops)			
KPI-16c: What proportion (in %) of your agricultural land is leguminous crops?	[%] in min column or [ha] in max column	("NA" only if farm does not have any farmland, only livestock houses; KPI-16 only concerns permanent grasslands or anything leguminous, ignore other crops)			
KPI-17a: Which proportion of permanent grassland or pasture did you convert to arable land (or e.g. vine-yards without vegetation cover) in the past 20 years?	[%] in min column or [ha] in max column				
KPI-18b: What proportion of your farmland is woodland?	[%] in min column or [ha] in max column				
KPI-19b: What proportion of woodland did you deforest and convert to grassland, arable land or buildings in the past 20 years?	[%] in min column or [ha] in max column				
KPI-20a: Do you plant catch crops and/or green cover outside the vegetation period?	1) yes 2) no				
KPI-20: If yes: On which proportion of the arable land do you plant it?	[%] in min column or [ha] in max column	KPI-20: Proportion of arable land with catch crops / green cover outside vegetation period?			
KPI-21a: Do you have non-intensively managed farmland to promote biodiversity or to protect water and soil recources (= ecological compenstation areas)? (e.g. flower strips on arable land, buffer strips)	1) yes 2) no				
KPI-21b: If yes: What proportion of your agricultural land is ecological compensation area?	[%] in min column or [ha] in max column				
KPI-22: Do you take additional measures to protect and promote biodiversity on farm, e.g. insect hotels, nesting boxes, piles of stones, dead wood, natural water bodies?	100) yes 0) no				
KPI-23: Do you grow rare or endangered agricultural crops (species / varieties)?	100) yes 0) no				
KPI-23b: If yes: Which ones?	[text]				
KPI-24a: Do you use techniques for reducing emissions from your livestock houses to air (e.g. specific filters), soil or water?	1) yes 2) no	(only addresses emissions from pig barns)			
KPI-25a: What proportion [%] of your agricultural land is on drained moorland?	[%] in min column or [ha] in max column	(see glossary)			

KPI-26a: Do you have any land degraded due to soil compaction, salination, erosion and pollution?	1) yes 2) partly 3) no				
KPI-26b: Or did you have degraded land, which was meliorated?	1) yes 2) partly 3) no				
KPI-27a: Insecticides/ herbicides/ fungicides on feed crops: average treatments per year for the average hectare?	[n treatments / year]	100% 0 treatments 50%: 1 to 3 treatments 0%: >3 treatments			

question				enter answer or "NA"	comments / hints for asking the question
Role of interview partner on farm [text]					
Quality of life					
On a scale from 1 (very low) to 5 (very high) how would you rate your job satisfaction?	(very low)	① ② ③ ④ ⑤	(very high)		
On a scale from 1 (strongly disagree) to 5 (strongly agree), how strongly do you agree with the following statements: I am motivated to be a pig farmer because:					
Pig farming is my livelihood	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Pig farming is a life style	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Everybody in my family was involved in farming, so I	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
I love farming	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Farming gives me pride	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
I am in total control of my job	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
On a scale from 1 (strongly disagree) to 5 (strongly agree), please state how strongly you agree with the following statements: I am demotivated to be a pig farmer because of:					
Excessive EU rules and regulations	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Excessive national rules and regulations	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Farm inspections and the forms to be completed and submitted to the government	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Politicians involvement in the decision making regarding how farmers should best to do their job	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		("political weather", things that "might be"; regulations "are")
Retailers' pressure to produce cheap food	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Consumers' attitudes towards pig farming in general	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Insufficient societal recognition of pig farming as a key national sector	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		
Insufficient financial reward	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)		

In your opinion, on a scale from 1 (very unacceptable/ unsatisfactory) to 5 (highly acceptable/ satisfactory), how acceptable do you find the following:						
Average working hours per week are:	(very unacceptable/ unsatisfactory)	①	② ③ ④	⑤	(highly acceptable/ satisfactory)	(to be answered by farm owner)
Working conditions are:	(very unacceptable/ unsatisfactory)	①	② ③ ④	⑤	(highly acceptable/ satisfactory)	
Workload is:	(very unacceptable/ unsatisfactory)	①	② ③ ④	⑤	(highly acceptable/ satisfactory)	
The level of stress experienced is:	(very unacceptable/ unsatisfactory)	①	② ③ ④	⑤	(highly acceptable/ satisfactory)	
The current status of your relationship with your family is:	(very unacceptable/ unsatisfactory)	①	② ③ ④	⑤	(highly acceptable/ satisfactory)	(refers to day-to-day relationship)
The amount of leisure time spent with your family is:	(very unacceptable/ unsatisfactory)	①	② ③ ④	⑤	(highly acceptable/ satisfactory)	(if no family than skip the question)
Your physical health status is:	(very unacceptable/ unsatisfactory)	①	② ③ ④	⑤	(highly acceptable/ satisfactory)	
Your relationships with your close neighbours are:	(very unacceptable/ unsatisfactory)	①	② ③ ④	⑤	(highly acceptable/ satisfactory)	(both farming and non-farming neighbours)
Over the duration of a calendar year, do you take any off-farm holiday?	1) yes 2) no					
If yes, for how long?	1) Less than 1 week 2) 1 - 2 weeks 3) More than 2 weeks					
Are you a member of a non-farming organisation?	1) yes 2) no					(anything which is non-farming)
Would your annual earnings from farming alone ensure you a decent quality of life?	1) yes 2) no					
In case of illness or emergency in the family, to whom do you turn to for assistance or (work) replacement?	1) Your family members 2) Your close farming neighbours 3) Other neighbours (not involved in farming) 4) Others (please specify)					
[others text]						
In your view, is succession a key problem for the future of the pig industry?	1) yes, for family farms 2) yes, for the pig industry in general 3) no					
Do you have a successor for your farm business?	1) yes 2) no					

For family farms: Do any members of your family work outside the farm?	1) yes, because they have other interests 2) yes, we need the extra money 3) no		
Capacity development			
Have you undertaken any training related to your business in the past 12 months?	1) yes 2) no		
If yes, who had provided this training (please tick all that apply)	1) Private advisory groups 2) Farmer's organisations 3) Public entities (e.g. local authorities, regional and national government) 4) Others (please specify)		
[others text]			
Are you aware of any farming training and education opportunities, to further your own capacities and skills?	1) yes 2) no		(incl. learning and networking events; incl. family members engaged in farming)
If you have employees, are there any opportunities for them to undertake training to enhance their career progression?	1) yes 2) no		(refers to the future)
In your opinion, on a scale from 1 (very difficult) to 5 (very easy) how difficult is to access free of charge farm advisory services?"	(very difficult) ① ② ③ ④ ⑤ (very easy)		
In your opinion, on a scale from 1 (very difficult) to 5 (very easy) how difficult is to access farm advisory services with costs?	(very difficult) ① ② ③ ④ ⑤ (very easy)		
In your opinion, on a scale from 1 (very difficult) to 5 (very easy) how difficult would you find to adopt the latest technologies/techniques (e.g. related to feeding) promoted within the pig industry to make your enterprise more ...			
productive and efficient	(very difficult) ① ② ③ ④ ⑤ (very easy)		
environmentally sound	(very difficult) ① ② ③ ④ ⑤ (very easy)		
Fair Access to Means of Production			
On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree or disagree with the following statements: I have fair access to:			(fair = just)
land (owned and/or leased with long-lasting contracts)	(strongly disagree) ① ② ③ ④ ⑤ (strongly agree)		

financial capital	(strongly disagree)	①	② ③ ④ ⑤	(strongly agree)		(money, credit, and other forms of funding that companies use to invest in their businesses)
buildings and other farming equipment and facilities	(strongly disagree)	①	② ③ ④ ⑤	(strongly agree)		
farming knowledge	(strongly disagree)	①	② ③ ④ ⑤	(strongly agree)		
Fair trading practices						
On a scale from 1 (very unfair) to 5 (very fair) how would you rate the fairness of the prices your buyer pays to you?	(very unfair)	①	② ③ ④ ⑤	(very fair)		
Do you have access to market information (e.g. price the seller receives in relation to prices paid to other sellers in the region for the same product and retail price)?	1) yes 2) no					
If yes, on a scale from 1 (very difficult) to 5 (very easy), how would you rate the access to this information?	(very difficult)	①	② ③ ④ ⑤	(very easy)		
On a scale from 1 (very unacceptable) to 5 (highly acceptable), how would you rate the fairness of prices paid to farmers throughout the supply chain?	(very unacceptable)	①	② ③ ④ ⑤	(highly acceptable)		(supply chain = farms - slaughterers - retailers -shops)
On a scale from 1 (very difficult) to 5 (very easy) how difficult is the process of establishing a fair contract/agreement with your input (e.g. feed) supplier(s)?	(very difficult)	①	② ③ ④ ⑤	(very easy)		(suppliers for feed etc., not pigs)
Labour rights						
Do you have sufficient number of workers to cover the day-to-day duties on your farm?	1) yes 2) no					
In your view, do your employees have a clear understanding regarding their wage and work conditions?	1) yes 2) no					
Do you involve children (16 years of age or younger) on farm work at any time?	1) yes 2) no					("from time to time" = yes)
If yes, has working on the farm interfered with their school activity	1) very often 2) often 3) occasionally 4) very rare 5) never					

Equity non-discrimination, gender equality, support to vulnerable groups			
Does your farm business have clear rules/guidelines regarding non-discrimination?	1) yes 2) no		
If yes, are these rules/guidelines clearly specified and made available to all staff?	1) yes 2) no		
Do all your employees have equal access to training opportunities?	1) yes 2) no		
If women are involved as (paid or unpaid) workforce on the farm, are they engaged in any way in the farm business decision-making?	1) yes 2) no 3) not applicable		(workforce women only, not family members who are not workforce)
If women are involved, on a scale to 1 (not important at all) to 5 (very important) how would you rate their contribution to the decision-making?	(not important at all) ① ② ③ ④ ⑤ (very important)		(if the owner is a female than the answer could be 5)
Do you currently employ on your farm any person who is registered (officially acknowledged) as disabled?	1) yes 2) no		
Human health and safety			
In your opinion, on a scale from 1 (very poor) to 5 (excellent) how would you rate the status of the workplace (facilities, machinery and other equipment, air quality) on your farm to ensure health and safety for yourself, your employees and any visitors?	(very poor) ① ② ③ ④ ⑤ (excellent)		
On a scale from 1 (very low) to 5 (very high), how would you rate the safety on your farm in general?	(very low) ① ② ③ ④ ⑤ (very high)		
Do you provide any health and safety training to your employees?	1) yes 2) no		(farmer him/herself: see Capacity development)

In the case of using toxic materials (e.g. pesticides and disinfectants), is the health of those who are using them (including the farmer) regularly monitored?	1) yes 2) no		
In your opinion, on a scale from 1 (very low) to 5 (very high), how would you rate the accident and injury frequency on your farm last year (2017)?	(very low) ① ② ③ ④ ⑤ (very high)		
Do you as an employer provide personal protective equipment free of cost to all employees?	1) yes 2) no		(employees only, not family members)

Good governance

In the last 5 years, has your farm business been responsible for any negative social impacts (e.g. on neighbours, other farms, any other groups)?	1) yes 2) no		(problems that had or may have judicial consequences)
If yes, has there been a successful resolution for all affected parties?	1) yes 2) no		
In the last 5 years, has your farm business been responsible for any negative environmental impacts?	1) yes 2) no		(e.g. accident while spreading slurry: slurry flows into open water)
If yes, has there been a successful resolution for all affected parties?	1) yes 2) no		
On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree or disagree with the following statement: My business has a high risk of polluting and contaminating the local environment	(strongly disagree) ① ② ③ ④ ⑤ (strongly agree)		
Regarding local environmental impacts, do you communicate all potential and real risks to those who may be affected?	1) yes 2) no		(e.g slurry application and potential emissions to air (incl. smell) and/or water)

On a scale to 1 (strongly disagree) to 5 (strongly agree) to what extent do you agree or disagree with the following statements:
My farm business makes a positive contribution to the:

Economy of local community	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)	
Local environment	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)	

Local culture	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)		(e.g. food festivals, heritage)
Local society as a whole	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)		

Human-animal relationship

hint: Use "sows" if there are sows on the farm, "pigs" if there are not. If you let the farm fill it in directly, ask sow farmers to think of their sows when answering the questions.

On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree or disagree with the following statements:

It is important (for animal welfare) ...

to talk to and/or friendly touch (stroke, pet, scratch) your pigs	(not important at all)	①	②	③	④ ⑤	(very important)	
to treat pigs as individuals	(not important at all)	①	②	③	④ ⑤	(very important)	
to avoid force when handling pigs	(not important at all)	①	②	③	④ ⑤	(very important)	

On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree or disagree with the following statements:

My sows/ pigs are difficult to move (eg. from the gestation unit to the farrowing unit)	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)	
My sows/ pigs are a pleasure to work with	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)	
My sows/ pigs are often nervous	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)	
My sows/ pigs are very social animals	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)	
Good sow/ pig welfare is directly linked to good overall farm performance	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)	
You can calm down sows/ pigs by talking to them calmly	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)	
Sows/ pigs have no problem being kept in isolation for many hours	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)	

On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree or disagree with the following statements:

When any of my pigs are ill or suffer of any health issues it also affects my mental well-being	(strongly disagree)	①	②	③	④ ⑤	(strongly agree)	

When I am ill, the welfare of my pigs suffers	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)	
When my well-being is at risk the welfare of my pig is at risk	(strongly disagree)	① ② ③ ④ ⑤	(strongly agree)	

question (always refers to calendar year 2017)	choice answer / [unit] ($ represents your national currency)	definition / hints	Sows, Gestating	Sows, Lactating	Sows (all together)	Suckling piglets	Weaners	*growing-finishing 1: ~ 25 - 50 kg*	*growing-finishing 2: 50 to ≥ 110 kg*
Basic									
Currency on the farm	1) Euro (EUR) 2) Złoty (PLN) 3) Pound Sterling (GBP)	(exchange rate for reference year will be looked up by analyst)							
Prices preferably without VAT and after deductions. Totals are for 2017.									
Inventory									
Number of pigs on 01.01.2017	[number]								
Number of pigs on 31.12.2017	[number]								
mean weight 01.01.2017	[mean kg/pig]	(Jan + Dec to calculate meat production)							
mean weight 31.12.2017	[mean kg/pig]	(Jan + Dec to calculate meat production)							
If you can only have the numbers above for a date other than 01.01.17/31.12.17: date(s)	[text]								
Purchased: Number	[total number]								
Purchased: weight/ head	[mean kg]								

question (always refers to calendar year 2017)	**choice answer / [unit]** ($ represents your national currency)	**definition / hints**	**Sows, Gestating**	**Sows, Lactating**	**Sows (all together)**	**Suckling piglets**	**Weaners**	***growing-finishing 1: ~ 25 - 50 kg***	***growing-finishing 2: 50 to ≥ 110 kg***
Purchased: Price/ kg live weight	[mean $]								
Purchased: Price/ kg slaughter weight	[mean $]								
Purchased: Price/ head	[mean $]								
Sales: Number of animals	[total number]	(excluding for slaughter)							
Sales: weight/ head	[mean kg]	(excluding for slaughter)							
Sales: Price/ kg live weight	[mean $]								
Sales: Price/ head	[mean $]								
Sales of pigs sold at very different price	(if farm sold a proportion of pigs at clearly different conditions than most pigs in that category)	(e.g. slow-growing weaners)							
Number of animals	[total number]								
weight/ head	[mean kg]								
price/ kg live weight	[mean $]								
sales: price/ head	[mean $]								
Prices are	1) without VAT 2) with VAT 3) mixed	(if mixed, indicate in remarks whether the number is with/out)							

question (always refers to calendar year 2017)	**choice answer / [unit]** ($ represents your national currency)	**definition / hints**	**Sows, Gestating**	**Sows, Lactating**	**Sows (all together)**	**Suckling piglets**	**Weaners**	***growing-finishing 1: ~ 25 - 50 kg***	***growing-finishing 2: 50 to ≥ 110 kg***
Remarks									
Slaughter									
Total number of pigs slaughtered on farm / in own slaughter house									
Total number of pigs sold for slaughter	[total n pigs]	(in 2017)							
Carcass weight	[mean kg]	(mean 2017)							
Carcass weight is	1) live 2) dead								
Dead carcass weight is	1) hot 2) cold								
Price/ kg slaughter weight	[mean $ / kg]								
Whole carcass condemnation	[total n pigs]								
Part-carcass condemnation	[total n pigs]								
Slaughter remarks: abscess	[total n pigs]								
Slaughter remarks: arthritis	[total n pigs]								
Slaughter remarks: liver	[total n pigs]								

question (always refers to calendar year 2017)	**choice answer / [unit]** ($ represents your national currency)	**definition / hints**	**Sows, Gestating**	**Sows, Lactating**	**Sows (all together)**	**Suckling piglets**	**Weaners**	***growing-finishing 1: ~ 25 - 50 kg***	***growing-finishing 2: 50 to ≥ 110 kg***
Slaughter remarks: pleuritis	[total n pigs]	(if you have separate numbers for pleuritis, pneumonia and other lung-related: split)							
Slaughter remarks: pneumonia	[total n pigs]								
Slaughter remarks: other lung-related OR all lung-related combined	[total n pigs]	(if you cannot distinguish pleuritis, pneumonia and other lung-related: enter all combined here and leave pleuritis and pneumonia empty)							
Remarks									
Performance									
Litters born	[total number]								

question (always refers to calendar year 2017)	**choice answer / [unit]** ($ represents your national currency)	**definition / hints**	**Sows, Gestating**	**Sows, Lactating**	**Sows (all together)**	**Suckling piglets**	**Weaners**	***growing-finishing 1: ~ 25 - 50 kg***	***growing-finishing 2: 50 to ≥ 110 kg***
Litters/ sow/ year	[number]	(if available; will also be calculated)							
Piglets born alive: total	[total number]								
Piglets born dead: total	[total number]								
Piglets weaned: total	[total number]								
Piglets born alive: per litter	[mean per litter]	(only if total is not available)							
Piglets born dead: per litter	[mean per litter]	(only if total is not available)							
Piglets weaned: per litter	[mean per litter]	(only if total is not available)							
average daily gain (ADG)	[g/day]	(if available; will also be calculated)							
feed conversion ratio (FCR)	[kg feed/ kg growth]	(if available; will also be calculated)							
Losses (animals that died, not including culled)	[number]	(for calculating mortality)							
Remarks									
Treatments									

question (always refers to calendar year 2017)	**choice answer / [unit]** ($ represents your national currency)	**definition / hints**	**Sows, Gestating**	**Sows, Lactating**	**Sows (all together)**	**Suckling piglets**	**Weaners**	***growing-finishing 1: ~ 25 - 50 kg***	***growing-finishing 2: 50 to ≥ 110 kg***
Anti-parasite treatments (endo + ecto together)	[total n treatments]	(will be calculated as treatments / 100 animals / year)							
Active substances (if not known: product names) used for anti-parasite treatments	[text]								
Treatments for diarrhoea that included antibiotics	[total n treatments]	(see glossary: "treatments")							
Treatments for diarrhoea that did not include antibiotics	[total n treatments]	(see glossary: "treatments")							
Treatments for respiratory symptoms that included antibiotics	[total n treatments]	(see glossary: "treatments")							
Treatments for respiratory symptoms that did not include antibiotics	[total n treatments]	(see glossary: "treatments")							

question (always refers to calendar year 2017)	**choice answer / [unit]** ($ represents your national currency)	**definition / hints**	**Sows, Gestating**	**Sows, Lactating**	**Sows (all together)**	**Suckling piglets**	**Weaners**	***growing-finishing 1: ~ 25 - 50 kg***	***growing-finishing 2: 50 to ≥ 110 kg***
Treatments for MMA that included antibiotics	[total n treatments]	(treatments against MMA explicitly or any of its symptoms, such as agalactia, fever, mastitis; see glossary: "treatments")							
Treatments for MMA that did not antibiotics	[total n treatments]	(treatments against MMA explicitly or any of its symptoms, such as agalactia, fever, mastitis; see glossary: "treatments")							
Other treatments that included antibiotics	[total n treatments]	(see glossary: "treatments")							
Other treatments that did not include antibiotics	[total n treatments]	(see glossary: "treatments")							
Remarks									
Outdoor pigs									

question (always refers to calendar year 2017)	**choice answer / [unit]** ($ represents your national currency)	**definition / hints**	**Sows, Gestating**	**Sows, Lactating**	**Sows (all together)**	**Suckling piglets**	**Weaners**	***growing-finishing 1: ~ 25 - 50 kg***	***growing-finishing 2: 50 to ≥ 110 kg***
Pasture: use	[% time / yr.]	Pasture = grassland without permanent buildings (shelters ok)							
Pasture: area per animal (current time and location)	[m^2/animal]	Pasture = grassland without permanent buildings (shelters ok)							
Pastures part of crop rotation?	1) yes 2) no 3) no crops								
How often do you move huts to a new location on the same field?	[every ... months]								
How often do you move feeding and watering sites to a new location on the same field?	[every ... months]								
At which interval do you move the pigs to fresh fields?	[every ... months]	(fresh = no pigs on field for at least 5 years)							

question (always refers to calendar year 2017)	**choice answer / [unit]** ($ represents your national currency)	**definition / hints**	**Sows, Gestating**	**Sows, Lactating**	**Sows (all together)**	**Suckling piglets**	**Weaners**	***growing-finishing 1: ~ 25 - 50 kg***	***growing-finishing 2: 50 to ≥ 110 kg***
Remarks									
For assessor									
Production data: source	1) MIS (software) 2) own recording solution (electronic, handwritten)								
If MIS is used: name	[text]								
Production data: subjective quality	1) reliable 2) mixed quality 3) doubtful								
Remarks	[text]								

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	data are: 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	**data are:** 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	data are: 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	data are: 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	data are: 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	data are: 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	data are: 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	data are: 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

growing-finishing 3: >110 kg (heavy pig)	growing-finishing pigs (all together)	Replacement gilts	Breeding boars	All pigs/ whole farm (only if needed)	**data are:** 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. sows: 1, weaners: 2)	remarks

Labour
(related to pig production or production of own pig feed in 2017)

Key data: no. of working hours. This table: full and part time family labour + full and part time employees Seasonal or spot labour >> Tab6, "contract labour"	**number of people**	**1) family member 2) employee**	**total working hours**	**total working hours are** 1) per day 2) per week 3) per month	**% of total hours dedicated to the pig and own feed production**	***data are:*** *1) exact 2) extrapolated 3) guessed*	**remarks**
labour type 1							
labour type 2							
labour type 3							
labour type 4							
labour type 5							
labour type 6							
labour type 7							
labour type 8							
labour type 9							
labour type 10							
...							

use 2a or 2b depending on how data are available

Tab2a: Crop and forage for own feed production

Crops name	**area grown** (for own feed)	**Seeds**	**yield**	**Fertilizer 1**	**Fertilizer 1**	**Fertilizer 2**	**Fertilizer 2**	**Fertilizer 3**	**Fertilizer 3**	**Herbicides/ Fungicides/ Insecticides 1**	**Herbicides/ Fungicides/ Insecticides 1**	**Herbicides/ Fungicides/ Insecticides 2**	**Herbicides/ Fungicides/ Insecticides 2**	**Herbicides/ Fungicides/ Insecticides 3**	**Herbicides/ Fungicides/ Insecticides 3**	**If the farm grew own feed + for sale but cannot tell the area for own only:** enter overall totals and enter how much of the yield was sold in this column	**remarks**
("maize", "wheat", "soy beans", "leguminous pasture" etc.)	[ha]	[kg/ha]	[t/ha]	name from Tab7	[kg/ha]	name from Tab7	[kg/ha]	name from Tab7	[kg/ha]	product name	[kg/ha]	product name	[kg/ha]	product name	[kg/ha]	[total tons sold]	
data are: 1) exact 2) extrapolated 3) guessed																	

Overall feed consumed in 2017 which was bought		$ represents your currency (€ / £ / Złoty)	for bought only			
(Enter the information in the available format. You don't need to calculate e.g. tons*$)	total tons bought	$ per ton (mean)	total costs (total tons * $/ton)	% crude protein (mean)	MJ/kg (mean)	remarks
data are: 1) exact 2) extrapolated 3) guessed						
milk powder [1 ton = 1,000 kg]						
pre-starter [1 ton = 1,000 kg]						
starter [1 ton = 1,000 kg]						
Maize						
Soy						
Barley						
Wheat						
premix 1						
premix 2						
premix 3						
premix 4						
Straw (total straw incl. bedding)						

Composition of feeds mixed on farm	if you need more feeds add columns									
	feed 1	**feed 2**	**feed 3**	**feed 4**	**feed 5**	**feed 6**	**feed 7**	**feed 8**	**feed 9**	**feed 10**
ingredients are given as 1) % per feed 2) tons										
data are: 1) exact 2) extrapolated 3) guessed										
remarks										
ingredient	**feed 1**	**feed 2**	**feed 3**	**feed 4**	**feed 5**	**feed 6**	**feed 7**	**feed 8**	**feed 9**	**feed 10**
Maize										
Soy										
Barley										
Wheat										

Feed amounts fed per pig in 2017	**if fed to multiple: enter all digits, e.g. 1,2,3**		**sows: NA**	**sows: NA**	
	fed to 1) boars 2) gestating sows 3) lactating sows 4) suckling piglets 5) weaners 6) grower-finishers 7) gilts	**kg per pig per day**	**from kg live weight**	**to kg live weight**	**remarks**
data are: 1) exact 2) extrapolated 3) guessed (if mixed: enter e.g. "sows: 1, weaners: 2")					
milk powder					
pre-starter					
starter					
feed 1					
feed 2					
feed 3					
premix 1					
premix 2					
premix 3					
straw					

	Land rents, labour, energy costs and other costs paid to external entities										
	(try to only enter amounts and costs for pig and own feed production in 2017) $ = your currency (€ / £ / Złoty)	**quantity (total)**	**$ per unit (mean)**	**Total costs [$]**	**breeder OR finisher farm: % used for pig and own feed production**	**farrow-finish farms: % used for sows + pigs up to ~25kg**	**farrow-finish farms: % used for finishing (pigs >25kg)**	**quantity or $ are:** 1) exact 2) extrapolated 3) guessed	**% used are:** 1) exact 2) extrapolated 3) guessed	**different reference time than 2017** (specify)	**remarks**
definition / hints		(try to only enter amounts and costs for pig and own feed production in 2017)	$ = your currency (€ / £ / Złoty)	(enter data as available, you don't need to calculate number * $/unit)	(allocate as ratio of the value of the pig output compared to total farm output)						
	Rents for land										
	Rights for spreading manure or other costs for disposing of manure										
	Salaries paid to employees										
(see glossary)	Social contributions (to national pension service): employees										
(see glossary)	Social contributions (to national pension service): family workers										
	Contract labour										
	Gasoline / diesel (liters)										
	Other fuel (liters)										
	Methane gas, natural gas and other types of gas (m3)										
	Electricity (kWh)										
	Water (m3)										
	Veterinary and medicine costs										
	Disinfectants (kg)										
	Artificial insemination										
(see glossary)	Local taxes										
(fire, theft, crop losses due to hail etc.)	Insurances										
	Other consumables (e.g. cleaning material, paper etc.)										
(e.g. costs for phone or accounting, fees for associations)	Overhead and administration										
	Crop services (like sowing; harvesting; ploughing etc.; $ to external only)										
	Herbicides / pesticides / fungicides										
	Seeds										
	Lease costs of production rights (If rights have been purchased, estimate annual lease costs)										
	Bedding material (tons)										
	Straw										
	Other enrichment material										
	...										
	...										

Fertilisers used for own pig feed production	(you can use analysis data from e.g. 2016: indicate year and how well it might fit 2017)									(for bought only)
Fertiliser name	**kg dry matter / ton product**	**N content [kg / ton]**	**P2O5 content [kg / ton]**	**K2O content [kg / ton]**	**% dry matter / ton product**	**N content [% / ton]**	**P2O5 content [% / ton]**	**K2O content [% / ton]**	**% own manure dispatched outside farm**	**cost [$ / ton]**
remarks										
farm yard manure (FYM)										
slurry										
compost										
other organic fertiliser (OOF)										
other, non-organic fertilisers										
Fertiliser 1										
Fertiliser 2										
Fertiliser 3										
Fertiliser 4										
Fertiliser 5										
Fertiliser 6										

Silos for feed, slurry tanks								
	Number of silos / tanks	**1) horizontal silo 2) vertical silo 3) concrete slurry tank**	**Volume [m^3]**	**only if** m^3 not available: volume [tons]	**Year of construction** - or >>	**Year of complete renewal**	**farrow-finish farms: % used for sows + pigs up to ~25kg**	**farrow-finish farms: % used for finishing (pigs >25kg)**
type 1								
type 2								
type 3								
type 4								
type 5								
type 6								
type 7								
type 8								
type 9								
type 10								
type 11								
type 12								
type 13								
type 14								
type 15								
type 16								
type 17								
type 18								
type 19								
type 20								

Only include big machines**with a motor** (e.g. tractors, slurry pumps)**owned by the farm**. NOT machinery without motor or owned by others

Big equipment for pig farm and own feed production							
Feed preparation	**Type**	**Number**	**Year of purchase**	**breeder farm, finisher farm: % used for pig and own feed production**	**farrow-finish farms: % used for sows + pigs up to ~25kg**	**farrow-finish farms: % used for finishing (pigs >25kg)**	**remarks**
Feed mill							
Feed mixer							
Kitchen (for mixing feed) Type: 1) manual, 2) automatic)							
Treatment of manure	**Capacity [kW]**	**Presence: 1) yes 2) no**	**Year of purchase**	**breeder farm, finisher farm: % used for pig and own feed production**	**farrow-finish farms: % used for sows + pigs up to ~25kg**	**farrow-finish farms: % used for finishing (pigs >25kg)**	**remarks**
Solid-liquid separator							
Nitrification-denitrification plant							
Biogas plant (in kW)							

Machinery	Type	Number of items of this type	Year of purchase	Power [horse power, HP]	breeder farm, finisher farm: % used for pig and own feed production	farrow-finish farms: % used for sows + pigs up to ~25kg	farrow-finish farms: % used for finishing (pigs >25kg)	remarks
Tractor type 1								
Tractor type 2								
Tractor type 3								
Lorry for slurry transport								
Maize harvester								

at the end of the visit

(farmer if possible/ enough time; assessor: always)

Questions for farmer	answers (free text)
What did you like about the assessment? What did you not like?	
Do you have suggestions for improvement?	
Which information would be most relevant for you as feedback?	

Questions for assessor	answers (free text)
When did you arrive on the farm?	
When did you leave?	
How long did the interview (incl. filling in tables based on records) take? May also be "part xy 10:00 - 11:15h"	
How long did the direct observations take incl. showering?	
How much time did you spend in your office preparing data or entering data sent after visit?	
You opinion on practicability, good points, bad points?	

question	choice answer / [unit]	definition / hints	group 1	group 2	group 3	group 4
building / field ID	[text]					
group ID	[text]					
pig category in group	1) gestating sows 2) lactating sows + suckling piglets 3) weaners 4) grower-finishers					
n pigs in group	[n]	(sows, weaners, finishers)				
n litters in group	[n litters]	(suckling piglets)				
category 4 + 5: mean pig weight	[kg]					
Pigs are tail docked	1) yes, all pigs 2) yes, some pigs 3) no, all undocked	(prepare info from farmer in interview)				
remarks	[text]					
Behaviour						
Huddling behaviour	1) yes 2) no 3) NA	(NA = e.g. all pigs running all the time)				
n pigs visible which are not sleeping, feeding or drinking	[n pigs]					
n pigs manipulating enrichment	[n pigs]					
n pigs manipulating other pigs	[n pigs]					
n pigs manipulating floor or pen fixtures	[n pigs]					
n pigs performing stereotypies	[n pigs]					
remarks	[text]					
QBA						
Clinical						
Number of pigs scored	[n pigs]					
BCS: ok	[n pigs]					
BCS: too fat	[n pigs]					

question	choice answer / [unit] definition / hints	group 1	group 2	group 3	group 4
BCS: too thin	[n pigs]				
vulva lesions: no lesion or deformation	[n pigs]				
vulva: deformed	[n pigs]				
vulva: lesion	[n pigs]				
vulva: deformed AND lesion	[n pigs]				
tail: dry crust	[n pigs]				
tail: fresh blood	[n pigs]				
tail: swelling	[n pigs]				

question	choice answer / [unit] definition / hints	group 1	group 2	group 3	group 4
tail: swelling AND (crust or blood)	[n pigs]				
tail: normal length	[n pigs]				
tail length: shortened	[n pigs]				
tail length: stump	[n pigs]				
red eyes	[n pigs]				
ear lesions	[n pigs]				
lesions body	[n pigs]				
n sows with at least 1 shoulder lesion	[n pigs]				

question	choice answer / [unit]	definition / hints	group 1	group 2	group 3	group 4
lameness	[n pigs]					
runts	[n pigs]					
ectoparasites	[n pigs]					
Pigs requiring hospitalization	[n pigs]					
At least 1 pig with nose ring?	1) yes 2) no					
remarks	[text]					
Housing						
total area	[m^2]					
area with solid floor	[m^2]	(concrete, plastic, rubber; calc diff)				
area with slatted floor	[m^2]	(concrete, plastic, rubber; calc diff)				
area with bedding	[m^2]					
% of bedded area with thin bedding	[% of bedded area]	thin bedding = floor can be seen				
% of bedded area with medium bedding	[% of bedded area]	medium bedding = occasional holes where the floor can be seen				
% of bedded area with thick bedding	[% of bedded area]	thick bedding = the floor cannot be seen at all				
bedding material	1) straw 2) sawdust or similar 3) other (specify) 4) no bedding					

question	choice answer / [unit]	definition / hints	group 1	group 2	group 3	group 4
bedding material: other	[text]					
dirtiness of bedded area	1) dirty 2) medium 3) clean 4) no bedded area					
dirtiness of pen area without bedding	1) dirty 2) medium 3) clean 4) NA					
Creep area: solid floor	1) yes 2) no					
Creep area: local heating	1) yes: on 2) no 3) yes: off					
Creep area: covered on top (lid)	1) yes: down 2) no 3) yes: up					
Size of creep area	[m^2]					
remarks	[text]					
Outdoor run						
Total area of outdoor run	[m^2]	(outdoor run: see glossary)				
Area with solid floor	[m^2]	(concrete or plastic)				
Area with permeable floor	[m^2]	(e.g. soil, gravel; liquid drains into ground)				
Area with bedding	[m^2]					
% of bedded area with thin bedding	[%]	thin bedding = floor can be seen				
% of bedded area with medium bedding	[%]	medium bedding = occasional holes where the floor can be seen				
% of bedded area with thick bedding	[%]	thick bedding = the floor cannot be seen at all				
dirtiness of bedded area	1) dirty 2) medium 3) clean 4) no bedded area					
dirtiness of pen area without bedding	1) dirty 2) medium 3) clean 4) NA					
% of outdoor run covered by a roof?	[%]					

question	choice answer / [unit]	definition / hints	group 1	group 2	group 3	group 4
Is there accumulated manure?	1) yes 2) no	(manure looks old, is dried out, disintegrated, mouldy)				
remarks	[text]					
Feeding						
Feeding system	1) ESF 2) individual stalls 3) trough feeding 4) dripple feeding 5) ad lib feeding 6) other	ESF = electronic sow feeding station				
feeding system other	[text]					
Feed type	1) dry 2) wet 3) liquid					
available trough length for long troughs or strangely shaped troughs	[cm]	to calculate pigs / feeding place				
radius of round troughs	[cm]	to calculate pigs / feeding place				
number of round troughs	[n]	to calculate pigs / feeding place				
sows with 1 FP/sow	1) yes 2) no 3) NA	(crates or self-lock crates: count!)				
Type of drinker	1) Nipple 2) allows natural drinking behaviour (trough, bowl etc.)					
number of functional drinkers	[n]					
Do ≤ 10 sows share 1 drinker?	1) yes 2) no	(if checking all drinkers takes too long)				
water troughs: total length	[cm]	(like for feed troughs)				
(Some) Drinkers are blocked if pigs are feeding	1) no 2) yes 3) no separate drinkers					
Drinking system	1) automatic 2) manual	(a tank on wheels on a field = manual)				
Presence of roughage in addition to bedding?	1) yes 2) no	(e.g hay, silage, grass)				

question	choice answer / [unit]	definition / hints	group 1	group 2	group 3	group 4
Roughage is provided	1) on the floor 2) in one ore more rack(s) 3) in a "rooting tower" 4) in a trough / bowl					
Roughage is	1) loose 2) pelleted 3) no roughage					
remarks	[text]					
Enrichment						
type of manipulable object	1) rope 2) wood 3) plastic 4) chain 5) jute sack/ cloth 6) other 7) no objects	(wood and plastic may be loose in the pen or hanging on a chain)				
number of objects	[n per pen]	(independent of distance in between objects or to pen fittings; can be reached by pigs)				
signs of obvious use of object	1) yes 2) no 3) NA	(teeth marks, missing parts)				
Objects are soiled with faeces	1) yes 2) no 3) NA					
% of pigs wich can simultaneously manipulate enrichment	[%]	(subjective; imagine all pigs want to use enrichment at the same time: can all of them do that? half of them?)				
Enrichment can be accessed by	1) sow 2) piglets 3) NA					
remarks	[text]					
Outdoor pigs						
Size of the paddock	[ha]	(paddock = where one group of pigs is kept; will need farmer help for size)				
How much of the paddock is covered by vegetation?	[%]	(grass etc., do not count trees; see picture in manual)				

question	choice answer / [unit]	definition / hints	group 1	group 2	group 3	group 4
Sufficient shelter	1) yes 2) no	(all animals can simultaneously shelter from sun/ rain and wind/ draughts = roof + at least three closed sides; floor dry and clean)				
Covers on feeders	1) yes 2) no 3) feed spread on ground					
Is the soil around feeding or watering places turned up and/or is there accumulated manure?	1) yes 2) no 3) NA					
Distance to next natural water from the paddock?	1) >500m 2) >100m 3) <100m but no access for animals 4) pigs can directly access water					
Slope towards natural water?	1) yes 2) no 3) no water	(would rain run towards water bodies)				
Slope of the paddock?	1) no slope 2) slight slope 3) medium slope 4) steep	(aimed at water run-off)				
Is there a buffer zone (vegetation strip outside the pig paddock)?	1) yes 2) no 3) surrounded by pig paddocks					
In the buffer zone are	1) bare soil 2) grass 3) bushes 4) trees 6) no buffer zone					
Estimated width of buffer zone	[m]					
Use of land before pigs were moved onto it	[text]	(ask farmer)				
remarks	[text]					
Structural						
Suitable sick pen: gestating sows	1) yes 2) no 3) NA					
Suitable sick pen: gestating sows	[available m^2 per animal category]	(see glossary; measure if you can)				

question	choice answer / [unit]	definition / hints	group 1	group 2	group 3	group 4
Suitable sick pen: weaners	1) yes 2) no 3) NA					
Suitable sick pen: weaners	[available m^2 per animal category]	(see glossary; measure if you can)				
Suitable sick pen: grower-finishers	1) yes 2) no 3) NA					
Suitable sick pen: grower-finishers	[available m^2 per animal category]	(see glossary; measure if you can)				
Walk around all buildings and manure storages.	***Answer once per farm***					
Is liquid leaking out of slurry tanks?	1) yes 2) no 3) no slurry tanks 4) NA					
Is farmyard manure stored on bare soil or liquid running off the manure storage area?	1) yes 2) no 3) no manure storage 4) NA					
Remarks	[text]					
For lactating and gestating sows: confinement	1)loose housing 2) stall / crate 3)farrowing in crate which is opened (some time) after farrowing	line added 06/2020				