



Pig Network

Mandes Verhaagh
Claus Deblitz
Christa Rohlmann

**A standard operating
procedure to define
typical farms**

January 2018

Content

1	Summary	2
2	Introduction	3
3	Define the purpose of your exercise/analysis	3
4	Select regions and locations	4
5	Define the relevant farm population	5
6	Identify the prevailing production systems in the country and the regions chosen	5
7	Define the farm sizes of the typical farm(s)	7
7.1	Different farm sizes and different production systems	7
7.2	Management, performance and yield levels	8
7.3	Number of farms required per country	8
7.4	Minimum-standards to define typical farms	9
8	Data collection and updating	10

1 Summary

The process to define typical farms described in this paper refers to farm data collected for the purpose of comparison of production systems, their economics as well as practice change analysis. In the following chapter a brief description of the necessary steps for the definition of typical farms is provided. All steps are based on the assumption that all required statistics are available. In case statistics are not available, chapter 7.4 provides a minimum standard to define farms.

1 Select regions and locations

In this step the most important regions and locations for the raw-production of the product considered are identified. For this purpose, maps showing the spatial distribution of production are created. Different regional reference units of production are considered to arrive at a conclusion. The most frequent indicators used are total number of pigs (sows, finishing pigs, respectively) and the regional density of pigs per ha.

2 Identify the prevailing production systems

Once the regions are identified, the relevant farm population, the production systems and farm types to be analysed must be determined. This step can be done by a researcher based on literature and statistics analysis and/or together with local advisors. For this purpose a check list is used to identify the degree of specialisation, the capital and labour structure and organisation, productivity levels, technologies, intensity levels and further indicators.

3 Define the size and management level of the typical farms

Typical farm size is defined as total finished animals sold per year for pig finishing and average number of sows for sow-enterprises. The typical farms should have less than 50 percent off-farm income and/or sustain at least the living of one person. Regional statistics on farm size distribution are used to determine the position of the farms in the distribution of the farm population or representative surveys. To start with, *agri benchmark* defines a moderate size farm with average management. In the next steps, if more resources and time are available, we aim at establishing additional farms from which we can expect different results when compared to the first farm. Different results can arise from different farm and herd sizes, different production systems and technologies as well as different management levels.

4 Data collection, cross-checking and updating

Data are collected in so-called “focus groups” comprising of producers and advisors. A standard questionnaire covering production and economic figures is used and each figure is checked and confirmed that it reflects the typical situation. Once the data are collected, they are computed and the results are returned to the focus group / advisor for cross-checking. Additionally, economic performance is cross-checked against other economic analysis from

the region, if available. For standard comparisons, we can also use data from individual farms that resemble the farm type identified in step 2. In that case, farm-specific particularities must be 'typified', i.e., replaced by more common figures of that system to remove any anomalies specific to that actual farm. Updating of prices and yields is done annually; the whole data set is updated every 2-4 years, depending on the pace of structural change and productivity changes.

2 Introduction

This paper describes the approach used in the *agri benchmark* for the identification and definition of data sets of typical farms. It is based on the experience gained in the *agri benchmark* and questions raised by *agri benchmark* partners and supporters during the existence of the network.

The purposes for this SOP are:

1. Make transparent to the network and the outside world, **how** typical farms have been selected.
2. Make transparent to the network and the outside world, how typical farms can be **described** relative to the rest of the farm population.
3. Make sure that irrespective of the availability of statistical data a minimum level of scientific standard in selecting farms has been respected.
4. In the long run: allow to draw conclusions regarding the entire sector based on results derived on farm level analysis.

In order to keep it simple, the SOP refers to the standard situation, in which data from the farms selected will contribute to the global *agri benchmark* network.

This paper will not answer all potential questions. Therefore every partner is kindly invited to get back *agri benchmark* headquarters in Braunschweig and ask for advice.

3 Define the purpose of your exercise/analysis

Since the purpose of an international farm comparison analysis has a major impact on the selection process for typical farms, it is assumed that **competitiveness and potentials of regions** are the objectives of the research.

4 Select regions and locations

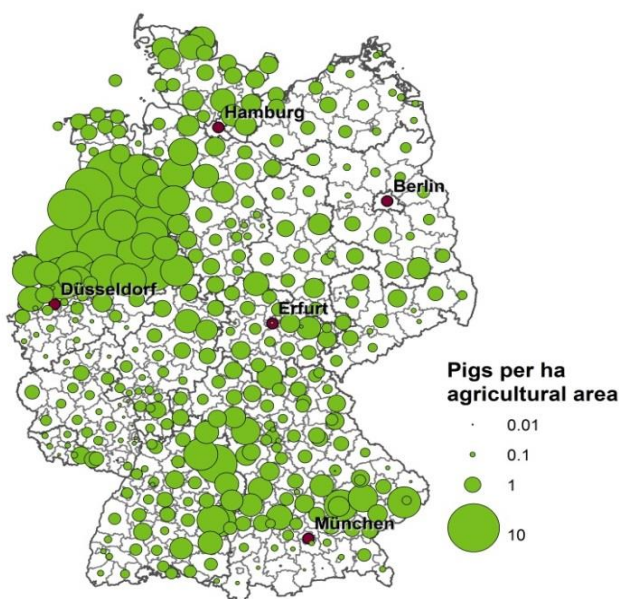
This step can be done by the country's *agri benchmark* researcher using statistics available. You need to know which regions in your country produce most of the product (pig finishing/piglet production) you are looking for.

This means that you are looking for the spatial distribution of the product and/or the farms producing it. You are probably looking for regions with a substantial size and a relatively high pig density. For this, you have to use the appropriate reference unit for the indicator.

Identification of the relevant region has to be based on a defined reference unit (total number of pigs per region, density of pigs per region). Each reference unit has some pros and cons which will be explained hereinafter.

- Total number of **pigs per region**: This indicator can be misleading if sizes of regions differ substantially. Large regions appear important whereas small regions appear less important although the latter might have a higher pig density (higher relative importance of pig production). The same applies if the share of a region in total pig production in a country is chosen as an indicator.
- Number of **pigs per square kilometre**: This is an absolute density measure taking the different sizes of regions into account. It does however, not measure the importance of pig production relative to other farming systems and it might be misleading in cases when the region is relatively small and surrounded by non-pig-producing areas.

Figure 1 Hotspots of pig production in Germany 2010



Due to the pros and cons of each indicator, it is advisable to produce tables or maps for both reference units.

Source: Destatis (2013)

5 Define the relevant farm population

Once the relevant regions have been identified, it needs to be checked whether the entire population of farms is considered to be relevant for the analysis. Because *agri benchmark* is aiming to focus on those farms which are producing the bulk of products, the relevant farm population is characterized by the ability to generate at least 50 percent of the farm income or to feed at least one person/family. This means that we are presently excluding part-time farms. This could be reconsidered if there were a situation where say 70% of regional production came from part-time farmers.

6 Identify the prevailing production systems in the country and the regions chosen

Once the relevant region(s) have been identified, the question arises what type(s) of farm(s) should be selected. In order to make sure that the most important production systems are represented in the typical farm network, a number of different systems need to be checked whether or not they make a difference in the results.

This step can be done by the researcher based on literature and statistics analysis and/or together with local advisors. A stepwise approach appears to be appropriate, starting with a rather rough classification and refining it in the next steps.

The following list of criteria is meant to be a proposal for a check list, which should be amended depending on the regional conditions in the different member networks. In many cases a number of these criteria will be meaningless for the selection procedure and should therefore simply be ignored.

- Specialised pig finishing or sows farm vs. mixed systems, examples:
 - specialised pig finishing farm, perhaps with some cash crop farming
 - specialised sows farm, perhaps with some cash crop farming
 - closed system (sows + pig finishing)
- High productivity vs. low productivity farm (in terms of physical productivity)
- Extent of purchase feed
- Family labour vs. hired labour farms

The result of this clarification procedure could look like this: We go for a sow farm with a pig finishing enterprise (closed system) in single operator (i.e., not integrated), which produces on a capital and labour intensive system. This typical farm in region xyz is not making any cash crop farming and is purchasing all feed. The farm has established a hired labour regime.

Following, there is a list of issues that must be addressed when defining typical farms and collecting their data. We should be aware that due to the voluntary participation of producers in *agri benchmark* we will – irrespective of the specific sampling rules – probably get a bias towards farms with above average size, management and performance.

Figure 2 Indicators to pre-define typical farms on whole-farm and enterprise level

Whole-farm	Sows	Pig finishers
Natural conditions <i>Soil type</i> <i>Climate</i>	Number of productive sows	Number finished pigs p.a.
Fully specialised	Breeds	Breeds
Combination with other enterprises	Own replacement	Category: boars /castrates
Crop	Piglets per sow / year	Start and end weights
Dairy	Weaning weights and ages	Daily weight gain
Beef finishing	Mortality	Feed conversion
Cow calf	Extent purchase of feed	Mortality
Sheep	Feed conversion	Extent purchase of feed
Pigs		Feed conversion
<i>Other</i>		Sale of pigs <i>Domestic/Export</i> <i>Direct sale to consumer</i>
Land area		
Labour organisation		
Mainly family labour		
Mainly paid labour		
Extent contractors used		
Capital input		
<i>Old or new buildings</i>		
<i>Type of buildings</i>		
Own machines/contractor		
Loan level		

This characterisation of the typical farm identified will be communicated to the network in order to allow a better understanding of the cost calculation and cost comparison as well as gross margin based analysis.

7 Define the farm sizes of the typical farm(s)

Once the relevant type of farms producing pig and the respective production systems are identified, a decision regarding the farm size of the typical farm, has to be made. Size, in the course of this paper, shall be measured as follows:

- in pig finishing: total number of finished pigs sold per year
- in piglet production: average number of sows per year

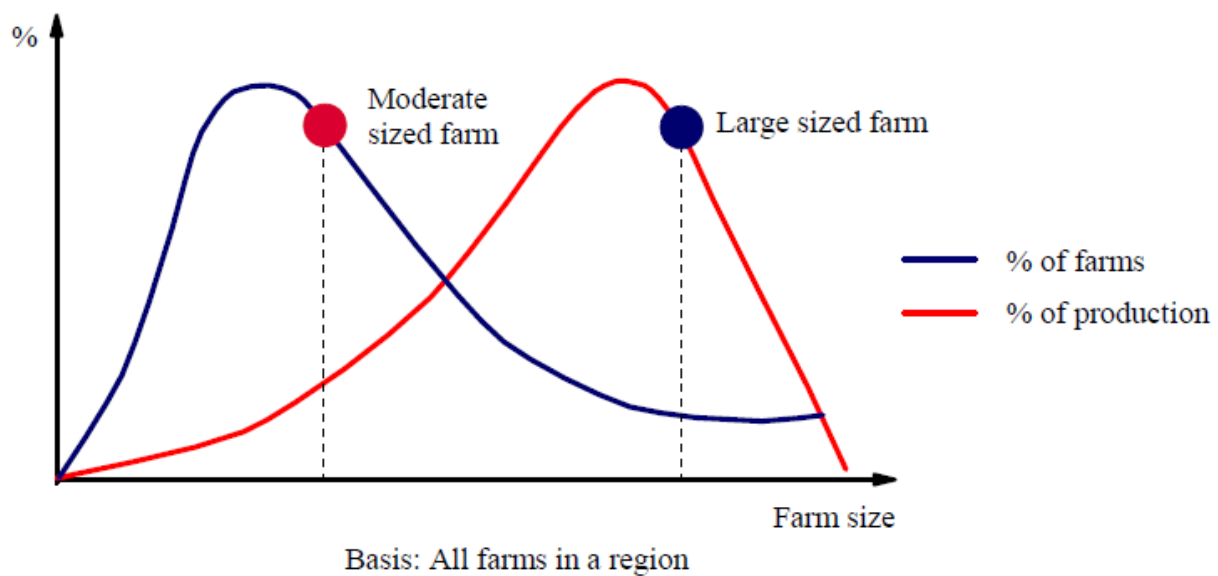
Further, we should make the position of our typical farms in the total farm population transparent. How many farms are in the same size category and how many are larger or smaller than the typical farm? This can be done by using data of the farm population (which will usually not be available to the detail required) or using representative random samples providing key indicators to measure the frequency of certain farm types and sizes (like the Farm Accountancy Data Network of the EU).

7.1 Different farm sizes and different production systems

As time and resources are usually limited, it is not always possible to reflect all farm sizes and production systems in a region. Based on the experience of *agri benchmark* work, the following recommendations can be given:

- In a region with minor differences between production systems (for example in the Northwest Region in Lower Saxony, Germany), two different farm sizes with the same production systems should be chosen. One farm should have a moderate size (usually slightly above average), the other farm should have a large size. The farm should belong to the 20 percent largest farms of the whole farm population. Given the typical distribution of farm size classes, this allows reflecting a large number of farms and a major share of production. Further it allows showing size effects.
- If possible, *agri benchmark* uses regional statistics regarding farm size distribution to assist the definition of appropriate farm sizes. It is obvious that the availability of reliable statistical data is a precondition for this step. Problems occur in parts of Central Europe, in Eastern Europe as well as in many countries in Asia and the Southern Hemisphere.
- In a region where a) size differences are either not pronounced or appear to be of less relevance to the results and b) there are significant differences in production systems (e.g. intensive and low-input systems), two farms of similar size reflecting different systems should be chosen.

Figure 3 Farm size distribution and selection of typical farm sizes



Source: Own illustration

7.2 Management, performance and yield levels

The typical farm should have an average level of management; this allows us to draw conclusions regarding the bulk of the output generated in a given region.

In order to explore the potentials of a region/country we strongly recommend adding one large farm with top management to the set of farms, if possible. The definition of top management is based on the economic success. The top management farm should belong to the top 10 percent performers in terms of economic success. Economic success should be measured in terms of profit. If this information is not available, gross margins or even productivity measures can be used as a proxy.

7.3 Number of farms required per country

The question of how many typical farm models are required to represent the pig production of a country given is frequently asked. In quantitative terms, there is no general answer to this question. Our own experience from Germany indicates that with increasing number of typical farms there is diminishing knowledge gain. Further, the number of farms required also depends on the research questions asked and the preferences of possible clients.

For example, we assess that for standard international comparisons in Germany, 4-6 farms appears to be sufficient and for specific analysis like animal welfare, 12 farms would be sufficient to reflect all relevant farming situations.

The number of farms required per country mainly depends on

- Diversity of production systems (natural conditions, economic conditions, infrastructure conditions) – usually the more diversity the more farms required.
- Diversity of farm size structure – usually the more diverse the more farms are required.
- Size of the country – usually the smaller the country, the less farm types required.
- On the other hand, very big countries with a great variety of farming systems might be subdivided into different regions, to be probably required in the U.S., Brazil, Russia, China and Australia.
- Regional level of analysis – usually the more international, the less farms are required (usually 2-4 farms per country, exceptions see previous point).
- Type of analysis you perform – usually the more farm adjustments you analyse the more farms you need.
- Financial resources to set up and maintain (!) a network of typical farms in a country (feasibility)

The experience so far has revealed that establishing a national network of typical farms in each country is the best way to get more detailed differentiation of production systems with a higher number of farms. Based on the national network, a procedure with the *agri benchmark* headquarters to select a number of farms from your national network for the international comparisons must be implemented to ensure the selection of the most relevant farm types for the international comparison.

7.4 Minimum-standards to define typical farms

In case statistics and resources to define typical farms are not available, a minimum criteria-list is defined here to allow the first steps in defining a typical farm.

- Select the region with the highest importance of pig population.
- In the region identified, select the production system with the highest proportion in the regional pig / piglet production.
- Select the farm size that produces the highest share of pigs / piglets within the production system identified.
- In any case, try to make transparent where on the distribution the typical farm sits (in the sense of points 7.1 and 7.3), even if it is expert-based estimation.

It is important that this procedure must be revised over time to improve accuracy and relevance of the data.

8 Data collection and updating

Data collection is done together with a local advisor and producers knowing: the region, the farms and the production systems. *agri benchmark* uses the so-called ‘focus-group’ consisting of the responsible researcher, an advisor and a number of producers. The focus-group is a round table meeting where all required farm data are collected based on a standard questionnaire applied globally. The focus-group creates a consensus on each figure to properly describe how a typical farm would look. Thus, in the focus group, we do not record averages from the participating producers. The most frequent question raised in the focus-group must be: “Can this figure be considered typical for the type of farm we want to describe?”

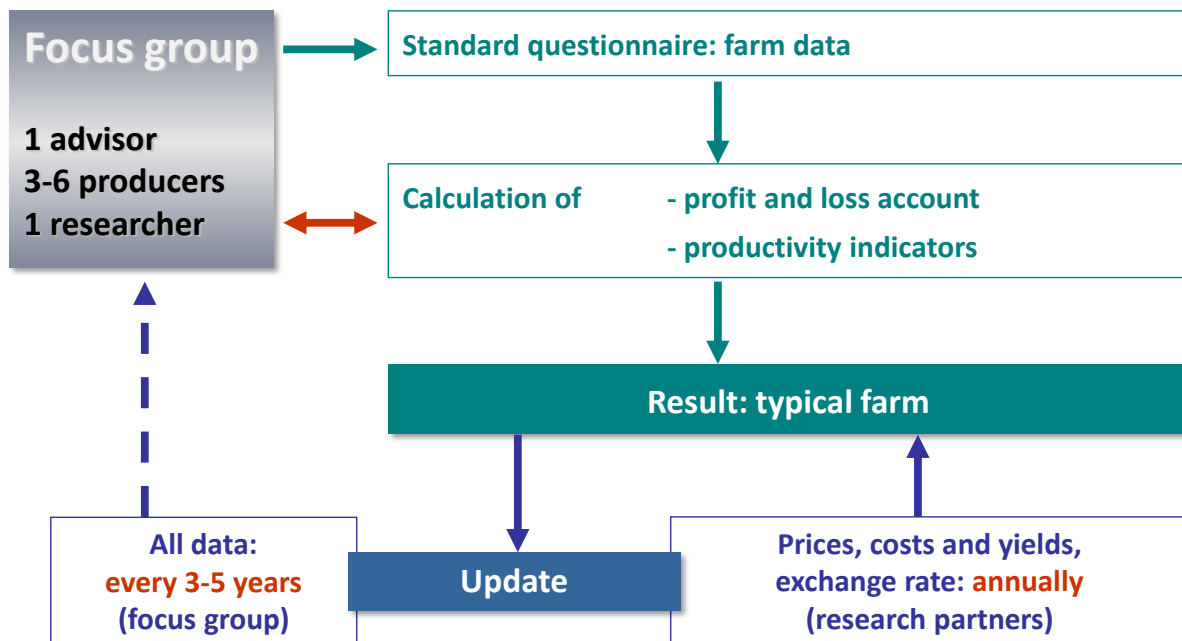
There are different intensity levels of producers’ participation:

- We aim to establish a complete **focus group** with 3-6 producers because it usually provides a broader data basis with better feedback from the actors. Such a group is particularly important when farm adjustments to changes in the framework conditions or farm strategies are to be discussed and defined. The main reason is that with a larger group a broader variety of adjustments and scenarios can be relected. For this purpose, the data and the analysis derived from an individual, typified farm as described below can be used as a basis for discussion.
- In some cases and countries, it can be difficult to establish a focus group. Reasons might be the regional extension of countries (long traveling distances) but also cultural peculiarities like not willing to share information with others. In these cases it is possible to base the typical farm data on **individual farm** data. Regardless, it is necessary (a) to identify and correct the particularities of individual farm data (to make individual farm data typical farm data) and (b) to make farm visits to two to three farms similar to the typical farm. This process is called ‘typification’ of farmsn any case, the producers involved have to run farms themselves which are similar to the envisaged typical farm.

Once the data are collected, they are computed with the analysis tools used in *agri benchmark* (mainly the simulation model TIPI-CAL) and results are returned to the focus-group and the advisor. This process is repeated until the focus-group agrees on the results obtained. At the end of this process there is a typical farm model.

In a final step the results have to be evaluated with results from other economic analysis, for example by comparing the whole-farm profit of the typical farms with representative survey results. By doing this cross-check we can make sure that our calculation and the selection of the typical farms are in line with other researchers’ results.

Figure 4 Focus group workflow



Updating of typical farms must be done annually according to changes in prices, farm sizes and productivity levels. Updating (= projecting the farm into the next year) can be done in two different ways:

- Prices for inputs and outputs of the farm as well as yield increases reflecting the usual technical progress are updated annually. This is done by using regional or national statistics on price and yield developments. Indices are calculated and the first year's values are indexed to achieve the current year prices and yields. This kind of update can be done by the researchers involved.
- Depending on the speed of structural change and the extent of technical progress a complete update of the entire farm data set is necessary. In the meantime we avoid changing animal numbers or production scopes because they result in changes in inventories which again impact on the farm economic results. If this data is used for further analysis like policy impact analysis, it is not clear anymore which part of the results comes from the policy change and which part originates from the change in inventories. Usually such an update has to take place every 3-4 years.
- The exception to this rule are for example catastrophic natural events like severe droughts or flooding which usually require an adjustment of animal numbers (destocking and restocking).
- In case the updated typical farm is not derived from an existing former one but is a totally new one this has to be communicated to the *agri benchmark* headquarters in order to manage respective data in time series analysis. In any case the updated farm reflecting a change in size has to be documented to the network by using a new farm code.