agri benchmark

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A standard operating procedure to define typical farms

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Content

Summary

The process to define typical farms described in this paper refers to farm data collected for the purpose of comparing 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 assume that all required statistics are available. In case statistics are not available, chapter 7.4 provides a minimum standard to define farms.

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.

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.

Define the size and management level of the typical farms

Farm size is defined as the hectares used for arable farming. Typical farms should either generate less than 50% of their income from off-farm sources or sustain at least the livelihood of one person. To determine the position of these farms within the agricultural structure, regional statistics on farm size distribution and representative surveys are used. As a starting point, *agri benchmark* defines a moderately sized farm with average management. In the next steps, if additional resources and time are available, more farms will be included to allow for comparisons. These additional farms may yield different results due to variations in farm size, production systems and technologies, as well as management level. Expanding the analysis in this way enables a more comprehensive understanding of economic and production-related aspects in agriculture.

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.

1 Introduction

1. 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 main purpose of this SOP is to describe the harmonized methods for the selection, data collection and establishment of typical farms in the *agri benchmark* network to ensure the scientific reliability and comparability of the results of benchmarking cost of production.

Specifically, this document:

2. Makes transparent to the network and the outside world, **how** typical farms are selected.
3. Make transparent to the network and the outside world, how typical farms can be **described** relative to the rest of the farm population.
4. Ensures a reliable scientific standard for selecting farms even in a situation of scarce availability of statistical data.
5. Describes the common standard for data collection and analysis, allowing a valid international benchmarking and to draw conclusions regarding the participating sectors based on results derived on farm level analysis.

Any typical farm data to be included in the global *agri benchmark* network should be collected following this SOP

Nevertheless, 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.

2 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 of regions** is the objectives of the research.
In section 9 of this paper, we will talk about other potential objectives of the comparison and their implications for the selection criteria regarding farms and regions in greater detail.

3 Select regions and locations

This step can be done by the country's *agri benchmark* researcher using available statistics. You need to know which regions in your country produce most of the product (apples, olives

etc.) you are looking for. Horticultural products, especially fruits, vegetables and other specialty crops such as wine grapes and olives, commonly are produced in well-known regional clusters. Sometimes, the specific regional growing conditions have a significant influence on the product quality and characteristics. Nevertheless, it is recommended to select and describe the major production regions with respect to their economic importance for the sector in the country. For the purpose of the agri benchmark network, a region refers to a defined geographical area where the specific production conditions for the product to be analysed are similar. This includes specific climatic and soil conditions, the availability of storage, marketing and processing facilities, or producer organizations and shared business support infrastructure. Hence a region can sometimes be defined as administrative units, e.g. federal state, province, department, but also might be larger or smaller than this.

This means that you need data for the spatial distribution of the product and/or the farms producing it, to identify the regions with a substantial size and a relatively high density of the respective fruit production. For this, different indicators can be used.

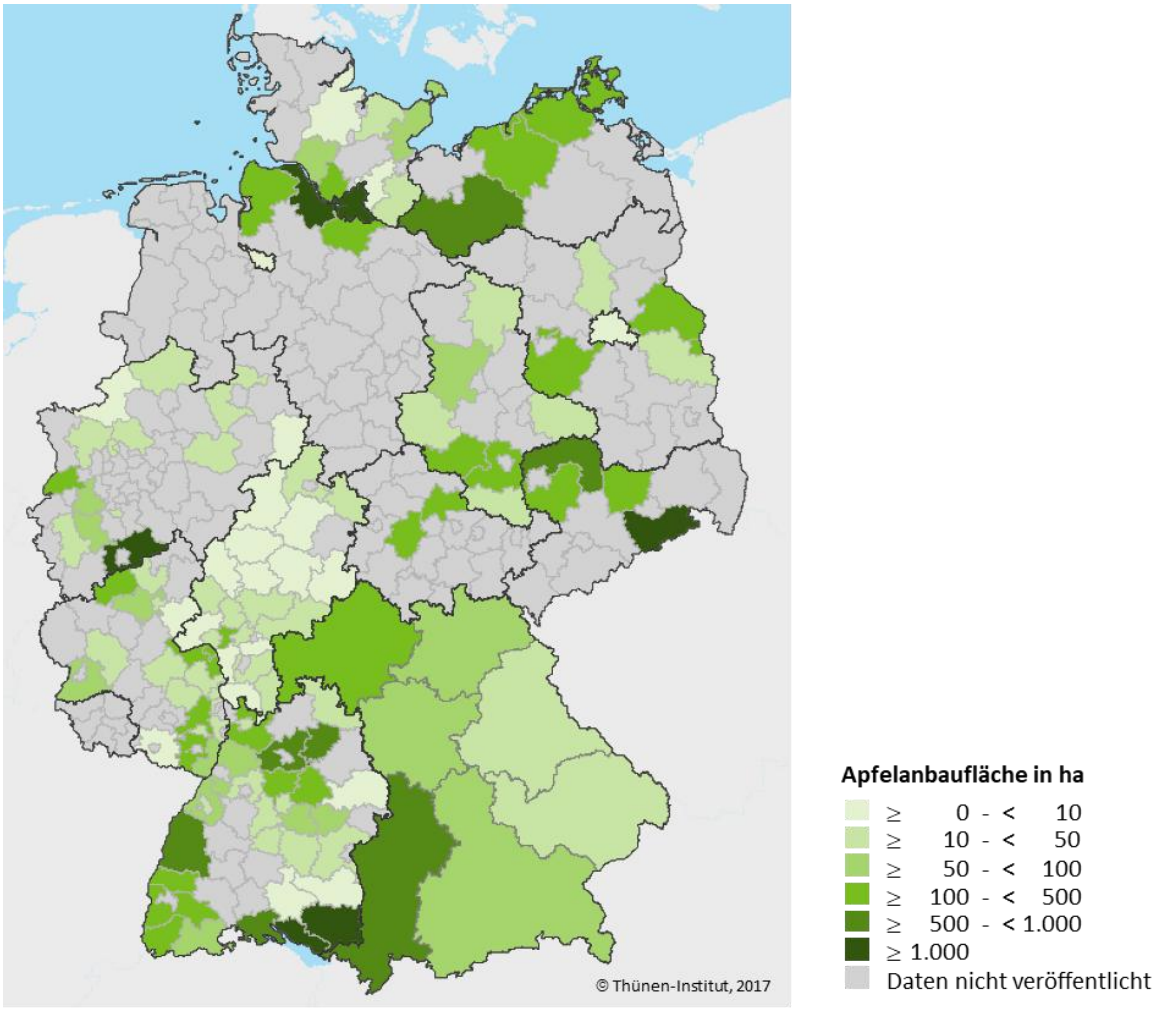
Typical indicators are the total acreage or total output of the respective crop in a defined geographic area, the number of farms producing the crop, or measures of the density of the production within terms of acreage per ha arable land or per square kilometre. Each indicator has some pros and cons which will be explained hereinafter. For illustrative purposes, apple as the selected crop is used.

- Total apple acreage in ha or total apple production in 1,000 t per region: This is a good first indicator to identify production clusters. However, if the sizes of the statistical regionals differ substantially, this indicator can be misleading, since small regions with a high density of production can be overlooked.
- Number of apple farms in a region: This indicator should be combined with the information on farm sizes. Regions with many small farms might produce even less apples than a couple of large sized farms in another region. Also, statistics can be incomplete in the case of small production sectors, as for publication there are minimum numbers required for data privacy reasons.
- Apple acreage per ha arable land or per square kilometre: The advantage of these density indicators can avoid fallacies of different sizes of regional units. However, as high intensity and high value crops, that are typically produced by highly specialized producers, the acreage of fruits and vegetables compared to any arable crop is usually very small, hence for the comparison between regions, variations of less than one percent might make all the difference. Also, the indicator might be misleading in cases, when the region is rather small and surrounded by non-apple producing areas.

Due to the pros and cons of each indicator, it is advisable to use more than one indicator to describe the importance of a production region relative to other regions and with respect to the total agricultural sector.

An example for Germany is provided in Figure 1. The map shows the apple acreage in ha for the smallest geographic statistical unit available. It illustrates the very high concentration of apple production in rather small regional scale.

Figure 1 Hotspots of apple production in Germany 2017



4 Define the relevant farm population

Once the relevant regions have been identified, it needs to be checked whether the entire population of farms is 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.

5 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. To make sure that the most important production systems are represented in the typical farm network, several different systems need to be checked whether 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.

- Specialized horticultural farms vs. mixed arable systems
- Multi-product vs. one product farms
- Target market: fresh or processed, domestic market or export
- Degree of vertical integration on the farm, own storage and packaging vs cooperative or contract farming
- Storage of fruits on-farm vs. fruits are sold to the elevator immediately after harvest

The result of this clarification procedure could look like this: We go for a specialised fruit farm with a mix of fruit varieties and high intensity of capital and labour input. This typical farm in region xyz is member of a cooperative and delivers the fruits to the cooperative directly after harvest for grading and storage.

This characterization of the typical farm identified will be communicated to the network to allow a better understanding of the cost calculation and cost comparison as well as gross margin-based analysis. Following, there is a list of issues that must be addressed when defining typical farms and collecting their data.

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

Once the relevant type of farms producing fruits and crops and the respective production systems are identified, a decision regarding the farm size of the typical farm, must be made. In this paper, we refer to the size of the farm in terms of **hectare** used for **the fruit crop in focus of the benchmarking**.

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 in *agri benchmark* we will – irrespective of the specific sampling rules – probably get a **bias** towards farms with above average size, management and performance.

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).

6.1 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:

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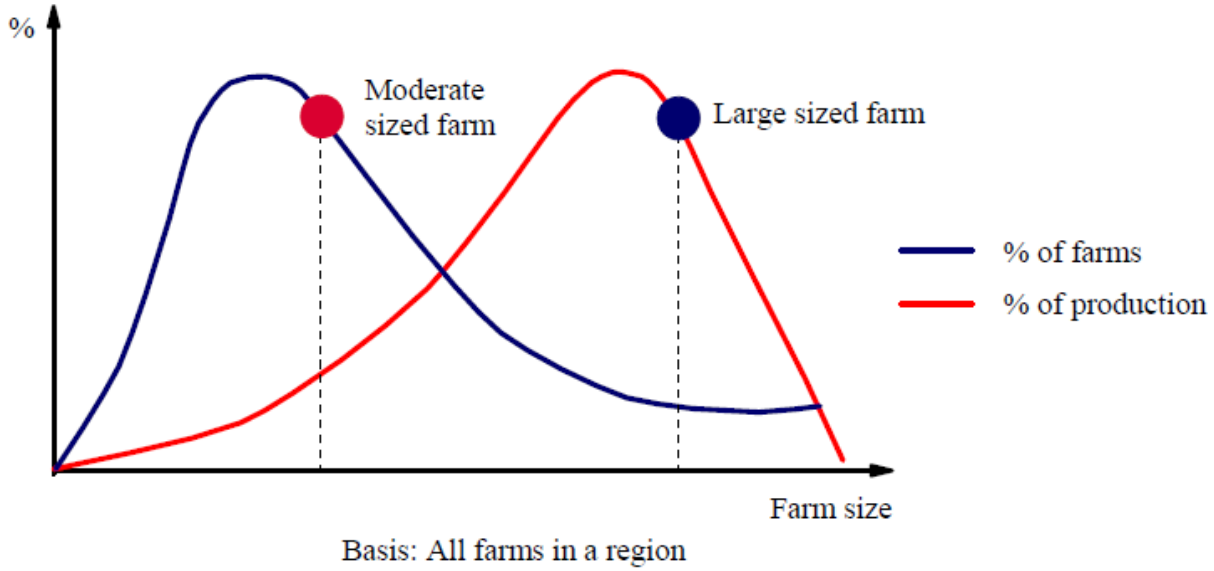
- If possible, *agri benchmark* uses regional statistics regarding farm size distribution to assist the definition of appropriate farm sizes. It is obvious that the availability of reliable statistical data is a precondition for this step. Problems occur in parts of Central Europe, in Eastern Europe 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

6.2 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 each region.

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.

6.3 Number of farms required per country

The question of how many typical farm models is required to represent the fruit 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.

The number of farms required per country and crop 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 several 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.

6.4 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 apple production.
- In the region identified, select the production system with the highest proportion in the regional apple production.
- Select the farm size that produces the highest share of apple 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.

7 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 several 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?"

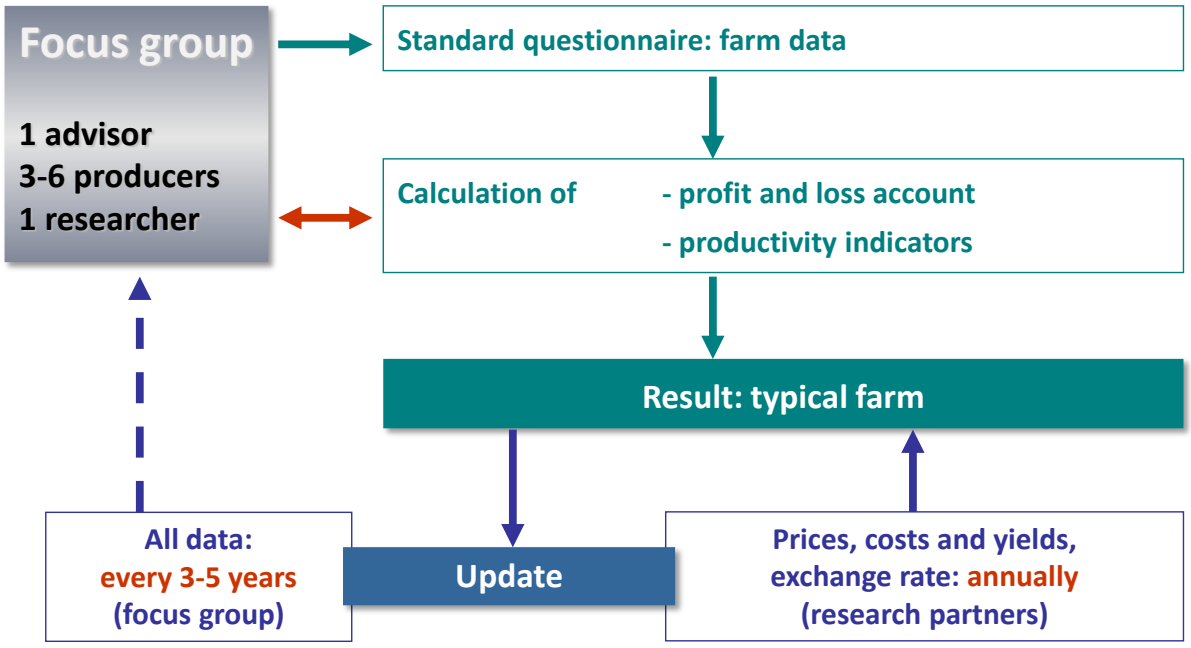
There are different intensity levels of producers' participation:

- 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 reflected. 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 like the typical farm. This process is called 'typification' of farms any case, the producers involved must run farms themselves which are like the envisaged typical farm.

Once the data are collected, they are computed with the analysis tools used in *agri benchmark* (mainly the simulation model TYPIHORT) 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 must 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 be 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. Usually such an update must take place every 2-4 years.
- The exception to this rule is for example catastrophic natural events like severe droughts or flooding which usually require an adjustment of).
- In case the updated typical farm is not derived from an existing former one but is a totally new one this must be communicated to the *agri benchmark* headquarters to manage respective data in time series analysis. In any case the updated farm reflecting a change in size must be documented to the network by using a new farm code.

8 Advanced studies based on typical farms

Up until now is has been assumed the purpose of the selection process is to contribute standard data to the *agri benchmark* network, focusing on competitiveness and potentials.

However, the concept of typical farms and the respective model TYPIHORT can tackle several other analytical issues. A selection of these other issues is displayed in table 1.

Table 1 Analytical questions suitable for typical farm-based methods

Type	Purpose	Farm
1	Income or social problems of farms	Small family farms Commercial farms with cash problems
2	Policy analysis	Farms mainly affected by policy under analysis
3	Farm strategy analysis	Reactions of farms that are faced with new technological or organizational options
4	Production potential of regions /farms	Non-typical farms with features indicating substantial future growth in output

In these cases, selection of relevant farms must be made in a different way. Suppose a study on the competitiveness of a new harvest technology must be made. Like in the standard routine for the farm selection process the relevant region must be identified. Regarding the size of the farm the “average” criterion probably won’t work because such a farm will usually not buy such technology. On the other hand, for Type 2 kind of project the spatial distribution and the selection of a certain region might be of less relevance in case the specific policy under review is not linked to certain crops or products.