agri benchmark Organic

A standard operating procedure to define typical organic farms

Braunschweig, 2016
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1 Summary

The present document describes the process of defining typical (virtual) organic farms. To this end, data of organic farms have to be collected in order to analyse the competitiveness and economic potentials of typical farms and regions, which is one of the main purposes of agri benchmark Organic. Other purposes of the analysis are discussed briefly in Chapter 10. In the following, a short description is provided of the necessary steps for the definition of typical farms. All steps are based on the assumption that the necessary statistics are available. If this is not the case, Chapter 8.4 provides a procedure to arrive at a minimum standard for the definition of typical farms.

Select regions and locations

In a first step, the agricultural product to be researched has to be defined. Then, the most important regions and production sites of the raw chosen agricultural product are identified. For that purpose, maps are created showing the spatial distribution of production sites and regions. The maps should also indicate different regional reference units such as administrative districts or other units that are used in the country.

Identify the prevailing production systems

Once the regions are identified, the number of farms (‘population of organic farms’), the production systems and farm types to be analysed have to be determined. This step can be done by a scientist who reviews the relevant literature and analyses statistics, and cooperates with the local advisor. To this end, a check list (see Chapter 7) is used to identify the degree of specialisation, the capital and labour structure and organisation, productivity levels, technologies, intensity levels and further features of the farms.

Define the size and management level of the typical farms

Size is defined in hectares used for organic farming. Usually, agri benchmark defines a typical medium and a typical large-sized organic farm in the chosen region. The selection of these two farm types makes it possible to include on the one hand a large number of farms and on the other a major share in the production of the chosen product(s). Both farms should dispose over an average management level, which means that they should make an average profit. Regional statistics or representative surveys on the distribution of farm sizes are used to determine the position of the selected farms within the distribution of the population of organic farms. In order to show the economic and agricultural potential of the chosen regions, a third organic farm with top management (high profit) has to be defined in addition to the medium and large-sized farm.
Data collection, cross-checking and updating

To collect the data, so-called pre-panels and full panels are carried out with farmers and advisors. The *agri benchmark* standard questionnaire is filled out during the panel. Each figure entered is discussed with the panel participants to make sure that it represents the typical situation. All yields and costs are calculated as three-year averages. Once the data are collected, they are computed and the results are returned to the panel participants who check them. A special emphasis is placed on cross-checking the economic performance against other economic analyses. The updating of prices and yields is done annually; the whole data set is updated every two to four years, depending on the speed of structural change and of productivity increase.

2 Toolbox and people/institutions involved

Table 1: Toolbox for the definition of typical organic farms

<table>
<thead>
<tr>
<th>Tool</th>
<th>Available from</th>
<th>Task</th>
<th>Performed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map</td>
<td>Centre¹</td>
<td>Indicate the regional production sites on the map</td>
<td>Partner</td>
</tr>
<tr>
<td>Check list</td>
<td>Partner (see Chapter 7)</td>
<td>List the degree of specialisation, the capital and labour structure and organisation, productivity levels, technologies, intensity levels and further indicators of the farms</td>
<td>Partner/scientist</td>
</tr>
<tr>
<td>Regional statistics/ surveys on distribution of farm sizes</td>
<td>Partner country</td>
<td>Determine the position of the selected farms within the distribution of the population of organic farms</td>
<td>Partner/scientist</td>
</tr>
<tr>
<td>Standard questionnaire /online tool</td>
<td>Centre</td>
<td>Fill in data on farms. Yields and costs calculated as three-year averages</td>
<td>Partner, farmers, advisor</td>
</tr>
<tr>
<td>Agri benchmark analysis tools</td>
<td>Centre</td>
<td>Compute collected farm data to set up the typical farms</td>
<td>Centre</td>
</tr>
</tbody>
</table>

Source: Own presentation.

¹ Centre refers to the *agri benchmark* Centre at the Thünen Institute in Braunschweig, Germany.
Similar to many other networks, the *agri benchmark* Organic network depends on the people involved. Thus, the set-up of an *agri benchmark* Organic network in a new partner country requires the participation of different groups of stakeholders. These are:

- One to six organic farmers from the partner country
- One local advisor from the partner country
- One scientist with statistical background from the partner country
- One agricultural economic institution with an organic department/expertise in organic agriculture
- The *agri benchmark* Organic team at the Thünen Institute in Braunschweig/Germany (the “Centre”)

### 3 Introduction

This document describes the approach used by the *agri benchmark* Organic network to identify and define data sets of typical organic farms. The approach is based on over ten years of experience with the other *agri benchmark* networks and on questions raised by *agri benchmark* partners and supporters.

The purposes of this Standard Operating Procedure (SOP) are:

- To show the network and other interested persons how typical farms have been selected.
- To show the network and other interested persons how typical organic farms can be described in relation to the rest of the organic population of organic farms.
- To make sure that irrespective of the availability of statistical data a minimum level of scientific standards with respect to the selection of farms has been observed.
- In the long run, to draw conclusions about the entire organic sector based on the results of the analysis of organic farms.

In order to keep it simple, the SOP refers to (a) the standard situation, in which the data of the selected farms contribute to the global organic network and (b) to a currently less frequent situation in which the data have to serve specific research purposes that differ from the standard *agri benchmark* research. This document does not answer all possible questions. Therefore, all partners are kindly asked to contact the *agri benchmark* Centre in Braunschweig to discuss their questions.
4 Define the purpose of your exercise/analysis

Since the purpose of *agri benchmark Organic* is to compare organic farms on an international level, it is assumed here that the economic and agricultural competitiveness and the potentials of regions within a country are the objectives of the exercise. In Section 9 of this document, other purposes of this comparison method and their implications for the selection criteria of farms and regions are presented.

5 Select regions and locations

This step can be done by the *agri benchmark* scientist using the available statistics. First of all, regions in the selected country have to be determined in which the major part of the researched product (organic cereals, oilseeds, pulses and/or milk) is being produced. There are two possibilities: either the spatial distribution of the product and/or the farms producing it are taken into consideration. This means to search for regions with large organic agricultural areas producing the crop and/or to look for a high density of farms producing the chosen product. In all cases, appropriate reference units for the farm features have to be used because the identification of the relevant region has to be done on the basis of defined reference units (organic agricultural areas in hectares (ha), litres (l) or kilogrammes (kg) of organic milk, heads of organic dairy cows, etc.).

Each reference unit has some pros and cons which are described below. By way of illustration, organic cereals are used as an example.

- Total area of organic cereal production (e.g., in 1,000 ha) per region: This indicator can be misleading if regions differ substantially in size. Large regions seem to be important whereas small regions seem not to be important although the latter might show a higher grain density (higher relative importance of grain production).

- Share of organic cereal production per 100 ha agricultural land: This indicator comes closer to real farming. It does not take into account non-agricultural land where grain production does not take place. However, a region with a very small share of agricultural land and just a few but large farms (which are producing organic cereals) seems then to be very important with regard to organic grain production, whereas regions with more agricultural land and a higher diversity of products seem to be less important.

- Share of organic cereal production per 100 ha surface area: This is an absolute density measure taking into account the different sizes of regions and avoiding the disadvantages of using agricultural land as a reference unit. On the other hand, this indicator does not measure the importance of organic cereal production relative to other farming systems. Therefore, the method might be misleading in cases where the region is relatively small and surrounded by
areas which do not produce cereals. However, using the surface area as reference unit probably provides the best indicator for the standard *agri benchmark* analysis.

Due to the pros and cons of each reference unit, it is advisable to create tables or maps for all three reference units. An example for these maps for Germany is provided on the next page (Figures 1 and 2). The maps show the total area of organic cereal production (Figure 1) and the regional density of organic arable production measured in hectares of organic arable land per 100 ha surface area (Figure 2).

The number of regions depends on the size of the chosen country, the importance of organic arable and dairy production and the structural, climatic and geographic differences of organic arable and dairy production. Finally, *as agri benchmark* Organic studies the competitiveness of organic production regions, research should focus on production volumes sold on the (export) market.
**Figure 1:** Total area of organic arable land (in ha) in German administrative districts 2010

**Figure 2:** Share of organic arable land in the surface area (in %) in German administrative districts 2010

6 Define the relevant groups of organic farms

Once the relevant production regions have been identified, it has to be decided whether the total group of organic farms should be analysed or only parts of it. Because agri benchmark focuses on those farms which produce the bulk of products, the relevant population of organic farms is characterized by the ability to generate at least 50% of the farm income or to feed at least one person/family. Thus, in many cases, not all organic farms of the total farm population are analysed.

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

The next question is what type(s) of farm(s) should be selected from the relevant part of the population of organic farms in the chosen region(s). In order to make sure that the most important production systems are represented in the typical organic farm network, different farming systems have to be verified with regard to their ability to change the data base.

This task can be executed by the scientist based on a literature review and on the analysis of statistics; and if possible, together with the local advisors. The approach starts with a rather rough classification, which is afterwards refined step by step.

The following list of criteria represents a template for a check list, which should be amended according to the regional conditions in the different agri benchmark Organic network countries. Depending on the organic farming situation in the selected country, some of the criteria below could be removed and others might be added to the list.

- Rather specialized organic arable farms vs. mixed arable farming systems
- Kind of organic crop rotations
- Share of purchased fodder
- Proportion of organic milk production vs. arable production on a single farm
- Intensive vs. extensive dairy cattle farming
- Capital and labour-intensive vs. low capital/low labour input systems (e.g., no-till)
- Storage of grain on-farm vs. grain is sold to the silo immediately after harvest
- High yielding farms vs. low yielding farms (in terms of physical output)
- Family labour vs. hired labour farms
The result of this filter process might produce, for instance, a typical farm with a mixed cropping and low yielding production system based on a capital and labour extensive production method. This typical farm X in region Y has established a hired labour regime with a manager who stores the grain on-farm.

The selected farm types should reflect the real organic arable and/or organic milk production situation in the chosen country. Once the typical farm has been identified, its characteristics have to be communicated to the agri benchmark Organic network to allow for a better understanding of the cost calculation and cost comparison, as well as for a gross margin based analysis.

8 Define the size of the typical farm(s)

After having defined the type and the production system of the typical organic farm, its size has to be determined. In this document, size refers to hectares used for organic farming.

Due to the voluntary participation in agri benchmark Organic a bias towards farms with above average size, management and performance might occur – irrespective of the specific sampling rules. To avoid this bias, Chapter 8.1 presents a list of topics that should be considered for the definition of typical farms and the collection of their data.

Further, the position of the typical farms in the total population of organic farms should be indicated: How many farms are in the same size category and how many are larger or smaller compared with the typical farm? This can be done by using data of the population of organic farms (which do usually not include the required details) or by using representative random samples that provide key indicators for measuring the frequency of certain farm types and sizes (like the Farm Accountancy Data Network of the EU).

8.1 Various farm sizes and various production systems

As time and resources are usually limited, it is not always possible to take into account all of the farm sizes and organic production systems that exist in the selected region. Based on the experience of agri benchmark, the following recommendations can be given:

- In a region with minor differences between production systems, two different farm sizes with the same production system should be chosen. One farm should be of medium size (usually slightly above average), the other farm should be of large size. The large farm has to represent the 20 % of largest farms of the whole population of organic farms. Given the typical distribution of farm size classes (many small farms with relatively little share in production and few large farms with relatively high share in production, see Figure 3), this kind of selection allows for the representation of a large number of farms together with a major share in production. Furthermore, it is possible to analyse size effects.
Whenever possible, agri benchmark Organic uses statistics on regional farm size distribution to assist the definition of appropriate farm sizes. The availability of reliable statistical data is a precondition for this step. However, in a number of countries, statistics on regional farm size distribution are not always available.

In a region where a) the differences in farm sizes are either not large or seem to be less relevant to the results and b) where significant differences between production systems (e.g., intensive and low-input systems) exist, two farms of similar size should be chosen that reflect the different production systems.

**Figure 3:** Farm size distribution and selection of typical farm sizes

![Farm size distribution and selection of typical farm sizes](image)

Source: Own presentation.

### 8.2 Management, performance and yield levels

The typical farm should have an average level of management which allows conclusions to be drawn on the bulk of the organic products produced in the chosen region.

In order to explore the organic agricultural and economic potentials of a region and/or country, it is strongly recommended to add the data of one large farm with top management to the set of farms (only if possible). These additional farm data from a producer who probably will dominate the sector in the future reveal a lot of details on the perspectives of a region with regard to the global organic crop and dairy sector. The standards these top farmers realize today provide valuable insights into structures and procedures (especially, if data of the production system are
available as well) that are technically possible. They might point to a future situation in which the limitations caused by average management have disappeared.

The quality of the management is measured in terms of profitability. This implies that the two farms with average management should be on an average level of profit whereas the farms with top management should belong to the upper 10% of large farms in terms of profit. In case data on profit are not available, gross margins or the physical productivity per hectare are used as a proxy.

For the analysis, the newest available data should be used in order to give an up-to-date picture of the economic situation of the typical organic farms. If the current data include rather unusual yield and/or price variations, the agri benchmark Organic partner is asked to highlight this topic in the report that all partners and the Centre have to prepare. Once sufficient data are available, the report will present both the most recent data and three-year averages data.

### 8.3 Number of farms required per country

How many typical farm models are required to represent the organic crop and/or milk production of the chosen country? No general answer to this question exists. Experiences from the agri benchmark network in Germany show that the knowledge gain decreases with an increase in the number of typical farms.

For the agri benchmark Organic analysis of production systems, the following three typical farm types were defined as the standard types: one average farm and one large farm both with average management and one large farm with top management. Besides this general rule, the number of farms required per country depends on

- the diversity of production systems (natural conditions, economic conditions, infrastructural conditions) – the higher the diversity, the more farms are required;
- the variation in farm sizes – the higher the variation, the more farms are required;
- the size of the country – the smaller the country, the less farm types are required. The bigger the country and the higher the variation in farming systems, the more it is necessary to divide the country into different regions (probably necessary in the US, Brazil, Russia, China and Australia) and to include a higher number of farms;
- the spatial level of analysis – the more the analysis is carried out on an international level, the less farms are required (usually 2-4 farms per country, exceptions see previous point);
- the type of analysis the agri benchmark Organic partner carries out – the more farm features she or he analyses, the more farms are needed;
The financial resources to set up and maintain a network of typical farms in the selected country (feasibility).

The implementation of a national network of typical farms in each partner country is the best way to include a higher number of farms. With a national farm network, it is possible to get detailed information on production systems and production costs.

8.4 Minimum standards to define typical farms

In case statistics and resources to define typical farms are not available, following minimum standards should be observed when defining typical farms:

1. Select the region of highest importance with respect to organic arable/organic milk production in terms of tradable volume produced.

2. In the chosen region, select the production system with the highest share in regional organic arable/organic milk production.

3. Select the farm size that produces the highest share of organic cereals/oilseeds/pulses and/or organic milk within the identified production system.

4. Locate the typical farm on the distribution function (see Figure 3 in Chapter 8.1). The process of locating the typical farm(s) on the distribution function has to be repeated from time to time to improve accuracy and relevance of the farm data.

9 Data collection and updating

Data are collected by the agri benchmark scientist in association with a local advisor and organic farmers familiar with the region, the farms and the production systems. To this end, agri benchmark conducts so-called ‘panels’ consisting of the responsible scientist, of a local advisor and of one to six farmers. Panels take place in the form of round-table discussions during which all required farm data are collected based on the agri benchmark Organic standard questionnaire. Panel participants are asked to reach agreement with respect to each figure entered into the questionnaire in order to properly describe what a typical farm should look like. During the panels, one of the most frequently asked questions is if the figures are really typical for the type of farm that shall be described.

Depending on the aim of the analysis, two different kinds of panels can be conducted:

- A ‘pre-panel’, in which one or two farmers participate, is sufficient for a status quo analysis of economic performance and production costs. During the pre-panels, it is already possible to derive the typical farm data from individual farm data. In this case, it is important (a) to
identify and correct the particularities of individual farm data in order to transform individual farm data into typical farm data, and (b) to visit two to three farms that come close to the typical farm.

- The ‘full panel’ is the second step after the pre-panel. A full panel in which four to six farmers participate is required if farm data have to be adjusted following changes in the (agricultural/political) framework conditions or if farm strategies have changed. These topics should be discussed during the full panel. Moreover, a larger group of panel participants offers more possibilities to define and discuss various options for action, which is probably not the case with few participants. For this purpose, the data and the analysis results of the pre-panel can be used as basis for discussion.

For the panels, it is important that the participating organic farmers run own farms which are similar to the targeted typical farm.

Panels are strongly recommended because only the interaction with the organic farming community enables the agri benchmark Organic network to create up-to-date impressions of organic arable farming and organic milk production all over the world. However, a pre-panel should be conducted if a full panel is not possible. The pre-panel is a prerequisite for any organic farm data that enters the agri benchmark network.

After having collected all of the required farm data, they are being computed by means of the agri benchmark analysis tools at the Centre in Braunschweig. The results are returned to the panel and to the local advisor who check them. This process is repeated until the panel agrees upon the results. In this way, the typical farm model is created.

Following the set-up of the typical farm model, the agri benchmark Organic results should be checked against results of other economic analyses, e.g., by comparing the whole-farm profit of the typical farms with representative survey results. This cross-check serves to ensure that the agri benchmark Organic calculations and the selection of the typical farms are in line with other scientific results.

Updating of typical farm data should be done annually by including changes in prices and productivity levels. These data adjustments – like the data of the initial description of the typical farm – are based on three-year production and price averages. Updating means projecting the farm data into the next year and can be done in two different ways:

(1) Prices for inputs and outputs of the farm, as well as changes in yields are updated annually by using regional or national statistics on price and yield developments. In a next step, price and yield indices are calculated with the values of the first year being indexed to calculate prices and yields of the current year. This kind of update can be done by the scientists involved.
(2) As structural changes and technical progress are expected to happen in the organic agricultural sector in the chosen regions, a complete update of the entire farm data set is necessary from time to time. Usually, farm data have to be updated every 2–4 years.

(3) If the updated typical farm is not derived from an existing previous typical farm but is a completely new one, the agri benchmark Centre should be contacted because it has to manage the respective data in the time series analysis. The updated farm data (which reflect a change in size) should be sent together with a new farm code to the agri benchmark Organic network as well.

10 Advanced studies based on typical farms

Up to this point, it has been assumed that the purpose of the selection process consists in the provision of agricultural data to the agri benchmark Organic network by focusing on the competitiveness and potentials of organic farms. However, the concept of typical farms and the respective model is also able to tackle a number of other research topics. A selection of these additional topics is displayed below (Table 2).

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

Source: Own presentation.

In the four cases mentioned in Table 2, the relevant farms are selected in different ways. To give an example, we suppose that a study on the competitiveness of a new combine harvester is planned. Similar to the standard procedure of selecting farms, the relevant region has to be identified. Regarding the size of the future typical farm in our example, defining a farm by taking the average of the region’s farm features will probably not work out because the result might be a farm of average size which usually does not buy this kind of expensive technology (Type 3 in Table 2). On the other hand, for a project in the domain of policy analysis (Type 2 in Table 2), the
spatial distribution and the selection of a certain region might be of less relevance in case that the investigated policy does not relate to certain crops or other products. In this case, the most important production region (“production hotspot”) of an organic product is not being selected but another region that suits the goals of the intended research project. The typical farm is then defined in bilateral panels for the region that is concerned by the agricultural policy.
Annex

How to specify a typical farm

I. **Step: Identification (scientist + advisor)**
   - Select important regions/reference units
   - Analyse regional farm structure
   - Define features of typical farms
   - Cross-check with population and/or survey data

II. **Step: Data collection (scientist, advisor, farmers)**
    - Contact farmers who operate such farms
    - Collect full set of economic and physical farm data

III. **Step: Processing and cross-check**
    - Compute results for the virtual typical farms
    - Cross-check with advisor (farmers); implement improvements