RUDN Journal of Agronomy and Animal Industries. ISSN 2312-797X (Print). ISSN 2312-7988 (Online)
Вестник РУДН. Серия: АГРОНОМИЯ И ЖИВОТНОВОДСТВО
2021; 16 (4): 400—408
http://agrojournal.rudn.ru

Агроэкономика
Agroeconomics

DOI 10.22363/2312-797X-2021-16-4-400-408
УДК 332.2

Research article / Научная статья

Assessment of the efficiency of agricultural land use: a case study of France

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Abstract. Land is one of the key resources in agricultural production. The use of these resources is significantly different from the use of labor resources and financing. It is the land features that affect the assessment of their use efficiency. The analysis of literary sources has shown, there are a large number of approaches and methods to assess the effectiveness of land resources. This indicates a great interest of researchers and practitioners in the issue under study. Each of the researchers offers their own unique methodology for assessing the efficiency of land use. However, it is impossible to distinguish a single method due to various reasons. Nevertheless, it should be noted that the proposed methods are complementary. The main goal of this study was to assess the effectiveness of agricultural land use in France. In this regard we used following methods: analysis and synthesis, graphical method, method of comparisons. The analysis was carried out in three stages. The dynamics and structure of agricultural lands of the country, the harvested areas of the main groups of agricultural crops were analyzed, both cost and natural indicators were calculated. As a result, we can say that the studied indicators should be used in the express assessment of efficiency, they can also be used in the comparative assessment of the efficiency of agricultural land use. For a deeper assessment, in our opinion, it is necessary to use other methods of analysis.

Key words: France, land resources, efficiency, productivity, arable land, perennial plantings

Article history:
Received: 26 August 2021. Accepted: 18 November 2021.

For citation: Zharov AN, Pliushchikov VG. Assessment of the efficiency of agricultural land use: a case study of France. *RUDN Journal of Agronomy and Animal Industries*. 2021; 16(4):400—408. (In Russ.). doi: 10.22363/2312-797X-2021-16-4-400-408

Introduction

Land, along with labor and capital, is one of the factors of production. In agriculture, on the one hand, land is an object of labor, and on the other, it is a means of production [1]. It has a number of features, among which the following can be distinguished [2]:

- The land has an unlimited service life;
- The amount of land resources is limited;
- The land is not the result of human activity as machinery and equipment. It is given to man by nature;
- Land is an immovable object;
- With proper use, the productivity of the land only increases.

It is the fact that land is different from other factors of production that makes it one of the most valuable resources and requires more efficient use. The question of assessing the efficiency of land use has not arisen today. The studies of both Russian and foreign researchers are devoted to it [3—8]. However, there is no single approach to assessing the efficiency of land use. In our opinion, this is due to several reasons. First, the level that is used in the study. For example, [9—11] assess the efficiency of the use of land resources at the enterprise level while [12—14] assess the efficiency of the use of land resources at the level of a particular region, country or group of countries. Secondly, different approaches to assessment are used. For example, [15, 16] assess the impact of environmental factors, while [17, 18] assess the efficiency of land use from the point of view of tourist and recreational purposes or during construction. Third, and one of the key reasons in our opinion is the study of various categories of land. For example, in [19], the efficiency of the use of agricultural land is assessed, while in [20] — urban land. These reasons make it difficult to develop a unified methodology for assessing the efficiency of land use. In this regard, **the main purpose of this work** was to assess the effectiveness of the use of agricultural land on the example of France.

Materials and methods

The agricultural lands of France were chosen as the object of the research. The database of the Food and Agriculture Organization of the United Nations (FAO), which is publicly available, was used as data sources [21]. The data were taken for the period from 2000 to 2019, in some cases from 2000 to 2018.

The study was conducted in three main stages. At the first stage, the structure and dynamics of agricultural land were analyzed. The dynamics of harvested areas of the main groups of agricultural crops was analyzed. At the second stage, cost indicators were studied, such as: the gross production value of agriculture per 1 ha, the cost of individual types of products per 1 ha. At the third stage, the dynamics of natural indicators were analyzed, such as the yield of the main types of agricultural crops, as well as the production of the main types of livestock products per 1 thousand hectares of agricultural land.

Results and discussion

The French Republic is one of the largest countries in Western Europe, it has maritime spaces. It borders with such countries as Belgium, Luxembourg, Germany, Switzerland,

Monaco, Italy, Spain, Andorra, Great Britain. The total area of the country is 54908.7 thousand hectares [21]. The territory of the country includes both plains and low mountains (located mainly in the north and west of the country), medium-high mountains (in the central regions and in the east), mountain ranges (in the southwest and southeast). Analyzing the structure of the land resources of France, we can note the following (fig. 1). As we can see, the main part (more than 50 %) is occupied by agricultural land, although its share is slightly decreasing. The share of forests accounts for 31 %, while there is an increase in it in dynamics. The share of other lands is also decreasing and is 16 % in 2019. The persentage of inland waters accounts for less than 0.3 %.

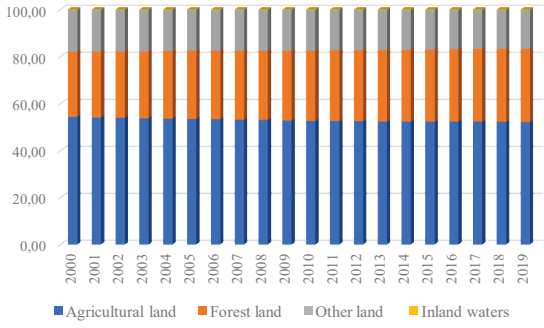

Fig. 1. Dynamics of the structure of French land resources in 2000—2019,%
Source: compiled by the author according to [21]

The composition of agricultural land includes such lands as: arable land, land under permanent crops, meadows and pastures. The dynamics of these types of land in France in the period from 2000 to 2019 is shown in Fig. 2. During the analyzed period, there is a slight reduction in the area of both arable land and land under permanent crops and meadows and pastures. The area of arable land decreased by 289 thousand hectares or 2 %, the area under permanent crops decreased by 130 thousand hectares or 12 %, the area of meadows and pastures decreased by 766 thousand hectares or 8 %.

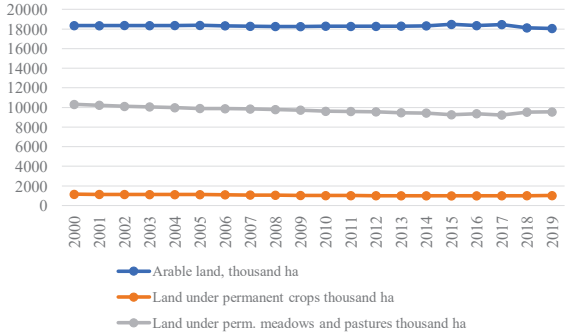

Fig. 2. Dynamics of the main types of agricultural land in France in 2000—2019, thousand hectares.
Source: compiled by the author according to [21]

An important indicator that characterizes the efficiency of land use is the indicator of the harvested area for a particular crop. Fig. 3 shows data on the harvested areas of the main groups of agricultural crops.

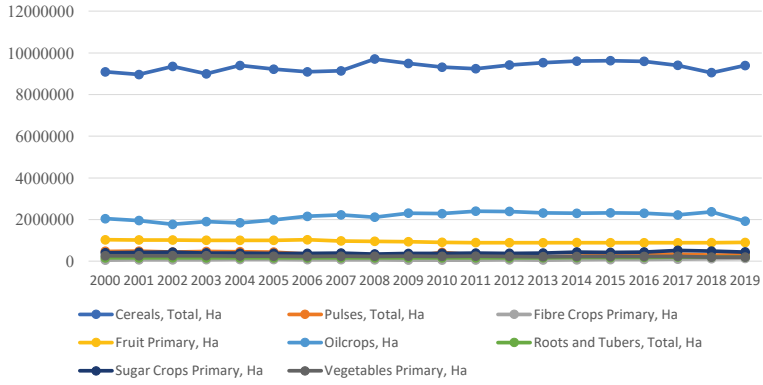

Fig. 3. Dynamics of harvested areas of the main groups of agricultural crops in France in 2000—2019, ha. Source compiled by the author according to FAO data

The largest sizes of harvested areas are observed for cereals. At the same time, if we analyze their structure in 2019, we note the dominance of wheat (55 %), barley (20 %), corn (16 %). In dynamics, there is a decrease in the share of wheat, corn and an increase in the share of barley. The second group of crops, according to the harvested area, consists of oilseeds. If in 2000 the harvested area under these crops amounted to 2,041,593 hectares, then in 2019—1,924,560 hectares. The main share is occupied by rapeseed (57 % of the harvested area), while the smallest share belongs to the coconut palm (0.01 %). The third group of crops by the harvested area is fruit primary. In 2019, 901,070 hectares were occupied under this group of crops, which is 126,954 hectares less than in 2000. The harvested areas of the remaining crop groups range from 136,220 hectares (Fibre Crops Primary) to 312,810 hectares (Pulses). The values of the Gross Production Value indicator (in 2014—2016 prices) per 1 ha of Agricultural land are shown in Fig. 4.

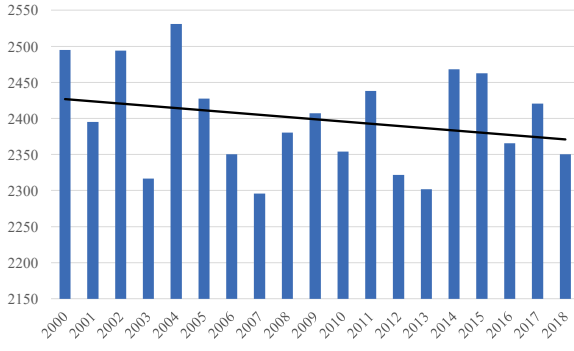

Fig. 4. Dynamics of the gross production value of agriculture of France per hectare in 2000—2018, $/ha. Source: compiled according to the author's calculations according to FAO data

Therefore, the values of this indicator are decreased by 145 $/ha. The dynamics of the Gross Production Value of main groups of corps per 1 ha of agricultural land (in 2014—2016 prices) is shown in Fig. 5. The figure shows that the highest value of the calculated indicator falls on roots and tubers, and the lowest — on cereals. Analyzing the dynamics for the main groups of crops, we note that the values have practically not changed.

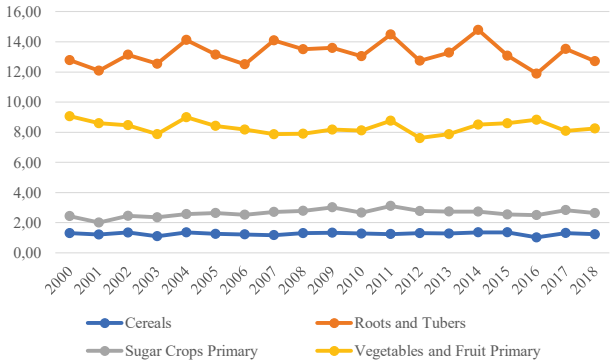

Fig. 5. Dynamics of the cost of certain types of products per 1 ha harvested area in France in 2000—2018, thousand dollars/ha (in 2014—2016 prices). Source: compiled by the author according to FAO data

The dynamics of the yield of the main groups of agricultural crops is shown in Fig. 6.

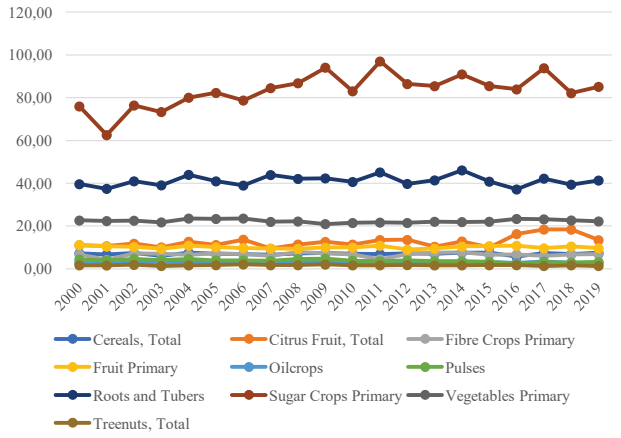

Fig. 6. Dynamics of yield of the main groups of agricultural crops in France in 2000—2019, tons/ha. Source: compiled by the author according to FAO data

As the figure indicates, Sugar Crops Primary have the highest yield. In 2000—2019, the yield of this group of crops increased by 12 %. The yield of Roots and Tubes increased by 5 %. The yield of Vegetables Primary decreased by 2 %.

The dynamics of the main groups of livestock products per 1,000 hectares are shown in Fig. 7.

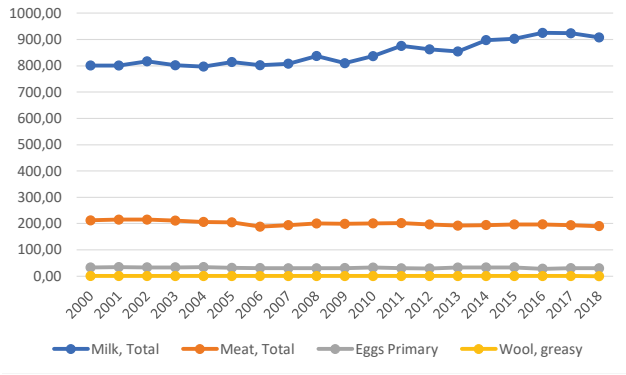

Fig. 7. Dynamics of production of the main types of livestock products per 1 thousand hectares of agricultural land in France in 2000—2018, tons/1000 hectares. Source: compiled by the author according to FAO data

Therefore, 800 tons of milk, 190 tons of meat, 30 tons of eggs and 0.5 tons of wool accounted for 1000 hectares in 2018. At the same time, in dynamics, we note an increase in the yield of milk per 1000 hectares and a reduction in the yield of meat, eggs, wool per 1000 hectares.

Conclusions

Summing up, we can draw the following conclusions. First, to assess the efficiency of land use, it is necessary to apply not one, but a group of indicators. Secondly, the considered indicators can be used for express assessment of the efficiency of the use of agricultural land resources in connection with their availability. For a more complete assessment of the efficiency of agricultural land use, it is necessary to use other indicators.

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Оценка эффективности использования земель сельскохозяйственного назначения на примере Франции

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Аннотация. Земельные ресурсы являются одними из ключевых в сельскохозяйственном производстве. Особенности, присущие земельным ресурсам, накладывают отпечаток на оценку эффективности их использования в отличие от трудовых ресурсов и капитала. Как показал анализ литературы, существует

большое количество подходов и методов к оценке эффективности земельных ресурсов, что говорит о большом интересе исследователей и практиков к изучаемому вопросу. Каждый из исследователей предлагает свою уникальную методику оценки эффективности использования земельных ресурсов. Эти методики являются взаимодополняемыми. Цель исследования — анализ эффективности использования земель сельскохозяйственного назначения во Франции. Применили методы синтеза и анализа, графический метод, метод сравнения. Анализ проводился в три этапа на основе как стоимостных, так и натуральных показателей. Исследованы динамика и структура земель сельскохозяйственного назначения страны, убранные площади основных групп сельскохозяйственных культур рассчитаны как стоимостные, так и натуральные показатели. Вывод: по рассмотренным показателям необходимо проводить экспресс-оценку эффективности, их можно также применять для сравнительной оценки эффективности использования земель сельскохозяйственного назначения. Более глубокую оценку, на наш взгляд, необходимо проводить с помощью более широкого спектра аналитических приемов.

Ключевые слова: Франция, земельные ресурсы, эффективность, урожайность, пашня, многолетние насаждения

Заявление о конфликте интересов: Авторы заявляют об отсутствии конфликта интересов.

История статьи: поступила в редакцию 26 августа 2021 г., принята к публикации 18 ноября 2021 г.

Для цитирования: *Zharov A.N., Pliushchikov V.G.* Assessment of the efficiency of agricultural land use: a case study of France // Вестник Российского университета дружбы народов. Серия: Агрономия и животноводство. 2021. Т. 16. № 4. С. 400—408. doi: 10.22363/2312-797X-2021-16-4-400-408

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