

THE ANNALS OF "VALAHIA" UNIVERSITY OF TARGOVISTE**ASPECTS CONCERNING THE ECONOMIC EFFICIENCY
OF FAMILY DAIRY CATTLE FARMS IN ROMANIA**Amalia-Gianina Străteanu¹, Mariana Sandu¹, Lavinia Udrea^{2*}, Vergina Chirițescu³¹Center for Studies and Research for AgroForestry Biodiversity "Acad. David Davidescu", Romanian Academy,
Calea 13 Septembrie, no. 13, 5th district, Bucharest, RomaniaE-mail: strateanuamalia.research@gmail.com, marianasandu47@gmail.com,²Valahia University of Târgoviște, Alea Sinaia no. 13, Târgoviște, RomaniaE-mail: moise_174@yahoo.com³ Local Action Group Făgărașul de Sud - Ținutul Posadelor Domnești – ArgeșE-mail: v.chiritescu@yahoo.comCorresponding author email*: moise_174@yahoo.com**Abstract**

The issue of the economic efficiency of family agricultural farms, the dairy cattle farms especially, has become more and more debated over the last few years, as the agricultural and small livestock farms need to be more and more productive in order to adapt to the eternal needs of the market, to the stronger price competition, the new environmental and socio-economic conditions. The dairy farming sector is strongly influenced by requirements regarding sanitary, ethical, animal welfare standards, and environmental factors in food production, processing, and marketing. The present scientific paper presents fundamental aspects regarding the economic efficiency of family dairy cattle farms breeding and modern development concepts of these farms in Romania's conditions, as a European Union member country. A lot of specialized bibliographic sources have been used, as well as a lot of research reports, government programs for the development of the agricultural sector, feasibility studies, and technical-economic analyses of farms, in order to write this scientific paper.

Keywords: economic efficiency, family dairy farms

1. INTRODUCTION

The instability determined by the repetitive negative shocks created by the crises of the last 5 years or so will leave their long-term mark on the European Union, still at the same time, they represent a turning point for ensuring food security and increasing the resilience of the agricultural sector [8].

Unfortunately, the context of the current geopolitical evolution in Europe affects the E.U. and implicitly Romania, causing significant increases in production costs in all sectors of the economy.

Constraints of a formative, organizational, and technological nature leave their mark on the decisions taken within family farms, and thus economic efficiency, as far as milk cow farms are concerned, is an essential requirement for the production activity [1].

To obtain a significant competitive advantage and a high and efficient production, with a positive impact on the level of input allocation, a clear strategy is needed regarding the choice of the best options and the evaluation of the economic results within a farm.

It is absolutely necessary to find solutions for the development of livestock farms that meet the requirements of sustainable development, by implementing an integrated support system containing several work tools, starting from the strategic level of farm development and going up to analyze process and environmental technologies.

The work packages used must also include the analysis of "clean dairy productions", of "environmentally friendly" process technologies, the internal cost management system also considered from the environmental point of view, the alignment of technologies with BAT recommendations

(best technologies available) integrated into the strategic model of the farm's sustainable development.

The tools for increasing eco-efficiency, such as the assessment of "clean dairy production" and environmental accounting, can be integrated into the strategic development model of the farm, so as to contribute to achieving its strategic objectives as quickly as possible, through the proactive component of which brings it as added value to the sustainable development model of the farm.

Small family farms are of great importance in Romania, because they reflect a way of life for a large part of the population living in the countryside, representing a form of ensuring daily living. In other words, the family farm is the basis of existence and should work on the principle of self-management - profitability - profit, namely from subsistence to profit [5]. Family dairy farms are those that ensure good utilization of resources, both natural and domestic. However, an important factor in the eco-efficient development of family dairy farms is their modernization, with a direct result in improving food sustainability. This not only contributes to food production that influences nutrition and health but also has a major effect on the local economy and social dynamics.

The national priorities in policies for the development and use of domestic animals, included in the Strategy for the development of the agri-food sector in the medium and long term 2020-2030 of the Ministry of Agriculture and Rural Development [6], are oriented toward the production and sustainable use of certain species and breeds with high productive potential, as well as for the maintenance and use of animal breeds in danger of abandonment,

simultaneously with the increase in production, the quality of the final products, respectively ensuring the competitiveness of family agricultural farms.

The continuation of the current practices and approaches at the farm level and the production sector would result in the inefficient use of resources and the decline of the Romanian milk and dairy products market, both at the national and European levels. Thus, Romania would no longer be able to persist in the development policies of family farms that do not ensure their own sustainability, the "exits" of process technologies being addressed, along with the consumption of resources and additional costs.

2. MATERIALS AND METHODS

This scientific paper addresses several fundamental aspects related to the issue of the economic efficiency of family dairy farms in Romania against the background of the increase in demand for food products and the current context characterized by a lack of fiscal predictability, economic instability, and uncertainties.

Thus, for the preparation of the work in good conditions and the correct presentation of the information related to the subject, the methodology used consisted of the comparative analysis of materials from specialized bibliographic sources, research reports, government programs for the development of the agricultural sector, studies of feasibility and technical-economic analysis carried out at farm level.

Also, within the comparative analysis, a series of data from the European Commission, the National Institute of Statistics, the Romanian Ministry of Agriculture and Rural Development, and EUROSTAT were used.

3. RESULTS AND DISCUSSIONS

The events that triggered the current economic and social crises demonstrated the vulnerability of the EU's food systems, implicitly Romania's, hence the importance of creating food autonomy. Even if from the point of view of structural characteristics, Romania presents a series of similarities with the agricultural sectors of the other EU member states and has a notable agricultural potential, unfortunately, the yields recorded in domestic agriculture are low, which indicates the much suboptimal use of production factors.

For these reasons, Romanian agriculture must optimally use all production factors and technological progress for sustainable productivity, which ensures economic growth and fair prices for consumers in rural areas.

The farm performance evaluation is mainly done by comparing the partial indicators of the operations that are currently carried out within the farm, and which directly target the quantity, cost and/or marginal profit of a given input per unit of production [2]. On this basis, identifying the factors that optimize the production efficiency of dairy farms is crucial in order to increase productivity and profitability and to protect animal welfare and the environment [4].

According to data provided by Eurostat, approximately 9 out of 10 of the 9.1 million farms existing in the EU are

family farms, (where the agricultural workforce is exclusively family, ~ 57%, or at least half family workers, ~36%).

These farms dominate the structure of EU agriculture in terms of the number of holdings, ~93%. In Romania, the share of family farms was ~99% [14].

According to the 2020 agricultural census data in Romania, the numerical situation of family farms is as follows: farms with an exclusively family workforce 1,967,777 and farms where family workers represent 50% or more (but not 100 %), 893,704.



Figure 1. Distribution of farms in the EU, % of agricultural holdings - data for Spain, Lithuania, and Slovenia are not comparable with other Member States

Source: Eurostat (Agricultural Census, 2020) [16]

Regarding dairy farms in the EU, the vulnerability of farmers is caused by the fact that they are highly specialized, which leads to their income being dependent on a single commodity. The resistance to income shocks is influenced by increased price volatility. The economic survival of dairy farms is threatened by their reduced economic size, which directly influences growth rate and profitability [3].

The total production of raw cow milk produced on farms in the E.U. was 154.3 million tons in 2022, out of the total 160.0 million tons, i.e. ~96% cow's milk. From the total production of raw cow's milk produced in farms in the E.U., the amount of 145.6 million tons was delivered to dairies, and the remaining 8.7 million tons were either used on farms, consumed by the farmer and his family, sold directly to consumers, used as feed, or processed directly. In concordance with existing statistics for an area with high potential, a dairy cow under these conditions should produce around 6,000 kg of milk per year. In the EU, the average milk yield/cow in 2022 increased, reaching 7,653 kg. Regarding average annual production in EU countries, Denmark and Estonia have the highest level, respectively 10 187 kg/cow and 10 128 kg/cow, and the lowest is registered in Bulgaria and Romania, equivalent to 3 621 kg/cow and 3 367 kg/cow (the lowest yield in the EU for milk production per cow) [13]. Also in 2022, the average monthly consumption of processed milk in Romania was 6.7 liters compared to the European average of 65-70 liters. At this moment, the Romanian milk and dairy products market is insufficiently developed, mainly due to the reduced purchasing power, as well as the lack of education of the consumer. Under these conditions, the milk quota

allocated to Romania was only used to the extent of approximately 80%, which further increased the gap between the amount of milk that can be utilized at national level and the actual production of milk meeting the requirements of the E.U. To reduce this gap, it is necessary for Romanian cow farms, regardless of their organizational form or size, to continuously invest in the modernization of the technological process that leads to higher production, respectively to improve the quality of milk.

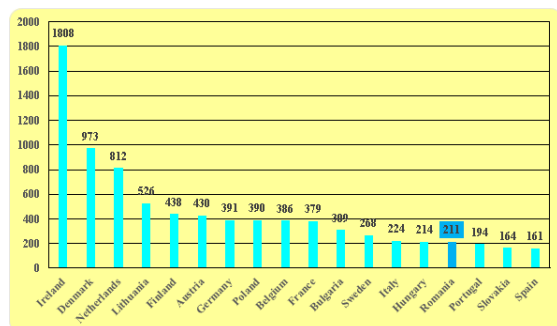


Figure 2. Total milk production per capita on 1 July 2021, in kg, in the E.U.

Source: INS - Statistical Yearbook of Romania 2023, table 23.22, page 711 [18]

The progress registered over time in the field of biotechnology allows a more precise selection of traits of socio-economic interest, resulting in the development of adaptable and efficient animals in terms of the quantity and quality of milk production.

3.1. Feasibility and opportunity of investments in family dairy farms in Romania

Analyzing the feasibility and opportunity of investments in family dairy farms in Romania, the following relevant aspects have been identified in terms of the sectoral level, market, labor force, favorable conditions, and local economies.

At the sectoral level, after a long period of stagnation and even regression, the production activity of dairy products is currently on an upward trend at the national level, this trend also being influenced by the tendency of increasing demand on the insufficient market satisfied by the offer of domestic producers and the increase in demands regarding the quality of food products and the increase in the consumption of domestic food products at the expense of imported products.

At the market level, the orientation of Romanian consumers' preferences towards whole milk and the increase in recent years at the national level of the demand for dairy products, as well as the consumption growth forecast at the level recorded in other EU countries are noteworthy. At the level of relief, soil, and climate conditions, the pedo-climatic conditions in most areas in Romania are quite favorable for the activities of raising and exploiting dairy cattle. The continental climate, with moderate amounts of precipitation and average annual temperatures of 10°-11° C, makes it possible to develop

modern and competitive agriculture in most areas of our country, including in the milk cow breeding sector.

At the level of local economies and geographical positioning, it is recommended that family dairy farms near areas with high fodder potential be located, thus leading to the ensuring of the necessary raw fodder materials with minimal costs and effort. A very important element in the case of family-type farms is the fact that the profit recorded from the exploitation of dairy cows will be used for the development of the family farm, implicitly leading to an increase in the standard of living of its members.

The market for milk and dairy products is quite vast, taking into account both the main products obtained in family cow farms, namely milk and dairy products, but also the secondary products (calves, manure, residual products).

Besides, milk and dairy products are part of the category of consumer goods, of a food nature, being subject to a high frequency of purchase. Currently, the final consumers of cow's milk are divided into two main categories, namely: the village population that mainly consumes milk and dairy products from their production; the urban population that supplies itself mainly with products from the trade, lately there has been a significant increase in the share of purchases through supermarkets and hypermarkets, as well as an increase in the appetite for Romanian products. Under these conditions, store chains have become more and more interested in collaborating with Romanian milk and dairy producers, and for Romanian family farms, this can represent a definite opportunity for development. A very valuable natural fertilizer also results from the activity of family cattle farms. The amount of cattle manure per year is about 265 tons/average farm. Manure consists of manure and straw for bedding. This is the universal complex fertilizer for all agricultural crops and can be applied to all types of soil, which is an opportunity for capitalization and obtaining additional income for family dairy farms. This high-quality natural fertilizer is used on unstructured, humus-poor soils where it loosens and improves water retention, soil warming, and the activity of soil organisms. In Romania, milk production is unevenly distributed across the territory. *The market for the production of collected cow's milk* by region is presented as follows: Central Region – 30.0%; North-West Region – 24.2%; North-East Region – 20.9%; South-East region with 9.5%; South-Muntenia region with 6.6%; Bucharest-Ilfov region with 4.9%; West Region with 2.3%; South-West Oltenia region with 1.6%.

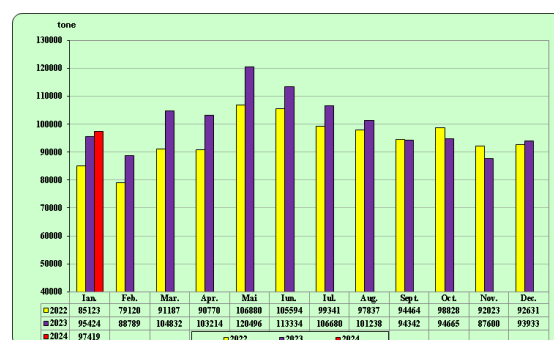


Figure 3. The dynamics of the amount of cow's milk collected by the processing units during Jan. 2022 – Jan. 2024

Source: INS - Collected cow's milk and production of dairy products [20]

The number of holdings producing cow's milk in Romania is approximately 900,000 units, with a total herd of 1,354,200 animals. The most numerous farms are those with 1-3 heads of cattle, representing over 85% of their total amount, and the vast majority of them are family farms.

The number of authorized sanitary and veterinary professional farms is 1.668 units. They own about 100,000 heads and deliver milk directly for processing, of which 889 have drawn up modernization programs for biosecurity, for the purchase of milk cooling and storage equipment and milking parlors.

In Romania, there are 223 cow's milk processing units, of which only 94 are compliant with European Union standards, and 51 factories are authorized to process compliant and non-compliant milk, without line separation. A single unit processes compliant and non-compliant milk on separate lines, and 77 units benefit from the transition period for alignment with all European Union standards, having restructuring programs. Currently, only 20% of the milk produced in Romania reaches factories for processing.

The Romanian consumer milk market, of almost 1.5 billion liters in 2022, offers three major types of products: ultra-pasteurized (UHT) milk; pasteurized milk, which, together with ultra-pasteurized milk, totals approximately 10% of the amount of consumer milk sold in Romania; unprocessed industrial milk, risky for the health of the consumer, but traditionally preferred and still having a huge share (almost 90%) in the milk sold in Romania. Raw milk also has a very important share in the subsistence trade of individual producers, being completely foreign to modern trade customs such as branding. UHT and pasteurized milk "belongs" to processing companies, smaller or larger. Brands (trademarks) in the true sense of the word only exist for UHT milk, probably because of its higher price, which allows financing a reasonable marketing budget.

As I mentioned, in Romania, the average monthly consumption of processed milk per person in 2022 was 6.7 liters, well below the European limit, the Romanian milk market is still insufficiently developed. Consumers' habit of unprocessed milk keeps many of them away from UHT milk and certified dairy products. None of the brands on the market today play a major role in educating the public about the taste and other qualities of processed milk.

In order to be able to face the rigors of an increasingly competitive market, dairy farms in the family system need to consider continuous development and making investments that allow obtaining quality products, in quantities that allow them to become constant, serious, and competitive local suppliers.

The price policy practiced by farms breeding dairy cows in the family system is based on practicing prices at an average level compared to those practiced by the competition for similar products. The strong competition

that exists in the milk market limits the upward trend in prices that can be easily noticed in the case of other food products. In the case of family-run production units, the tendency for prices going up is very slow, this aspect having an impact on the entire set of competitors on the market who are in a position to go bankrupt under the conditions where they become unable to offer the products at the price set by the other market players.

To keep prices as low as possible, family dairy farms will try to permanently reduce their unit costs, both by using the most competitive technologies and by increasing labor productivity. In establishing and changing the price level, family farms will take into account several factors, the most important of which are: production and marketing costs, milk quality, market prices for similar products, the state of direct competition, the existing economic situation at the time, the legislation in force, etc. The average prices at which dairy products obtained from family-type cow farms are sold on the market are as follows: 1.4 lei/liter of milk + VAT; 15 lei/kg live calf + VAT; 60 lei/ton of manure. These are negotiable depending on the quantity purchased.

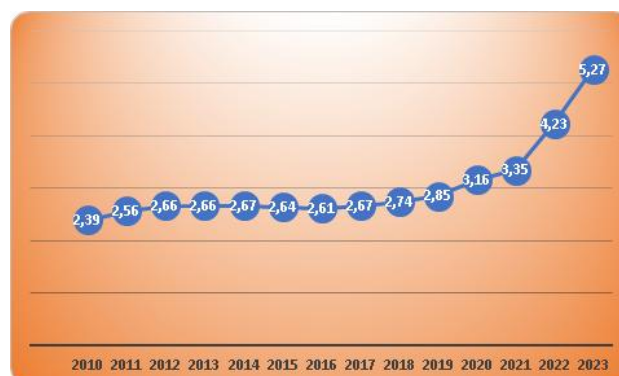


Figure 4. Dynamics of the price of fresh cow's milk sold on Romanian agro-food markets, (lei/liter)

Source: INS – TempoOnline [19]

According to the data provided by the European Milk Observatory [9] the average price of cow's milk at the farm gate in the EU in 2023, had a decrease of ~ 22%. There was also an approximately 18% price drop in Romania.

If in October 2022, the average price of milk in the E.U. for 100 kg was 56.64 euros, in the same month of 2023 it dropped to 44.2 euros, and in Romania, from 53.82 euros/100 kg it reached 44.18 euros/100 kg.

To calculate the price of a liter of milk, we must remember that 1 kg of milk = 0.97 l of milk. Thus, in the E.U., the price went down from 0.58 euro/liter to 0.45 euro/liter, in the same period of one year, and in Romania from 0.55 euro/liter to 44.18 euro/100 kg to 0.45 euro/liter.

3.2. Development directions of family dairy farms

Increasing the competitiveness of family dairy farms in Romania can be achieved through better use of resources (technical, material, human, environmental, etc.) and production factors, as well as the fulfillment of national and community quality standards.

In general, family farms adopt a system of housing dairy cows in free stalls, mechanized and semi-automated, characterized by the application of efficient cattle breeding methods. The constructive characteristics of zootechnical farms and the use of high-performance cattle exploitation technologies, with the permanent monitoring and verification of the quality of the obtained products and the state of health and well-being of the cows ensure the achievement of a high level of competitiveness for these farms in relation to similar holdings in other countries of the European Union.

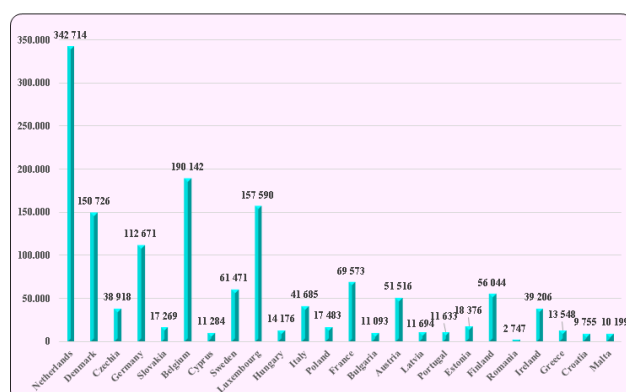


Figure 5. Average economic size of family farms in Member States, 2020 - agricultural - data for Spain, Lithuania, and Slovenia not comparable with other Member States

Source: Eurostat [15]

As can be seen from Figure 5, in Romania, the average economic output of a family farm was 2,750 euros in 2020, compared to an average of 165,456 euros for non-family farms. This suggests that many of the family farms in Romania should be considered subsistence farms [17].

Family farms strive to comply with national and European environmental protection requirements. For this purpose, within these farms, covered platforms are built for the storage of cattle manure and buried basins for the collection of liquid manure. In regard to the Community norms in the sanitary and sanitary veterinary fields, farms need to comply with the following standards for the protection of animals.

The *main directions of development of family dairy farms* are the introduction and development of new technologies and processes, diversification of production, and adjustment of the profile, level, and quality of production to market requirements. Thus, within family farms, an open system of exploitation of dairy cattle characterized by the application of efficient methods of feeding and automatic water supply can be adopted. Also, the technology of rearing dairy cattle in free stalls ensures a total area of min. 10 square meters of cattle, which creates optimal conditions for raising and exploiting animals. Resting areas for dairy and young cows can be provided with straw bedding.

Family dairy farms can have a high degree of automation of operations in the production flow. The production hall will be equipped with facilities that allow watering, maintaining, and regulating the microclimate. The technology used will allow high work productivity,

rigorous sanitary-veterinary control, and high milk production thanks to the microclimate conditions that will be ensured: shelter ventilation, temperature, air humidity and lighting being regulated automatically and at optimal levels.

The facilities and equipment provided in the technological flow allow the exploitation and breeding of dairy cows to be carried out in optimal conditions. The new technologies used in the breeding and exploitation of dairy cows lead to the obtaining of quality products, to increased yields, under conditions of increased work efficiency and productivity. At the same time, through the use of these technologies, the aim is to achieve good working conditions for the staff working on the farm.

Adaptation of family farms to community standards. As regards the Community norms in the sanitary and sanitary-veterinary field, farms must comply with the following standards: minimum standards for the protection of farm animals; minimum standards for the protection of calves; meeting quality standards for raw milk. Investments in family farms must comply with Romanian legislation harmonized with European norms, respectively: meeting the standards for raw milk - Order no. 67/2009 on the approval of the Plan of measures to improve the quality of raw cow's milk [12]. In order to meet this standard, the farm will have a milk storage room equipped with a cooling tank for keeping the quantity of milk under its own conditions for a maximum of 24 hours. The milk cooling and storage process must ensure high milk quality, following national and European standards - Directive 89/362/EEC on general hygiene conditions on farms for milk production [10] and Directive 92/ 46/CEE establishing the sanitary-veterinary rules for the production and placing on the market of raw milk, thermally processed milk and milk-based products [11].

Milking is the single most important activity on a dairy farm. The management of the milking process aims to minimize bacteriological and physical contamination. The term milking refers to all aspects of the process of obtaining milk from cows quickly and efficiently while ensuring the health of the cows and the quality of the milk. Milking and milk storage processes will be carried out in such a way as to avoid any risk of milk contamination.

The disinfection of the shelter and premises will be carried out in such a way that there is no risk of introducing disinfectants into the milk or contaminating it - Order no. 868/2003 for the approval of the Veterinary Sanitary Norm regarding the Program of measures for the prevention of milk pollution, raw material with pesticide residues or substances used in agriculture and animal medical treatments [7].

Increasing the income of agricultural holdings by obtaining income from the sale of milk, calves at a maximum age of 3 months, as well as manure, given that dairy products respond to a growing demand identified on the market for domestic products.

In recent years, the orientation of Romanian buyers towards the consumption of dairy products has been noted. Romanian consumers are becoming aware of the fact that this food can become dangerous if it is not stored and

processed at the optimal temperature and if it is consumed after the expiration date.

Supporting members of producer groups or other associative forms in order to encourage the phenomenon of association between family-type dairy farms.

Economic-financial objectives. The main factors that allow for minimizing production costs and obtaining high economic profitability are: the semi-automated feeding and watering system will allow efficient use of feed consumption, avoiding feed waste; optimization of utility consumption necessary to ensure specific microclimate conditions through permanent monitoring of environmental factors (temperature, humidity, light, etc.); rigorous disease control as a result of the lack of feed and water contamination reduces medication costs and allows for quality milk production; high labor productivity due to the mechanization and semi-automation of the feeding and watering operations of dairy cows and the disposal of solid and liquid manure.

Environmental objectives. Thanks to the technology that will be adopted, the farm's activity will have minimal impact on environmental factors. The natural and automated ventilation system ensures a very good microclimate, refreshing the air in the production hall and thus significantly reducing humidity, odor, and NH₃ emissions.

Use of local animal breeds. Maintaining genetic resources by increasing the number of adult breeding animals from traditional local breeds that are in danger of abandonment leads to the establishment of a source of valuable genes, well adapted to local and regional environmental conditions, which can provide a basis for continuous progress in breeding animal productivity, it can contribute to the diversification of existing populations at a certain time, it can contribute to restoring the vitality of selected lines and restoring resistance to diseases. Also, by encouraging the breeding of animals from local breeds in danger of abandonment, the local identity is preserved and the cultural-historical value of these breeds is preserved.

4. CONCLUSIONS

✓ Starting from the concept of Clean-Clever-Competitive (Clean-Clever-Competitive - 3C) promoted by the European Union, family farms must have as general objectives the development and implementation of an integrated support system to ensure the increase of economic competitiveness simultaneously with the improvement of environmental performance and the implementation of eco-efficiency tools.

✓ The increase in milk consumption per inhabitant and the achievement of a normal level for the conditions and resources of Romania, justify the investments in the branch of increasing the herds of milk cows and modernizing family-type farms. The milk deficit in the consumption of the population, and especially in the consumption of children and the elderly, amounts to over 40% of what is needed at the national level.

✓ Supporting the milk cow breeding sector, through investments in the purchase of cows for family farms and

the organization of modern marketing structures in the rural environment is a strategic objective, aimed at ensuring the food security of the population and which must be considered at the regional and national level in the long term medium and long.

✓ Farms for raising dairy cows of the family type present a series of advantages, among which we cite: - credibility of the head of the farm, directly involved in its management; - cheap fodder, obtained including from own production; - stable customers and high demand in different deficient areas of the country; - the purchase of high productivity breed cows; - family participation in the farm activity; - the organization of a modern farm, of economic dimensions, which produces "ecological product" milk, which has a higher price and which can constitute a quality raw material for dairy products; - the purchase of some agricultural machinery and equipment for the performance of mechanized works in the production of fodder, the expenses for this sector being high due to the recourse to external services; - tracking the achievement of optimal ratios between specific consumptions and their conversion into products, between these consumptions and the dimensioning of expenses in such a way as to ensure obtaining a competitive price; - the achievement of advantageous prices for the producer, both as a result of selling milk on markets lacking in this product, and due to its superior quality; - strict compliance with production technology; - distribution of profit for development, so as to achieve the proposed strategic goals; - knowledge of the domestic legislation and the legislation of the European Union, to be able to benefit from the facilities created for dairy cow breeders and to comply with the regulations in force.

✓ The constructive characteristics of zootechnical farms for raising dairy cows in a family system, combined with the use of the most efficient cattle breeding technologies, with the permanent monitoring of the quality of the products obtained and the state of health and well-being of the animals can make this farm model one of the most modern and competitive cattle farms in our country, comparable in terms of economic performance to family dairy farms in other European Union countries.

✓ Romanian research can and must be a solution to the challenges of the food system, providing benchmarks and contributing through responsible innovation, fair and equitable transformation, based on principles of sustainable development and efficiency, to the development of milk-producing farms, a category in which cow farms also fall of family type milk.

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