THE IMPACT OF LOGISTICS COSTS ON CERTIFIED FOOD PRODUCTS – COW'S MILK

A. Marin*

Research Institute for Agricultural Economy and Rural Development, Bucharest, Romania

***Abstract*:**

The paper aims to assess the economic impact of cow's milk certification, taking into account the additional costs generated by certification and transportation. Through economic-statistical methods, indicators such as the unit cost per liter, the break-even point and the economic yield per head of animal were calculated. The study included alternative scenarios - rented car and own car - to highlight the differences in profitability. The results show that, in the rented car variant, maintaining profitability requires a minimum price of 3.05 lei/liter or a production of over 8,400 liters/head/year, and in the own car variant, the threshold drops to 2.72 lei/liter or 7,470 liters/head/year. The paper supports decisions regarding the certification and development of mountain farms.

Key words: *mountain product, profitability, production costs, cow's milk, certification*

INTRODUCTION

In a globalized economy, product certification is essential to ensure quality, credibility, and market differentiation. Certified products guarantee safety, controlled origin, and sustainability. Interest in mountain products has grown due to their nutritional value, traditional methods, and their role in developing remote areas. The "mountain product" certification confirms quality and origin, following strict ecological standards and contributing to sustainability and tradition preservation [1,2,3].

Consumers are increasingly focused on healthy eating, favoring natural products with controlled origin. Mountain products such as milk, cheese, honey, or meat are appreciated for their taste and health benefits. These products support the local economy, preserve traditions, and attract tourism. Agricultural practices are adapted to local specifics and promote environmentally friendly methods. Certification enhances product value, boosts competitiveness for small producers, and improves international market access [4].

According to Article 18 of Regulation (EC) No. 1257/99, mountain areas are defined by harsh climatic conditions and short growing seasons, which lead to high production costs. Countries such as Switzerland, France, and Italy have protected the term "mountain" to promote local products. At the European level, the Charter for Quality Mountain Products was launched in 2005, followed by regulations on the use of the term, aiming to support sustainable development and help consumers identify these products [4].

Despite rising interest in certified food, many consumers still overlook the specific attributes of mountain agriculture [5]. The rural lifestyle, often seen as healthier, contrasts with unhealthy urban habits, and access to fresh, unprocessed products is increasingly important for health [6].

Voluntary quality schemes highlight product attributes in modern trade, yet certifications are not always perceived as adding value, as is the case with milk [7]. According to Lamarque and Lambin, interest in local and certified food is

* Corresponding author: marin.ancuta@iceadr.ro
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growing, and consumers are willing to pay more for sustainable products [8]. Certification supports access to premium markets, protects traditional methods, and promotes the sustainable development of mountain areas.

MATERIAL AND METHOD

The material and methodology used in the research were adapted to the topic of production costs and profitability of cow's milk. Economic-statistical methods were applied, with an emphasis on calculating average production costs, to which were added expenses related to certification and transport. The analyses targeted both direct and indirect costs, as well as relevant technical-economic indicators, such as the unit cost per liter of milk and the yield per animal. Cost estimates were based on price scenarios and the dynamics of agricultural inputs. Data were taken from official sources, such as the National Institute of Statistics and the Ministry of Agriculture, but also from scientific articles and specialized reports. This integrated approach allowed for a clear and well-argued analysis of economic performance, substantiating strategies for increasing competitiveness in the sector.

RESULTS AND DISCUSSION

According to Order No. 174 of 20.07.2021 on granting the right to use the term "mountain product", [9] in the National Register of Mountain Products (R.N.P.M.), as of July 31, 2025, 4,515 producers with the right to use the certification were registered. Of these, in the "milk and dairy products" category, at the country level, 480 farmers are certified, representing 10.63% of the total certified producers in the country [10].

To determine the influence of mountain certification of cow's milk on farmers' costs, we exemplify a farm with 100 cows, from Bistrița Năsăud County (the county with the most certified farmers 194, representing 4.30% of the total in the country).

The technological estimate is calculated for an average production of 6,000 liters/cow. 305 days of lactation are taken into account. Thus, the total estimated annual production reaches 600,000 liters of milk. The average daily production delivered is: 600,000 liters/305 days of lactation = 1,967.21 liters/day, we approximate it to 2,000 liters/day. From the analysis of the technological estimate for cow milk production developed by Chetroiu and collaborators [11] for an average annual production of 6,000 liters per cow, a complex structure of expenses, both variable and fixed, is highlighted. The total annual expenses amount to 13,797.6 lei per cow, which leads to a unit production cost of approximately 2.30 lei per liter of milk. Variable expenses represent approximately 80% of the total, which indicates a high dependence on direct production factors, especially feed. Analyzing their structure, it appears that 76.55% are allocated to feed expenses. This aspect, which can represent both a risk factor and an opportunity to improve farm efficiency (Fig. 1).

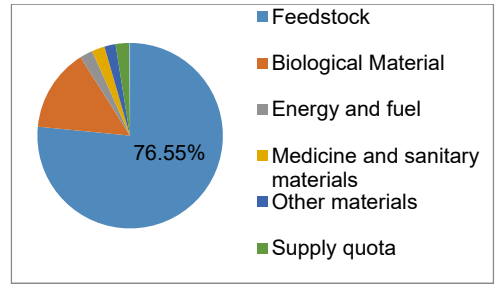

Fig. 1 – Structure of variable expenses [11]

The structure of feed expenses reflects a clear orientation of the farm towards high productivity, with a significant dependence on concentrated feeds. Thus, 54.71% of total feed expenses are allocated to concentrates, which indicates an intensive feeding system, specific to farms aiming to obtain high milk production per head of animal. This type of ration, rich in energy, supports productive performance, but also

implies a higher level of expenses and increased vulnerability to price fluctuations of raw materials.

Hay (13.32%), succulent feeds (12.79%) and green mass (19.18%), together accumulate 45.29% of total nutrition expenses. These can be produced within the farm, offering significant potential for cost optimization and increasing farm autonomy, especially in the specific conditions of the mountain area, where natural resources can be exploited efficiently. At the same time, the high share of feed expenses in total variable costs (over 76%) underlines the crucial role of this segment in determining the profitability of livestock farming (Fig. 2).

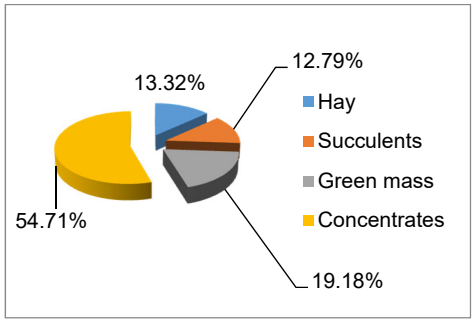

Fig. 2 – Breakdown of feed expenses [11]

On the other hand, fixed costs, which include labor costs, overheads, interest and depreciation, amount to 2,765.2 lei per head, which represents about 20% of total costs. Of these, labor has the largest share, reflecting the importance of human resources in the daily activities of the farm. Interest and depreciation indicate the existence of investments in infrastructure and equipment, which contribute to the long-term stability of the farm (graph 3). Therefore, the total cost of 2.30 lei/liter provides a clear benchmark for the profitability of production and the minimum threshold below which the selling price should not fall, in the absence of subsidies or forms of financial support.

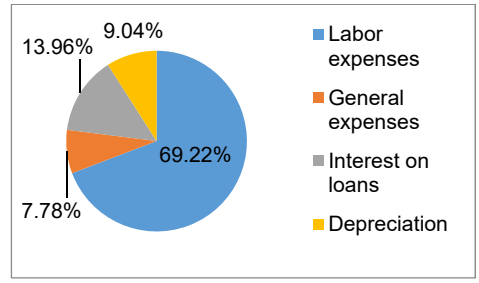

Fig. 3 – Structure of fixed expenses [11]

Obtaining the mountain product label requires both compliance with strict standards and additional costs, but can bring added value to the final market price. The analysis in the technological estimate refers strictly to the costs of producing cow's milk, along the entire chain of activities carried out on the farm, without including expenses related to the transport of milk to collection or processing points, packaging and labeling, external cold storage, distribution or marketing. This estimate reflects the cost of production up to the farm gate, but for the analysis in the example it is necessary to add logistics and certification costs, which can significantly influence the final profitability of the activity. [11].

The "Mountain Product" certification offered by ANZM (National Agency for the Mountain Area), according to the Mountain Law no. 197/2018 and the Order of the Ministry of Agriculture, Rural Development and Rural Development no. 52/2017, does not provide for a mandatory direct fee for granting the right to use the "mountain product" mention. The procedure is administrative and essentially free.If the label also includes mentions such as "traditional", "organic", "PDO" or "IGP", then third-party certification bodies come into play, which charge fees. Annual audits are mandatory and expensive. It is also mandatory to perform laboratory tests (microbiology, composition, etc.).

Consulting is most often optional, but almost indispensable in practice - especially for small producers or those without

expertise in drafting documentation. In conclusion, the mention "mountain product" itself does NOT have a legal fee imposed, but the total costs of certification exist and can be significant (1,500–6,000 EUR/product). The paper provides minimum and maximum estimates of these (table 1).

Table 1 Certification cost estimate

Certification type	Fee	Value		UM
		minimum	maximum	
Traditional Mountain Product **(PMT)**	Initial	500	2.000	EUR/product
	Laboratory testing	200	1.000	EUR/product
	Renewal	300	1.000	EUR/an
	Consulting	500	2.000	EUR
	TOTAL	**1.500**	**6.000**	**EUR**

The costs of the "Traditional Mountain Product" certification are relevant for farmers who want to maximize the value of their product. Estimating an average cost of the initial certification (fee, laboratory tests and consultancy) of 3,100 euros, distributed over 5 years, and an annual renewal fee of 650 euros, results in a total annual cost of approximately 6,435 lei/year (Table no. 2).

For the transport component, the daily delivery of 2,000 liters of milk was taken into account, in two trips, each of 100 km round trip, using a Ford Transit Custom refrigerated vehicle, with an average consumption of 9 liters per 100 km.

We did not identify an official source such as ANRE to find out the price of the standard diesel train, but based on specialized media sources such as Observatornews.ro, Kanal D and Ziarul Profit, on August 29, 2025, it was around 7.58 – 7.60 lei/liter.

At an average diesel price of 7.60 lei/liter, this results in a daily consumption of 18 liters and a daily cost of 136.8 lei/day, respectively an annual cost of 41,724 lei (for 305 days of delivery). Regarding the means of transport, the analysis considered two options: renting a refrigerated truck at a monthly cost of 1,300 euros, which is equivalent to 79,048.32 lei/year, or purchasing a second-hand vehicle at a price of 19,700 euros, amortized over 5 years, resulting in an annual cost of 19,965 lei.

In conclusion, the total annual costs reach 61,007 lei in the option with the purchase of the means of transport and 120,343 lei in the one with its rental. The major difference is generated by the logistical costs, the certification having a lower financial impact, but contributing significantly to increasing the added value of the product.

Thus, in the conditions in which a long-term strategy is pursued, the purchase of the refrigerated truck represents a more sustainable option, and the certification of the mountain product can support its positioning on premium markets, where higher prices and a higher degree of consumer loyalty are obtained.

The budget analysis for cow's milk, in the case of an average production of 6,000 liters/animal/year, reflects a profitable activity, with a production value of 14,594.5 lei/animal, equivalent to 2.43 lei/liter.

The main production (milk sold directly) generates 13,080 lei/animal, i.e. 2.18 lei/liter, to which are added subsidies of 730.9 lei/animal (0.12 lei/liter), contributing to the increase of the gross product to 15,325.4 lei/animal. The total expenses are 13,797.6 lei/animal (2.30 lei/liter), of which the majority are variable expenses (approximately 80% of the total),

reflecting the high dependence on direct costs of feed (1.41 lei/liter) and biological material.

Fixed costs, at 0.46 lei/liter, include labor, depreciation and interest, having a smaller but significant share in the total structure. The production cost is estimated at 2.05 lei/liter, while the selling price is slightly higher – 2.18 lei/liter, which indicates a positive gross margin, although relatively narrow (0.13 lei/liter). This difference highlights the fact that the farm's profitability is decisively influenced by subsidies, but also by the ability to keep expenses under control and obtain a competitive price for milk.

To understand the impact of mountain product certification and logistics expenses on the profitability of the dairy farm, we take into account their costs and recalculate the main economic indicators (table 4). The analysis of the financial impact of the "Traditional Mountain Product" certification and transport costs on the budget of a farm with an average production of 6,000 liters of milk per head of animal was carried out on three variants: the initial situation, the variant with rented car transport and certification, respectively the variant with purchased car transport and certification. In the initial case, without additional costs related to certification and transport, the value of production per head of animal is 14,594.5 lei, and the total costs are 13,797.6 lei, resulting in a positive net income of 1,448.1 lei/head and a net income rate of 11.8%.

In the variant with rented car transport and product certification, the total costs increase by 4,500 lei/head, reaching 18,297.6 lei, and the net income becomes negative, -3,051.9 lei/head. This is mainly due to the higher costs of renting the refrigerated truck (3,000 lei/head) and the cost of certification (1,500 lei/head). Thus, the profitability of the farm decreases significantly, with a production cost reaching 16,783.1 lei/head and a negative taxable income, highlighting the high impact of logistics costs in the short term. In the option with the purchase of the refrigerated truck and product certification, the additional costs are lower, increasing the total expenses by approximately 2,497 lei/head, which leads to a total cost of 16,294.6 lei/head. The net income is negative, but to a lesser extent (-1,048.9 lei/head), and the adjusted production cost is 14,680.1 lei/head.

This option proves to be more financially sustainable in the long term, reducing the financial burden compared to the rental option.

In all cases, the production value and the market price remain constant, but the additional costs for certification and logistics directly influence the profitability of the farm. The certification of the mountain product, although it adds a significant cost, is essential for positioning the product on premium markets, contributing to increasing the added value and consumer loyalty.

Thus, farmers must carefully evaluate the logistics options and plan a long-term strategy that includes the acquisition of refrigerated transport and product certification, in order to maximize profitability and competitiveness in the market. To achieve these goals, we calculate the physical and value profitability powder per liter of milk and per farm.

In the context of increasing costs generated by certification and transport, the farmer is faced with a decrease in profitability, as the physical break-even point exceeds the current average production of 6,000 liters/head. In the variant with rented car transport and certification, a production of approximately 8,400 liters/head is required to cover costs, and in the variant with purchased transport and certification, approximately 7,470 liters/head.

Under these conditions, one of the main solutions is to increase production per head

of animal. This can be achieved by improving nutrition, more efficient management of animal health and comfort, as well as by using superior genetics.

Increasing productivity is essential to reach or exceed the break-even point calculated under the new conditions. Another important option is to increase the selling price of milk. By obtaining certification and targeting premium markets (mountain, organic, local products), the farmer can sell milk at a higher price.

For example, in the case of the variant with rented transport and certification, in order to maintain profitability at the current level of production, the capitalization price should be at least 3.05 lei/liter, compared to 2.18 lei/liter currently. This adjustment can be achieved through direct sales, partnerships with specialized stores or integration into a short supply chain.

At the same time, logistics and certification costs can be reduced. Purchasing your own means of transport has already proven to be a more efficient option than renting, in terms of the profitability threshold. Also, through negotiations or by accessing subsidies for certification, the farmer can reduce fixed expenses. Optimizing transport routes, using vehicles with lower consumption or efficiently organizing deliveries can also contribute to lowering the cost per liter.

Another strategy is to increase the size of the farm. If the number of heads increases, fixed costs (such as certification or consultancy) are distributed over a larger volume of production, which reduces the unit cost per liter and improves overall profitability. This requires careful scaling, depending on the capacity to manage the available resources.

Last but not least, the farmer can transform milk into a value-added product. Through processing (cheeses, yogurts, cream, etc.), a much higher price per liter can be obtained, which leads to significantly better profit margins.

Certification, in this case, becomes a major asset, allowing access to niche markets that value local, traditional and organic products. Thus, even if the initial costs are higher, they can be offset by an integrated strategy to increase the value of the final product and streamline the activity.

Certification does not stop with the issuance of the document. The producer enters a continuous monitoring system, being periodically subject to checks to verify that the standards are still being respected. In the event of non-compliance, sanctions may be applied, and in serious situations, the certificate may be withdrawn. Finally, the certification has a limited validity in time.

Upon expiry of the term, the producer must resume the procedure to obtain the renewal of the certification, going through the necessary steps again. This mechanism ensures that a constant level of quality and compliance is maintained over time, strengthening consumer confidence in certified mountain food products. Any deviation, even involuntary, can lead to the withdrawal of the certificate, which creates additional pressure and constant uncertainty. In this context, many producers consider that the risks and efforts involved are not justified by the results obtained.

The certification of mountain products is undoubtedly a valuable tool for promoting quality, tradition and sustainability in mountain areas. However, from the perspective of farmers, this process is not without difficulties, which explains why many of them choose not to get involved in obtaining such certification, despite the obvious advantages.

One of the most important obstacles is excessive bureaucracy. The certification process involves completing complex files, following strict procedures, on-site inspections and regular checks. For small farmers, who do not have administrative staff or experience in managing documentation, these requirements can

become overwhelming. Often, the time needed to complete all the stages to obtain the certificate is very long, which discourages involvement.

In addition to the administrative aspects, certification also involves a significant financial effort. Farmers have to bear the costs of inspections, consultancy, adapting their farms to the required standards and maintaining them in the long term. In many cases, commercial benefits are not immediately guaranteed, and the market does not always offer a high enough price to justify these investments.

Thus, certification ends up being perceived as a burden rather than a real opportunity for development.

Another major limitation is related to the technical and production requirements imposed by the certification system. Products must be produced using traditional and ecological methods, and in the case of animal products, specific animal welfare conditions are required.

Many farmers do not have the necessary infrastructure to comply with these standards or cannot afford the investments that would be required. In addition, the lack of information and institutional support prevents them from understanding exactly what steps to follow or how they can access European and national funds to facilitate this process.

Certifications have a common objective: to guarantee that mountain products are safe for consumption, produced in a responsible manner, traceable from source to shelf, correctly labeled and comply with the strictest environmental and public health protection standards. In this way, certification becomes an essential tool for increasing consumer confidence and consolidating the identity and value of mountain products nationally and internationally.

CONCLUSION

As shown in the paper, certification involves administrative, logistical and promotional costs. This can bring significant advantages, such as access to niche markets, customer loyalty and the possibility of selling at higher prices.

The main objective is to provide a clear perspective on the economic sustainability of these products and to support strategic decisions regarding the adoption of the "mountain product" certification. The analysis indicated that, in order to cover the costs related to certification and transport, farms must reach a minimum sales threshold that varies depending on the level of production per head of animal.

Undoubtedly, the costs of certification are added to the operational expenses of the farm (logistics, feed, labor, etc.) and raise the profitability threshold, forcing the producer to sell a larger volume of milk to cover the investment in certification.

In this sense, mountain certification, although more accessible, must be managed strategically, so that the added value brought to the product by labeling justifies the additional costs and contributes to increasing profits. Compared to other types of certification, "Mountain Product" offers a favorable ratio between costs and superior capitalization potential, but the real benefits depend on the farmer's ability to integrate this mention into an efficient marketing chain and a sales strategy that capitalizes on the image of an authentic mountain product.

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