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SUMMARY

The title of the doctoral thesis: *Research on improving the management of cattle raising from Neamț County.*

Keywords: *management, cattle, feeding, breeding, rentability.*

Raising cattle is recognized as a fundamental pillar of animal husbandry, playing a crucial role in providing the population with animal-origin foods, which are essential for a healthy and balanced diet. Cattle produce milk, considered a complete food due to its high nutritional value and energy content of 762 kcal/kg. Milk contains essential nutrients for the human body. Therefore, a liter of milk contains 33 grams of protein (equivalent to 4 eggs), 38 grams of fat, and 49 grams of lactose. (Georgescu, 2006)

Cattle also supply meat, which plays a vital role in the population's diet, having significant nutritional and biological value. Beef is considered a complete food with a rich chemical composition. The protein content in beef is approximately 18.7%, while fat represents 15.3% of its content. It provides an energy value of 1800 kcal/kg and contains all essential amino acids necessary for proper body function. (Acatincăi, 2010)

Neamț County, located in an area encompassing mountainous, pre-Carpathian, and hilly terrains, offers favorable conditions for cultivating various fodder and technical plants, facilitating the raising and exploitation of herbivorous-ruminant animals, such as sheep, goats, and especially cattle.

Within the territory of Neamț County, activities involving the raising and exploitation of different breeds of cattle take place. Among these are breeds specialized in milk production, such as Holstein and Bălțată cu negru românească. Additionally, there are mixed breeds used for both milk and meat production, like Brună, Bălțată românească, and Pinzgau. Besides these, there are breeds specialized in beef production, like Charolaise and Aberdeen-Angus. Furthermore, the county is home to numerous crossbreeds resulting from crossings between these breeds. [169]

It is worth mentioning that most cattle breeds in Neamț County have adapted to the specific climate and feeding conditions of this region. However, their technical and productive performances vary, and there is significant potential for improvement that needs to be explored and utilized.

The situation is particularly complex, especially considering the level of milk and meat cattle production in small and medium-sized agricultural farms in

Neamț County, as well as the need for genetic improvement of the cattle in these farms, along with technological factors of exploitation and management. Therefore, conducting rigorous research based on a solid scientific foundation, including collecting a significant volume of data, analyzing it, and presenting the obtained results, was necessary.

In this context, the research focused on the management and technological flow in seven farms, specialized in dairy cattle breeding and six other farms, specialized in beef cattle breeding. The aim was to obtain relevant results and identify opportunities for profitability.

The first part of the thesis was developed based on consulting bibliographic references from the specialized literature and is structured into two chapters. Chapter I addresses aspects related to the economic and social importance of cattle breeding, the typology of agricultural farms, and production factors. It also analyzes the situation and dynamics of cattle populations and the two main products obtained from them, namely milk and meat, at the global and national levels. In the second chapter, given the complex nature of the production process in agro-zootechnical farms, aspects related to factors influencing milk and meat production, technologies used in cattle raising, technological factors management in cattle farms, and the cattle breeds raised in Neamț County are presented.

The second part of the thesis titled "Research on cattle raising and exploitation in Neamț County" consists of 5 chapters focusing on management, technological flow, and economic efficiency in the studied cattle farms. This part of the thesis includes a comparative analysis of the studied farms, evaluating various relevant aspects.

Based on all these investigated elements, conclusions and recommendations regarding cattle raising and exploitation in Neamț County were formulated. These conclusions and recommendations represent the result of the analysis and interpretation of the data obtained in the research and can provide practical guidance and suggestions for improving performance and efficiency in cattle farms in the region.

The aim of the research was to provide support to farmers, considering that not all of them have the necessary specialized training. Thus, the research aimed to formulate economic and organizational recommendations to improve management and technological flow in cattle farms. These recommendations aimed to achieve high production and develop an efficient business in cattle raising. Through this, the research sought to provide farmers with the necessary tools to achieve better results in their activities and promote sustainable development in the cattle breeding sector.

The plan of objectives involved several stages of research:

1. *Research on cattle raising and exploitation in Neamț County was carried out through the following stages:*

- *General analysis of the natural framework and geographical peculiarities of Neamț County.*
- *Study of the types of agro-zootechnical farms in Neamț County.*
- *Study of cattle raising and economic management in the farms of Neamț County.*
- *Analysis of cattle raising in family farms.*

2. *Research on the management and technological flow in the studied cattle farms was conducted through the following stages:*

- *Results regarding management in the studied cattle farms:*
  - *Results regarding management in dairy cattle farms.*
  - *Results regarding management in beef cattle farms.*
- *Results regarding the technological flow in the studied cattle farms:*
  - *Results regarding the technological flow in dairy cattle farms.*
  - *Results regarding the technological flow in beef cattle farms.*
- *Results regarding the management and efficiency of cattle exploitation:*
  - *Results regarding management and efficiency in dairy cattle farms.*
  - *Results regarding management and efficiency in beef cattle farms.*

3. *Research on productive performances by cattle breeds in Neamț County was conducted through the following stages:*

- *Results regarding milk production performances:*
  - *Results regarding productive performances in the ancestry of cattle.*
  - *Results regarding productive performances in the descendants of cattle.*
- *Results regarding meat production performances:*
  - *Results regarding productive performances in the ascendants of cattle.*
  - *Results regarding productive performances in the descendants of cattle.*
- *Results regarding reproduction performances in the cattle breeds of the studied area.*
  - *Results regarding the quality of cattle productions obtained.*
  - *Results regarding the valorization of cattle productions in the analyzed farms.*

4. *Research on possibilities for optimizing management and technological flow in the studied cattle farms:*

- *Study on possibilities for optimizing management in cattle farms in the studied area.*
- *Study on possibilities for optimizing the technological flow in cattle farms in the studied area.*
- *Study on possibilities for profitability in cattle farms in Neamț County.*

To achieve these objectives, various methods and techniques were used. For evaluating the phenotypic performances of the ancestry and descendants of the studied cattle population, reproductive performances, and milk quality, a data processing and statistical analysis were carried out using the S.A.V.C. computer program within the discipline "Cattle raising technology" at the University of Life Sciences, Iași.

This statistical analysis included determining the arithmetic mean ($\overline{X}$), the arithmetic mean error ($\pm s_{\bar{x}}$), standard deviation (s), coefficient of variation (V%), Fisher test, Tukey test, as well as using the SPSS 16.00 for WINDOWS program for multiple regression coefficient, ENTER method, Pearson correlation, Chi-Square, ANOVA tests, and regression line construction.

By using these methods and techniques, the aim was to obtain precise and relevant results that provide important information regarding cattle performances, reproduction, and milk quality in the research.

The primary data used in this research were extracted from the Genealogical Register of Breeds, both for dairy cattle and those destined for meat production. Additionally, information from agricultural farm records was utilized.

For determining economic efficiency through profitability calculation, which is an essential indicator of economic efficiency, primary data on financial resources, namely income and expenses, were used, extracted from farmers' accounting records.

These aforementioned research methods and techniques were complemented with extensive observations conducted within the farms included in the study.

The biological material studied consists of cattle from breeds specialized in milk production, such as Holstein and Bălțată cu negru românească, dual-purpose milk-meat breeds like Bălțată românească and Brună, as well as breeds specialized in meat production, such as Aberdeen Angus and Charolaise.

The research results led to the following conclusions:

1. *In the analysis of management in the farms involved in cattle breeding and exploitation of dairy breeds, the following distinctions were observed:*

- *Ownership form: Private agricultural units (individual - 1, family enterprise - 2, sole ownership - 2, authorized individual - 2) and agricultural units with full state agricultural capital, public institution - 1.*
- *Work time management: In all 7 farms, activities start in the morning at 5:00 a.m. and end at 10:00 a.m., followed by a rest period from 10:00 a.m. to 3:00 p.m. The afternoon program runs from 3:00 p.m. to 7:00 p.m., both in summer and winter seasons, for farms L1-L6. However, in farm L7, during the summer season, since pasture feeding with green fodder is practiced, activities start at 5:00 a.m.*

but do not end at 10:00 a.m. (the animals rest on pasture), and certain activities related to feeding at the barn are not carried out under these conditions.

- *Human resources management: Different levels of professional qualification are found among farmers in the farms. Some farms have salaried staff with higher education: L5 and L6, with secondary education and baccalaureate: L1, L2, L3, L4, L5, and L6, and with vocational school education: farm L5. Regarding the number of people involved in farm activities (employees), there are farms with multiple salaried employees (21): L5, one salaried employee: L1, L2, L4, L6, and L7, and no salaried employee in farm L3.*
- *Financial resources management: The structure of expenses varies in dairy cattle farms, corresponding to the allocated production factors. Some farms have expenses of production, representing all expenditures for material resources and labor force, excluding variable expenses related to production valorization (farms L1, L2, L6, and L7). Other farms have production expenses, comprising all expenditures for material resources, without labor expenses, and variable expenses related to production valorization (farm L3), and production expenses, including all expenditures for material resources, labor force, and variable expenses related to production valorization (farms L4 and L5). Incomes in these farms come from various sources, including calves obtained, sales of animals for reproduction or meat, sales of finished products (milk or milk-derived products), manure, and subsidies representing agricultural payment schemes.*

2. *In the analysis of management in the farms involved in cattle breeding and exploitation of beef breeds, the following distinctions were observed:*

- *Ownership form: Private agricultural units (individual - 3, sole ownership - 1, commercial company - 2).*
- *Work time management: The work schedule in all 6 farms starts at 6:00 a.m. and ends at 7:00 p.m., with differentiation based on activities for the winter and summer seasons, including grazing and administering green fodder.*
- *Human resources management: Farmers or their salaried employees have different levels of education, with some having higher education (farms C3 and C5), secondary education and baccalaureate (farms C1, C4, and C6), and vocational school education (farm C2). The number of people involved in farm activities (employees) varies, with 2 salaried employees in farm C3, one salaried employee in farms C1 and C6, and no salaried employees in farms C2, C4, and C5.*
- *Financial resources management: The structure of expenses varies in beef cattle farms, corresponding to the allocated production factors. Some farms have production expenses, including expenditures for material resources and labor force (farms C1, C3, and C6), while other farms have production expenses, comprising all expenditures for material resources, without labor expenses (farms C2, C4, and C5). Incomes in these farms come from various sources, similar to dairy cattle*

farms, including calves obtained, sales of animals for reproduction or meat, manure, and subsidies representing agricultural payment schemes.

3. *The analysis of the technological flow in dairy cattle farms reveals several technological variants within the subsystems of the technological flow:*

- *In the feeding subsystem, two technological types are adopted regarding cattle feeding, based on the diet structure and administration method. Farms L1, L2, L3, L4, and L6 use feed from stock, indoors, based on ensiled voluminous feed, particularly ensiled corn in the milk-dough stage. However, in farms L5 and L7, feeding is differentiated seasonally. In farm L5, winter feeding is based on ensiled voluminous feed, while summer feeding consists of green fodder, particularly alfalfa, administered at the barn. In farm L7, winter feeding relies on fibrous and coarse voluminous feed, while summer feeding is based on green fodder administered on pasture.*
- *In the milking subsystem, two technological variants are distinguished: can milking in farms L1, L4, L5, L6, and L7, and platform milking in farms L2 and L3.*
- *In the maintenance subsystem, two technological types are applied: free-range maintenance in farms L1, L2, L3, and L6, and tied maintenance in farms L4, L5, and L7.*
- *In the manure evacuation subsystem, two types are differentiated: mechanical evacuation in farms L1, L2, L3, L5, and L6, and manual evacuation in farms L4 and L7.*
- *In the reproduction subsystem, two methods are practiced: artificial insemination in farms L1, L2, L3, L4, L5, and L6, and mating with authorized bulls in farm L7.*
- *In the breeding subsystem, all dairy farms studied practice a single improvement method, i.e., purebred breeding.*
- *Regarding the utilization subsystem of the obtained productions, two methods are highlighted: the sale of raw milk to various milk processors, with prices ranging from 1.30 to 1.35 lei/liter in farms L1, L2, L3, L6, and L7; farm L4 sells milk through a special milk dispenser (milk vending machine) at the price of 3.50 lei/liter; farm L5 sells milk after processing at the milk processing point at the price of 2.69 lei/liter. Milk processing at this section yields various cheese types: fresh cow cheese, cow telemea, and cream with 32% fat content, called farm cream. A portion of the milk is also pasteurized at high pasteurization at 90°C.*

4. *The analysis of the technological flow in beef cattle farms reveals several technological types within the subsystems of the technological flow:*

- *In the feeding subsystem, a single mixed technological variant is adopted, from stock, indoors in the winter season, and on pasture in the summer season. However, there is differentiation in the winter period in the ration structure. Farm C2 feeds based on fibrous voluminous feed, while farms C1, C3, C4, and C5 use ensiled voluminous feed, particularly ensiled corn.*

- *In the maintenance subsystem, two technological types are observed: free-range maintenance in farms C1, C2, C3, and C6, and tied maintenance in farms C4 and C5.*
- *In the manure evacuation subsystem, two types are differentiated: mechanical evacuation in farms C2 and C3, and manual evacuation in farms C1, C4, C5, and C6.*
- *In the reproduction subsystem, two methods are practiced: artificial insemination in farms C3, C4, and C5, and mating with authorized bulls in farms C1, C2, and C6.*
- *In the improvement subsystem, two methods are practiced: purebred breeding in farms C1, C4, C5, and C6, while farms C2 and C3 practice absorption crossings, using the Aberdeen Angus breed as the improvement breed.*
- *In the utilization subsystem of the obtained productions, two methods are highlighted: farms with Aberdeen Angus and Aberdeen Angus crossbred cattle, i.e., farms C1, C2, and C3, sell fattened animals to Karpaten Meat Group in Sibiu, which purchases live calves at prices ranging from 10.50 to 12.00 lei/kg, depending on weight category. Farms with Charolaise cattle, i.e., farms C4, C5, and C6, sell fattened animals to the Samcom Meat slaughterhouse in Cătămărăști, Botoșani County, at an average price of 10.50 lei/kg carcass.*

The doctoral thesis contains significant elements of novelty, including comprehensive research on the management and technological flow in cattle farms for milk and meat production in Neamț County. This research took into account the geographical distribution of the main types and subtypes of soils, influenced by climate, anthropogenic factors, and specific relief in the region. The thesis highlights various aspects related to the territorial distribution of land use, with 41.7% of the total area covered by forest vegetation and woods, 48.9% occupied by agricultural land, and 9.4% consisting of unproductive land.

By conducting this research, concrete results were obtained that can significantly contribute to improving the technological flow and management in cattle farms in Neamț County. These results provide valuable information and practical guidance for farmers, helping them optimize production processes and improve performance.

The doctoral thesis can be utilized as a manual of best practices for farmers in Neamț County. The results and recommendations can be presented as a practical guide, offering farmers detailed information and instructions to apply the best practices in cattle breeding and exploitation.

The obtained results in this research led to viable solutions that, when correctly implemented, can generate profits in cattle farms in Neamț County. These solutions are based on technological aspects, efficient management, and adaptation to the specific conditions of the region.

Therefore, the doctoral thesis makes significant contributions to the field of cattle breeding and exploitation, providing relevant information and practical recommendations for the development of this branch of agriculture, effectively and profitably in Neamț County.