

ABSTRACT

The title of the doctoral thesis: Research on improving the technological flow and the influence of cattle breeding in the Dornelor Basin on the mountain product.

Keywords: Dornelor Basin; mountain product; taurine; mountain area; Pinzgau; Brown; Bălțată românească; technological flow; productive performance

Cattle breeding is a major branch of global and national agriculture and animal husbandry, due to the volume, diversity and value of products and products obtained from this activity (Acatincăi, 2004, 2009, 2010).

Cattle breeding is a branch of intensive agricultural production, a means of superior capitalization of feed resources and ensuring the essential means of subsistence necessary for man (Bocănici, M., 2007).

Cattle breeding in Romania is a traditional activity of the population in rural areas and especially in the mountains.

The Dornelor basin has large areas of permanent meadows (pastures and hayfields) that provide cheap food for cattle raised in this area. The inhabitants of this area are animal breeders, especially cattle, from ancient times, who make very good use of permanent meadows with high natural value.

For the elaboration of this doctoral thesis, research was carried out in order to highlight the influence of cattle breeding in the Dornelor basin on the „mountain product”, by analyzing the management and technological flow of seven specialized farms for milk production and four specialized farms for meat production. Laboratory analyzes were also carried out on dairy products and meat products benefiting from the optional quality label „mountain product”.

The first part of the thesis was made by consulting the bibliographic references in the literature which includes 2 chapters that describe aspects regarding the situation of cattle herds worldwide and nationally and their dynamics; the evolution of farms for raising cattle worldwide and in our country; production of milk and milk products; production of meat and meat products; factors influencing milk and meat production and global and national research on cattle breeding and exploitation.

The second part of the thesis comprises 5 chapters and brings information on the management and technological flow of farms located in the mountainous area of Romania, more precisely in the Dornelor basin, but also new information on the use of the optional quality term "mountain product". as a way of promoting and capitalizing on the products obtained in the studied farms.

The aim of the research was to improve the technological flow and identify the influence of cattle breeding in the Dornelor basin on the "mountain product".

The objective plan covers several stages of research:

1. Analysis of the management and technological flow in the cattle farms in the Dornelor basin, by going through the following stages:

- Management analysis in specialized farms for milk production;
- Management analysis in specialized farms for meat production;
- Analysis of the technological flow in specialized farms for milk production;
- Analysis of the technological flow in specialized farms for meat production;

2. The study of the productive performances for the breeds of cattle raised in the Dornelor basin by going through the following stages:

- The study of the productive performances at the ascent of the herd of cattle from the specialized breeds for milk production;
- The study of the productive performances for the offspring of the herd of cattle from specialized breeds for milk production;
- The study of the productive performances at the ascendancy of the cattle of the specialized breeds for the meat production;
- The study of the productive performances for the descendants of the herd of cattle from the specialized breeds for meat production;
- Productive performance on total and normal lactation, in the succession of lactations, on farms and breeds: duration of lactation, amount of milk, fat content, amount of fat, protein content, amount of protein. Reproduction indices: V.P., R.M., S.P., C.I;
- Productive performances in meat production, assessment of fattening status of cattle (live weight at birth and delivery, s.m.z);

3. Research on the possibilities to improve the management and the technological flow in the cattle farms in the studied area by going through the following stages:

- Possibilities to improve the management and technological flow of specialized cattle for milk production;
- Possibilities to improve the management and technological flow of specialized cattle for meat production;
- Possibilities for profitability of cattle farms in the Dornelor basin.

4. *Research on the influence of cattle breeding on the "mountain product" by following the steps below:*

- Carrying out laboratory analyzes regarding the chemical composition of the mountain products studied;
- Carrying out laboratory analyzes regarding the content in fatty acids, cholesterol and mineral substances (Ca, P and Fe), of the mountain products studied;
- Carrying out laboratory analyzes of the mountain products studied, from a microbiological point of view.

In order to achieve these objectives, in this research, it was necessary to go through several stages. For the study of the productive performances at the ascendancy and descent of the studied cattle herd, data were taken from the Genealogical Register of Breeds (milk breeds and meat breeds), they were statistically processed, at the discipline Livestock technology of FIRAA Iași, but also methods for estimating milk production on normal lactation in offspring were also used, using the method based on maximum production. For ascendancy mathematical relations were used for estimating milk production, in cattle that were not studied for the official control of production.

For the calculation of the profit obtained in the studied farms, the value of the gross profit obtained was determined by the difference between income and expenses.

In order to highlight the influence of cattle breeding on the mountain product, laboratory analyzes were carried out on dairy products that benefit from the quality mention „mountain product”, from the Dornelor basin. As there are no meat products registered in this area that benefit from the quality mention „mountain product”, products from producers in the mountain area of Gorj County were studied.

The dairy products obtained in the Dornelor basin, which were analyzed are: „Călimani” sweater; „Călimani” cheese; „Călimani” smoked cheese; „Călimani” kneaded cheese and „Călimani” telemea.

The meat products from Gorj County, which were analyzed are represented by: Angus grill sausages; Angus spicy sausages; Angus pastrami and Angus mountain salami.

The laboratory analyzes performed on the mountain products studied are the following: chemical composition; establishing the profile of fatty acids, the total cholesterol content and mineral elements; microbiological analysis.

The laboratory analyzes regarding the chemical composition of the analyzed products were performed in the Laboratory of Animal Production Technology within the Faculty of Animal and Food Resources Engineering of Iași.

For the determination of crude protein and crude fat, two methods are to be used: the method of determining total nitrogen (Kjeldahl); extraction method (Soxhlet or Randal).

Research on laboratory tests to establish the profile of fatty acids, cholesterol and mineral content (Ca, P and Fe), was conducted at the National Research - Development Institute for Animal Biology and Nutrition (IBNA) Balotesti.

The concentrations of calcium, phosphorus and iron in the studied samples were determined according to a complexometric method validated and used in the Laboratory for Determining the quality of animal feed and products, within the National Research - Development Institute for Animal Biology and Nutrition (IBNA) Balotesti.

The laboratory analyzes, regarding the determination of the microorganisms from the mountain products under study, were performed in the Microbiology Laboratory, within the Veterinary and Food Safety Authority from Iași, where the following microorganisms were monitored: *Enterobacteriaceae*; *Staphylococcus c.p.*; *Escherichia coli*; *Listeria monocytogenes*.

The herds of cattle specialized for milk production, from the studied farms, are located in the Dornelor basin and belong to the Romanian Bălțată breeds; Dotted with Romanian black; Brown and Pinzgau, and bulls of the specialized breeds for meat production belong to the Aberdeen Angus and Charolais breeds. The farms studied are numbered L1-L7 for milk production and C1-C4 for meat production.

The results of the research led to the formulation of the following conclusions:

1. In the analysis of the management of cattle farms belonging to mixed breeds (milk-meat), two farms are distinguished, respectively L2 and L3, by the following elements: the form of organization for the farm L2 is an individual enterprise and L3 is a company; as a level of professional training, the farmer from the L3 farm has higher education (food industry), and the farmer from the L2 farm has secondary education (veterinary technician).
2. When analyzing the management of beef cattle farms, 2 farmers are highlighted, from holdings C2 and C3, which have as a form of organization Authorized Individual (PFA) and as a level of training secondary education, completed with a baccalaureate degree. In the case of specialized farms for meat production, there is a significant share of farms with poor management (50%).
3. The technological flow from cattle breeds belonging to mixed breeds (milk-meat) is closed, maintenance is linked. They differ in the size of the accommodation spaces, the floor being made of wood or concrete. There are

individual drinkers, ventilation baskets, the evacuation of manure is done manually.

4. The technological flow from specialized farms for meat production is characterized by: free maintenance on permanent bedding, the use of collective gutters. There are ventilation baskets, feed alleys. Milking is not performed, the calves suckling the mother cows until weaning.

5. Related to farm management and technological flow, the highest profits are obtained in L2 and L3 farms (mixed milk-meat production), because they sell dairy products at very good prices. The farmer from the L3 holding benefits from the option of optional quality „mountain product”; on specialized farms for meat production the highest profits are obtained in C3 and C4 farms, which have the largest herds of cattle and have large areas of land;

6. In ascendancy, the results on the productive performance of the specialized (mixed) milk-meat farms highlighted the L2 and L3 farms which obtained the following results: in the L2 farm (mainly the Romanian Bălțată breed) a milk production of 6120 kg was obtained from the mother, 6170 kg of milk from the father's mother, and 6035 kg of milk from the mother's mother; in the L3 farm (Brown breed) a production of 6336 kg of milk was obtained from the mother, 5981 kg of milk from the father's mother and 6171 kg of milk from the mother's mother;

7. In the offspring of the cattle herd studied for milk-meat production, the best results were obtained in farms L2 (Bălțată românească - 5339 kg/normal lactation) and L3 (Brown: 5842 kg milk/normal lactation). These farms have a valuable ancestry and the best management compared to the rest of the studied farms, which explains the results obtained;

8. On specialized farms for meat production, the most valuable ancestry is recorded on farms C2 (Aberdeen Angus) and C3 (Charolaise), which obtained the following results: birth weight-34 kg in mother and father, weight in age of 200 days-206 kg in father and 204 kg in mother, the average daily increase at the age of 365 days-1026 gram for father and 969 gram for mother;

9. The best results were obtained in the offspring of beef cattle on the C1 (Aberdeen Angus) and C3 (Charolaise) farms: birth weight - 28 kg, average daily gain at the age of 365 days-856 grams and weight at the age of 365 days - 327 kg. Even if the C2 farm has the most valuable offspring, it failed to obtain the best productive performance in the offspring.

10. The Charolaise breed develops a very good average daily increase until the age of 15-16 months, having a very good growth rate compared to the Aberdeen Angus breed, which has high values at the average daily increase and growth rate in the first 12 months of operation, and subsequently the mentioned indicators are reduced; the valuable ascendancy of the herd, completed with optimal exploitation

and welfare conditions determines the externalization of the genetic potential of the animals;

11. The capitalization of milk production is differentiated on farms; on the L2 farm within the integrated processing center on the holding, the products being sold at the farm gate and within the own boarding house; in the L3 farm within the company *Dany Lily* S.R.L, which belongs to the farmer, obtaining products with the mention of quality „mountain product"; milk from farms L1, L4, L5, L6 and L7 is delivered to the processing unit (S.C. *Rarăul* S.A. which is part of the *Lactalis* Group, at a price of 0.9-1.2 lei / liter, depending on the quantity delivered);

12. The capitalization of meat production is differentiated on farms, depending on the breed. At the farms that exploit the Aberdeen Angus breed (C1 and C2) the animals are capitalized at a weight of 580 kg, at the slaughterhouse in Răchiți locality, Botoșani county, at a price of 11 lei/kg carcass, but also by the company *Karpaten Meat Group*, from Sibiu county, which acquires Aberdeen Angus calves and crossbreeds of this breed, at the age of 30 days for breeding and fattening or female and male youth at the age of 365 days and weighing over 250 kg, for slaughter; Charolais calves are weaned, fattened up to 650 kg and slaughtered in a series of meat slaughtering and processing units, such as: the slaughterhouse in Răchiți locality, Botoșani county, (at a price of 11 lei / kg carcass) ; the slaughterhouse from Pașcani locality, Iași county (at a price of 11 lei/kg carcass);

13. The "mountain products" from the Dornelor basin studied were represented by the following dairy products: „Călimani" șvaițer, „Călimani" cheese, „Călimani" smoked cheese, „Călimani" telemea cheese and „Călimani" kneaded cheese. As there are no „mountain products" from beef in the Dornelor basin, meat products were studied in the mountain area of Gorj county, represented by sausages: Angus grill sausages, Angus spicy sausages, Angus mountain salami and Angus pastrami;

14. In the chemical analysis of the „mountain products" from the studied milk, the highest amount of protein was obtained in the „Călimani" swaițer, respectively 26.5 grams/100 grams of product, 27.5 grams/100 grams of lipid product and 4 grams/100 grams of product total minerals, and for meat products Angus pastrami has the highest protein content, respectively 22.5 grams/100 grams of product, fat content 13.6 grams/100 grams of product and 1.7 grams/100 grams of total mineral product;

15. $\Omega 3$ fatty acids are found in dairy products in quantities of 1.3-1.6%, and in meat products, in a proportion of 0.6-3.0%; $\Omega 6$ fatty acids are found in quantities of 3.06-3.25%, in dairy products and 3.56-7.88%, in meat products; Angus spicy sausages are the richest in $\Omega 3$ (3.06%) and $\Omega 6$ (7.88%);

16. The highest amounts of cholesterol, contained in dairy products, were 43.54 mg/100 g product, in the „Călimani" swaițer and 48.51 mg/100 g product, in Angus spicy sausages;

17. Milk „mountain products" have the highest calcium (1.48% for „Călimani" smoked cheese) and phosphorus (1.17% for „Călimani" kneaded cheese) and the lowest iron (22.69% for telemea cheese „Călimani"), and meat products are deficient in calcium (0.06% in Angus pastrami) and phosphorus (0.39% in Angus spicy sausages), but have a high iron content (78.31% in Angus mountain salami);

18. Meat „mountain products" have a higher protein content (22.5% for Angus pastrami) and a lower fat content (13.3% for Angus pastrami), having a higher nutritional value compared to conventional meat products (21.2 g protein/100 grams produced in conventional wet beef pastrami, 16.8 g lipids/100 g produced in conventional wet beef pastrami);

19. *Enterobacteriaceae* microorganisms have been identified in mountain dairy products, the highest content being in fermented „Călimani" cheese (15 MPN/g), while in meat products, no microorganisms of this class are present; the level of *staphylococci* in the analyzed samples (milk and meat) is <10 cfu /g, *Escherichia coli* was identified in meat products <10 cfu/g being within normal limits according to data from the literature, and *Listeria monocytogenes* was not detected in the analyzed samples;

20. *Enterobacteriaceae* microorganisms are missing from conventional dairy products, because in the production process milk is pasteurized, a process in which the destruction of microorganisms takes place. *Staphylococcal* microorganisms are present in amounts of up to 10 cfu/g;