The influence of technological factors on cow milk production in zootechnic ecosystems from Vrancea County in Romania

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Summary: - The increasing of cattle number from livestock ecosystems is a major objective in achieving feeding security of the human population. By the same time, the sustainable development of livestock is tightly linked to the protection, conservation and development of human useful animal species biodiversity. In this study are presented the comparative results from specialty literature about cows breading, depending on the exploitation technology and factors that influence milk production. By the same time, comparisons are made between the mode of cows maintenance at national and international level with existing conditions in Vrancea County in Romania, regarding the applicability of possible strategies of reorganization of exploitation technologies for milk cattle, according to race, ecological zone, size of holdings and form of property.

Keywords: ecosystem, management, feeding security, holdings, biotechnology

1. Introduction

In current conception, cattle's breeding and exploitation technologies represents all managerial and technical measures developed and applied in order to achieve harmonization the economic optimum with biological one, aiming at obtaining maximum quality productions at a lower production cost.

Management it's one of the important factors that contributing to the increased production and reduction of the physical human effort, in both intensive system and in other operating systems of exploitation and animal breeding. Considering the fact that the process of cows exploitation it is an operation based on knowledge of individual peculiarities and of animal populations, as well as the interrelationships that occur between genotype and environment, for obtaining oh maxim production, appears the need to determine the demographic parameters, of structure and population dynamics, the knowledge of exploitation and production organization factor's.

Below is presented as a study case, the territorial situation for Vrancea County. To identify those elements, the research took place at the location of medium and small holdings of dairy cows from Vrancea zone ant it was based on: analyzing the evolution of livestock and production obtained, of the forage base, accommodation and degree of mechanization of technological processes, biological value and the degree of genetic improvement of the two basic races - Brown (fig.1) and Romanian Black Spotted (fig. 2) exploited in the area, size of holdings and cattle's number in holdings, load to 100 ha of agricultural land, work force and management of technological factors in production.

Fig.1. Aspect of races – Brown

Changing the ownership structure of cattle species from 30-35% in 1989, at over 99% in 2009, passed into private ownership, moves the interest in increasing modernization and in to exploitation of this species at small individual household level.

In terms of large farms and holdings, the existence of a highly skilled workforce and of experts with extensive
production experience, it is guarantee for successful migration from existing production facilities to more flexible, with complete technological flow and with economic efficiency secured. that characterizes this production.

Analyzing the modern concept of exploitation of dairy cows, we see that his guiding principle is to increase milk production quantitatively and qualitatively, in condition of economic efficiency, with respecting internal and external factors influence

2. Study of agricultural holdings

As demonstrated by literature and achievements in the world, we can say that agricultural exploitation it is the base of food production now and in future. To resist in the domain of breading milk cows in holdings should take into account the criterion of efficiency, land surface for growing fodder, for grassland (fig.3) and the market for selling products.

The experience gain in agricultural exploitations from developed countries may be different from an aria to another, from country to country and even inside these ones, considering the form of agricultural organization. Thus, we can see a large variety of exploitations from the basic one of family exploitation to the capitalist enterprises and also various forms of associations and corporations (cooperative associations, companies, private or combined corporations etc.), or multinational food companies.

In Western Europe, USA, Canada, we can see a massive growing of the dimensions of the exploitations partially because the farm with a surface till 10 hectares is not consider profitable in most of the west European countries, but the optimal size of a farm is not strictly dependent of its and surface or by the number of cattle. Here we take into consideration the factor intensity. From our information it is significant that inside E.U. were we have reached an over production, the cattle farm receive money only in the following conditions: keeping production between established limits; diminishing of the total quantity of milk; diminishing the areas cultivated with cereals; rural tourism; making Bio products (fig. 4).

These conditions have creates a frame for the appearance of cooperative exploitations or associations, specialized in raising animals, were the imposed conditions have not stopped the organizations to grow the average productivity.

The ideology of the exploitations in Romania begins with agrarian law from 1864. The promoter of this law was Ion Ionescu de la Brad which organized the agriculture in: small family farms of 5 hectares; large farm farms of hundreds of hectares.

From these types a third from the small farm and a half from the large farms had to be cultivated with fodder.

The reforms which followed tried to establish the social order in rural areas, but, not until now, even with the latest law no. 18 \ 1991, all we have manage to achieve is to pass the lands to those who are working it.

Chronologically, the explorations have evolved as follows: small and large farms; credit cooperatives, lease and buying cooperatives (1919 – 1921); reducing the number of these explorations due to the “law of free circulation of agricultural properties” (1929); growing the peasant properties to minimum 50 hectares (V., Magearu – 1933); gathering of rural properties (M., A., Badarau, 1920 – 1940); organising cooperative exploitations (Vasiliu); obligatory exploations of minimum 500 hectares (N., Stefanescu – Iasi – 1931); associations for improving agriculture (Gh. Ionescu Sisesti – 1931); making associations as agricultural production cooperative (V. Rănescu – 1923); economical organisations to coordinate the cooperatives (C. Moldoveanu – 1935); the most complex form of organisation was proposed by Marin Chiritescu Arva, uniting the economical form of peasant properties into a cooperation (cooperation –farms).

The raising of animals during this time had the objective to ensure the own needs of a house hold not to produce goods.

In this stage, after Law no. 18 \ 1991 was applied, when properties have been reduced to average 10 hectares of land and 1,3 cattle for each owner, brings us to a point where we cannot even call the farms but explorations, situation explained by the fact that an owner has land, raises cattle but also other species, birds and the agricultural products which exceed it consumption are pre-worked before selling using its
own labour. The number of these explorations is very large for the moment being.

As for the actual situation from private owned explorations, if we want them to be profitable it is necessary to consider the evolution of Romanian agriculture in time, the achievements of developed countries and advices from scientist and specialists.

Given the necessity to present the latest theoretical knowledge and to link these existing knowledge of the practical conditions, we tried to group everything that is new and useful knowledge and understanding of the current level of development of dairy farms.

Due to the peculiarities of the relief (fig. 5) and geographical position, climate, flora, fauna and soil structure of Vrancea County are varied and complex, which characterizes a different agricultural production in the three defined areas (lowland, hilly and mountainous). In terms of agriculture, county size is given by the existence of 133 429 farms with an average area of 1.42 ha of agricultural land, of which 35,202 are holdings, with an average of 1.54 cattle, a situation that confirms the nature of subsistence farm.

These holdings are primarily providing labor and all sectors of activity in the area. Regarding ownership, the proportion of farms owned 1-3 ha of agricultural land and between 0.5-1 ha, with an average of 1.54 cattle effectively against average, 1.44 bovine.

Summarizing the most significant aspects of the investigation results in this paper, data have been presented since 1990, which were compared with the previous period this year, at the macroeconomic level and then through a case study.

Comparisons were made with some values in the country and we are part of the European area, issues that led to the conclusion that the evolution of cattle herd, even if not maintained on a continuous upward curve, there was private interests of the population this species and to increase production.

The positive effect of the transition to private ownership of livestock was characterized by: significantly improving the overall state of maintenance of animals; reducing the incidence of morbidity and mortality; improving the reproduction indices; significant improvement of average milk production and average weight at slaughter; improving the age structure by increasing the share of young animals and older animals to reduce weight, with low production.

At the same time, very small size, the actual number and size of land holdings has many more disadvantages, the most important being: limited application of technology flows, as well as the equipment for obtaining, processing, storage and recovery of production; lack of an appropriate framework for carrying out an appropriate feeding with a balanced structure and volume of concentrated feed, allowing the expression of biological potential and obtain quality products and efficient; difficulties in applying biotechnology to breeding and selection in relation to artificial insemination, embryo transfer and control of breeding performance; difficulties in the application of sanitary-veterinary prevention, detection and combating disease to reduce morbidity and mortality; limiting the recovery of output produced by specialized processing units for them to reduce the herd; low level of professional knowledge of the farmer, growing and care of animals, obtaining and processing in terms of production and adaptation to market economy requirements.

3. The study of biological material

Knowledge of the production levels, plant development, reproduction indices and degree of genetic improvement from which we start, the management of technological factors and state economic policy in the field of cattle breeding is essential in promoting the modernization of breeding and cattle operation.

Simplistic approach to modernization by increasing the number of cows in stables scale family farms and adapt to new requirements of stable dimension the transition to market economy, would be an unfortunate remake of fundamental errors, prepared in haste, resulting in large and complex firm, many oversized, functional and economically inefficient. It should be noted that modernization of farm livestock it triggers over time important changes in socio – professional plan.

In the three ecological zones of Vrancea County is growing two main breeds of cattle: Brown Maramures, which is basic breed farm holding and Romanian Black Spotted breed found only in plain and hilly areas, both small and medium-sized family farms and in farms belonging to state-owned
companies.

The analysis of production performance, successive lactations, the areas, towns and family farms, it appeared that Brown cattle population Vrancea area is characterized by an average of 032.42 kg in March and 3.71% milk fat content. The ecological zones are found in the hilly area cattle population has made the best productive performance, with an average of 3106.21 kg milk fat and 3.70%, while the population has made the Brown Mountain area, only 2796, 72 kg of milk fat and 3.75%. Brown cattle in the lowlands have achieved an average production of 055.73 kg in March and 3.71% milk fat.

The existence in these populations of 3.24% cows with average performance over 5000 kg milk, reflects the genetic potential of the Brown race and beneficial impacts of the use of increased genetic value and can improve the productivity level of the population studied.

Brown cattle population studied of the ecological zones and farm types show significant differences between family farms in the same area and between plains, hilly and mountainous zone.

Analysis of age at first birth shows a slight precocity of the population studied, but also great variability within each farming areas and from one farm to another.

On the other reproductive indices studied breast repose, calving interval, service period), it can be concluded that the function of reproduction was greatly influenced by technological factors operating and management practices in each farm.

Development and body conformation analysis shows that the population studied is characterized by an average of 125.19 cm height and weighing 473.29 kg, with differences from one area to another and from one farm to another.

With a much lower share in the structure of Vrancea County the Romanian Black Spotted race, is prevalent only in some family farms and state-owned companies in the area of plains and hills.

Average performance of milk production and fat are at level 3131.22 milk kg and 468.39 kg milk fat, for Romanian Black Spotted cattle in plains, respectively, 597.67 kg and 135.49 kg milk fat in the area hilly.

The analysis of indices of Romanian Black Spotted breeding cattle population, the same issues emerged, and as established with the Brown race.

The Romanian Black Spotted cattle from Vrancea area is characterized by an average size of 129.10 cm and 505.73 kg of body weight, values below the breed standard.

4. Accommodation and providing forage base

The analysis of housing and interior design space of existing livestock farms in the Vrancea area, prior to 1990, can make the following comments: maintenance cows make the system „bound” in the stables with a capacity of 107, 204 or 316 seats, with seating on two and four lines that, depending on the nature and intensity of farm operation were different and complex technological solutions.

These houses and farms in late 1989 were upgraded 90%, ensuring: optimal microclimate conditions; comfort stand on maintenance technology; maintenance and dispensation system linking group; water supply to the stand by automatic drinking troughs; mechanization of feeding solution volume with fodder; solutions for manure disposal and management; mechanized harvesting of feed solutions, storage, preparation and administration; maternity, disease control, nursery, artificial insemination, medical station - veterinary; parking for cars, machinery, vehicles and workshop; administrative group.

It is a fact that these shelters had some shortcoming: high consumption of materials; maintenance of housing and poor sanitation conditions in most farms; a low productivity and poor working conditions; a poor reliability; poor management lack of modern data; poor management, with direct influence on performance, cost and profitability.

On the basis of feed and production averages prior to 1990, there is some swings from year to year and from one farm to another, the trend towards reduction of arable fodder crops.

The decrease in area, and average yields contributed to the inconsistent production of total milk in the existing biological potential.

Analysis of these elements after 1990 leads us to the general conclusion that, in 2009, compared with 1989 (52,121 head), breed number decreased to 33242 heads.

5. Technologies and management from holdings

The study conducted in three areas of Vrancea County, it appears that the total holdings, 56% raise one cattle, 35.5% raise two cattle, 7.4% raise three cattle, 1.1% raise four cattle and only 0.2% raise five cattle or more. The largest proportion of farms with one cattle are in the hilly area (61.1% of farms), followed by those in the mountain area with 55.5% and 55% in plains.

It is pointed out that the number of farms that have just cattle is extremely low, most farm are practicing polyculture in order to meet their own consumption. The studies of technological elements of family farms with dairy cows lead us to general praise that, currently, the peasant households still apply old technologies, traditional ones: applies to maintenance related holdings winter and summer mixed; housing generally allow operation housed livestock, but...
farmers are striving to improve comfort, especially for lighting, ventilation, manure disposal, taking food, water, feeding is done manually, the mechanization of the technological links are nonexistent; watering is done with specially designed buckets or troughs or directlz in some wells near streams; solid manure removal is done manually, and those liquids through channels, straight out, where in rare cases is collected in tanks or platforms, often being left to pollute the environment; during the summer, during the day is organized communal grazing in herds on fields, in the evening, the cows are withdrawn in their own household; in the mountains, there are also situations where cows are taken to fields located at large distances, where they organized the so-called cows-place till autumn maintenance.

There are no shelters improvised operation, accommodation at night and in case of bad weather; cattle grazing include all age groups and even non castrated steers and other species, in most cases being goats; the quality of pasture is totally inadequate, hydro-fertilizing, over seeding, weed control and toxic plants are totally forgotten; milking is done only manually, because the owner holding a small number of cows, the requirement to present material, can not allow the purchase of a mechanical milker.

Poor financial strength does not allow that farmers do invest for the modernization of housing, providing quantitative and qualitative forage base, provision of equipment, machinery, plant, that would work easier and to ensure the profitability required.

The farmer has great difficulty in realizing the production of milk and meats costs far exceeding production costs.

Case study, in 1263 farms and 2626 farm people, highlighted the following aspects of employment: breakdown by age groups: 13.02% up to 20 years; 20.9% between 20-40 years; 40.6% between 40-60 years; 25.48% spots 60 years; the sample studied, dealing directly livestock: 3.22% up to 20 years group, of which only 1.06% girls; 13.32% of group 20-40 years, of which 9.14% women; 31.79% of group 40-60 years, of which 21.13% women; 11.04% in the group over 60 years, of which 4.68% women. Compared to the above, it can be concluded that, of the 2626 people surveyed existing farms, 60.39% raised animals, 42.83% which exceeds the age of 40 years, and of these 34.95% are women. Given the average number of residents who returned to the farm, compared to those working directly, the ratio is 1.39 persons, with variations from one locality to another, ranging from 0.44 persons in Panciu holdings and 2.16 people in Hângulești holdings.

6. Conclusions and recommendations
The research showed that the breeding of cattle is a key concern to farmers Vrancea area.

Concerning the development, production modernization and achieving effective freight dairy farms, we think it is absolutely necessary to upgrade technologies in cattle breeding and exploitation of dairy farms in the general context of action to recover and revival of the Romanian livestock is the main link to be taken into account regardless of ownership form and size of holdings.

In this context, it is in the essentials: construction and modernization, especially in the housing; completion of new water supply systems and water sources in own holdings; establishment of private centres specializing in local level (community), taking over for milk storage, primary processing (pasteurisation, cream) and, in perspective, processing and recovery in the form of milk products; establishment of fixed and mobile private centres at local level (common) or the joint centres for the preparation of concentrated feed, which is technically assisted nutrition experts to develop recipes and optimized rations for dairy cows and other species; improving the structure and fodder crop cultivation, showing a growing interest among farmers, even if establishment of this culture is very expensive; extending technologies for growing forage plants in own field and improving the natural pastures, harvesting, conservation and efficient use of feed obtained maximum of production, the mechanization having a leading role; potential for soil fertility through land improvement (drainage, irrigation), with manure and chemical fertilization, pest and disease control; the natural meadows, the main concern is the need to increase their use, by creating technical and organizational conditions in order to increase the load of cattle, with quantitative and qualitative increase of green mass.

Technical and managerial actions will be taken, separately on ecological areas as follows: natural grassland in plains, given the high fertility of the soil, will be exploited for fodder cultivation with high productivity; natural grasslands in hilly and mountain area must be improved through: anti-erosion works; deforestation, drainage and irrigation; reseeding and over seeding varieties and hybrids of perennial grasses and legumes, high productivity; manure and chemical fertilization.

For full and effective exploitation of pastures, it is necessary to ensure a rational grazing, dividing surfaces normal or electric fences, ensuring water provision, collection and preservation as hay, of the surplus of green mass.

Natural grassland areas, particularly pastures, will be operated as follows: by individual owners of privatized; owners associations or organizations the
congregation; the fields jointly organized by the City Hall, especially for family farms use animals, so the smaller size. Own field of forage crops is considered as optimal (indicative) in Vrancea area as the following structure: 64% alfalfa and clover; 15% perennial grasses; corn silage and 11% in own field; 1% annual perennial green mass; 9% fodder beet and kale. Also successive double crops can be a resource and be considered possibly as back-up. For the full realization and effective implementation of feed volume given the physiological requirements of animals and the need to maximize their biological potential, it is necessary that: during the summer (grazing) cattle can be fed with green mass, primarily through grazing areas cultivated for green matter; during the winter (indoors) for the same species, feeding with hay is made (fig. 7), special attention will be given to the whole plant silage made from corn as the basic feed and fodder roots. In achieving high yields of milk and meat.

Fig. 6. The appearance of an adjustable fitting for hay storage

The directions to improve breeding technologies for dairy cows in medium and small farms in Vrancea area must consider: carrying out feasibility studies in the area adapted to specific conditions; improving development and integrated foundation technology flows; adapting existing technologies to systems maintenance and animal feed production using appropriate technologies, food preparation and administration; ensuring complex echanization and development of effective technological solutions; general reduction of energy consumption and use of unconventional sources; medium and long term, should be considered computerization of basic technological activities: concentrated feeding, milking, breeding, manure disposal, materials management and production. The breeding strategy of dairy cows, it seems necessary: increase in density to 100 ha of agricultural land, especially in hilly and mountainous areas; average production increased to 4,500 kg up in 2005 by making genetic progress 1-2% annually; improving the reproduction parameters increased birth to at least 85%, reducing the interval between births and reducing the age at first birth; increasing the number of calves destined for fattening and exploit existing availabilities acquisition organization.

Improvements in production parameters in small and medium-sized farms of dairy cows can be achieved through the development of quantitative genetic research priority populations and conversion index increased by cows, taking into account all adjustment mechanisms and the use of technology efficient operation. Genetic progress must be oriented to improve profitability by reducing production costs, specifically by increasing animal productivity. From interviewing made, results that those who breed dairy cows on the farm would introduce technical progress, but lack of money, lack of initiative, yet to achieve the production of goods and lack of support on loans beneficial (causing the farmer to milk all by hand) does not allow the purchase of a milking device. In order to harmonize the economic optimum with biological one, operated by dairy cows is necessary to apply the modern technology.

Only a greater labour productivity of dairy farmers, coupled with experience in production, investment levels in high-tech equipment, which avoids hard work and time, will give them enough time for planning, purchasing, sales, etc. in a word to management. Selection, in turn, determine, according to the management and functionality of the farm, the restructuring of the animal population, restructuring occurs, practically, by multiplying the differentiated phenotype of animals with the most favourable under the circumstances, occurring while the goal and the selection of use full genotypes.

Concerning the development, production modernization and achieving effective freight in agricultural holdings county, it is imperative: equipped with adequate machinery; construction and modernization especially of animal shelters; supporting the optimization of the size of holdings; continuing improvement of existing breeds in areas of the county; establishment of alfalfa, silage crop production and improve existing natural pastures and meadows; intensive use of manure; promotion of cattle breeding projects in peasant holdings funded by efficient loans; creation of professional organizations that promote and protect the interests of farmers. To do different work in farms, the use of horses in the first place, and cows for milk to be used only for this production. In order to ensure appropriate animal comfort during feeding, milking, rest and hygiene, we recommend improving the constructive and functional aspect of the shelters.
Maintaining the current form of dairy farm provides not only the internal needs of milk, but also the capitalization of surplus, which is a false idea of commodity production.

A feature of the development of small and medium livestock farms should be to focus, specialization and integration through associative forms of production. Economic activity, nutrition and reproduction in dairy farms are compartments where computer finds a wide field of utility.

The activity of dairy farms to be understood, at present, not as an individual view of the small farmer, who use unreasonable means of production, fragments of land areas, livestock and products, but as a social function, in which take into account three key factors: land, animals and humans.

Most important technological developments to increase holdings of dairy cows can be grouped around three main factors, namely: increased productivity; reduce feed costs; emission control.

As a general conclusion of this case study, the territorial aspect, the ideal solution, in dairy farms is to increase the average production per female (practicing artificial insemination for further improvement of breeds), and it is delivered as the production of high quality goods, without ignoring that "the decisive factor of production to raise welfare in general is neither space nor energy nor cultivated land, but also improve the quality of the human population and increasing their level of knowledge" (Schultz TW, Nobel Prize 1979).

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