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VETERINARY MEDICINE „ ION IONESCU de la BRAD” IASI
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SUMMARY

Thesis for obtaining the scientific title of
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The doctoral thesis **“Contributions to the study research of the Brown breed cow population in Neamt county”**, elaborated by Eng. Dipl. Margareta Mihailescu, under the coordination of Prof. Ph.D. Eng. Vasile Ujica, within the University for Agricultural Sciences and Veterinary Medicine “ Ion Ionescu de la Brad” - Iasi, Faculty of Zootechnics, includes 3 parts, **7 chapters , 310 pages, 167 tables and 176 figures.**

The first part is structured in 2 chapters which cope with a large review of the bibliography upon the actual situation of growing cows at a global, national, regional and local level, the origin, the geographical spreading, population, ownership structures, exploitations, trends and principals when

According to the conducted study, it appears that the population of cows encounters a slow increment at a global level, and a more pronounced one in what refers to the productions. There are big differences between continents, countries, depending on the natural conditions, economic development, tradition in cow growing, existence of improved breeds and many other factors.

The Swiss breed, developed in Switzerland, represents a biological material with a special genetic value, spread worldwide because of the exceptional qualities that it has (high genetic value for milk and meat production, adaptability to the harsh mountain living conditions, increased valorification of the food, and small specific consumptions, organic resistance, productive longevity, etc.)

The problematic of cow growing and management in private exploitations, like family farms, is of high importance, both at global as well as at national level, because the realisation of increased milk and meat productions, with minimal costs per product unit, generates the increment of the level of living.

The Maramures Brown breed was introduced, grown and developed in Moldova region about one hundred years ago (1907), originating from Maramures and spreading along the extra-Carpathic zone of Moldova, Muntenia and Oltenia regions.

Through the introduction of this breed into the mentioned areas, the Brown breed contributed to the improvement of the existing cow populations, through mixing and absorption of Brown breed bulls, indigenous and imported, finally resulting a population with individual morpho-productive, reproduction and economic characteristics, which differentiate it from similar populations from other regions of the country.

The transformation process of the local cow populations through mixing with Brown breed, still continues in Moldova region.

A valuable pool of genes continues to be the Maramures region, as well as other countries with a long tradition in the development of the Brown breed, such as: Switzerland, Austria, Germany, Italy, USA. (V.Ujica, 1974, 2005)

The actual area of spreading for the Brown breed includes the Northern Transylvania, the Maramures county, parts of the Satu Mare, Salaj, Bistrita counties; in Moldova region, the Neamt, Iasi, Bacau, Vaslui, Vrancea, Galati and recently also Suceava counties; in Muntenia region, the Buzau, Prahova, Dambovitza counties; in Oltenia region, the Gorj and Mehedinti counties.

We must mention that even though the Brown breed has the largest spreading in Romania, after 1990 it encountered an evident regress, as population and area cover, due to mistakes of the growers and specialists who focused excessively on the Priza and Holstein Friza breeds.

Considering that the Brown breed has an important position in the cow breeds structure managed in the extra-Carpatic area, and in some of the counties from the Moldova region, like Neamt, Bacau, Vrancea is almost the exclusive breed grown, the author considered necessary a research upon the productive performances of the exploitations methods, obtained under specific circumstances, especially in small private peasant farms.

The second part includes the results of the research done on the farms and individual dwellings from Moldova region and Neamt county.

The reason behind this research is the situation that, even though the Brown breed has been introduced in Moldova region one hundred years ago, no in-depth research has been carried out, focusing on the cow population from the private sector (both individual and associative), allowing the knowledge of the current level of genetical improvement, the level of productive performances and the way the breed evolved in this area, the qualities and the faults encountered, the way it reacts to specific technologies and to the management of specific technical factors, the genetic and economic effect of maintaining into exploitation for a long period the cows with extremely diversified productive performances.

The research method was based on the study made at macroeconomic level (farms) and also based on individual farms interviews. In this respect, the autor used data from UARZ, DARZ, ANARZ, INS, etc, focusing on the following objectives:

- Study of the natural environment for the area, and the specific growing technologies;
- Study of the phonotypical parametrs for the milk production, per successive milking seasons;
- Study of the body development and constitution;
- Study of the reproduction indexes, per successive milking seasons;
- Study of the genetic parameters;
- Analysis of the intra-population structure;

Study of the genetic value for the improvement od the main selection characters for the bulls used for reproduction purposes.

With respect to the natural environment, the Eastern area or Romania offers favorable conditions for the growing of cows. The climate has a pronounced continental character. The temperature fluctuates between +9° C and +1° C, the mean annual precipitations range between 450 and 600 mm, and the wind regime is specific to the silvo-prairie area.

Through the research conducted on the production and reproduction performances in the active population, and from the analysis of the milk production indexes, per successive milking seasons per genetic groups and per entire population, the results are the following:

➤ **The duration of total milking season (DLT)** ranged between $379,34 \pm 3,89$ days for the first milking season, and $325,71 \pm 27,31$ days for the seventh milking season, existing the tendency to extend the milking season, especially for the cows with good milk productions, and to reduce the optimal duration of the mammary pause.

➤ **The quantitative milk production**, per normal milking season, according to the succession of the milking seasons, ranged between $2507,67 \pm 514,93$ kg of milk for the eighth milking season and $3477,79 \pm 77,36$ kg of milk for the fifth milking season, which is the maximal milking season in life. From the analysis of the evolution of the milk production, per successive

milking seasons, results that the Brown breed in the studies area has a mean productive precocity, during the first milking season being obtained 79,88% from the maximal production. In addition, it must be recorded a good productive longevity, characteristic very important for the economics of the Brown breed.

➤ **The fat content in milk** had average values between $3,77 \pm 0,01\%$ in the second milking season and $3,86 \pm 0,05\%$ in the eighth milking season, reaching the average of the breed. Related to the quantity of fat, there were + situations which prove the genetic potential of the breed as being higher than the average values expressed for the population.

➤ **Milk content in proteins** ranged values between $3,35 \pm 0,10\%$ during the seventh milking season and $3,51 \pm 0,03\%$ in the eighth milking season, while the quantity of proteins was in concordance with the milk production and the content of fat.

For determining the **reproduction indexes (VP, RM, CI, SP)**, the reaserch area covered the selection centers Piatra Neamt, Roman and Targu Neamt from Neamt county.

The analysis of the main reproduction indexes generates the general conclusion that the reproduction function was in acceptable limits, the growers being interested in getting one calf per cow, every year.

The age at the first bringing forth (VP) was, in average of $1000,86 \pm 5,25$ days (33 months and 11 days), with limits between 459 days and 1933 days. In this respect, the Brown breed population from Neamt county has an average precocity, characteristic which is influenced less by the genetics and more by the growing conditions of the young population of cows.

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The interval of time between the bringing forth events (C.I.), estimated as a syntetic indicator of the reproduction function, had an average value of 377,75 days, which was close to the ideal value of 365 days.

The service-period (S.P.) had an average value for the entire population of 112,63 days, close to the maximal accepted limit (120 days).

The varibility of these indexes offers the possibility for phenotipical and genetic selection for the genetic improvement of the population, but the main actions must be focused on improving the technical factors of the exploitations and of the management of the reproduction function.

In general, the reproduction activity for this cow population ranges between normal parameters, and shows that the Brown breed has qualitates superior to other breeds.

The estimation of the body conformation and development, though the linear depiction method, shows that the analyzed population is at the minimal limit of the sufficient class, with an average of $65,07 \pm 0,12$ points. Most of the frequent faults are at the feet level, especially at the hock, but also at the udder. For the udder, the total scoring was of $20,41 \pm 0,06$ points, with limits between 15 and 25 points. The most frequent faluts of the udder refer to the uniformity of the mamelons, size and simetry of the udder, and the speed of milk flow.

Considering the main parameters which define the **productive longevity** (life span, productive life span, total milk production and the survival percentage, according to the milking season), the drown conclusion is that there is a low efficiency, caused mainly by the technical factors and an unappropriate management.

Related to the heredity (h^2), repeatability (R), phenotypical (rp) and genetic (rg) correlations of the main selection characters, the average values for the phenotypical characteristics of production, reproduction and the main body dimensions, presented along the thesis, shown the existence of several sub-populations with a great individual variability and characteristics belonging to the milk-meat mix type, or even closer to the milk-type, like it was the case in Roman selection center.

The heredity coefficients of the quantitative milk production ($h^2=0,16$) show a low hereditary transmission, proving a deficitary consolidation of the genetic characteristic inside the population, but also the possibility to improvement through a genotypical selection.

Repeatability coefficients for the selection characters under analysis have higher values than for heredity, which show a more fidel expression of the component genotypes and a genetic determinism better expressed.

The analysis of the **coefficients for phenotypical correlation** between the quantitative milk production and the main production and reproduction characteristics, shows that in all the selection centers, the correlations have in the majority of cases different values and different than nil, situation proven also by other researches upon other cow breeds and populations (A.Petre, Gh. Mărginean, H. Grosu, V. Ujică ș.a.)

Related to the genetic correlations between the milk production and the other analyzed characteristics, the conclusion is that they are at a lower level than the phenotypical correlation of similar sign. There is a very strong correlation between the milk quantity and the fat quantity, respectively the protein, situation which favours the improvement of this parameter, considering also the strong correlations between the fat and protein percentage in milk.

The results of the **genetic analysis** of the relation between the milk quantity and the fat quantity, respectively proteins, but also between the fat and proteins, for all the sub-populations analyzed, are small and in most of the cases insignificantly different from nil.

The **analysis of the intra-population structure** underlined that, within the exploitation, there are a number of genetic families like paternal sister-branches with average productive performances over 5000 kg of milk, and also the existence of several plus-variants with 6-7000 kg of milk, characteristics correlated with a good body development and an improved reproductive prococity.

The synthesis of the data regarding the **improvement value of the bulls used for reproduction** purposes, leads to the conclusion that most of the reproducers had a negative influence over the main selection characters. This is shown by the values of the production indexes, much below the breed genetic potential, and the very slow evolution of the improvement of the morpho-productive and reproductive characters for the cow population in this area.

The third part of the thesis includes the parameters of the **Zonal Program for genetic improvement and management of the use of bulls from the Brown breed population, in Moldova region, during 2005-2010.**

Knowing the genetic structure of the Brown breed population from Moldova region, the phenotypical and genetic parameters for the main selection characters, the improvement value of the reproducers, of the main factors which contribute to the genetic improvement of a cow breed, the author developed a project for a **program for zonal genetic improvement** of the breed through the

improvement of the management of the improvement factors, of the selection plan with the matching of the mixing, and of the technological exploitations factors.

For the Brown breed population from Moldova region, the author obtained the data needed for the elaboration of the project for the program regarding the long term genetic improvement of the exploited breed, in family farms and in associative farms.

The used method was based on the setting of the sources for genetic progress and the amount of genetic progress induced through these sources:

1. Genetic progress induced through the bulls used for reproduction purposes

82 bulls were used (15 indigenus and 67 imported) with a genetic influence, per generation, was estimated to be 427,77 kg of milk for the indigenus bulls, and 562,22 kg of milk for the imported bulls. The total genetic gain was 494,94 kg of milk.

2. Genetic progress induced through the selection of the first-bringing-forth cows

Starting from a natality of 85%, a reform percentage of 15% for the young cows and 20-25% for the mature cows, and considering the size of the selection intensity and of the selection difference, a genetic progress of 98,00 kg of milk was reached.

3. Genetic progress induced into the population through the selective reform

The analyzed parameters were: the percentage of selective reform (12%), coefficient of repeatability (0.546) and the average production of the selected cows, reaching a genetic progress of 124,48 kg of milk.

By suming up the three sources (494,94 +98,00+124,48), it resulted a total genetic progress of **717,42** kg of milk.

This performance can be reached in 2010, if the parameters proposed in this program will be used, simultaneously with the improvement in the technological factors of exploitation.

The synthesis of the research shows that the Brown breed cows are well adapted to the environment of the area, but the production performances are many times modest and very different between the exploitations.

The great variability of the productive and reproductive characteristics, offer increased possibilities for the genetic improvement by using modern criteria and methods.

The improvement of the productive genetic potential will be done through the intensive use of bulls with a high genetic value, as main source for genetic progress in the cow populations. It is needed the improvement of the technology and of living conditions for the young populations, of the management of the reproduction, of the technology for exploitation and of the management of the technological and economic factors.

Considering the results obtained via this research over the management of the Brown breed in Moldova region, the author concludes that the Brown breed is and will be one of the main breeds for this area, the unaccomplishments could be corrected in time through selection, improvement of the technological factors and of the management of the farms.

The results and the conclusions of the research over the Brown breed population in Moldova region, are a good database of the current status of the genetic improvement, and can be utilized for further technical actions inside the program implementation, as an integrant part of the National program for the genetic improvement of the cow populations.