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THE STUDY OF POPULATIONS OF GOATS RAISED IN THE NORTH-EAST OF ROMANIA

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PHD DISSERTATION ABSTRACT

The importance of goats as livestock producing essential foodstuffs such as meat and milk has been presented more often in recent years, within the framework of several international conferences. This can be reflected by the growing number of individuals registered in the past 20 years. Moreover, in many rural areas of the globe, goats are the main supplier of milk and meat for the processing or self-consumption.

In addition, more and more consumers and nutritionists, believes that the products obtained from goats as having a particular food value, sometimes with miraculous properties in the treatment of some diseases. In view of the increasing interest for this species, it was considered appropriate to carry out more elaborate researches, both to assess the genetic potential of the domestic goat, but especially for the analysis of the nutritional value of the products obtained from them.

The need to conduct the research stems from the fact that the goat in Romania has not been fully studied, and the literature does not include the relevant data that can be used to characterize and improve them genetic potential. Based on the results of these surveys may be producers, processors and consumers and nutritionists, if we take into consideration international trends towards lean meat consumption and the fact that when it is recommend a diet, you need to take into account the relevant data and knowledge. In addition, this research is fully in line with the trend outlined lately in regards to raising goats in our country, their number being constantly growing, and the products obtained from the goats have a growing demand on the European market.

The research has been conducted in accordance with the experimental protocol and was held in several farms and agro-livestock production, named according to the aim pursued. Thus, for the collection of data related to the morphology of goat populations studied, as well as for controlling milk production, investigations were carried out within the framework of the six private farms, one in each county which comprised the North-East Region of Romania.

Determination of quality hair and fluff and the evaluation of physic-chemical and organoleptic goat milk were carried out in the laboratories of the disciplines of "Technology of sheep and goats" and "Technology of manufacturing products of animal origin", both belonging to the Faculty of Animal Sciences, in the University of Agricultural Sciences and Veterinary Medicine in Iaşi.

Analysis of chemical composition of raw milk from goats has been made in the “Laboratory of analysis of the quality of the milk", in the Office of Animal Breeding and Improvement, Iaşi.

Analysis on the quality of fats (saturated fatty acids, mono-unsaturated, poly-unsaturated and cholesterol) and minerals in the milk of goats studied, were made at the laboratory of “Food Chemistry”, the University "SAPIENTIA" in Miercurea-Ciuc, Harghita County. Evaluation of protein structure (the contents of amino acid) and protein in the goats milk, was made in the laboratories of the University of Kaposvár, Hungary.

To assess the body weight of the kids at kidding, investigations were being carried out within the framework of the five private farms from the six above mentioned.

To assess the body weight of youth goat, was take into the study only youth male and female from farms of Suceava and Neamț. In order to determine the degree of body development, at the age of 28 days, 3 months, 5 months and 7 months, were carried out the weightings’, on herd.

Slaughtering was done at the age of 7 months in facilities of farms. Since there were no significant differences between males and females in relation to body weight, were slaughtered only males. With 12 hours before slaughter, all individuals intended for slaughters have been subjected to the diet (were given only water).

Immediately after slaughter and skinning the weightings’ were made for the determination of the amount of blood and skin weight. After removing the intestines, it was made another weighed to determine the weight of the carcasses with the organ, the gastrointestinal mass and leg extremities. Then it passed to the weighing of each internal organ (lung, heart, liver, kidneys, and spleen). As a result of these activities, from each individual were taken several series of muscle samples, were packed, labeled and preserved by freezing, to use later for qualitative analyses.

Working methods in the context of investigations were standard procedures, specific to this type of study and are in full compliance with international scientific standards.

The results of research of the doctoral thesis entitled "*THE STUDY OF POPULATIONS OF GOATS RAISED IN THE NORTH-EAST OF ROMANIA*", have been structured into three chapters and are briefly presented in the continuation of this summary.

I) On the morphological data specific to the goats in the North-Eastern Romania, assessed both by direct assessment and measurement, and microscopic analyses:

- As a result of body measurements, one showed that the body format of the goats being studied is one characteristic (pear shaped), with ascending dorsal line, medium size (64.03 cm in females and 72.52 cm in males) and the rump height 65.70 cm in females and 75.09 cm in males;
- The body index of the goats studied was 103.35% in males and 102.75% in females, the transverse body index 31.12% in males and 27.83% in females, bone index with a value greater than 10% in both sexes, and the values for the massiveness index was 119.04% in bucks and 126.88% in the adult goats;
- Analyzing the values obtained from the measurements and calculation of body indices, one can say that the native goats reared in the North-Eastern Romania presents an harmonious conformation, a robust- to fine constitution, which enclose them in the types of animals with good skills for milk production;
- As a result of observations regarding the colors present in the native goat in North-Eastern Romania, one showed that they were heterogeneous from this point of view, however, the most common was the white color (over 55%), followed by gray color (18.42%) and black individuals (11.51%);
- Qualitative analysis of pilots, has revealed that the hair does not presented waves, have a length of 11.95 ± 0.273 cm and a thickness of 104.99 ± 1.149 µ. Also, throughout its length (3.27 ± 0.122 cm), the fluff do not have waves and have a fineness of 18.81 µ;
- In terms of external assessment of the six populations taken into study, it was noted that over 50% of individuals had horns, 90.57% of individuals present with goatee, tassels 33.77% and 17% had undeveloped ears;

II) On the breeding activity of the six populations of goats from North-East of Romania:

- The breeding system used in farms studied was in freedom mating, the bucks being held together with goats throughout the heating season and for each buck has been allocated approximately 35 goats;

- The mating season began after 20 august in farms from Vaslui, Iaşi, Bacău and Neamț, and in Suceava and Botoşani farms, first heating appeared after 15 September and were performed during three sexual cycles;
- During the pregnancy, the basic daily ration was composed of alfalfa hay and grasses hay, to which was added and a concentrated food supplement (sunflower meal, corn and wheat). Also, in each of the six farms studied, both salt and water were provided at discretion;
- Referring to the fecundity index calculated from six populations studied, with the exception of the population in Neamț, where the value of the this index was lower (88.8%) due to a relatively large number of goats which have not heats (11.24%), for all other values have been registered more than 97%;
- Analysis of the data showed that the prolificacy index registered in populations taken in the study had a mean value of 129.6%, with limits between 121.2% (at the farm of Suceava) and 132.8% (at farm in Iaşi), values relatively small compared with those of specialized breeds;
- Index of fertility and birth rate calculate in the populations studied, hare registered mean value of 121.1 % and 93.4% respectively, data similar to those related by other authors for the Romanian indigenous goats;

III) With reference to the results of the qualitative and quantitative production of milk, specific to populations of goats raised in the North-East of Romania:

- From the analysis of data relating to the production of milk, it was found that it was in the range of 170.8 kg (in Iaşi) and 192.75 kg (in Bacău), with no significant differences ($P>0.05$) between populations of goats studied;
- The fact that in the populations studied one met and individuals with large production of milk, denotes a higher potential of domestic goats in the North-East region for dairy production, however, quite high values of the coefficient of variance (between 25% and 47%) indicates a strong heterogeneity of this character, caused primarily by a meager selection;
- Lactation curve specific to populations studied had a normal trajectory (with a maximum in the month of June and a minimum in October) in the case of goats in Bacău, but with a slight deviation to the normal in the goats from Iaşi and Neamț (more obvious to those of Iasi);
- Physical analyses of milk from goats studied has highlighted the fact that it has an average density of 1.034, a pH of 6.45 and a value of the freezing point of -0.58 °C;
- Analysis on chemical composition of raw goat milk reveal a different content of the main elements, depending on the lactation phase, with an average concentration of fat and lactose

to slightly more than 4% and the average level of 3.07% protein, and the differences between the values of such elements in the populations studied were statistically not significant (*P>0.05*).

- As a result of chemical analyses for cholesterol concentration in milk from goats studied, it was revealed that it had a mean value of 9.43 mg cholesterol per 100 g milk;
- Estimation of direct correlations between the main parameters that define the production of milk have highlighted very close positive cross-dependencies between quantitative production and the following parameters: the amount of lactose (r = +0.996), the amount of protein (r = +0.957) and amount of fat (r = +0.927);
- With respect to the concentration of fat in goat colostrums, range 0 - 72 hours post partum, after tests have revealed the following: 4.2% immediately after kidding, 8.08% to 6 hours, 5.14% at 12 hours, 6.02% at 24 hours and 3.5% to 72 hours;
- Similar with the content in fat, cholesterol levels in colostrums had a similar variation, except that the maximum concentration was recorded at the 12 hours after kidding (21.13 mg cholesterol per 100 g colostrums);
- Analysis of fat present in colostrums of goat's at different intervals of time after kidding, have revealed the presence of short-medium chain fatty acids, such as capronic acid (C6: 0), which is found in greatest proportion and who has made most evident shift within interval 0 - 72 hours post-partum, however, the differences between the average values recorded during this period were statistically significant (*P<0.05*);
- Analysis of mono-unsaturated fatty acids, highlighted oleic acid (C18: 1ωc) (ω9), which was found in the goat colostrums in a concentration of more than 28% (28.74%), representing 93.42% of this group of fatty acids. Also, in this component does not have recorded significant differences (*P>0.05*) between the average values in samples of colostrums harvested from 0 up to 72 hours after kidding;
- Of poly-unsaturated fatty acids in goat colostrums, linoleic acid (C18: 2ω6c) was found in highest concentration (2.93%), representing over 54 percent (54.58%) of total fatty acid from this group;
- In the case of poly-unsaturated fatty acids which have been determined in goat colostrum, the ratio of omega 3 and omega 6 was 1/4.64 at kidding time and 1/4.23 to 72 hours after kidding, the differences being not significant (*P>0.05*) in terms of statistics;
- The same analyses have revealed that the highest concentration of the fatty acids in goat colostrum were saturated fatty acids (62%), followed by unsaturated acids (about 30%) and poly unsaturated of fatty acids (5.36% of total fats);

- As a result of the analyses on protein profile of goat milk were detected 9 of the 10 essential amino acids, which represent 42% of total amino acids that have been detected, and the differences between individuals regarding this parameter were not significant (*P>0.05*);
- Analysis of minerals in milk from goats studied highlights an important quantity of macro- and micro-nutrients, with higher values compared to cow's milk or with the woman's milk, and a ratio Calcium/Phosphorus quite balanced (1.33/1);

IV) With respect to the results of the qualitative and quantitative production of meat, specific to populations of goats raised in the North-East of Romania:

- Weighing the kids immediately after birth, have highlighted the fact that the body weight was influenced both by the sex of the offspring, and the type of birth (single or twin), but significant differences (*P<0.01; P<0.001*) were revealed only in the case of female kids;
- Studies that took account of the body development of youth goat showed that, in the range 0 – 7 months it has been relatively good values in both sexes (about 12 kg at 3 months and 18 kg at 7 months), with no significant differences (*P>0.05*) between males and females kids;
- Data on the body weight of male kids, show that at the time of slaughter they had different weights (*P<0.001*) depending on the conditions in farm, this parameter having a major influence over the dressing percentage and over weight of body cuts;
- Following slaughter of youth male goats (aged 7 months) of the two farms, one could calculate the dressing percentage, which was enclosed within the limits of 34.16% (the kids from Suceava) and 43.91% (the kids from Neamț), differences between the values obtained from the two groups of kids being very significant (*P<0.001*) in terms of statistics;
- Estimation of direct heritability of characters specific for the meat production in indigenous goat revealed the following values weight at slaughter (7 months) h^2 = 0,57; carcass weight h^2 = 0.37; dressing percentage h^2 = 0.35, internal organs h^2 = 0.24; gastro-intestinal mass h^2 = 0.31; gigot weight h^2 = 0.26; shoulder weight h^2 = 0.27; meat in gigot h^2 = 0.28;
- The weighing of individual portions of carcasses has led to the conclusion that gigot and shoulder are the regions which make up the largest part of the carcass (both 49.3%), with a tissue ratio (meat/bones) relatively good for domestic goats reared in the extensive system;
- Analysis of correlations between the main production parameters leads to the conclusion that the body weight at slaughter time has a positive influence on the weight of the carcass (r = +0.99) and commercial components (r = +0.95), but at the same time, it is poorly correlated with the gastro-intestinal mass (r = +0.28);

- In view of the significantly lower fibers surface ($P<0.05$) which forming muscles *Longissimus dorsi*, one can say that this category of muscles are characterized by a better tenderness and a capacity for water retention in comparison with the other muscle groups;
- Analysis of chemical composition of raw meat derived from domestic youth goat highlighted the fact that it has on average of 74.22% water, 20.34% protein, 3.18% fats, 0.97% minerals and 0.04% cholesterol, and from this point of view meat derived from domestic goats fits in lean meats category;
- In terms of content in fatty acids of goat meat, as a result of chemical analyses performed on the three muscle groups, one can say that the ratio of saturated and unsaturated fatty acids is one balanced (approximate 1/1), significant differences ($P<0.05$) registered only between levels of saturated fatty acids in muscles from shoulder and the other muscle groups analyzed;
- Regarding the contents of amino acid in meat from young goat studied, glutamic acid and aspartic acid have most prominence within the protein, together representing about 29% of total amino acids;
- Analysis of mineral content of goat meat shows a somewhat balanced ratio of these elements, and from this point of view meat from domestic goats largely met the daily requirements of an adult consumer.