The Optimization of Milk Protein Using Different Breeding Systems

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Abstract

The purpose of this study is to increase the intensive production systems in dairy goat flocks necessity specifications on feeding strategies and housing structures to optimize milk production and animal welfare and to control the impact of animal husbandry on the environment. Milk serves as the most excellent sources of protein with rich quality protein content. It doesn't contain a large quantity of proteins, but those are containing all the essential amino acids that the body requires. The nutritional and processing properties and there by the market value of milk, largely depends on its protein content.

Keywords: goat, milk, nutritional factors, protein.

1. Introduction

Goat's milk is beneficial to human health food, whose structure is similar to breast milk. It is a rich source of calcium, phosphorus, citric acid, potassium, magnesium, also having a high content of vitamin A, its composition does not differ greatly from that of cow's milk [1, 2, 3].

Protein is one of six groups of essential nutrients for living organisms present in all living cells, composed of amino acids. Of the 20 amino acids used by humans to produce protein, human bodies produce 11 of them (Glycine, glutamic acid, arginine, aspartic acid, proline, alanine, serine, tyrosine, cysteine, asparagine and glutamine), other 9 (isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine and histidine) procuring through diet [4, 5, 6].

Because our country has fallen in the goat population, we conducted a study with the aim of increasing milk protein content.

One of the factors that can influence milk protein content is the way of feeding the goats [7, 8]. It should be borne in mind that a substantial modification of the composition of which comprises food can lead to digestive disorders, toxicity in the ruminant body and even death.

Unlike cow's milk protein, goat milk proteins are composed of 80% casein (α-s-1 casein, α-s-2 casein, β-casein, k-casein) and 20% whey protein (α-lactalbumin, β-lactoglobulin), as shown in Table 1.

Table 1. Comparison of cow's milk and goat's milk, the protein composition

	Concentration of protein in 244 ml milk	α-casein	β- casein	γ- casein
Cow milk	8,1 g	55%	30%	15%
Goat milk	8,69g	19% α1 21% α 2	60%	-

St.Gelais et al. (2000) showed that the proportion of α-s-1 casein increases in autumn, while α–s-2 casein decreases [9].

Due to lower casein and β increased α casein, goat milk coagulates in the stomach by up to 2%,

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compared with the cow, which precipitated in a proportion of about 10% [8, 10, 11]. From the point of view and semi essential amino acid content of protein, goat milk has the highest biological value. Whey proteins are α-lactalbumin and β-lactoglobulin, whose values depend on the time of lactation, β-lactoglobulin content was lower in goat milk.

Amino acids are used by the body in the formation of new proteins for growth, production and maintenance, and for replacing protein lost by normal wear and tear.

Bacteria in rumen formed bacterial protein from protein consumed, but also from non protein sources (urea).

Urea is the main nitrogen source for ruminant's nonproteic. This may be because goats are subjected to urea toxicity than cattle. Goats seem more effective than other types of recycling nitrogen to the rumen in the body where it can be used to form microbial protein, given that enough energy is available. This recycling of urea in the rumen helps to reduce the amount of protein required in the diet. When animals are consuming low quality forage, a grain supplement can also improve the status of proteins by providing additional energy for rumen microbial protein synthesis.

Factors affecting goat milk proteins. The amount of protein in milk can be influenced by several factors, among which:

1. Breed
2. Genetic factors: productive qualities of an animal depends on the breed to which he belongs, the ability to produce a greater quantity of milk or fat content are more characters to transmit hereditary.
3. Age: protein content decreases with age, milk production is lower in the first calving, calving increases to the fourth, then decreases gradually.
4. Mastitis: is an inflammation of the mammary gland caused by an infection, improper diet, injury to the udder, unsanitary living conditions; mastitis in animals shows a slight increase observed in total protein. The most important microorganisms causing mastitis are *Staphylococcus aureus, Pasteurella haemolytica, Corynebacterium pseudotuberculosis*.
5. Nutritional Facts: Food can influence the amount of protein in milk composition, as follows:

5.1 Carbohydrates. Provide, usually, the majority of energy intake in goats. They can be simple, such as sugars and complex, such as starch (found in cereals) or cellulose (eg, fibers). Grass, alfalfa and clover generally contains high levels of cellulose, which must be digested by bacteria in the rumen to provide energy. Fibers of young plants are easily digested and provide a high level of energy; the mature plant fibers are often poorly digested and can only provide half the energy of other carbohydrates.

5.2 Fats (lipids). Fats offer twice the carbohydrates on energy. The fat content in the diet of ruminants is generally low because the plants have a low fat content. Fat can be added to the diet to increase energy content. However, a high level of fat added to prevent fiber digestion. Lipids are taken from sources such as flaxseed, soybeans, sunflower extract.

5.3 Additives. These additives are chemical compounds that are included in animal rations, but not supply nutrients for animals (such additives are antibiotics, antibacterial agents, combinations of anti microbial, yeast (*Saccharomyces cerevisiae*), vitamins and enzymes.

2. Materials and methods

The study was carried out 40 goats, Carpatina breed, belonging to FLMS farm of Sibiu with a production system extensively. Goats were divided into 3 groups, depending on the feeding system adopted, as follows: a group of goats (L1) whose daily forage ration was supplemented with 0.2 kg yeast, a group of goats (L2) whose daily forage ration was supplemented with 0.2 kg of soya beans and a lot of goats (L3) whose daily forage ration was supplemented with 0.2 kg oats.

Daily forage intake of goats was determined according to season (calves period and grazing period) as shown in Table 2 and Table 3.

In Tables 2 and 3 also we can observe the control group (Lm) whose ratio was fodder without supplements. The introduction of nutritional supplements in standard forage intake was done gradually, and samples were taken at the end of each season.

	Lm	L1	L2	L3

	Cant(Kg)	PBD(g)	Cant(Kg)	PBD(g)	Cant(Kg)	PBD(g)	Cant(Kg)	PBD(g)
Alfalfa hay	2,5	250	2,5	250	2,5	250	2,5	250
Coarse	3	35	3	35	3	35	3	35
Forage concentrate	0,5	60	0,5	60	0,5	60	0,5	60
Yeast	0	0	0,2	90	0	0	0	0
Soybeans	0	0	0	0	0,2	80	0	0
Barley	0	0	0	0	0	0	0,2	18
TOTAL	6	345	6.2	435	6.2	425	6.2	363

Table 2. Feed rations during the calves/day

Table 3. Feed rations during the grazing/day

	Lm		L1		L2		L3	
	Cant(Kg)	PBD(g)	Cant(Kg)	PBD(g)	Cant(Kg)	PBD(g)	Cant(Kg)	PBD(g)
Green lucerne	2,5	75	2,5	75	2,5	75	2,5	75
Mash	3	60	3	60	3	60	3	60
Forage concentrate	1	120	1	120	1	120	1	120
Coarse	0,5	7	0,5	7	0,5	7	0,5	7
Yeast	0	0	0,2	90	0	0	0	0
Soybeans	0	0	0	0	0,2	80	0	0
Barley	0	0	0	0	0	0	0,2	18
TOTAL	7	262	7,2	352	7.2	342	6.2	280

To analyze the amount of protein from milk were taken 40 samples each season. Samples have been collected in sterile 50 ml vials, labeled and stored at 4°C until the Center for Research in Biotechnology and Microbiology of the University "Lucian Blaga" of Sibiu, where they were examined with Ekomilk Total analyzer.

The sampling procedure was accompanied by an individual file which included the identification number of the goat, lactation number, date of harvest, the amount harvested and the physic-chemical indices analyzed: fat, protein, SNF, lactose, pH, density, conductivity and freezing point. Measurements were made according to season and stage of lactation.

3. Results and discussion

Following research, according to LM, there was an increase in protein content of 0.1- 0.14 units in L1, a decrease in the L2 protein with 0.22-0.27 units.

Also we establish an increase of protein content in L3 by 0.03-0.04 units as shown in table 4 and figure 1.

Comparing the two periods we can see that the content of protein in calves during the account is higher than during grazing proteins because of the different feed rations.

Table 4. Goat milk protein content, g/kg

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	Lm	L 1	L 2	L3
Feed ration during the grazing	3.87	3.97	3.65	3.9
Feed ration during the calves	4.26	4.4	3.99	4.3

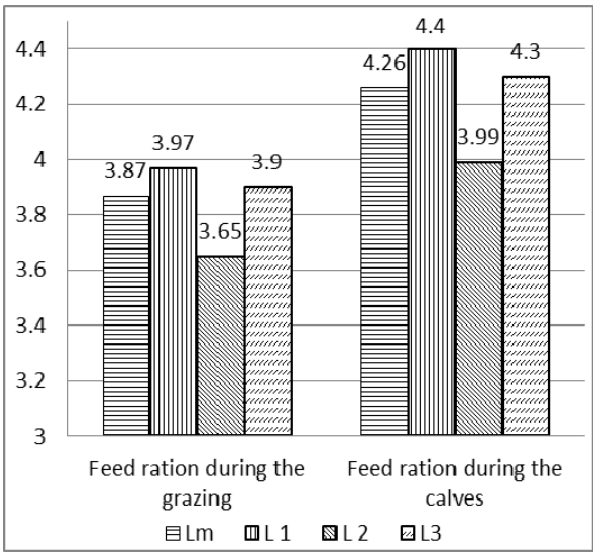

Figure 1. Goat milk protein content, g/kg

4. Conclusions

By modifying the diet, milk protein content is changed only by 0.1 to 0.3 units.
A high fat content in forage intake may decrease the amount of protein in milk.
If it is to achieve a rich goat's milk protein is recommended to use yeast as a supplement in feed goats.
Any change in the goat diet should be gradual.
The changes in the feeding program, goat milk protein content changes very little and therefore it is recommended to increase milk production.

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