Physical, chemical and sensory characteristics of cream goat cheese produced with Saanen and Alpine milk

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Abstract— *The objective of this study was to evaluate the effect of inclusion of different protein sources in the diet of Saanen and Alpine goat on the physical and chemical parameters and sensory quality of cream goat cheese. The experimental design was based in double balanced 4x4 latin square (four animals by breed x four diets), with different protein sources: soybean meal (SBM), cottonseed meal (CM), cassava foliage hay (CFH) and leucaena hay (LH) in diets. The physical, chemical, texture and color parameters were not influenced (p>0.05) by feed, but the pH, fat, moisture and elasticity of the cheeses were influenced by breed. The levels of pH ranged from 4.24 to 4.43 and lactic acidity from 0.50 to 0.56g lactic acid/100g, fat from 12.31% to 17.85 and moisture ranged from 63.08 to 70.71%. The Alpine presented greater variability in the sensory profile, with the attributes softness, pasty, homogeneity, appearance, acid taste and goat milk taste presented highest variation due different animal. The Saanen presented the same sensorial profile for three animals, only one animal presented variation influenced by the attribute goat milk taste.*

Keywords— composition, nutrition, quality, sensorial profile.

I. INTRODUCTION

The use of goat milk as an excellent food source is undeniable. Goat's milk has a high biological value and higher digestibility, due to its characteristics, such a lower protein content, smaller amount of casein, higher non-protein nitrogenous substances and slightly higher calcium content, it has beneficial effects for health maintenance, physiological functions, in the nutrition of children and elderly people, and can be consumed without negative effects by people suffering cow milk allergy. This highlights the market potential of goat milk [6-13].

In many countries, the goat´s milk processes takes on great importance. Numerous varieties of goat cheeses are produced worldwide and the large number of varieties of cheese made from goat milk has resulted in a great diversity in the nature of the products. Besides, manufacturing techniques include wide variations in amount and species of organism used in culturing, incubation procedures, and forming or pressing techniques, and variations in aging time and conditions play the most important part in determining the flavor, body and texture of cheese [13].

[10] reported that cheese quality depends closely on the composition and quality of milk, and the quality of these milks can be evaluated by several criteria: sanitary, dietetic, nutritional, technological and after cheese-making under aspects of gustative, rheological, gastronomic and hedonic parameters. All these kinds of quality depend on multi-factors and their interaction. They are mainly linked to their main components (fat, protein, lactose) and to their physico-chemical characteristics, as well as to micro-compounds present regularly or occasionally.

The nutritional characteristics of the milk used to make cheese can vary according to the conditions of milk production, effect of breed and more precisely nutritional, genetic and physiological factors. Most of the data relating to the effects of management practices, milking and technological factors on the nutritional characteristics of milk concerns however cow's milk and rarely goat's milk [12-9].

According to [13], sensory properties of goat cheeses are an important factor for consumer acceptability and marketability of the products, and most sensory and textural attributes of cheeses increase during ripening. [12] report that goat milk products have a specific odour and flavour, which have been subject of several investigations, and with the increased consumption and

popularity of goat milk products, an investigation and resolution of some of the factors influencing the sensory properties of goat's milk have become economically important.

Cream goat cheese can be classified as a type fresh cheese, made of goat milk, it is more comparable in taste, texture, and production methods of the Boursin cheese. According to [1], this cheese type can classified as very high moisture, with moisture not less than 55.0%, and soft or brand.

The aim of this study was to evaluate the effect of four different protein sources in the diet of Saanen and Alpine breeds on the composition, color texture parameters and sensory quality of cream goat cheese.

II. MATERIAL AND METHODS

1.1. Obtaining raw materials

The experimental design consisted of a double balanced 4x4 latin square, which was simultaneously carried out. Each experimental period totalize 15 days: 10 days for adaptation and 5 days for sample collection. Four Saanen breed goats and four Alpine goats have been used. All goats were at the 60^{th} day of lactation and had an average daily production of 2.5 kg milk and body weight around 50 kilograms. Four diets have been evaluated: elephant grass (*Pennisetum purpureum,* Schum.) silage was used as forage (40%) and the 60% remaining dry matter consisted of concentrate, with different protein sources: soybean meal (SBM), cottonseed meal (CM), cassava foliage (*Manihot esculenta*) hay (CFH) and leucaena (*Leucaena leucocephala*) hay (LH).

Diets were formulated according to [11] and were daily provided at 07:30 a.m. and 03:00 p.m., *ad libitum*; it was intended that leftovers could represent approximately 15% of food supply.

Samples were collected from the tenth to the fifteenth day in the trial period. All milk obtained per animal, treatment and breed was packaged in individual 1-liter bags, thus enabling identification of the respective diets and breeds; the bags were afterwards frozen.

1.2. Preparation of cream goat cheese

When cheese was processed, samples from every process and breed were thawed under refrigeration temperature, for 24 hours, thus composing a special type of milk for cheese production. Also, the use of 10 liters of milk has been standardized for preparation of cheese, considering the variables "breed" and "diet". Milk was pasteurized at 65°C, for 30 minutes, and then cooled to 42°C. After that, 3.5% of lact was added and the milk was left to rest for 30 minutes. Then, 8mL of rennet enzyme were slowly mixed until the content; next, the mixture was left at rest in a covered pan for approximately 16 hours at room temperature (±30ºC), in a clean airy area. After this period, curd was sliced and placed in sterile bags (autoclaved at 121ºC, for 15 minutes); then, the curd was left to slowly drain at room temperature (±30ºC) in a clean area, for about four hours. The mass was then cooled to about 25°C, for 15 hours, until it became consistent. The mass was afterwards handled to get uniform consistency; after that, 1.7% of salt was added to it. Packaging was done in proper recipients and cheeses were stored at approximately 4°C for consumption within 7 days. Total of 32 samples (2 breeds, 4 animals and 4 diets) of cream goat cheese was prepared.

1.3. Properties of cream goat cheese

Physicochemical analyses have been conducted on pH using a QUIMIS pHmeter, and total acidity (% lactic acid), percentages of moisture, ashes, fat and protein [4]. Color parameters were determined by the CIELAB system in ColorQuest XE Colorimeter in a range of three coordinates: L* (light level), and chromaticity coordinates a * and b *, measured on the device.

Determination of texture parameters was conducted throughout the Texture Profile Analysis (TPA). Analyses were performed on a Brookfeild CT3 Texturometer, fitted a loud cell of 25 kg. The samples were packed, individually, in plastic bags to prevent dehydration, then were placed in capped plastic bags and cooled at 10±1ºC. These samples remained for 10 minutes in this container, before start the testing. Since then, we removed the plastic, cut samples with 30mm length and 32mm diameter and instrumental texture analysis was initiated by means of double compression test samples by a compression device (acrylic cylinder with 38.1mm in diameter and 20mm length – TA4/1000). Was used the software Texture Pro CT V 1.2 Build 9 (Brokfield Eng. Labs, Inc.), at speed of 2,0mm/s until the final deformation of 20%. We

analyzed the first of attributes firmness, cohesiveness, adhesiveness, elasticity, chew ability and gumminess, in triplicate for all treatments.

1.4. Sensory analysis

Cream goat cheese were performed analysis of coliforms at 35°C and 45°C (using the method of most probable number, MPN) and mesophilic [3].

32 samples of cream goat cheese was subjected to sensory evaluation at the Laboratory of Sensory Analysis, using the quantitative descriptive analysis technique (QDA), according [17]. Prospective members of the descriptive panel were recruited among teachers, staff and students. Fifty questionnaires were distributed to screening judges in interest in voluntary participation, time available, affinity for goat cheese, ability to use descriptive terms and not structured scale, and any health problems that disturbed the sensory performance. A pre-selection of the panelists was performed using difference test (ranking), where four samples were served at random, and panelists were asked to arrange the samples in ascending order for consistency. This test was conducted in four replication, where the judges were selected with 75% accuracy.

Panelists were trained on the products, and a list of terms (descriptors) describing the sensory attributes were obtained using the network method, where pairs of samples were presented to judges and requested the identification of similarities and differences between samples. A total of 8 descriptors: appearance - Smooth and solid, without granules or pellets, with evenly distributed colour; Whitish colour - Characteristic colour of goat cheese, tending to white; Buttery aroma - Characteristic aroma of cheese, similar to butter; Goat milk taste - Characteristic flavour of goat milk products; Acid taste - Characteristic flavour caused by a citric acid taste; Softness - It is not hard, tending to have a softer consistency, intermediate between liquid and solid; Pastiness - Property related to product consistency, resembling a paste; Homogeneity - Property related to the absence of lumps detected in the product sample. Were chosen after suggestions from the panel leader based of consensus among the panelists.

After the training stage, a pilot test was conducted to select the judges according to their ability to discriminate the samples and repeatability. Four samples were presented in individual cabin, monadic form, using the answer sheet, in four replicates. Seven panelists were selected based on F probability for sample greater than 0.50 and F probability for replicates less than 0.05. Samples were scored using a 9-cm unstructured scale, with anchors for each descriptors were: appearance (unpleasant to pleasant), whitish color (light to dark), buttery aroma (mild to strong), goat milk taste (mild to strong), acid taste (little to much), softness (little to much), pasty (little to much) and homogeneity (little to much). Descriptive analysis was performed under normal light; the samples (approximately 35 mL) were served in clear plastic, coded with three digits random, kept at 16°C for 1 h prior to serving and taken out 5 min before serving. In each sensory session, 4 replicates were performed. Samples were served in randomized order over panelists within each replicate.

1.5. Statistical Analysis and Data Processing

Results were submitted to ANOVA; for comparison of means, SNK test at 5% significance level has been applied using the statistical software SAS (2011). Depending on the level of significance, the interaction was broken down. The final results of the QDA were analyzed using principal component analysis with means of scores by samples for each attributes, using software Statistica (version 9.2).

III. RESULTS AND DISCUSSION

3.1 Properties characteristics of cream goat cheese

The results obtained for the physicochemical properties of the samples of cheese made from milk of goats fed different sources of protein are described in Table 1.

TABLE 1
EFFECT OF THE DIETS AND GOAT BREED ON PH, ACIDITY AND COMPOSITION OF GOAT CREAM CHEESE PRODUCED FROM THE MILK OF SAANEN AND ALPINE GOATS.

Parameter	Breed	Diets				Average	s.e.
		SBM[a]	CM[b]	CFH[c]	LH[d]		
pH	Saanen	4.36 ± 0.27	4.43 ± 0.15	4.36 ± 0.14	4.34 ± 0.20	4,38[a] ± 0.18	0.05
	Alpine	4.29 ± 0.10	4.24 ± 0.11	4.29 ± 0.88	4.27 ± 0.05	4.27[b] ± 0.08	0.02
Acidity (g lactic acid/100g)	Saanen	0.50 ± 0.18	0.53 ± 0.07	0.54 ± 0.04	0.52 ± 1.01	0.52 ± 0.10	0.02
	Alpine	0.53 ± 0.12	0.56 ± 0.15	0.52 ± 0.08	0.54 ± 0.13	0.54 ± 0.11	0.03
Fat (%)	Saanen	15.99 ± 4.63	14.40 ± 3.74	16.24 ± 2.81	17.85 ± 1.71	16.12[a] ± 3.29	0.82
	Alpine	12.45 ± 2.63	12.31 ± 3.61	13.85 ± 4.66	14.01 ± 4.58	13.16[b] ± 3.63	0.91
Protein (%)	Saanen	15.45 ± 4.32	16.65 ± 3.93	18.34 ± 3.51	16.74 ± 4.27	17.32 ± 3.67	0.91
	Alpine	16.54 ± 4.75	17.58 ± 1.95	19.48 ± 4.60	17.23 ± 1.77	17.70 ± 3.38	0.84
Moisture (%)	Saanen	66.68 ± 5.51	70.61 ± 1.39	70.71 ± 3.04	68.30 ± 3.45	69.08[a] ± 3.70	0.92
	Alpine	65.60 ± 1.23	66.85 ± 2.03	63.13 ± 5.51	63.08 ± 2.30	64.67[b] ± 3.43	0.86
Ash (%)	Saanen	2.20 ± 0.53	1.67 ± 0.65	2.07 ± 0.51	1.63 ± 0.23	1.89 ± 0.51	0.13
	Alpine	1.90 ± 0.30	1.63 ± 0.63	1.66 ± 0.23	1.84 ± 0.35	1.76 ± 0.40	0.10

Regarding the parameters there has been no significant difference ($p>0.05$) between diets. Regarding breeds, significant differences ($p<0.05$) have been detected for pH, fat and moisture. pH values ranged from 4.24 to 4.43 and lactic acidity ranged from 0.50 to 0.56g lactic acid/100g, considering that the cheeses are characteristically acids. The pH was higher ($p<0.05$) in Saanen cheese (4.38) than Alpine cheese (4.27). However, no effect was observed ($p>0.05$) on the acidity (g lactic acid/100 g) between Saanen (0.52) and Alpine (0.54) breeds. The high acidity observed is due to the addition of lactic cultures and subsequent lactose fermentation, beyond the time of loss of whey from the curd for 15 hours, which can promote fermentation and acidification of the dough.

The Saanen presented higher fat content ($p <0.05$) in the different diets (16.12%) and the Alpine the lowest fat content (13.16%) (Table 1). [12] Also observed the effect of breed on the fat content in cheese. However, other factors such as

milking shift, lactation length and diet can have effects on fat content in cheese. In this stud all treatments were held in same conditions. Thus, these factors have similar effects in all treatments.

Average protein, fat, total solids, ash and lactic acid in goat milk are influenced by breed, and that genotype has significant effect on the content of casein, fat and characteristics of micelle (size and mineralization). These characteristics are often kept in dairy products, which may reflect differences in products made with milk from different breeds.

[15] Investigated the effect of pasture feeding with different levels of concentrate on the quality of Domiati soft cheese elaborated with goat milk and results showed that diets did not influenced the composition (fat, protein and total solids). [15] evaluated the effect of breed (Nubian and Alpine) on the composition of milk and soft cheese (Chevré) and observed that in spite of the races presented significant differences for fat and protein, goat breed did not affect cheese composition, with average of fat from 13.3% to 17.1% and protein from 10.4% to 15.5%. The authors state that observations are typical due to the breed differences, and this observation is important and should be considered if the standards of quality goat cheese were established for production and marketing.

According to the technical regulation in Brazil that sets identity and quality standards for cheeses, cream goat cheese is classified as very high moisture, with moisture not less than 55.0%. The average moisture was 69.08% for Saanen and 64.67% for Alpine goats, meeting the minimum required by national legislation, and differences probably occurred due to the difference between breeds, since the supply does not affected the results.

Regarding all color parameters (L*a* b*), no significant difference ($p > 0.05$) was detected between diets and breeds (Table 2). In this study, L* values remained between 86.72 and 88.12 (near one hundred), thus showing a clear trend towards the white color, which is typical of goat's milk and cheese. The high L* values found resulted from the lower content of constituents such as fat and protein in the product, therefore favoring the reduction of free water content due to the increase in total solids and hence resulting in less reflected light.

TABLE 2
EFFECT OF THE DIETS AND BREED ON THE COLOUR PARAMETERS OF GOAT CREAM CHEESE PRODUCED FROM MILK OF SAANEN AND ALPINE GOATS

Parameter	Breed	Diets				Average	s.e.
		SBM	CM	CFH	LH		
L*	Saanen	87.69 ± 0.73	88.12 ± 0.61	88.09 ± 0.63	88.16 ± 0.54	88.01 ± 0.60	0.15
	Alpine	87.00 ± 1.93	86.88 ± 1.19	87.68 ± 2.30	86.72 ± 2.90	87.07 ± 1.98	0.50
a*	Saanen	-1.51 ± 0.18	-1.62 ± 0.09	-1.59 ± 0.31	-1.64 ± 0.10	-1.59 ± 0.18	0.05
	Alpine	-1.42 ± 0.38	-1.69 ± 0.24	-1.33 ± 0.31	-1.51 ± 0.45	-1.49 ± 0.34	0.09
b*	Saanen	7.85 ± 0.75	7.30 ± 1.16	7.14 ± 0.87	7.52 ± 1.55	7.45 ± 1.04	0.26
	Alpine	7.26 ± 1.55	8.13 ± 1.37	7.20 ± 1.75	7.39 ± 0.97	7.50 ± 1.35	0.34

For the chromaticity coordinates, the value of a* negative, which represents the intensity of the green, did not ranged significantly between samples with values ranging from -1.33 to -1.69, while b* values were positive (+b*) towards the yellow color with values ranging between 7.14 and 8.13. In general, the samples showed high lightness (L*), with the

predominance of yellow component (b*) on the green component (a*), whose contribution was very small in color with very low values, indicating a sample of white characteristic of cream goat cheese.

The different diets did not influence the texture parameters for the two breeds studied. Significant differences ($p < 0.05$) were observed between breeds for elasticity of cream goat cheese, produced from Alpine goats were higher than those from Saanen goat's cheese (Table 3).

TABLE 3
EFFECT OF THE DIETS AND BREED ON THE TEXTURE PROFILE ANALYSIS (TPA) OF GOAT CREAM CHEESE PRODUCED FROM MILK OF SAANEN AND ALPINE GOATS.

Parameter	Breeds	Diets				Average	s.e.
		SBM	CM	CFH	LH		
Firmness (N)	Saanen	2.11 ± 1.07	1.52 ± 0.40	2.00 ± 1.25	2.11 ± 0.83	1.93 ± 0.88	0.22
	Alpine	2.30 ± 0.83	2.01 ± 0.51	2.79 ± 1.16	2.44 ± 0.46	2.40 ± 0.76	1.19
Cohesiveness (%)	Saanen	0.40 ± 0.08	0.40 ± 0.06	0.41 ± 0.05	0.44 ± 0.06	0.41 ± 0.06	0.02
	Alpine	0.43 ± 0.03	0.49 ± 0.12	0.50 ± 0.08	0.45 ± 0.07	0.47 ± 0.08	0.02
Adhesiveness (mJ)	Saanen	0.45 ± 0.53	0.93 ± 1.16	0.80 ± 0.56	1.02 ± 1.09	0.80 ± 0.82	0.24
	Alpine	0.78 ± 0.92	1.55 ± 1.19	0.52 ± 0.61	0.43 ± 0.85	0.82 ± 0.94	0.23
Elasticity (mm)	Saanen	3.06 ± 0.65	3.01 ± 0.28	3.07 ± 0.41	3.13 ± 0.44	3.07^{a} ± 0.42	0.10
	Alpine	3.19 ± 0.13	3.55 ± 0.22	3.41 ± 0.26	3.36 ± 0.48	3.38^{b} ± 0.30	0.08
Chewiness (mJ)	Saanen	2.95 ± 1.96	1.92 ± 0.97	1.70 ± 1.54	3.15 ± 2.08	2.43 ± 1.65	0.41
	Alpine	3.05 ± 0.79	3.00 ± 2.05	3.38 ± 0.59	3.80 ± 1.55	3.30 ± 1.27	0.32
Gumminess (N)	Saanen	0.89 ± 0.54	0.62 ± 0.26	1.87 ± 2.05	0.96 ± 0.49	1.08 ± 1.09	0.27
	Alpine	0.97 ± 0.28	1.79 ± 1.65	1.15 ± 0.31	1.10 ± 0.31	1.25 ± 0.84	0.21

According to [7], generally, the more elastic the cheese, the greater its resistance to breakage and therefore its cohesiveness. The values found for elasticity and cohesiveness of the cheeses reported in this paper agree with this information, because the cheese Alpine had higher elasticity values (3.38mm) and cohesiveness (0.47%) than the Saanen breed (3.07mm and 0.41%, respectively).

By evaluating the instrumental texture of Feta cheese [8] have detected a mean firmness higher with value of 4.55 N, a result expected, since this cheese is a brined curd and has a grainy texture slightly.

[5] Assessing the texture of "Minas Frescal" cheese during storage of 21 days, detected average values gumminess ranging from 1.26 to 3.12N and chew ability from 4.92 to 11.48mJ, the values higher than found this study. This can be explained by the type of cheese and the period which the cheeses were analyzed.

3.2 Microbiological characteristics of cream goat cheese

For microbiological analysis, we found that all samples were within the microbiological standards designated by law for very high moisture cheeses with respect to coliforms [2], being the suitable samples for sensory analysis.

3.3 Sensory profile of cream goat cheese

A descriptive sensory panel evaluated the samples of cheese produced from goat milk from two different races (Saanen and Alpine) and four different animals for each breed. Different sensory profiles were obtained with the Alpine presenting greater variability in the profile, in Fig. 1

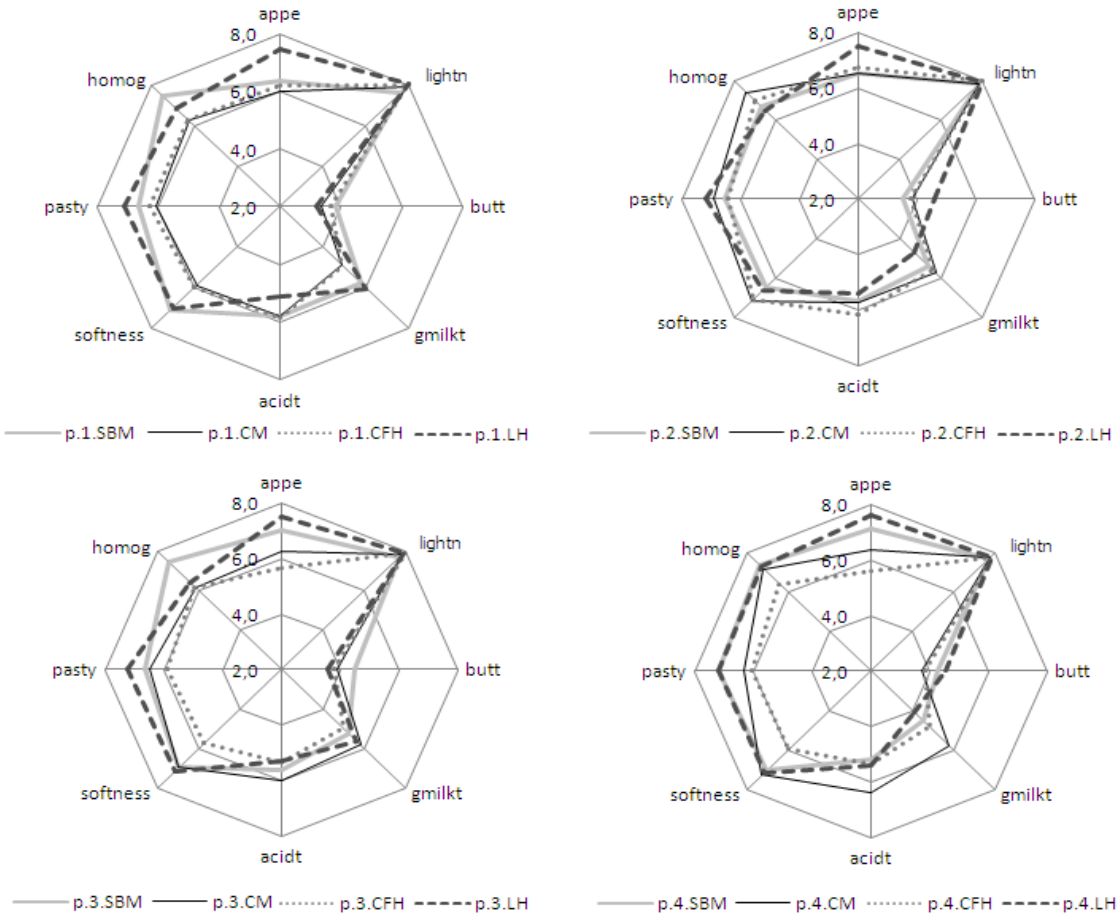

FIGURE 1: SENSORY PROFILE OF GOAT CREAM CHEESE PRODUCED FROM THE MILK OF FOUR ANIMALS (1-4) OF THE ALPINE BREED (P.) FED DIFFERENT DIET (SOYBEAN MEAL – SBM; COTTONSEED MEAL – CM; CASSAVA FOLIAGE HAY – CFH; LEUCAENA HAY – LH).

The attributes softness, pasty, homogeneity and appearance presented highest variation due different animal in the same race (Alpine). The higher intensity for attribute like goat milk taste (gmilkt) occurred in the cheese produced from milk of the animal 4 fed with cottonseed meal, and animal 1 fed *Leucaena* hay and soybean. Attributes that influenced less variation in the profile was whitish color and buttery flavor.

Cheese made from milk of animals fed Saanen race by four different concentrates not interfere with the sensory attributes evaluated by the trained panel, for the same profiles were obtained for animals 2, 3 and 4 (Fig. 2). Only cheese produced from milk of the animal 1 showed a variation in the sensory profile, with a diet of soybean meal concentrate exhibited low

intensity on the attribute goat milk taste, and the other concentrates generated cheeses with higher intensity of this attribute may be unpalatable

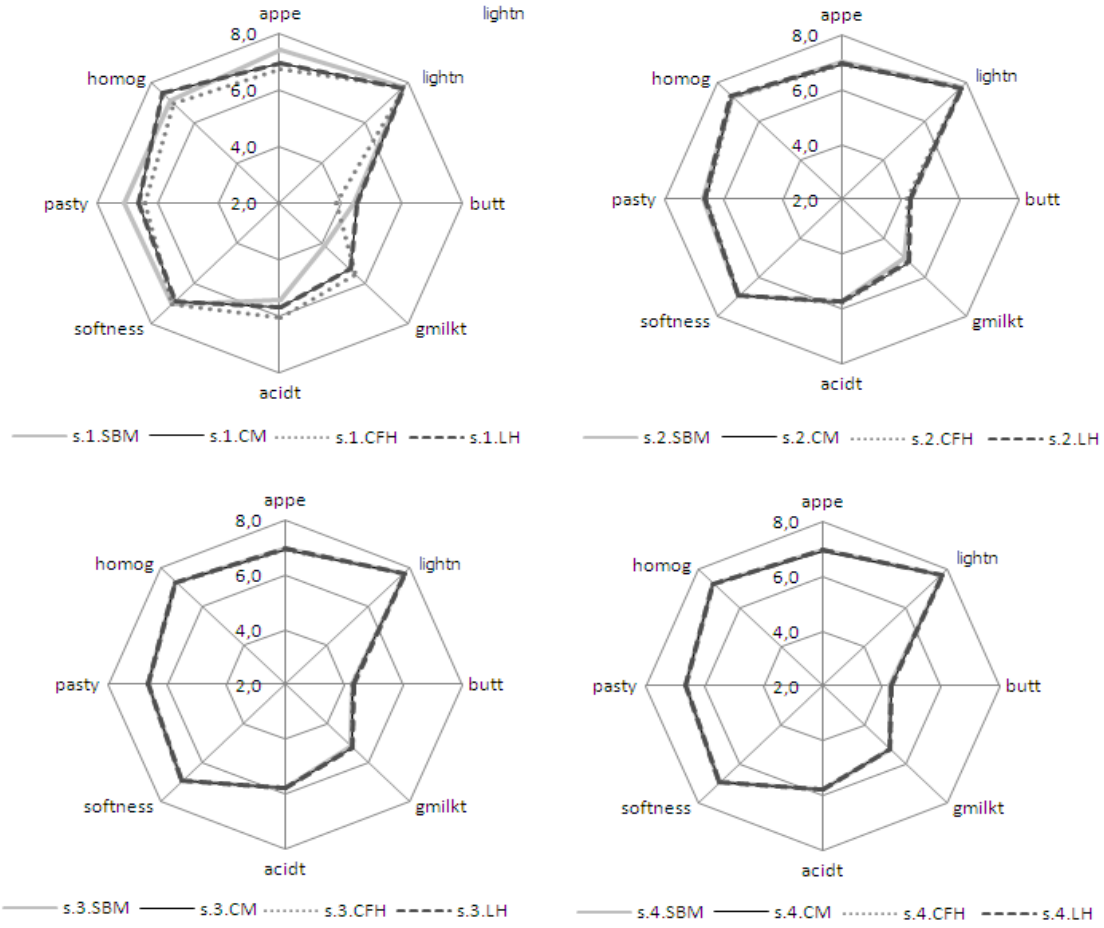

FIGURE 2: SENSORY PROFILE OF GOAT CREAM CHEESE PRODUCED FROM THE MILK OF FOUR ANIMALS (1-4) OF THE SAANEN BREED (S.) FED BY DIFFERENT DIET (SOYBEAN MEAL – SBM; COTTONSEED MEAL – CM; CASSAVA FOLIAGE HAY – CFH; LEUCAENA HAY – LH).

The cream goat cheese made from goat milk fed diet of LH had a higher score for taste of goat milk (6.0) and is considered strong taste of this attribute the highest grade 9.0 (average between animals and breeds). Already cream goat cheese produced from milk from animals fed with hay-based diet of CFH showed a taste for goat's score slightly lower (5.6).

A small variation in scores on each attribute showed a good training of the panel and possibly the samples were homogeneous in the sensory characteristics evaluated, eg, the attribute whitish color have small variation in scores for 16 different samples (0.2 between maximum and minimum score for cheese produced by goat fed diet based on cottonseed meal and cassava foliage hay). However, when the difference between the scores will be high, the judges were able to observe the sensory cheese milk produced by animals subjected to different diets, eg, the attribute taste of goat milk have large variation in scores for 16 different samples (1.9 between maximum and minimum score for cheese produced by goat fed diet based on leucaena hay).

To evaluate the correlation among the sensory parameters and 32 samples PCA was carried out. Three components were extracted that together explained 87.4% of the variance for sensory attributes (Fig. 3). The first component explained 44.8% of the variance and showed a positive correlation with the attribute whitish color (factor coordinate 0.636) and negative correlation with homogeneity (-0.837), appearance (-0.815) and softness (-0.811). The second component explained 24.6% of the variance and showed a negative correlation with acid taste (-0.853). The third component explained 18% of the variance and showed a positive correlation with buttery aroma (0.545) and negative correlation with goat milk taste (-0.708).

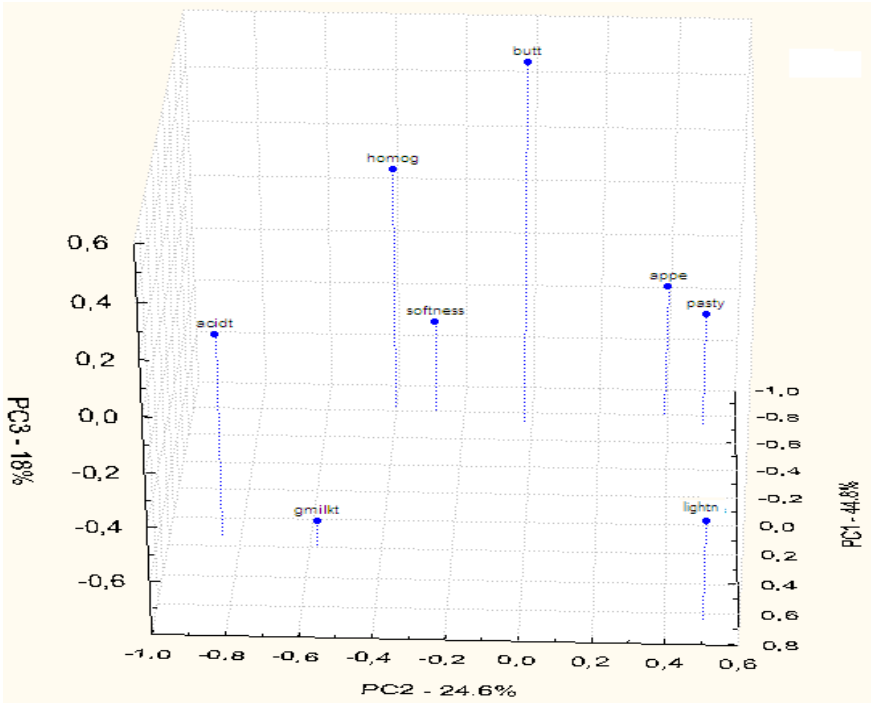

FIGURE 3: PCA 3D-LOADING PLOT OF THE ATTRIBUTES FOR THE THREE PRINCIPAL COMPONENTS EXPLAINING 87.3% OF THE VARIANCE

To evaluate the correlation among the sensory parameters and 32 samples PCA was carried out. Three components were extracted that together explained 87.4% of the variance for sensory attributes (Fig. 4).

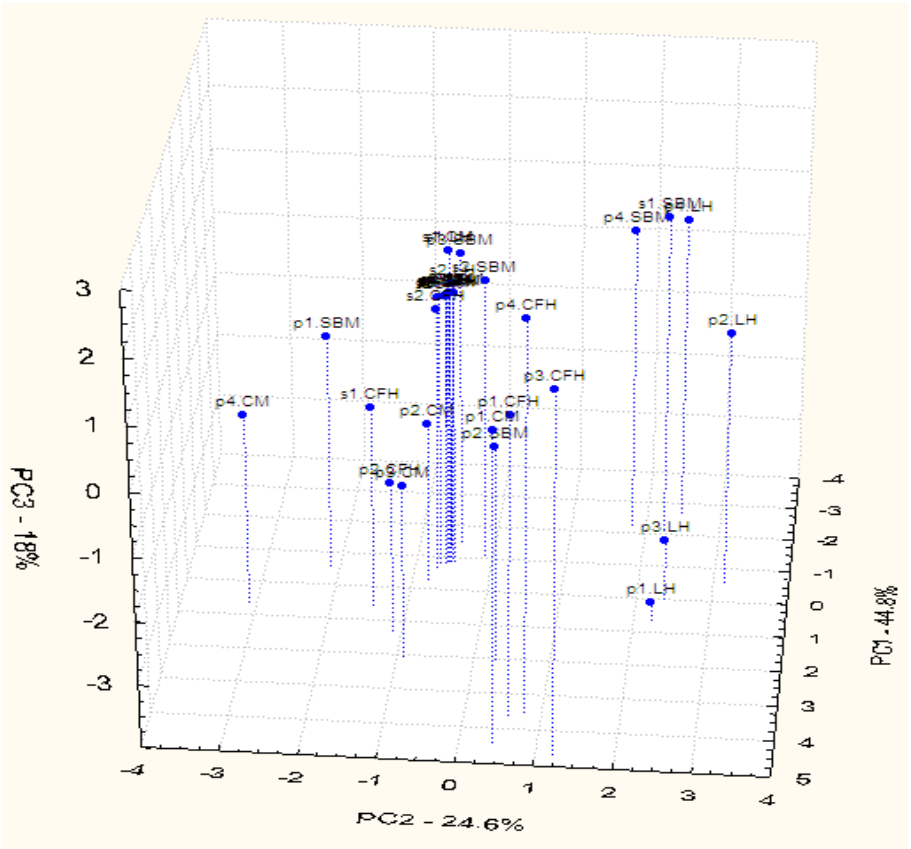

FIGURE 4: PCA 3D-LOADING PLOT OF THE 32 SAMPLES FOR THE THREE PRINCIPAL COMPONENTS EXPLAINING 87.3% OF THE VARIANCE.

All samples of cream goat cheese produced by milk from Saanen breed showed similarities in the sensory profile for crowed in PCA-3D loading – plot. Two animals of different breeds showed similar profiles and were fed the same diet (p4.SBM and s1.SBM), even as animals the same breed and fed by the same diet presented similar sensory profiles (p3. LH and p1. LH).

IV. CONCLUSION

Results obtained from this study indicated that there was no significant effect of feed on cheese composition, color, texture parameters and sensory scores. However, the breed influenced the pH, fat, moisture, elasticity and sensory profiles of the cheeses. The Saanen showed higher pH, fat and moisture, and Alpine higher elasticity of the cheeses. The Saanen breed showed the same sensory profile and Alpine breed showed variations in the sensory profile, not only for presenting variations whitish and buttery aroma. The sour taste, like goat milk, and pasty appearance we noticed a group of samples relating to the Alpine race, justifying their similarities.

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REFERENCES

[1] BRASIL. Ministério da Agricultura, Pecuária e Abastecimento. Portaria nº 146 de 07 de março de 1996. Regulamentos Técnicos de Identidade e Qualidade dos Produtos Lácteos. Diário Oficial da União, Brasília. 1996.

[2] BRASIL. Ministério da Agricultura, Pecuária e Abastecimento. RDC nº 12 de 2 de janeiro de 2001. Regulamento Técnico sobre padrões microbiológicos para alimentos. Diário Oficial da União, Brasília. 2001.

[3] BRASIL. Ministério da Agricultura, Pecuária e Abastecimento. Instrução Normativa nº 62 de 26 de agosto de 2003. Métodos Oficiais para Análise Microbiológicas para Controle de Produtos de Origem Animal e Água. Diário Oficial da União, Brasília. 2003.

[4] BRASIL. Ministério da Agricultura Pecuária e Abastecimento. Instrução Normativa nº 68 de 12 de dezembro de 2006. Métodos Analíticos Oficiais Físico-Químicos para controle de Leite e Produtos Lácteos. Diário Oficial da União, Brasília. 2006.

[5] F. C. A. Buriti, T. Y. Okazaki, J. H. A. Alegro, and S. M. I. Saad, "Effect of a probiotic mixed culture on texture profile and sensory performance of Minas fresh cheese in comparison with the traditional products," Archivos Latinoamericanos de Nutricion, vol. 57, pp. 179-185, 2007.

[6] V. Gomes, A. M. M. P. D. Libera, K. M. Madureira, and W. P. Araújo, "Influência do estágio de lactação na composição do leite de cabras (Capra hircus)," Brazilian Journal of Veterinary Research and Animal Science, vol. 41, pp. 339-342, 2004.

[7] S. Gunasekaran, and M. Ak, "Cheese Rheology and Texture," in Essential Information and State-of-the-Art Measurement Techniques. CRC Press, Catalog n. TX218, 2002, pp. 512.

[8] S. Konteles, V. J. Sinanoglou, A. Batrinou, and K. Sflomos, "Effects of γ-irradiation on Listeria monocytogenes population, colour, texture and a sensory properties of Feta cheese during cold storage," Food Microbiology, vol. 26, pp. 157-165, 2009.

[9] Lucas, J. B. Coulon, C. Agabriel, Y. Chilliard, and E. Rock, "Relationships between the conditions of goat's milk production and the contents of some components of nutritional interest in Rocamadour cheese," Small Ruminant Research, vol. 74, pp. 91-106, 2008.

[10] P. Morand-Fehr, V. Fedele, M. Decandia, and Y. Le Frileux, "Influence of farming and feeding systems on composition and quality of goat and sheep milk," Small Ruminant Research, vol. 68, pp. 20-34, 2007.

[11] National Research Council. Nutrient requirements of goats. Washington, D.C.: National Academy of Science, 2007.

[12] M. Pizzillo, S. Claps, G. F. Cifuni, V. Fedele, and R. Rubino, "Effect of goat breed on the sensory, chemical and nutritional characteristics of ricotta cheese," Livestock Production Science, vol. 9, pp. 33-40, 2005.

[13] C. Ribeiro, and S. D. A. Ribeiro, "Specialty products made from goat milk," Small Ruminant Research, vol. 89, pp. 225-233, 2010.

[14] SAS. Statistical Analysis Systems. Cary: SAS Institute, 2011.

[15] K. A. Soryal, S. S. Zeng, B. R. Min, S. P. Hart, and F. A. Beyene, "Effect of feeding systems on composition of goat milk and yield of Domiati cheese," Small Ruminant Research, vol. 54, pp. 121-129, 2004.

[16] K. Soryal, F. A. Beyene, S. Zeng, B. Bah, and K. Tesfai, "Effect of goat breed and milk composition on yield, sensory quality, fatty acid concentration of soft cheese during lactation," Small Ruminant Research, vol. 58, pp. 275-281, 2005.

[17] H. STONE, and J. L. SIDEL, Sensory Evaluation Practices. New York: Academic Press, 1993, pp. 338.

[18] S. S. Zeng, K. Soryal, B. Fekadu, B. Baha, and T. Popham, "Predictive formulae for goat cheese yield based on milk composition," Small Ruminant Research, vol. 69, pp. 180-186, 2007.