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TECHNOLOGIES RELATED TO THE SHEEP AND GOAT MILK WITHIN ECHOLOGIC CONDITIONS

TEHNOLOGII DE OBȚINERE IN CONDITII ECOLOGICE A LAPTELUI DE OAIE SI CAPRA

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The introduction of HACCP system within sheep exploitations represents a unitary control manner, scientifically proved, which enforces the discipline and correctness, allows an objective evaluation of sheep and goat meat and milk quality. When determining the main components of sheep and goat milk from the animals that grazed on the pasture fertilized with stable manure, within ecologic conditions, the following results were obtained: at sheep there was a fat percent of 6.22% and 6.11%, protein 5.32% and 5.52%, and dry substance 14.25% and 14.21%, normal values for sheep milk; at goats the fat percent was that of 6.22% and 6.11%, protein 5.32% and 5.52%, and dry substance 14.25% and 14.21%, normal values for goat milk. The milk samples taken from the sheep belonging to Palas Merino breed and from Carpatina breed were also analysed with regard to the toxic residues and it has been stated that the values obtained fit within the normal norms admitted by the food domain' standards, being in compliance with the safety and protection of the consumers. The elimination of chemical fertilizers, pesticides and herbicides has led to the non-noticing of their presence within the sheep and goat products. By the regulation of ecologic products' quality, in relation with the consumers' and environment's protection, a balance was created between the producers' interests and obligations, those of the merchants and also those of the consumers. On the basis of results obtained through the microbiological examination of milk and meat samples taken from the sheep it has been stated that the microbial flora identified is formed by representatives of Staphylococcus–72.72% Streptococcus β hemolitic – 9.09% and Fungi filamentous – 18.18%. The microbial flora is non pathogen for man

Key words: sheep, goats, ecologic, toxic residues.

Introduction

Food safety is a parameter which is related to the European consumer and within its insurance are involved all the branches that participate to the production, processing, transport and distribution of food products. The European politics of promoting the food products quality represents a component of community agricultural politics, also addressing to both the agricultural and industrial producers and the consumers, having in view the settlement of a reference basis for

the improvement of food products' quality and citizens' life. The introduction of HACCP system within sheep exploitations represents a unitary control manner, scientifically proved, which enforces the discipline and correctness, allows an objective evaluation of sheep and goat meat and milk quality and the continuous monitoring of the technological and hygienic parameters, avoids the accomplishment of inadequate food products.

Nowadays there is a great request of milk products produced out of sheep and goat milk, not only on internal market but also on external one. Under the conditions of Romania's integration within the European Union and knowing the fact that the countries within are great consumers of different sorts of cheese prepared out of sheep and goat milk or mixture between cow and sheep milk, the obtaining of qualitatively competitive products is imposed (products that could be in accordance with the European and World level requests, regulations and standards) as well as reasonable prices. At the level of the EU, within many countries, the HACCP system has become mandatory not only within the food industry but also within the farms producing raw materials. The elimination of chemical fertilizers, pesticides and herbicides has got a positive effect on the quality of milk obtained out of sheep and goat species.

Materials and Methods

The researches have been performed at ICDCOC–Palas Constanța and also at a private breeder. The animals comprised within the projects were individually examined, having registered data related to the: control of milk production (Nica-Dermengi method); milk qualitative determinations (SU determination of fat and protein out of milk).

The maintenance of sheep and goats was performed in stabulation of 150-160 days and 205-215 days on pasture, observing the insurance of fodder rations as follows: for the sheep within the preparation for services, in the period of service and in the first two months of gestation, for the pasture period there was a fodder ration of 2.09 kg SU, 1.53 UN and 257 g PBD, and in stabulation period 2.05 kg SU, 1.54 UN and 179 g PBD; within the second part of gestation (the last two months) and in the suckling the sheep received in the stabulation period 2.98 kg SU, 2.26 UN and 213 g PBD, and in pasture time 2.18 kg SU, 1.95 UN and 242 g PBD. The fodder rations for the goats within the pasture time were 1.64 kg SU, 1.36 UN and 192 g PBD, with a consumption of 0.83UN/kg SU and 117 g PBD/kg SU, and in the stabulation period 2.04 kg SU, 1.46 UN and 171 g PBD, with a consumption of 0.72 UN/kg SU and 84 g PBD/kg SU

The usage of pastures which were cultivated and fertilized with stable manure (there were no chemical fertilizers administrated) was performed for a greater period of time, this one having had beneficial effects over the health of and productive level of animals, avoiding long and exhausting walks.

The performance of microbiologic examination of milk samples taken from mother sheep and of meat samples taken from youth sheep, through insemination

by medium culture gel + blood, AABTL, ABE, colouring of smear by simple colour or Gram colour and the performance of pathogenity tests – haemolysis, coagulation tests.

For the calculation and systematization of data usual statistical methods were used, the computer performing the obtained data.

Results and Discussions

The elimination of chemical fertilizers, pesticides and herbicides has had a beneficial effect over the quality of meat and milk taken from the sheep species. The milk quality as well as its nutritive value is determined by its chemical composition. Special analyses were performed in this sense in order to certify this quality.

Dry substance, fat and protein were determined to the milk samples taken from two lots of sheep bred on the pasture fertilized with stable manure, under ecologic conditions. (Table no. 1).

Table no.1

Main components of sheep milk

Specification	n	Lot I	Lot II
		- - X ± Sx V%	- - X ± Sx V%
Dry substance %	20	14.25 ± 0.17 5.33	14.21 ± 0.15 4.72
Fat %	20	6.22 ± 0.16 11.51	6.11 ± 0.19 13.91
Protein %	20	5.32 ± 0.18 15.13	5.52 ± 0.17 13.77

From the data of table no. 1 might be noticed that all the milk main components had close values to the sheep from the second lots. The chemical analyses have shown that the fat percent was of 6.22% and 6.11%, protein 5.32% and 5.52%, and the dry substance 14.25% and 14.21%, normal values for sheep milk. The determination of milk main components of goats from two lots and which grazed on the pasture fertilized with stable manure, under ecological conditions, was performed as well (table no. 2).

From the data of table no. 1 might be noticed that all the milk main components had close values to the goats from the second lots. The chemical analyses have shown that the fat percent was of 6.22% and 6.11%, protein 5.32% and 5.52%, dry substance 14.25% and 14.21%, normal values for goat milk.

The determination of toxic residues content of milk coming from two lots of sheep and goats, which grazed on pasture fertilized with stable manure, under ecologic conditions, was performed (Table no. 3).

Table no. 2

Main components of goat milk

Specification	n	Lot I	Lot II
		- - X ± Sx V%	- - X ± Sx V%
Dry substance %	20	13.65 ± 0.17	13.62 ± 0.12
Fat %	20	3.67 ± 0.13	3.83 ± 0.19
Protein %	20	3.68 ± 0.15	3.74 ± 0.17

Table no.3

The content of toxic residues determined by sheep and goat milk

Pesticides residues							
	Organic clorurate				Organic phosphoric µg/kg		
	α HCH ppm (mg/kg)	β HCH ppm (mg/kg)	γ HCH (Lindan) ppm (mg/kg)	DDT total ppm (mg/kg)			
Maximum admitted limits *	0.004	0.003	0.008	0.04	20		
Lot 1	0.004	0.004	0.013	abs.	abs.		
Lot 2	0.022	0.008	0.013	abs.	abs.		
Heavy metals (ppm)							
Maximum admitted limits *	Pb.	Cu.	Cd.	Zn	Sn.	Hg.	As.
	0.02	0.1	0.05				
Lot 1	abs.	1.1	abs.	20.9	abs.	abs.	abs.
Lot 2	abs.	1.1	abs.	21.3	abs.	abs.	abs.
	Radioactivity - Cs_{134} + Cs_{137} Bq/kg						
Lot 1	16.88						
Lot 2	15.21						

*In accordance with the data from the Romanian Official Monitory no. 356 dated December 2001

The milk samples taken from the Palas Merino sheep (Lot 1) and also Carpatina breed (Lot 2) were also analysed from the point of view of toxic residues and had the following values: ***the content of nitrites and nitrates*** (mg%) – these substances are absent; ***pesticides*** (ppm) – ***organic clorurate,*** to the 1st lot α HCH-0.004; β HCH-0.004; γ HCH (Lindan)-0.013 şi DDT-totally absent; to the 2nd lot α HCH- 0.022; β HCH-0.008; γ HCH (Lindan)-0.013 şi DDT-totally absent; organic phosphoric – totally absent; ***residues of heavy metals (ppm)-*** to the 1st lot the following values were registered: Cu = 1.1; Zn = 20.9; Cd- absent; Sn – absent; Pb – absent; Sn – absent; Hg. – absent; As – absent; to the 2nd lot the following values were registered: Cu = 1.1; Zn = 21.3; Cd- absent; Sn – absent; Pb – absent; Sn – absent; Hg. – absent; As – absent; the registered values for Cu and Zn correspond to the conditions of Health Ministry Order 975/1998; ***the degree of radioactivity***

(Bq/kg)- the samples analyzed through spectrometric gamma with detector of Nal and the results represent the adding of ^{134} Cs and ^{137} Cs. The radioactive contamination degree places within the limits on both lots: 1st lot = 16.88 Bq/kg and 2nd lot 15.21 Bq/kg; the radioactive contamination degree places within the normal limits. The content of organic clorurate pesticides residues is in accordance with the conditions published within the MAAP Order 356/2001, and the one of heavy metals is in accordance with the conditions of Health Ministry Order 975/1998. The radioactive contamination degree places within the normal limits (16.44 Bq/kg).

The total analysis of the regular results related to the quality of sheep – goat bio products with regard to the chemical composition, proves that the values obtained place within the normal limits admitted by the food domain standards, observing the safety and protection of the consumers. The elimination of chemical fertilizers, pesticides and herbicides has led to the non noticing of their presence within the sheep and goat products. Microbiological analyses of the milk samples taken from the sheep and goats on lactation were performed, the results being presented in table no. 4.

Making an analysis of the data included in table no. 4 it is noticed the fact that the microbial flora identified within the milk samples taken from the sheep belonging to Palas Merino breed and from the goats belonging to Carpatina breed is represented by more microbial species: *Staphylococcus albus non haemolytic* (non pathogen), *Staphylococcus albus haemolytic* (possibly pathogen), *Staphylococcus citreus* (non pathogen), *Streptococcus β haemolytic* (generally, pathogen) *and Filamentous Fungi* (non pathogens). These microorganisms are placed on teguments being saprophyte, with the exception of *Staphylococcus albus haemolytic* and of *Staphylococcus β haemolytic,* which are pathogens. The number of colonies forming units (**UFC**) varies from one another, placing itself among **1 – 80**, with an average of **12** (Table no.4). The microbial spectrum is expressed in percentages. (Table no.5), as follows: **36.36%** -*Staphylococcus albus non haemolytic*; **9.09%**-*Staphylococcus albus haemolytic;* **27.27%** *Staphylococcus citreus*; **9.09%** - *Streptococcus β hemolitic;* **18.18%** - Filamentous Fungi.

It has been noticed the fact that the *Staphylococcus* type has had the greatest weight within the microbial load identified from the milk samples taken from sheep and goat milk (**72.72 %**), the smallest weight being that of (**9.09 %**) which was occupied by the *Streptococcus* type. From the pathogenity point of view it has been noticed the fact that the non pathogen microorganisms has had the greatest weight **(81.82%**), the pathogen microorganisms being poorly represented **(18.18%)**.

Table no.4

Microbial flora from the milk samples taken from the mother sheep belonging to *Merinos Palas* breed and from the goats belonging to *Carpatina* breed

Crt. No.	No. sample/ species	Microorganisms	Colouring	Pathogenity tests	Habitat (human/animal)	UFC *
1	201/sheep	*Staphylococcus citreus*	Positive gram	-non pathogen	-saprophyte on teguments	80
2		Filamentous Fungi	Simple coloration	- non pathogen	-saprophyte on teguments	
3	202/sheep	*Staphylococcus albus* - non haemolytic	Positive gram	- non pathogen; *coagulant negative*	-saprophyte on teguments	3
4		*Staphylococcus citreus*	Positive gram	- non pathogen	-saprophyte on teguments	1
5	203/sheep	*Staphylococcus albus* non haemolytic	Positive gram	- non pathogen	-saprophyte on teguments	1
6	301/ goats	*Staphylococcus albus* non haemolytic	Positive gram	- non pathogen; *coagulant negative*	-saprophyte on teguments	2
7		*Staphylococcus citreus*	Positive gram	- non pathogen	-saprophyte on teguments	1
8	302/ goats	*Staphylococcus albus* hemolitic	Positive gram	*-manito-positive; coagulant positive*	- on teguments (possibly pathogen)	2
9		*Streptococcus β hemolitic*	Positive gram	- generally, pathogen	- on teguments	1
10		Filamentous Fungi	Simple coloration	- non pathogen	- on teguments	
11	303/ goats	*Staphylococcus albus* non haemolytic	Positive gram	- non pathogen	- on teguments	31

UFC * = colonies forming units

Table no. 5

Milk microorganisms weight expressed in percentages

Crt. No	Type	%	Species	%	Observations
1	***Staphylococcus***	**72.72**	*Staphylococcus albus non haemolytic*	36.36	- non pathogen
2			*Staphylococcus albus haemolytic*	9.09	- pathogen
3			*Staphylococcus citreus*	27.27	- non pathogen
4	*Streptococcus*	**9.09**	*Streptococcus β haemolytic*	9.09	- pathogen
5	*Filamentous Fungi*			**18.18**	- non pathogen

Conclusions

1. When determining the main components of sheep and goat milk from the animals that grazed on the pasture fertilized with stable manure, within ecologic conditions, the following results were obtained:

- at sheep there was a fat percent of 6.22% and 6.11%, protein 5.32% and 5.52%, and dry substance 14.25% and 14.21%, normal values for sheep milk;
- at goats the fat percent was that of 6.22% and 6.11%, protein 5.32% and 5.52%, and dry substance 14.25% and 14.21%, normal values for goat milk;

2. The milk samples taken from the sheep and goats were analysed from the toxic residues point of view it has been noticed that the values obtained place itself within the normal limits admitted by the food domain standards.
3. The elimination of Chemicals fertilizers, pesticides and herbicides has led to the non noticing of the toxic substances' presence within sheep and goat products.
4. By the microbiologic examination of milk samples taken from the sheep and goats the following have been noticed:

- the microbial flora identified by the microbiological examination of milk samples is made up of representatives of Staphylococcus type –72.72% *Streptococcus β haemolytic* – 9.09% and Filamentous Fungi – 18.18%, the number of colonies forming units (UFC) varying in large limits (1- 80 UFC) **,** with an average of 12 UFC;
- the microbial flora emphasized within the milk samples is mostly non pathogen (81,82%), being represented by species of Staphylococcus type and Filamentous Fungi**,** which live saprophyte on teguments;
- the pathogen microorganisms represent 18.18%, being representatives of ***Staphylococcus*** *(Staphylococcus albus haemolytic)* type and ***Streptococcus*** *(Streptococcus β haemolytic)* type.

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