

THE TECHNOLOGY OF INCREASING AND IMPROVING THE MILK YIELD BY FEEDING EWES AND GOAT WITH VEGETAL LECITHIN

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Abstract

The experiments of nutrition made through introduction of the vegetal lecithin contained by the residue from the processing of the soy and sunflower in the fodder ratio of sheep and goats determined the elaboration of a technological solution in order to increase and improve the milk production of sheep/goats, of the quality of the sheep/goats milk. By introducing the vegetal lecithin in the fodder ratio of the sheep and goats during lactation period it was made an increased production of milk, an increase of the total production with 39.38% at the Merinos de Palas sheep, with 10% at the sheep from milk population of Palas and with 14% at the goats of Carpathian breed and an increase of the production of merchandise milk with 49% at the Merinos de Palas sheep, with 13% at the sheep from milk population of Palas and with 16% at the goats of Carpathian breed. The introduction of a daily quantity of 100 g of raw lecithin in the food of sheep and goats has generated the nutritive modifications of the fodder ratios. The vegetal lecithin administrated in the ratios of sheep and goats during lactation is a technological solution of increasing and improving the milk production, at the experimental lots being noticed an increase of the percents of dry substance, fat and protein. The experiments made to verify the technological parameters at the processing of cheese emphasized an improvement of the technological characteristics of the milk, contributing to the increase of the yield with 20 % at the goat milk from the experimental lot, and at sheep with 7%.

Key words: sheep, goat, vegetal lecithin, milk production

INTRODUCTION

The work had as main objective to feed the sheep and goats with ratios where the vegetal lecithin from soy and sunflower was introduced as lipid supplement, by using the secondary product resulted from the processing of soy and sunflower oil. By introducing the vegetal lecithin in the fodder ratio of sheep and goats during lactation result an increased production of milk, an increasing of the main reproduction indicators and an improvement of the health status of these animals [3;4].

The vegetal lecithin stimulates qualitatively and quantitatively the milk production, the biological value of milk increases, this meaning that the content in saturated fat acids decreases and the content in unsaturated fat acids increases (with 18, 20 and 22 atoms of carbon), fact that gives a special biological value to the milk for human consumption [2].

The phospholipids of the lecithin from soy are important in moistening the lipids and it can remain undamaged in the rumen, influencing the acids in the narrow intestine. The feeding with soy lecithin increases the level of polyunsaturated fat acids from the *longissimus dorsi* muscle and from the under skin adipose tissue [2]. The researches regarding the effect of the lecithin at the milk cows showed the effect of the lecithin from soy upon the rumen digestion of the proteins and the productive performances of the milk cows and that the use of the lecithin at sheep reduces the fermentation of the fibers at the level of rumen [1; 5].

MATERIAL AND METHODS

The fodder ratios were elaborated per categories of sheep and goats, the control of milk production was made. The animals included in the works were observed individually under the rapport of the own

performances, registering data regarding: control of productions, main reproduction indicators; control of milk production and qualitative determinations of the milk (determination of SU, fat and protein from milk). The control of the milk production was made based on the Romanian method of the control coefficient, that of *Nica - Dermengi*, through which both sheep and goats which are milking and those which weaned their lambs or kids are controlled. The method is based on the ratio between the daily milk production and the quantity at a single milking session from the same day, it can be applied on the whole lactation period, once or twice a month, on the whole effective of mother sheep and goats since the first week from dropping (after colostrums period), with the condition that the lambs and kids to be sufficiently developed to support the separation from their mothers, a time between 10 and 12 hours (the method is operative, it expresses truly the milking capacity of the sheep, the error being of approx. 2%).

The maintenance of sheep and goats was made in stable for 150-160 days and 205-215 days at pasture. For the sheep and goats there were assured fodder ratios depending on the physiological stage of the animals. All the categories of sheep and goats were supervised sanitarly-veterinary, the sanitary-veterinary from the strategic plan of prevention and combating the diseases at sheep and goats were made.

The sheep and goats grazed on areas planted with a mixture of 70-75% grain plants and 25-30% perennial vegetable plants, with high degree of consumption, of 94,12%, administering also a mixture of concentrated fodders.

For the qualitative determinations of the milk, there were used: Gerber method for the

percent of fat; Kjeldahl method for the percent of protein; the method of thermosetting (6-7 hours at 105±2°C), for the percent of dry substance.

RESULTS AND DISCUSSIONS

In order to administer the raw lecithin in the food of small ruminators (sheep and goats) it was proceeded to establish its raw chemical composition and then its nutritive value. The results of the chemical analyses revealed that the raw lecithin has an average content in water of 54,61 % respectively of 45,39 % dry substance (SU) consisting in 2,79 % raw ashes, 2,12 % raw protein, 26,30 % raw fat and 14,18 % raw SEN. At this chemical composition the nutritive contribution of the product was evaluated at 2220 Kcal EM/kg, at 1395 Kcal ENL/kg, at 1481 Kcal ENC/kg respectively 0,96 UNL or 1,00 UNC and 16,2 g PD/kg. It was established that a quantity which has an effect of increasing the milk production at sheep and goats is the daily administering of 100g of raw Lecithin.

Using these nutrition experiments it could be elaborated the technological solution of increasing and improving the milk production at sheep/goats, of the milk quality of sheep/goats.

The introduction of a daily quantity of 100 g raw lecithin in the food of sheep and goats during lactation period has generated the nutritive modifications of the fodder ratios presented in the table no. 1-3.

Analyzing data from the this tables it can be noticed that the raw lecithin does not –significantly modify the nutritive indicators of the fodder ratio, the energy increasing with 0,09 UNL and the protein less, respectively with 1,2 g for PDIN and PDIE.

Table no.1
The ratio for a Merino sheep with a weight of 55-60 kg, during lactation

Specification	SU kg	UNL	PDIN g	PDIE g	Ca g	P g
Necessary	1,5-1,7	1,3-1,5	70-80	70	4-5	3-4
Lucerne hay – 1 kg	0,89	0,57	75	65	10	1,9
Pickled corn - 1 kg	0,26	0,21	13	17	1,2	0,5
Snored corn - 0,2 kg	0,18	0,25	15	22	0,04	0,46
Barley 0,3 kg	0,25	0,34	20	26	0,54	1,14
Assured (1)	1,58	1,37	123	130	11,78	4
Raw lecithin–0,1 kg	0,04	0,09	1,2	1,2	-	-
Assured (2)	1,62	1,46	124	131	11,78	4

Table no.2

The ratio for a sheep during lactation, from the milk population of Palas, with the weigh of 50 kg

Specification	SU kg	UNL	PDIN g	PDIE g	Ca g	P g
Necessary	1,3-1,5	1,07	61	61	4,2	2,7
Lucerne hay – 1,5 kg	1,34	0,86	113	98	15	2,9
Mixture of concentrated fodders* – 0,2 kg	0,17	0,23	19	20	0,7	1,2
Assured (1)	1,51	1,09	132	118	19,2	4,1
Raw lecithin–0,1 kg	0,04	0,09	1,2	1,2	-	-
Assured (2)	1,55	1,18	133,2	119,2	8,3	5,1

* the used mixture of concentrated fodders is given in table no.4

Also in the case of goats during lactation the main nutritive indicators, energy the introduction in the fodder ratios of 100 g increasing with 0,09 UNL and the protein raw lecithin does not significantly influences with 1,2 g PDIN and PDIE.

Table no.3

The ratio for a goat of Carpathian breed of 50 kg, during lactation

Specification	SU kg	UNL	PDIN g	PDIE g	Ca g	P g
Necessary	1,3	0,94	67	67	3,5	2,5
Lucerne hay – 1,3 kg	1,16	0,74	98	85	13	2,47
Mixture of concentrated fodders* –0,2 kg	0,17	0,23	19	20	0,7	1,2
Assured (1)	1,46	0,97	117	105	13,7	3,67
Raw lecithin–0,1 kg	0,04	0,09	1,2	1,2	-	-
Assured (2)	1,50	1,06	118,2	106,2	13,7	3,67

* the used mixture of concentrated fodders is given in table no.4

Table no.4

The mixture of concentrated fodders used during milking period

Specification	%	SU kg	UNL	PDIN g	PDIE g	Ca g	P g
Corn	68	58,5	83	4910	7779	13,6	204
Oat	10	8,7	9,3	638	658	9	35
Wheat	20	17,2	21	1640	1480	12	68
Salt	1						
Di-calcium Phosphate	1					260	185
TOTAL	100	84,4	113,3	7188	9917	294	492
Turns back to	1 kg	0,84	1,13	72	99	2,9	4,9

Regarding the introduction of the lecithin in the fodder ratio, as a result of the made experiments, the most efficient method was to introduce the mucilage (the dregs) in a structure of mixture of concentrated fodders and it does not influences the palatability of the fodders. Having a more fluid consistency than the molasses, the mucilage can be added „in thin wire” in a mixture of snoring cereals, which, subject to homogenizing can assure a fodder concoction without agglomerations. Due to the high content of water (cca.55%), in order to prevent fermentations it is recommended that the lecithin to be daily introduced in the structure of the mixture of concentrated fodders, this being also the

technological solution for preparing the food with this fodder product.

Another modality of administering the lecithin at sheep and goats is that to introduce it in the drinking water, making a suspension which is well consumed by the animals. We recommend the dilution of the fresh mucilage (dregs) with 10-12 liters of water and then this suspension is poured in the drinking water. To preserve the mucilage (for 3-7-9 days), this is mixed with sodium chloride, in a proportion of 3-5 %, avoiding fermentation. In the case that the dregs are in a dehydrated stage it is recommended diluting it with warm water at the temperature of 80-85 °C.

During the lactation period the sheep from the experimental and witness lots received the same fodder ratio, at the sheep of Merinos breed the ratio had 1,58 kg SU, 1,37 UNL, 123 g PDIN, 130 g PDIE, to which calcium of 11,78 g and phosphor 4 g were added, at the sheep from the milk population of Palas the ratio had 1,51 kg SU, 1,09 UNL, 132 g PDIN, 118 g PDIE, to which calcium of 19,2 g and phosphor 4,1 g were added; also the goats from the experimental and witness lots received the same fodder ratio, 1,46 kg SU, 0,97 UNL, 117 g PDIN, 105 g PDIE, calcium 13,7 g and phosphor 3,67 g.

The sheep and goats during lactation received a supplement of vegetal lecithin,

residue (mucilage) from the soy oil processing, acquisitioned from S.C. ULEROM Constanța (the quality certificate states its chemical composition: water and volatile substances 50 %, fat substances (oil) 20-22 %, lecithin 18-20 %. The vegetal lecithin was administered in the morning, in the drinking water, after a previous dilution with warm water, in proportion of 1/1. It was noticed that the vegetal lecithin does not modify the palatability of water and it is well supported by sheep and goats.

It was determined the milk production at sheep and goats by twice a month control, through Nica-Dermengi method, the results being given in the tables no. 5-6.

Table no.5

The average total milk production, the average production of merchandise milk and the duration of lactation at the sheep treated with lecithin and at the witness lots

Breed or population of sheep/lot	n	The average total milk production (liters)	Average production of milked milk (liters)	Duration of lactation (days)
		$\bar{X} \pm sx$ V%	$\bar{X} \pm sx$ V%	$\bar{X} \pm sx$ V%
Merinos de Palas – experimental lot	58	117,51 ± 3,1 20,16	48,66 ± 1,85 28,95	112,9 ± 3,1 20,91
Merinos de Palas – witness lot	38	84,21 ± 3,4 24,96	24,05 ± 1,01 25,89	97,4 ± 2,6 16,65
Milk population of Palas – experimental lot	25	217,3 ± 7,8 17,94	81,6 ± 2,8 17,15	203,6 ± 3,9 9,57
Milk population of Palas – witness lot	70	197,6 ± 10,3 43,61	72,8 ± 3,9 44,82	184,7 ± 6,3 28,53

Table n.6

The average total milk production, the average production of merchandise milk and the duration of lactation at the goats of Carpathian breed, treated with lecithin and at those from the witness lot

Breed /lot	n	The average total milk production (liters)	The average production of milked milk (liters)	Duration of lactation (days)
		$\bar{X} \pm sx$ V%	$\bar{X} \pm sx$ V%	$\bar{X} \pm sx$ V%
Carpathian – experimental lot	25	261,01 ± 8,7 16,66	149,42 ± 3,7 12,38	211,44 ± 4,5 10,64
Carpathian – witness lot	49	227,49 ± 6,3 19,38	128,47 ± 2,8 15,25	184,65 ± 5,1 19,33

At Merinos de Palas breed the total milk production increased at the experimental lot with 39 % (117,51 liters at the experimental lot and 84,21 liters at the witness lot); the production of merchandise milk increased with 49 % (48,66 liters at the experimental lot and 24,05 liters at the witness lot). At the

milk population of Palas the total milk production increased at the experimental lot with 10 % (217,3 liters at the experimental lot and 197,6 liters at the witness lot); the production of merchandise milk increased with 13 % (81,6 liters at the experimental lot and 72,8 liters at the witness lot);

At the goats of Carpathian breed the total milk production increased at the experimental lot with 14 % (261,01 liters at the experimental lot and 227,49 liters); the production of merchandise milk increased with 16 % (149,42 liters at the experimental lot and 128,47 liters at the witness lot).

It was determined the chemical composition of the sheep milk per months and per experimental and witness lots, at the experimental lots of sheep from Merinos de Palas breed and the milk population of Palas there were noticed a little higher values at the dry substance, fat and protein (table no. 7).

Table no.7
The chemical composition of milk at the sheep and goats fed with vegetal lecithin comparatively to the witness lots

Lot	SU %	Fat %	Protein %
	$\bar{X} \pm sx$ V%	$\bar{X} \pm sx$ V%	$\bar{X} \pm sx$ V%
Experimental- Merinos sheep n=25	18,48±0,31 8,38	6,43±0,24 18,86	5,84±0,23 19,69
Experimental-sheep of the milk population of Palas n=25	18,26±0,25 6,84	6,45±0,35 27,13	5,97±0,28 23,45
Witness - Merinos sheep n=16	17,61±0,28 6,36	5,81± 0,29 19,96	5,71±0,15 10,51
Witness - sheep of the milk population of Palas n=16	17,56±0,25 5,69	6,15±0,35 22,76	5,91±0,28 18,95

At the qualitative examination of the milk production at the goats of Carpathian breed, at the experimental lot it was noticed

an increase of the percents of dry substance, fat and protein (table no. 8).

Table no.8
Chemical compositions of the milk at the goats of Carpathian breed which were fed with vegetal lecithin and at the witness lot

Lot	SU %	Fat %	Protein %
	$\bar{X} \pm sx$ V%	$\bar{X} \pm sx$ V%	$\bar{X} \pm sx$ V%
Experimental n=15	13,45± 0,41 11,81	3,59± 0,33 35,61	3,62± 0,41 43,87
Witness n=15	13,21± 0,24 7,07	3,67± 0,27 28,49	3,56± 0,31 33,73

The experiments made to verify the technological parameters at processing the cheese of sheep and goat milk, with the purpose to establish the output of production emphasized an improvement of the technological characteristics of the milk from both species, fact that contributed to the increase of output with 20 % at the goat milk from the experimental lot, and at sheep with 7 %.

CONCLUSIONS

➤ By using the vegetal lecithin from the residue from processing the oil of soy and sunflower in the ratios of sheep and goats during lactation is achieved an increase of the milk production, of the quality of the milk from sheep/goats.

➤ The introduction of a daily quantity of 100 g vegetal lecithin in the food of sheep and goats during lactation can be beneficial both in the nutritional and technological point of view, if the administering of lecithin is constantly made and-on bigger lots.

➤ The increases of the total milk production was of 39 % at Merinos de Palas breed, with 10 % at the milk population of Palas and with 14 % at the goats of Carpathian breed.

➤ It was determined the chemical composition of the sheep milk at the experimental and witness lots, noticing a little higher values the dry substance, fat and protein.

➤ At the qualitative examination of the milk production from the goats of Carpathian breed, at the experimental lot it was noticed

an increase of the percents of dry substance, fat and protein.

➤ It was emphasized an improvement of the technological characteristics of milk from both species, fact that contributed to the increase of the output at the cheese processing.

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