

Effects of Lecithin on Some Nutritive, Productive and Ruminant Indices in Young Fattening Lambs

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Abstract

Aim of this research was to determine the measure in which 100 g/head/day lecithin has an effect on the ruminal parameters and growth indices in lambs during the fattening process, compared to a normal ration which consisted of alfalfa hay and a concentrates mixture. Experiment was carried out on two experimental groups (n=10) of fattening Turcana lambs, from 138 to 176 days of age and an average weight of 28 kg. For the same level of feed consumption, lecithin improves the average daily gain by 14.85%, while the consumption rate for proteins and energy was 12.9% lower. Following lecithin administration the number of ruminal bacteria increased to 4.52×10^8 cfu/ml ruminal fluid compared to the average of 3.68×10^7 cfu/ml for the control diet. Lecithin has as effect the reduction of the protozoa number by 168,944/ml ruminal fluid and the species are less diversified.

Keywords: growth indices, lecithin, fattening lambs

1. Introduction

In the process of extracting vegetable oils from sun flower and soy a secondary product results, product that has an average dry matter (DM) of 45%, and a percentage of 58% fats and very high content of lecithin. This product called “dregs” creates problems about pollution of the environment, but can be used as forage to the ruminant animals. [1]

The aim of this research was to determine the manner in which the lecithin from the “dregs” has an effect on the rumen parameters and of growth indices in lambs that are in the fattening process, compared to a standard ration. The supplementation of lecithin in the farm animals forages might be recommended because of the role that this has in the lipids metabolism. Lecithin has a great capacity to emulsify fats, especially

cholesterol and to expose efficiently the fats to the action of the digestive liquids.

2. Materials and methods

Researches were carried out at the Didactic farm Timisoara, on 136 days old Turcana weaned lambs, born as singletons.

At the beginning of the experimental period, the lambs was randomly divided into two groups, each group was made of 10 lambs, according to the experiment organization program presented in table 1. The lambs groups were maintained in total confinement, under the same environmental conditions.

- Group 1 (control) was fed with 0.8 kg lolium hay/head/day and 0,5 kg concentrates mixture/head/day.

- Group 2 was fed with the same diet, but in the concentrates mixture (AC) 100 g lecithin/head/day was introduced.

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Table 1. Organization schedule of the experiment

Item	Group 1 (control)	Group 2 (experimental)
n	10	10
Period	Fattening lambs during 138-176 days old	
Ration fed (quantity/head/day)	Rb. (0.8 kg lolium hay + 0.5 kg AC)	Rb. (0.8 kg lolium hay + 0.5 kg AC) + 100 g lecithin
Established indices	Nutritive and bio-productive indices: feed intake, body weight, weight gain, specific consume.	
	Rumen parameters: total germ count (UFC/ml), number and genus of protozoa's.	

With 10 days before the beginning of the experiments, the lambs were used to consume the forages used during experiments, the chemical composition and the nutritive value of the forages were established, and for the animals, according to the category needs rations were calculated.

Quantity of lolium hay and concentrates distributed to the lambs was scaled with a precision of 0.05 kg.

In the semi-intensive fattening system, a ram lamb is fed with a ration consisting in 0.8 kg lolium hay and 0.5 kg of concentrates, which ensures 0.98 UNC, 101.3 g PDIN and 109.1 g PDIE, level that satisfy the vital needs and an average daily weight gain of 200 g. By adding 100 g of lecithin in the concentrates, the nutritive level of the ration has grown to 1.06 UNC, 102.6 g PDIN and 110.1 g PDIE.[2,3]

Comparative to the ration administered to lambs from the control group (L₁), by adding lecithin in concentrates fed to the experimental group (L₂) the changes observed were the followings:

- dry matter intake is growing slightly, with 4.46%;
- energy level calculated in UNC grows because of the lecithin with 8.16%;
- protein level by the two forms of PDI was very little influenced, being with 1.28% higher for PDIN and with 0.91% higher for PDIE.

After the statistical interpretation of the registered results, these were compared between themselves using Mann Whitney test, in order to determine if differences exist statistically among the experimental groups. This test is a non-parametric method which does not take into account the values of the repartition parameters and can be applied in order to appreciate the significant differences

between the experimental groups that have a relatively low number of subjects.

3. Results and discussion

In order to quantify the effect that adding 100 g of lecithin/head/day, same forages constituted the standard ration that was administered to both experimental groups. Hay was given to the lambs once a day, during morning time at 8:00, in quantity of 0.800 kg/head/day, the lambs had access to the hay 24 h. Lambs from both experimental groups received a mixture of concentrates of 0.500 kg/head/day, quantity consumed entirely by the animals.

Evolution of the body weight and the growth rates was established by scaling the lambs individually at the beginning and at the end of the experimental period.

Statistically analyzed data are presented in table 2. According to this data it can be observed that initially the two experimental groups have been homogenous, and weight averages were very similar, respectively of 28.21 ± 0.45 kg at L1 and of 28.29 ± 0.48 kg in L2.

At the end of the experimental period, lambs from L1 have registered a mean of the body weight of 34.86 ± 0.62 kg, and those from L2, of 35.92 ± 0.66 kg, difference of 1.06 kg being insignificant (p>0.05).

Calculations showed that at the control group average of the total weight gain during entire experimental period was significantly (p<0.01) lower with 0.98 kg comparative with the experimental group.

By administering lecithin to group 2, average daily weight gain was 201 g/lamb, significantly higher (p<0,01) with 14.85% compared to the control group which has registered 175 g/lamb and day.

Specific consume realized according to the data resulted from our study is presented in table 3 and it is expressed for the energy levels in UNC/kg

gain, and for protein levels in PDIN and PDIE per each kg gain.

Table 2. Productive indices registered by the fattened lambs from L1 and L2 experimental groups

Item	Group 1 - control Sr				Group 2 Sr + Lecithin				Differences L ₂ -L ₁	Mann-Whitney test
	n	$\bar{X} \pm S\bar{x}$	s	Cv %	n	$\bar{X} \pm S\bar{x}$	s	Cv %		
Initial body weight [kg]	10	28.21±0.45	1.41	4.99	10	28.29±0.48	1.52	5.38	0.08	0.82 ns
Final body weight [kg]	10	34.86±0.62	1.96	5.61	10	35.92±0.66	2.08	5.79	1.06	0.32 ns
Growth gain [kg]	10	6.65±0.19	0.60	9.03	10	7.63±0.23	0.72	9.44	0.98	0.01**
Average daily gain [g]	10	175±5.00	15.80	9.03	10	201±5.99	18.94	9.44	26	0.01**

Table 3. Specific consume registered by the fattened lambs during experimental period

Specific consume	Group 1 (control)		Group 2 (experimental)	
	Lolium hay	Concentrates mixture	Lolium hay	Concentrates mixture + lecithin
UNC	3.84	3.20	3.34	2.79
UNC/ kg gain		7.04		6.13
PDIN g	338.74	239.94	294.93	208.91
PDIN g/kg gain		578.69		503.83
PDIE g	340.57	282.74	296.52	246.17
PDIE g/kg gain		623.31		542.69

At the same forage intake, higher weight gains in labs from the experimental group determined the lower specific consumes for this group, comparative to the control group. Thus, as for the energy requirements, specific consume (UNC/kg gain) is of 6.13 in the experimental group, which is with 12.93% lower that to the specific consume in the control group, where the value is of 7.04. In the case of the protein requirements, also for gaining 1 kg weight at the second experimental group, 503.83 g PDIN, respectively 542.69 g PDIE were used, which means with 12.94% less comparative to the control group.

At the end of the experimental period, ruminal liquid was collected for the determination of the total germs count (UFC/ml) also the number and genus of the protozoa.

As for the UFC/ml ruminal liquid (table 4), it can be observed that by supplementing the food with 100 g of lecithin/day, the multiplication of the ruminal bacteria can be favored, they number reaching at $4,52 \times 10^8$ /ml in lambs from group L2, compared to the average of $3,68 \times 10^7$ from the control group. This multiplication could explain the positive effect on the rumen micro flora that

lecithin has, because improves digestive value of the nutrients and enriches the quantity of PDIN at the duodenal level.

Data from the table shows that by adding lecithin in the forages of fattening lambs, the ruminal pH levels are not affected or changed.

Number and genus of protozoa from the ruminal liquid from lambs that were included the two experimental groups are presented in table 5.

Data from the table confirms once again the observation registered in lactating ewes, after a period in which 100 g of lecithin was administrated, like in the case of the fattening lambs, number of protozoa diminishes. For L1 the number dropped until 958466/ml, and for L2 the means were around 789522/ml. Protozoa genus was more diversified in at the control group. Protozoa from Entodinium genus were predominant (over 95%), Dasytricha genus was found in both experimental groups but the Diplodinium genus has disappeared after the lecithin administration.

Table 4. UFC/ml and ruminal pH in the lambs from experimental groups

Group 1 (control)		Group 2 (experimental)	
UFC/ml	pH	UFC/ml	pH
3.68x 10 ⁷	6.9	4.52 x10 ⁸	6.8

Table 5. Number and genus of the protozoa isolated from the lambs ruminal liquid

Group 1 (control)				Group 2 (experimental)			
No /ml	Genus %			No /ml	Genus %		
	Entodinium	Diplodinium	Dasytrichia		Entodinium	Diplodinium	Dasytrichia
958466	97.10	2.15	0.75	789522	97.25	0	2.75

4. Conclusions

Supplementing rations with 100 g/day lecithin of the fattening lambs between 25-35 kg on a period of 38 days, the following effects can be observed:

- At the same levels of forages intake, lecithin improves average daily gain with 14.85% and reduces energy and protein specific consumes with 12.9%,
- The multiplication of ruminal bacteria are stimulated, UFC/ml ruminal fluid was around 4,52 x 10⁸ for L2, compared to L1 in which the averages were 3,68 x 10⁷,
- The number and genus of protozoa is reduced.

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