

Feeding ewe lambs replacing sunflower meal with soybeans and peas

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Abstract

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There is insufficient data on the direct use of grain legumes as protein sources in the feeding of ruminants and, in particular, of sheep and lambs. The purpose of this study is to track the growth and consumption of feed in female lambs for breeding in weight of 19.4 kg when replacing sunflower meal “Sunpro 46” with a high protein content, with peas and thermally treated soybean grain. 30 female lambs of Pleven Black face breed were used. Lambs from all three groups received an equal amount of compound feed of 18% protein content. It was found that the thermally treated soybean and pea grains as protein sources in compound feed for lambs did not have a meaningful impact on the weight development of female lambs for breeding with weight from 19 kg to 28 kg. An average daily weight gain of 0.205-0.209 kg for female lambs was obtained in the three types of rations, respectively with the participation of sunflower meal “Sunpro-46” and grain of soybeans and peas. Feed intake per 1 kg weight gain is 4.9 kg DM, regardless of the protein source in the ration (sunflower meal, soybeans and peas).

Keywords: feeding; female lambs; peas; soybeans

Introduction

Protein sources for animal nutrition – in Europe are limited. Over the last decades, research programs have focused on refining the animal’s needs for protein and its digestibility. The use of genetically modified soybean varieties and, accordingly, the use of soybean meal from GMO varieties has forced Europe to search ways to increase the share of own sources of legume plant protein. The inclusion of legumes in crop rotation schemes largely reduces nitrogen fertilization, enriches the soil with nitrogen and is an important element in organic farming. To date, the European Commission has allocated funds to help producers who grow protein crops for green manure or for feed by paying additional subsidies. This policy encourages producers to increase the area of cultivated various forage legumes and increase the share of their use in animal rations. Studies in our country (Shyndarska et al., 2002) for different levels and sources of protein in the compound feed (sunflower meal, urea and combination of

them) show that the productivity of lambs for fattening not substantially influenced by the origin of the protein. There is insufficient data on the use of legume beans such as soybeans and peas as protein sources in ruminant feeds and in particular sheep and lambs.

The purpose of this study is to track the growth and consumption of feed in female lambs for breeding in weight of 19.4 kg when replacing sunflower meal “Sunpro 46” with a high protein content, with peas and and thermally treated soybean grain.

Materials and Methods

The experience was conducted between May and June 2017 in the experimental platform at the Institute of Forage Crops – Pleven. 30 female lambs of Pleven Black face breed were used. The lambs entered in experiment after reaching a live weight of 19.4 kg. Before that they are weighed individually in two consecutive days. The average weight of the two

measurements is assumed to be the initial live weight of the animals entering the experiment. Animals were divided into three groups of 10 animals each.

In the first group, the lambs received compound feed consisting of sunflower meal “Sunpro-46” (23.27%) as a protein source, corn (74.73%) and vitamin-mineral supplement and salt (2%). In the second group of lambs, half of the protein in the compound feed was replaced with soybeans – 8.25% and peas – 12.95% and the other half consisted of sunflower meal “Sunpro 4”6 – 12.95%. Corn – 63.82%, vitamin-mineral supplement and salt – 2% were included in ration. In third group, soybeans –18.00% and peas – 24.65% were used as protein sources. And respectively corn – 55.35% and vitamin-mineral supplements and salt – 2% were used in the compound feed.

Lambs from all three groups received an equal amount of compound feed of 18% protein content. Grain feeds were pre-milled through a sieve of 8 mm size for a better intake of lambs. The rations were balanced by energy, protein and mineral substances for a daily gain – 225g, according to the feeding standards for lambs with live weight of 20 kg (Todorov et al., 2010). In order to better measure the effect of the protein source used, medium quality alfalfa hay (15% refusals) was used in all three groups. The daily ration of feed was given twice – at 8 am and 4 pm. Daily the remainder of the previous ration is collected and weighed in the morning before the new ration for the day. The animals had free access to drinking water and salt for licking. During the experiment the lambs are measured every 14 days of the experimental period. Duration of the trial period was 42 days.

Samples from the feeds used were taken weekly for determination of dry matter at 105°C to constant weight, as well as chemical analysis samples dried at 65°C. Weed-method chemical analysis was performed on the samples taken and dried to constant weight of the feeds (roughage and combined). Samples before to analysis were ground through a 1 mm sieve by Retsch SM100 mill. Dry matter (DM) at 105°C to constant weight (according to BDS-ISO 6498) was determined. Crude Protein (BDS-ISO 5983) and Crude Fiber (CF) (AOAC, 2007) were determined by Kjeldahl.

Results and Discussion

The data from the component composition and the laboratory chemical analysis of the feed used in the lamb experiment are shown in Table 1.

The differences in the CP content in sunflower meal “Sunpro-46” (48.91%) are large compared to the other two protein sources – peas (23.98%) and soybean (36.68%), which is due to the high quality of the product “Sunpro-46”,

Table 1. Chemical composition of feed used, % of DM

Forages	DM	CP	CF
Corn	93.87	8.85	3.36
Sunflower meal “Sunpro-46”	92.00	48.91	7.06
Soy (grain)	95.40	36.68	13.05
Peas (grain)	93.09	23.98	6.05
Lucerne hay	92.13	13.36	34.04

a high-protein and low-cell fraction of sunflower meal (Nedelkov et al., 2018; Nedelkov et al., 2019). High protein content provides a basis for satisfying the nutritional and energy needs of the growing organism, as well as achieving high productivity of lambs. CF in soybeans is higher (13.05%), compared to peas (6.05%) and sunflower meal. “Sunpro-46” (7.06%). The results from laboratory analysis of lucerne hay correspond to reference literature for medium-quality hay.

Table 2. Growth gain of ewe lambs, kg

Indicators	First group 100% Sunflower meal Sunpro	Second group ½ Sunflower meal Sunpro	Third group 100% soy and peas
Weight at start of experiment	19.35	19.37	19.37
Weight at the end of the experiment	28.15	28.00	28.05
Total growth	8.80	8.63	8.68
Average daily gain	0.209	0.205	0.206

Weight at start of experiment and the end of the trial is approximately the same in all three groups of experimental lambs (Table 2). The total growth of lambs fed with the three different rations is approximately equal, regardless of the share and participation of protein sources. The average daily growth gain from measurements made over 14 days varies in narrow range, from 0.205 kg to 0.209 kg for all three groups of lambs. The growth and development of lambs in all three groups showed resistance and persistence in the mean increase, with no significant differences in the experimental groups. The results obtained correlate with those of other authors (Krachunov et al., 2007), close to our results in fattening lambs with sunflower meal – 0.207 kg. A lower average daily gain of lambs fed on base of sunflower meal – 0.180 g/day was obtained and when its fed on base of rapeseed meal, the results – 231 g/day are higher than ours (Yossifov, 2013).

Figure 1 shows the growth of the lambs by weeks of the test groups. In the first week of the trial, the weight between the lambs was equalized for all three groups. It was found that the lambs weight in all three groups increased by an average of 2.8 kg per week with a very high correlation, respec-

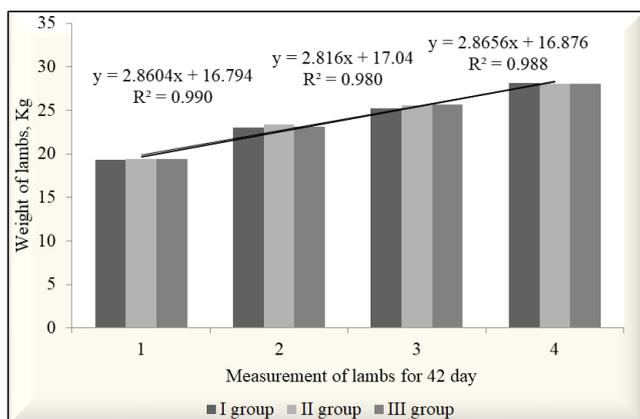


Fig. 1. Growth of lambs during the test period

tively for the first, second and third groups: $R^2 = 0.990$, $R^2 = 0.980$ and $R^2 = 0.988$.

The daily amount of feed intake from one animal ranges from 1.014 to 1.034 kg of DM (Table 3; Figure 2). The amount of lucerne hay intake is from 0.246 kg to 0.266 kg per animal per day. The average intake feed for 1 kg growth is about 4.9 kg DM in three groups of lambs. Lower values for intake feed per kilogram of growth were obtained from Krachunov et al. (2007), and it was found that in a group of lambs fed on ration of 26% sunflower meal, the intake feed was 4.47 kg of DM, as compared to our results.

Table 3. Intake feed, kg DM

Parameters	First group 100% Sunflower meal “Sunpro-46”	Second group ½ Sunflower meal “Sunpro-46”	Third group 100% soybeans and peas
Intake feed of 1 lamb	1.034	1.014	1.025
Compound feed	0.768	0.768	0.768
Lucerne hay	0.266	0.246	0.257
Intake feed for 1 kg of growth			
DM, kg	4.947	4.946	4.975
DM of compound feed	3.674	3.746	3.728

Higher values for intake feed per kg were also established by Yossifov (2013), respectively – 6.38 kg DM, compared to our results. Intake compound feed in this study is 3.6 to 3.7 kg DM. The use of different protein sources in fattening lambs after weaning to higher weight depends on their effectiveness (Antunović et al., 2019). In studies with early weaned lambs with weight of 10 kg for fattening up to 25 kg, an average daily gain of 0.218 and 0.221 g was

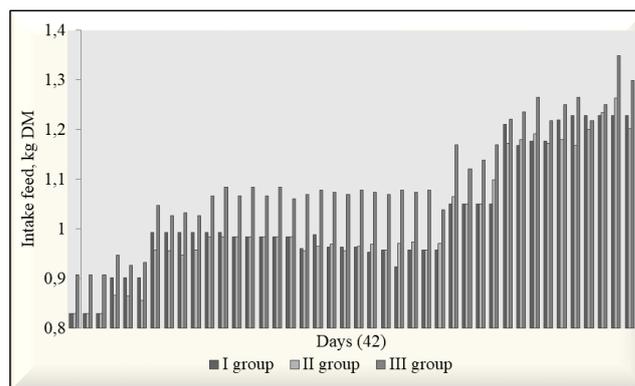


Fig. 2. Intake feed for 42 day, kg DM

obtained using dry distillers grain and sunflower meal and limited amount of soybean meal (Simeonov, 2012).

Conclusion

The results obtained in determining the growth and consumption of feed in female lambs for breeding in weight of 19.4 kg when replacing sunflower meal “Sunpro 46” with a high protein content, with peas and thermally treated soybean grain allow the following conclusions to be drawn:

It was found that the thermally treated soybean and pea grains as protein sources in compound feed for lambs did not have a meaningful impact on the weight development of female lambs for breeding with weight from 19 kg to 28 kg.

An average daily weight gain of 0.205-0.209 kg for female lambs was obtained in the three types of rations, respectively with the participation of sunflower meal “Sunpro-46” and grain of soybeans and peas.

Feed intake per 1 kg weight gain is 4.9 kg DM, regardless of the protein source in the ration (sunflower meal, soybeans and peas).

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