

THE EFFECT OF NATURAL ZEOLITE ON FATTENING LAMBS PRODUCTION RESULTS¹

J. Stojković, M. Adamović, J. Lemić, B. Jašović²

Abstract: The paper presents results of the investigation concerning the effect of a minazel-based preparation on fattening lambs production results. The experiment was performed on two groups of lambs (control – K and experimental – O), 20 animals per group, and for a duration of 90 days. The diet consisted of sheep milk, a compound mix for fattening lambs, and meadow hay. Lambs of the experimental group, contrary to those of the control group, got a minazel-based preparation. The preparation Min-a-Zel S (in the form of 25% suspension) was administered to lambs from birth until the 14th day of life, directly into the mouth, once daily (before the morning meal), 10 ml each. Min-a-Zel Plus was administered starting from the 15th day by adding it to the fodder mix (0.5%). Feeding was ad libidum. The average starting lamb body mass was 4.10 kg. The average body mass of lambs at the end of the experiment was 24.50 vs 28.10 kg, K vs O respectively ($P < 0.01$). The daily growth of the lambs, during the course of the experiment, was 226:266 g, and was 40 g or 11.76% higher in the experimental group ($P < 0.01$). The experimental group had better utilization of dry matter, proteins and energy, with a lower incidence of diarrhoea.

Key words: lambs, growth, feed utilization, natural zeolite

Introduction

The contemporary cattle production demands constant invention of the new possibilities that would improve health condition and production results of the domestic animals. Having in mind that aim, during the last decade a large number of reports dealing with possible use of natural zeolite in the cattle production could be met in public. Hence, it is believed that because of its good absorption efficiency, the absorption of various harmful material can remove some bad or favorite influence of some good factors in feed, animal digestive tract, as in the environmental conditions, under which the animals are kept (Stojic *et al.*, 1998).

Zeolites are cationic ionizer containing clinoptiolite. They are mostly used for absorption of mycotoxins, i.e. for preventing of mycotoxicosis development in the animals. For this purpose 0.2–5 % is added in the fodder mix. Previous investigation of Stojkovic *et al.* (2004) showed the positive effects of using the preparation based on natural zeolite in the fattening lamb diet. This investigation is an addition to the previous one.

Material and method

The experiment was performed on the two lamb groups (control – K and experimental – O), with 20 animals per group, at the farm Mramor near Nis. The experiment lasted 90 days. The feeding was ad libidum. The preparation Min-a-Zel S (in the form of 25% suspension) was administered to lambs from birth until the 14th day of life, directly into the mouth. Min-a-Zel Plus was administered starting from the 15th day by adding it to the fodder mix (0.5%). Min-a-Zel S is 25% suspension of refined zeolite compound mix, which contains 90% of clinoptiolite. Min-a-Zel Plus represents a new generation of mineral mycotoxin absorbents, and it is made by modification of the surface of zeolite material named clinoptiolite with a long-chained quaternary amine (Tomasevic *et al.*, 2000). Both preparations are made at The Institute for Technology of Nuclear and other Mineral Raw Materials in Belgrade.

At the start of this experiment the usual chemical analyses of the feed components were made (milk, concentrate fodder mixture, and hay).

¹ Original scientific paper – Originalni naučni rad

² Jovan Stojković, PhD, associate professor; Boban Jašović, MSc, assistant, Faculty of Agriculture Priština – Lešak; Milan Adamović, PhD, scientific advisor; Jovan Lemić, MSc, research associate, Institute for Technology of Nuclear and other Mineral Raw Materials, Belgrade

Table 1. Chemical composition of used feedstuffs (calculated to 100% of DM)

Parameter	Concentrate mixture	Meadow hay	Sheep milk
Dry matter	88.00	89.20	18.60
Proteins	17.16	11.88	32.26
Ash	6.36	7.62	3.49
Fat	3.07	2.24	39.52
Cellulose	11.02	30.72	0.00
NFE	62.39	47.54	24.73
Ca (g)	0.82	0.76	1.13
P (g)	0.64	0.56	0.81
ME, MJ/kg	8.07	5.11	13.44

The body mass of lambs was measured at the beginning and at the end of the experiment. The amount of consumed food was measured every day. The statistical interpretation of the data was done by Statistica computer program, version 6, *StatSoft. Inc.* (2003).

Results and discussion

The results of lamb body mass gain indicate that lambs that received Min-a-Zel S and Min-a-Zel Plus gained more weight. The average body mass of lambs at the end of the experiment (90th day of life), was 24.50 vs 28,10 kg (K vs O, respectively), and the observed differences were statistically significant at the level of $P < 0,01$. The average lamb daily growth (table 2) during the experiment was 226 vs 266 g, and the established difference of 40 g or 11,76% in favor of the experimental group, was highly significant ($P < 0,01$). The difference in daily growth, in favor of the experimental group, was greater in the second part of the experiment, when lambs took most of the nutritive material from the concentrate fodder mixture in which Min-a-Zel Plus was added. The characteristics of the new generation preparation, enable it to bind large number of adverse materials (mycotoxins, radionuclides, heavy metals, ammonia, etc.) which can come into the organism through food, preventing their bad effects thus.

Table 2. The results of the comparative examination of natural zeolite in fattening lambs diet

Parameter	Group		Index
	K	O	
Number of lambs	20	20	-
Duration of the experiment, days	90	90	-
Input lamb body mass, kg	4.10	4.10	-
Output lamb body mass, kg	24.50	28.10**	114.89
Total growth of lambs, kg	20.40	24.00**	117.64
Daily growth of lambs, g	226	266**	117.69
Food consumption, kg	2.40	2.60*	108.33
Food conversion, kg	9,20	8,60*	93.47

* $P < 0,05$; ** $P < 0,01$

Previous reports also point out to positive effects of minazel on the production results of fattening lambs.

In the previous experiment performed by *Stojkovic et al.* (2004) the body mass of the lambs in the control group at the end of the fattening was 24.48 kg, while in the experimental group, with added preparation based on zeolite, was 26.94 kg. *Nikkah et al.* (2001) reached daily growth from 167 to 197 g by added clinoptilolite in lamb meals. Using the same zeolite-based preparation (Min-a-Zel Plus) in fattening lambs in dose of 0.2% and 0.5% of concentrated mixture *Stojsic et al.* (2004) observed the daily growth of 209 g and 179 g respectively, while the increased preparation dose did not increase daily growth additionally. However, in this research an increased dose of Min-a-Zel Plus influenced zearalenon residui elimination from liver, kidneys, and muscles, what was the real importance of these results. Adding in mixture for older

lambs 0.2 or 0.5% of the zeolite-based preparation (Min-a-Zel), *Stojkovic et al. (1999)* reached slight increase of lamb body mass (2%) and daily growth (3%), what was significantly less than the daily growth increase found in this research. *Pond et al. (1995)* and *Abu-Zanat (1977)* also affirmed that the lambs eating the mixture with clinoptilolite added showed better results, while *Ochodnicky et al. (1986)* did not observe any positive result using lamb diet with added zeolite, which probably was the result of using different zeolite type.

The lambs food consumption, according to the sequence of treatments K vs O was 2.40 vs 2.60 kg respectively, and the observed difference was statistically significant ($P < 0.05$). The results of the food conversion indicate that the lambs fed by additional Min-a-Zel S and Min-a-Zel Plus spent less food per one kg growth. During the whole experiment (0-90 days), the food conversion of the studied groups K vs O was 3.20 vs 3.00 kg respectively, and the observed difference was highly significant ($P < 0.05$).

A greater difference in growth observed in this study probably is a result of these two zeolite-based preparations combined influence in the different stages of growth. Application of Min-a-Zel S suspension (used in the first 14 days of life) contributed to the better results of experimental group during the first weeks of lambs' growth, when the use of the concentrate mixture was insignificant. Min-a-Zel Plus preparation had the positive influence after 30th day, when the lambs became used to eat a larger amount of the mixture in which this preparation was added.

In the control group lambs between 17th and 23rd day of life, seven lambs had diarrhoea, which repeated between 45th and 50th day of life. In the experimental group lambs any serious diarrhoea case was not noticed, which probably was a contribution of the tested preparations.

Conclusion

The use of the preparation based on natural zeolite (Min-a-Zel S and Min-a-Zel Plus) had a positive influence on the production of the fattened lambs. The average body mass of the control group lambs was 24.50, while the average body mass of the experimental group lambs was 28.10 kg, which was by 3.60 kg or 11.48% more. The average daily growth was greater in the experimental group for 40 g or 11.76%. In the same group the food consumption per kilogram of growth was lower by 60 g or 6.53%. The diarrhea incidence rate was also lower in the experimental group.

EFEKTI PRIMENE PRIRODNOG ZEOLITA U HRANI NA PROIZVODNE REZULTATE JAGNJADI U TOVU

J. Stojković, M. Adamović, J. Lemić, B. Jašović

Rezime

U radu su prikazani rezultati istraživanja o uticaju preparata na bazi minazela na proizvodne rezultate jagnjadi u tovu. Ogled je izveden na dve grupe jagnjadi (kontrolna – K i ogledna - O), po 20 jagnjadi, u trajanju od 90 dana. Obrok se sastojao od ovčijeg mleka, krmne smeše za tov jagnjadi i livadskog sena. Jagnjad ogledne grupe, za razliku od kontrolne, dobijala su preparate na bazi minazela. Preparat Min-a-Zel S (u obliku 25% suspenzije) jagnjad su dobijala od rođenja do 14. dana života, direktno u usta, jednom dnevno, (pre jutarnjeg napajanja), po 10 ml. Mina-a-Zel Plus im se davao počev od 15. dana uzrasta na taj način što je bio uključen u krmnu smešu (0,5%). Ishrana je bila po volji. Prosečna telesna masa jagnjadi na kraju ogleda, prema redosledu tretmana (K:O), bila je 24,50:28,10 kg ($P < 0,01$). Dnevni prirast jagnjadi, tokom ogleda, bio je 226:266 g i u oglednoj grupi bio je veći za 40 g ili 11,76 posto ($P < 0,01$).

Cljučne reči: jagnjad, minazel, proizvodni rezultati

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