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THE EFFECT OF ROASTED CEREALS ON GROWTH AND BLOOD PARAMETERS OF LAMBS FATTENING

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Introduction

Young lambs have high energy and protein requirements and consume limited amounts of dry matter. Main energy source in fattening lambs rations are cereals, primarily maize and oat. In lambs, the rumen does not function fully until about 7 weeks of age, thus, the very young lamb is functionally a nonruminant (Antunović et al., 2000) and are more sensitive to various stress conditions (ablactation, feed changes etc.). They may also cause diverse rumen microflora disorders leading to development of some harmful microorganisms and lambs growth decrease. Forage heat treatment is known to reduce harmful bacteria (Domaćinović et al., 1996) thus contributing to easier transition from milk feeding to dry food.). Since the literature is short of the papers dealing with application of heat-treated cereals in lamb rations, these investigations should provide better insight in its application in lamb rations and effect on fattening traits as well as blood composition.

Material and methods

Biological investigations were carried out with 40 lambs of Merinolandschaf breed after ablactation at average age of 50 days. The experimental lambs were classified into two groups: control (C) and experimental group (E). Lambs were of the equal age, body weight, sex and origin. They were kept in the same conditions during the experiment. The fattening period lasted 57 days. Lambs of the control group were fed on mixture with crude forages, those from the experimental group on mixture with roasted cereals (maize, oat and barley) (Table 1). Hay was consumed *ad libitum*. Cereals roasted using a Jet-Pro Roaster (Jet-Pro Co. Atchison, KS) to an exit temperature of either 135^{o}C. Considering the aim of the investigation, forages used in feed mixtures, their raw material and chemical composition (analysed according to AOAC, 1995) can be seen in Table 1 .

Body weight, average daily gain and daily feed consumption during postweaning period were determined for lambs on 28 and 57 days of fattening. The lambs were weighed at the beginning of the experiment, on 28th day and at the end of the experiment (57th day).

Table 1. Ingredients and chemical composition of feed mixtures for lamb fattening

Composition, %	Feed mixtures	
	Control	Experiment
Raw maize	25.00	-
Roasted maize	-	25.00
Oat	16.00	-
Roasted oat	-	16.00
Barley	20.00	-
Roasted barley	-	20.00
Soybean	31.00	31.00
Wheat forage meal	5.00	5.00
Phosphonal	1.00	1.00
Limestone	1.00	1.00
Salt	0.50	0.50
VAM	0.50	0.50
Total	100.00	100.00
Dry matter	85.96	85.94
Crude fat	3.80	3.72
Crude ash	5.31	5.38
Crude fibres	8.13	8.17
Crude proteins	15.50	15.52
Metabolic energy, MJ ME/kg	12.33	12.33
Ca – Calcium	0.92	0.91
P – Phosphorus	0.44	0.46

The blood was collected from the jugular vein (10ml) into the sterile vacuum tubes Venoject® (Sterile Terumo Europe, Leuven, Belgium) from all lambs. After that, the serum was separated by centrifugation (10 min) at 3000 revolutions/min and placed into the Boehringen Mannheim/Hitachi 911 auto analyser (Boehringer Mannheim GmbH, Mannheim, Germany). Within the blood serum there have been found the concentrations of the mineral indicators (Ca-Calcium, P-inorganic Phosphorus, K-Potassium, Na-Sodium, Cl-Chloride and Fe-Iron, concentrations of the biochemical indicators (urea, glucose, total proteins, albumin, cholesterol, high-density lipoproteins or HDL-cholesterol, tryglicerids and bilirubin total) and enzyme activity (ALT-alanine aminotransferase, AST-aspartate aminotransferase, alpha-amylase, AP-alkaline phosphatase, CK-creatine kinase, GGT-γ-glutamyl transferase, cholinesterase and LDH-lactate dehydrogenase).

Statistical analysis of data was performed by computer program STATISTICA (StatSoft, Inc. 2001).

Results

The lambs from experimental group grew faster (by 15%), gained higher final body weight (by 6.72%) although feed consumption was lower (by 2.32%) in comparison with the lambs from the control group (Figure 1, 2 and 3).

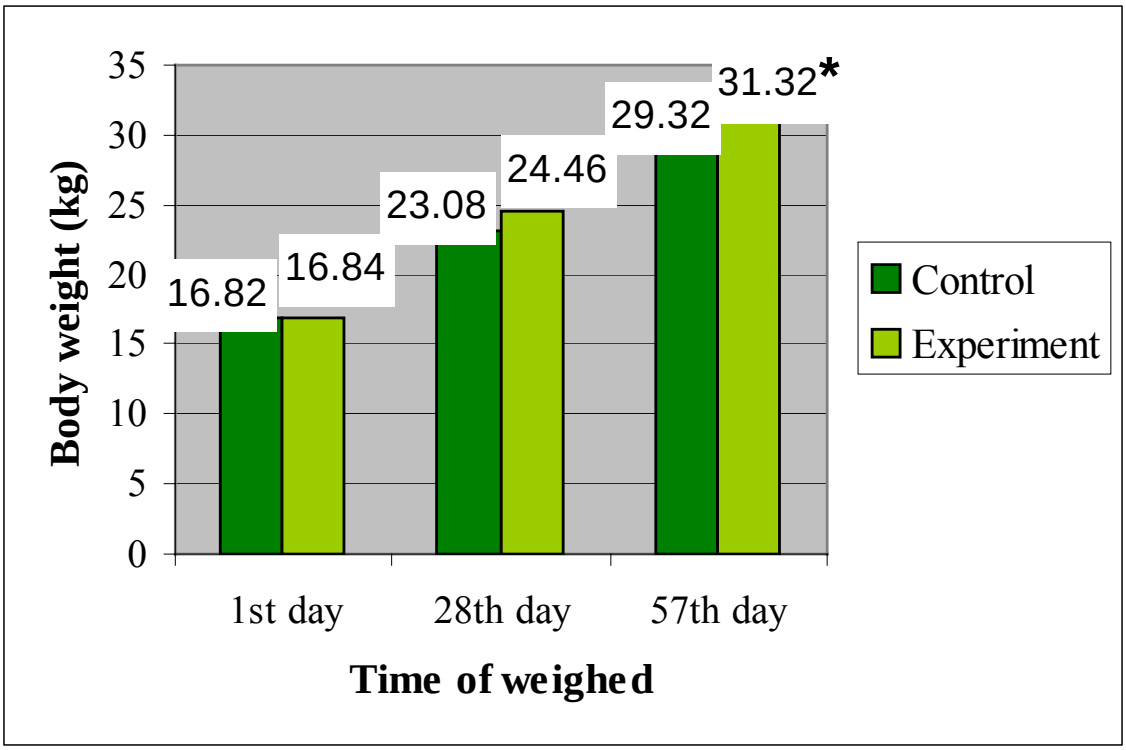

Figure 1. Average body weights of lambs (*-P<0.05)

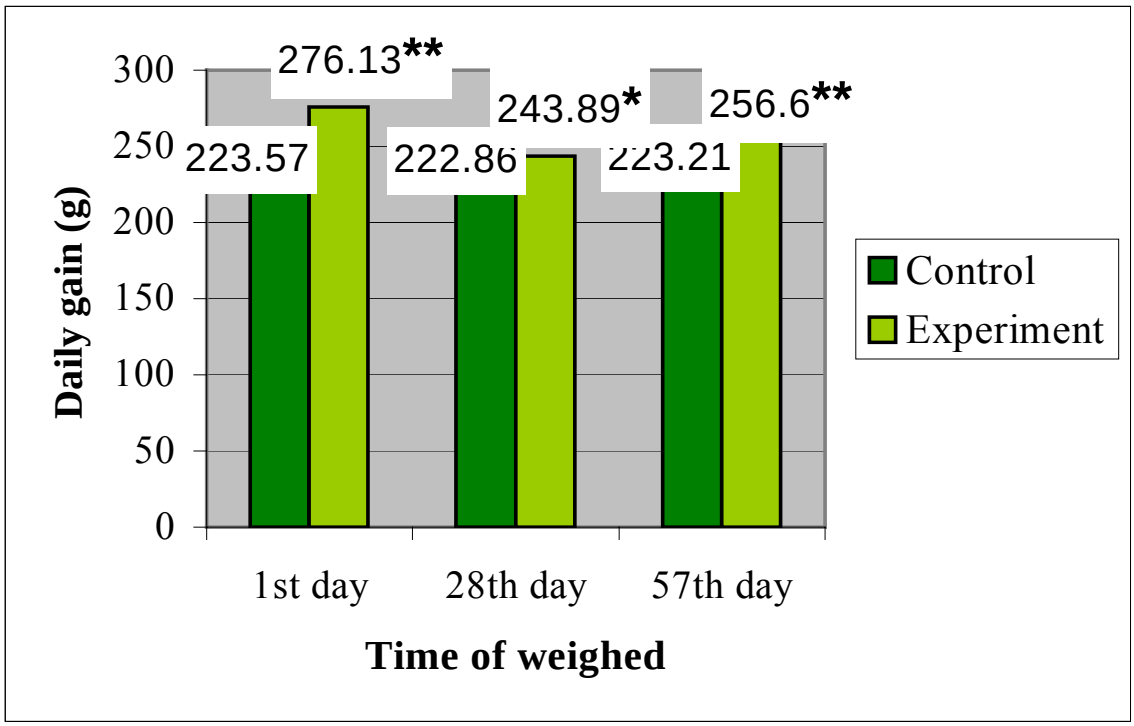

Figure 2. Daily gains of lambs (*-P<0.05; **-P<0.01)

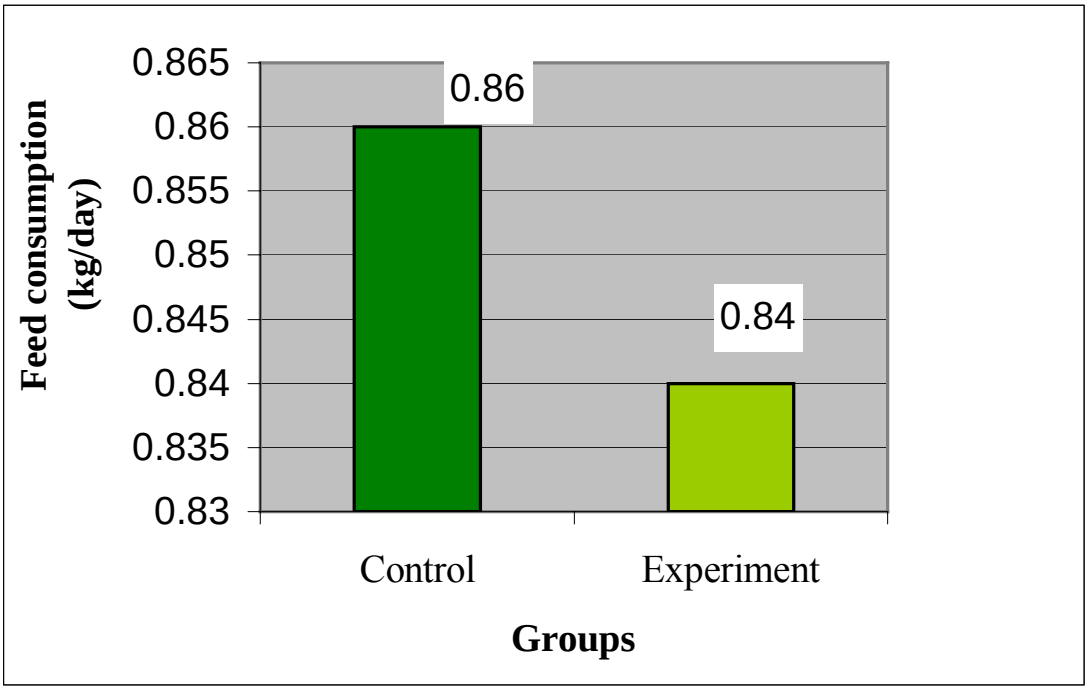

Figure 3 Average daily feed consumption of lambs

The blood serum concentrations of cholesterol-total, cholesterol-HDL and AP activity were lower for lambs E group. There were no differences among groups for the serum minerals content (Ca, P-inorganic, K, Na, Cl, Fe), concentration glucose, urea, creatinine, bilirubin, albumine, total protein and enzymes activity (ALT, AST, Alpha amylase, CK, GGT, Cholinesterase, LDH) - Table 2, 3 and 4.

Table 2. Mineral indicators in lambs blood serum

Minerals	Statistical parameters	Groups	
		Control	Experiment
Ca ($mmol\ l^{-1}$)	$\bar{x}$	2.28	2.32
	s	0.22	0.21
P-inorganic ($mmol\ l^{-1}$)	$\bar{x}$	2.97	3.24
	s	0.46	0.40
Na ($mmol\ l^{-1}$)	$\bar{x}$	132.90	134.40
	s	9.07	8.06
K ($mmol\ l^{-1}$)	$\bar{x}$	4.42	4.49
	s	0.28	0.52
Cl ($mmol\ l^{-1}$)	$\bar{x}$	93.60	93.20
	s	6.04	5.87
Fe ($\mu mol\ l^{-1}$)	$\bar{x}$	27.99	28.73
	s	5.27	6.33

Table 3. Biochemical indicators in lambs blood serum

Minerals	Statistical parameters	Groups	
		Control	Experiment
Urea (mmol l^{-1})	$\bar{x}$	11.23	10.23
	s	2.45	1.46
Glucose (mmol l^{-1})	$\bar{x}$	1.93	1.96
	s	0.44	0.39
Bilirubin (µmol/l)	$\bar{x}$	4.90	4.30
	s	2.02	1.06
Albumins (g l^{-1})	$\bar{x}$	28.49	29.63
	s	2.21	2.03
Total proteins (g l^{-1})	$\bar{x}$	55.42	55.50
	s	5.19	5.37
Cholesterol- total (mmol l^{-1})	$\bar{x}$	0.99**	0.72
	s	0.18	0.18
Cholesterol- HDL (mmol l^{-1})	$\bar{x}$	0.62**	0.46
	s	0.10	0.12
Tryglicerids (mmol l^{-1})	$\bar{x}$	0.39	0.30
	s	0.25	0.31

**-P<0.01

Table 4 Enzyme activities in lambs blood serum

Enzymes, U l^{-1}	Statistical parameters	Groups	
		Control	Experiment
Alpha amylase	$\bar{x}$	12.50	13.70
	s	3.21	3.30
ALT	$\bar{x}$	36.10	38.50
	s	10.32	18.26
AST	$\bar{x}$	160.50	150.00
	s	31.98	56.55
AP	$\bar{x}$	249.00*	196.4
	s	35.77	40.57
CK	$\bar{x}$	344.80	462.00
	s	138.50	161.11
GGT	$\bar{x}$	67.20	71.70
	s	14.59	13.48
Cholinesterase	$\bar{x}$	118.50	113.90
	s	14.00	19.14
LDH	$\bar{x}$	598.90	685.70
	s	116.18	72.73

*-P<0.05

Conclusion

Concerning the gained production results and a higher price of feed mixtures with roasted cereals in relation to the price of standard mixtures it may be concluded that the use of roasted cereals in feed mixture in lambs fattening is in terms of economics justified.

Reference

Antunović Z., Berić B., Steiner Z., Senčić Đ., Domaćinović M., 2000. Primjena stabilizirane buražne mikroflore «Eservit» u tovu janjadi. Krmiva 42, 1, 21-26 (Application of stabilized rumen microflora «Eservit» in lambs fattening).

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Domaćinović M. Milaković Z., Steiner Z., Zirdum M., Brkić S., 1996. Mikrobiološko stanje žitarica nakon procesa mikronizacije. Krmiva 38, 6, 287-291. (Microbiological condition some cereals after process of micronisation).

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Summary

The study examined the effect of raw and roasted cereals (corn, oat) in diet on growth performance and blood parameters of lambs fattening. Totally 40 lambs of Merinolandschaf breed, after ablactation at average of 50 days, were tested and equally divided into two groups: an experimental (E) and a control (C) group. The fattening period lasted 57 days. The lambs were weighed at the beginning, on 28th day and the end of the experiment (57th day) when collected individual blood samples from the jugular vein. The lambs from E group grew faster (by 15%), gained higher final body weight (by 6.72%) although feed consumption was lower (by 2.32%) in comparison with the lambs from the C group. The blood serum concentrations of cholesterol-total, cholesterol-HDL and AP activity were lower for lambs E group. There were no differences among groups for the serum minerals content (Ca, P-inorganic, K, Na, Cl, Fe), concentration glucose, urea, bilirubin, albumine, total protein and enzymes activity (ALT, AST, CK, GGT, LDH). Concerning the gained production results and a higher price of feed mixtures with roasted cereals in relation to the price of standard mixtures it may be concluded that the use of roasted cereals in feed mixture in lambs fattening is in terms of economics justified.