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EFFECT OF POLIZYME FEED MIXTURE ADDITIVE ON LAMB FATTENING AND SLAUGHTERING CHARACTERISTICS

UČINKOVITOST DODATAKA POLIZYMA U KRMNU SMJESU NA TOVNA I KLAONIČKA SVOJSTVA JANJADI

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SUMMARY

New possibilities for improvement of productive animal properties have been opened in sheep production by in biotechnology progress. The aim of this investigation was to determine results of lamb fattening on qualitative meadow hay and feed mixtures with the addition of a polyenzyme preparation. Experiments were carried out on two groups of lambs of Würtemberg breed. The first group of lambs was the control one and it was fed ad libitum on qualitative meadow hay and a feed mixture with a higher share of oat, wheat and barley and a reduced corn share. The second group of lambs was experimental and was fed mixture of the same composition with addition of the polyenzyme preparation "Polizym" (alfa-amylase, beta-glucanase, n-protease, cellulase, hemicellulase and beta-glucosidase) amounting to 0.1% of total mixture raw material composition. The experimental group achieved better results in body weight, daily gain as well as slaughtering indicators. This group was also characterized by better daily conversion and higher daily feed consumption.

Key words: lambs, polyenzyme preparation"Polizym", fattening.

INTRODUCTION

Profitability of modern sheep production mostly depends on ration price and the feed value. Lamb fattening considerably depends on feed type and ration nutrients in relation to the degree of lamb digestive system development. Far more attention should be paid to this problem since lambs at the age of seventy days do not yet have well developed digestive system enzyme system for nutrient decomposition from roughage.

Several authors (Gazdarov et al., 1979., Scheglov et al., 1979., Kovalski et al., 1981., Nechipurenko et al., 1981. a-b, Tolokonnikov and Nikilburkij, 1982, Modyanov and Zelner, 1983., Baran and Kmet, 1987., as well as Judkins and Stobartt, 1988) confirmed positive effects of enzyme preparations (Pectofoetidin, Tselokandin, Amylo-subtilin, Amylorisin, Glukavomorin and Vitaferm) added into lamb rations. The positive effects refer to carbohydrate and energy metabolism improvement as well as to productive and slaughtering properties,

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better feed fermentation in the rumen and higher ration digestibility.

The aim of this investigation was to determine the effect of the added polyenzyme preparation on productive properties of fattened lambs. The polyenzyme preparation was added into complete feed mixtures containing higher share of oat, wheat and barley and reduced corn share using qualitative meadow hay.

MATERIALS AND METHODS

Biological investigations were conducted on 36 lambs of Württemberg breed ablacted on 70th day after lambing. Lambs were equal considering age, body weight, sex. They were classified into two groups (control and experimantal), as can be seen in the experiment scheme (Table 1.).

Table 1. Experiment scheme
Tablica 1. Shema pokusa

Groups - Skupine	Control - Kontrolna	Experiment - Pokusna
Type of mixture Vrste smjese	Complete forage mixture Kompletna krmna smjesa	Complete forage mixture + enzymes Kompletna krmna smjesa + enzimi
Quantity of mixture and meadow hay Količine smjese i liv. sijena	ad libitum	ad libitum
Number of animals - Broj životinja	18	18
Fattening duration (days) - Trajanje tova (dani)	40	40
Sex ratio (m : f) - Omjer spolova (m : ž)	50:50	50:50

All lambs were kept under the same conditions during the investigations. Complete feed mixtures were made according to specific recipe for special investigation purposes i.e. they were adapted to the best polienzyme preparation effect.

Lambs from the control group were given basic feed mixture made of corn (25%), oat (16%), barley (20%), forage wheat flour (5%), sunflower grits (19%), soybean grits (12%), limestone (1%), phosphonal (1%), salt (0,5%) and vitamin, antibiotic and mineral mixture (VAM) (0,5%). Lambs of the experimental group were fed on the same feed mixture with 0.1% of the polyenzyme preparation "Polizym®".

Chemical analysis of the feed mixture and meadow hay (AOAC, 1960) showed the following composition: water 11.45% and 10.35%, raw proteins 18.65% and 10.58%, raw fats 3.72% and 3.06%, raw ash 5.67% and 7.50%, raw fibres 7.49% and 31.90%, calcium 1.27% and 1.07%, phosphorus 0.57% and 0.33%. Calculated energy value of the feed mixture and meadow hay was 1.06 kg and 0.32 kg of oat feeding units whereas the calculated NET (non-nitrogen extractive matters) was 53.05 and 37.22.

The polyenzyme preparation "Polizym" ("Krka" Novo Mesto, Slovenia), added into complete feed mixtures of the experimental group, represents stabilized enzymes complex (alfa-amylase, beta-glucanase, n-protease, cellulase, hemicelullase and beta-glucosidase). Feeding on complete feed mixtures and meadow hay as well as drinking throughout the experiment was ad libitum. The experimental fattening lasted 40 days.

Lambs were weighted individually at the beginning, in the middle and at the end of fattening. After that, the mixture and meadow hay per groups as well as daily feed consumption were calculated.

Ten lambs were randomly chosen from each group and slaughtered at the and of the fattening. Weight of warm carcasses with innards and without innards was determined within 60 minutes after the lambs had been slaughtered weight of cold carcasses without innards was determined in the thigh depth at the temperature of about +4 °C 24 days after cooling. Rendements were calculated on the basis of body weight before slaughtering, weight of warm carcasses with innards, the weight of warm carcasses without innards and the weight of cold

carcasses. Certain indicators of slaughtered lamb carcasses quality(carcass length, ham length and ham circumference) were obtained by means of a steel (cm) tape after carcass processing on the slaughtering line. Ham index was calculated on the basis of its length and volume.

Carcass quality indicators, carcass conformation and carcass fat tissue covering including kidney tallow were analysed. They were evaluated by marks from 1 to 5 after Živković et al. (1981): (mark 1 = poor i.e. does not satisfy, mark 2 = sufficient i.e. satisfies to a certain degree, mark 3 = good i.e. satisfies to higher degree, mark 4 = very good i.e. mostly satisfies and mark 5 = excellent i.e. fully satisfies).

All values obtained in the investigation were processed by usual statistical procedures (Hadživuković, 1973.).

RESULTS AND DISCUSSION

Body weights and daily gains of the fattened lambs are presented in Table 2.

Table 2. Average body weights and daily gains
Tablica 2. Prosječne tjelesne mase i dnevni prirasti

Indicators Pokazatelji	Statistical sizes Statističke veličine	Groups -Skupine	
		Control - Kontrolna	Experiment - Pokusna
Initial body weights, kg Početne tjelesne mase, kg	$\bar{x}$	16.25 ns	16.26
	s	0.64	0.67
	Vk	3.94	4.12
Body weights 20th day, kg Tjelesne mase 20. dana, kg	$\bar{x}$	21.40*	21.82
	s	0.62	0.50
	Vk	2.90	2.30
	%	100.00	101.96
Final body weights 40th day, kg Završne tjelesne mase 40. dana, kg	$\bar{x}$	26.62*	27.13
	s	0.64	0.52
	Vk	2.40	1.92
	%	100.00	101.92
Daily gains by 20th day, g Dnevni prirasti do 20. dana, g	$\bar{x}$	257.44**	278.55
	s	8.70	16.37
	Vk	3.38	5.88
	%	100.00	108.18
Daily gains by 40th day, g Dnevni prirasti do 40. dana, g	$\bar{x}$	261.11 ns	265.83
	s	7.66	9.27
	Vk	2.93	3.49
	%	100.00	101.81
Average daily gains (1st - 40th day), g Prosječni dnevni prirasti (1.-40. dana), g	$\bar{x}$	259.28**	272.16
	s	4.97	8.01
	Vk	1.92	2.92
	%	100.00	104.97

ns-not significant, - nije na granici značajnosti (P<0.05), ** - (P<0.01)

Initial lamb body weights were also uniform in the groups (variance analysis did not determine significant differences), which enabled accurate comparison of production results.

Average body weight on the 20th day of the experiment ranged from 20.10 to 22.30 kg in the control group and from 21.10 to 22.55 kg in the experimental group. Differences between the groups were significant (P<0.05). Also statistically significant differences were determined considering final body weights on the 40th day of the experiment (P<0.05). The experimental group of lamb fed on complete feed mixture with the addition of polyenzyme preparation had higher average body weight (27.13 kg) then the control group (26.62 kg). It is in accordance with the results of Gazdarov et al., 1979. and Nechipurenko et al., 1981. a, b.

Lambs of the experimental group had significantly higher average daily gains (278.50 g) in relation to average daily gains of the control group (257.44 g.) by 20th fattening day (P<0.01).

Lambs of the experimental group also had higher daily gains than those from the control group already by 40th day of fattening, but they were not statistically significant (P<0.05).

Statistically average daily gains from 1st to 40th fattening day were significantly higher (P<0.01) with lambs of the experimental group (272.16 g) in reference to the lambs of the contorl group (259.28 g). Nechipurenko et al., 1981. a, b as well as Kovalski et al., 1981. obtained similar results in the investigation on the influence of "Pectofoetidin" addition into feed mixtures for fattening lambs.

The achieved average daily consumption and utilization efficiency of complete feed mixture and meadow hay throughout the fattening period can be seen in Table 3.

Table 3. Average daily feed consumption and conversion
Tablica 3. Prosječna dnevna konzumacija i konverzija hrane

Indicators Pokazatelji	Statist. sizes Statis. veličine	Groups - Skupine			
		Control - Kontrolna		Experiment - Pokusna	
		mixture smjesa	meadow hay liv. sijeno	mixture smjesa	meadow hay liv. sijeno
Feed consumption, (kg/day) by 20th day	$\bar{x}$	0.78	0.26	0.81	0.30
Konzumacija hrane do 20. dana (kg/dan)	%	100.00	100.00	103.90	115.40
Feed consumption, (kg/day) from 20th to 40th day	$\bar{x}$	0.86	0.33	0.87	0.36
Konzumacija hrane od 20. do 40 dana (kg/dan)	%	100.00	100.00	101.20	109.10
Feed consumption, (kg/day) from 1st to 40th day	$\bar{x}$	0.82	0.30	0.84	0.33
Konzumacija hrane od 1. do 40. dana (kg/dan)	%	100.00	100.00	102.40	110.00
Feed conversion (kg/kg) by 20th day	$\bar{x}$	3.03	1.02	2.92	1.09
Konverzija hrane do 20. dana (kg/kg)	%	100.00	100.00	96.40	106.90
Feed conversion, (kg/kg) from 20th to 40th day	$\bar{x}$	3.28	1.25	3.26	1.32
Konverzija hrane od 20. do 40. dana, (kg/kg)	%	100.00	100.00	99.40	105.60
Feed conversion, (kg/kg) from 1st to 40th day	$\bar{x}$	3.16	1.14	3.09	1.21
Konverzija hrane od 1. do 40. dana (kg/kg)	%	100.00	100.00	97.80	106.10

Lambs of the experimental group had better appetite which is indicated by higher average daily consumption of feed mixture and hay. It indicates better effect of enzyme mixture on digestion ratio. Judkins and Stobart, 1987. obtained similar results in "Vitaferm" investigations on lamb fattening when they found higher digestion ratio. Scheglov et al., 1979. as well as Nechipurenko et al., 1981.b also

determined higher digestion ration with enzyme preparation combination (Pectofoetidin and Tselokandin) added into mixtures of the experimental lambs group.

Lower feed mixture consumption per kilogram of gain, during the experiment, was achieved by lambs of the experimental group (3.09 kg) in relation to the lambs of the control group (3.16 kg). Modyanov and Zelner, 1983. determined better lamb productive properties (higher daily gain and better conversion) while they investigated the effect of enzyme preparations "Amylorisin" and "Glukavomorin" added into mixtures for lamb fattening. Gazdarov et al., 1979. determined lower feed conversion in experimental groups in relation to the control groups of lambs when they conducted investigations on lambs fed on feed mixtures with addition of combination of enzyme preparations (Amylosuptilin and Pectofoetidin).

Meadow hay consumption was higher per gain unit in the expeirmental group (1,21 kg) in relation to the controls (1.14 kg).

Average body weights of lambs before slaughtering and after as well as their rendements can be seen in Table 4.

Table 4. Lamb body weights before slaughtering, carcass weights and rendements at slaughtering
Tablica 4. Tjelesne mase janjadi prije klanja, mase trupova i randmani klanja

Indicators Pokazatelji	Statistical sizes Statističke veličine	Groups - Skupine	
		Control - Kontrolna	Experiment – Pokusna
Body weight before slaughtering, kg Tjelesna mase prije klanja, kg	$\bar{x}$	25.92*	26.41
	s	0.49	0.50
	Vk	1.89	1.89
Weight of warm carcass with innards, kg Masa toplog trupa s iznutricama, kg	$\bar{x}$	14.30*	14.67
	s	0.38	0.37
	Vk	2.66	2.52
Rendement of warm carcass with innards, % Randman toplog trupa s iznutricama, %	$\bar{x}$	55.17 ns	55.55
	s	1.48	2.13
	Vk	2.69	3.83
Weight of warm carcass without innards, kg Masa toplog trupa bez iznutrica, kg	$\bar{x}$	12.74 ns	13.02
	s	0.36	0.38
	Vk	2.83	2.92
Rendement of warm carcass without innards, % Randman toplog trupa bez iznutrica, %	$\bar{x}$	49.07 ns	49.32
	s	1.21	1.34
	Vk	2.47	2.72
Weight of cold carcass, kg Masa hladnog trupa, kg	$\bar{x}$	12.33 ns	12.58
	s	0.34	0.32
	Vk	2.76	2.54
Rendement of cold carcass, % Randman hladnog trupa, %	$\bar{x}$	47.65 ns	47.64
	s	1.37	1.70
	Vk	2.88	3.57

ns-not significant, - nije na granici značajnosti (P<0.05)

Statistically lambs of the experimental group had significantly body weights ($P<0.05$) before slaughtering in relation to lambs of the control group. The expeirmental group also had statistically significantly higher weight of warm carcass with innards ($P<0.05$).

However, statistically significant differences between the experimental and the control group of lambs concerning warm carcass weight without innards, cold carcass weight, warm carcass rendement with and without innards as well as cold carcass rendement were not determined. Lambs of the experimental group were heavier by the given indicators. Similar results were obtained by Nechipurenko et al., 1981. a.

Table 5. Indicators of lamb carcass slaughtering quality
Tablica 5. Pokazatelji klaoničke kakvoće janjećih trupova

Indicators Pokazatelji	Statistical sizes Statističke veličine	Groups - Skupine Control - Kontrolna	 Experiment – Pokusna
Length of carcass, cm - Dužina trupa, cm			
- os pubis - atlas	$\bar{x}$	78.50 ns	79.60
	s	2.95	4.03
	Vk	3.76	4.06
- os pubis - first rib	$\bar{x}$	63.60 ns	64.30
	s	3.50	4.08
	Vk	5.50	6.35
Ham measurements, cm: - Mjere buta, cm:			
- ham length (tuber calcanei - tuberculum ossis ischii) - dužina buta	$\bar{x}$	26.60 ns	27.30
	s	1.99	1.43
	Vk	7.48	5.24
- ham circumference (the widest part) - opseg buta (najširi dio)	$\bar{x}$	28.70 ns	28.90
	s	1.99	1.22
	Vk	6.62	4.22
Ham index, % - Indeks, buta, %	$\bar{x}$	92.68 ns	94.47
	s	4.87	5.95
	Vk	5.25	6.30
Carcass estimation, (1-5): - Ocjena trupa, (1-5):			
- conformation - konformacija	$\bar{x}$	3.90 ns	4.30
	s	0.74	0.82
	Vk	18.97	19.07
- carcass fat tissue + tallow covering - prekrivenost masnog tkiva uključujući i bubrežni loj	$\bar{x}$	3.90 ns	4.30
	s	0.74	0.82
	Vk	18.97	19.07

ns = not significant - nije na razini značajnosti

Indicators of slaughtering quality of lamb carcasses (Table 5) were somewhat better for the experimental group of lambs in relation to the lambs of the contorl group, but not statistically significant.

CONCLUSIONS

Application of the polienzyme preparation "Polizym" in lamb fattening from 70th to 110th day of life led to: significant increase ($P<0.01$) of average daily gains by 4.97%, appetite increase i.e. better average daily consumption of meadow hay and feed mixture, better feed mixture conversion per gain and significant ($P<0.05$) increase of body weight before slaughtering as well as warm carcasses weight with innards in relation to lambs of the control group. As for indicators of slaughtering quality of lamb carcasses, significant differences between lambs of the experimental and the control group were not determined.

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SAŽETAK

Napredak u biotehnolgoiji dao je ovčarskoj proizvodnji nove mogućnsoti za poboljašanje proizvodnih svojstava životinja. Cilj ovog istraživanja bio je utvrditi ishode tova janjadi s kvalitetnim livadnim sijenom i krmnim smjesama s dodatkom polienzimskog pripravka. Pokusi su provedeni na dvije skupine janjadi tipa Würtemberške pasmine. Prva skupina janjadi bila

je kontrolna, a hranjena je po volji kvalitetnim livadnim sijenom i krmnim smjesom s većim udjelom zobi, pšenice i ječma, a manjim udjelom kukuruza. Druga skupina janjadi bila je pokusna, a hranjena je krmnom smjesom istog sirovinskog sastava uz dodatak polienzimskog pripravka "Polizyma" (alfa-amilaza, beta-glukanaza, n-proteaza, celulaza, hemicelulaza i beta-glukozidaza) u količini od 0,1% od ukupnog sirovinskog sastava krmne smjese. Bolje rezultate s obzirom na postignute tjelesne mase, ostvarene dnevne priraste kao i klaoničke pokazatelje, ostvarila je pokusna skupina janjadi, a u ovoj skupini također je utvrđena bolja dnevna konverzija, te veća dnevna konzumacija hrane.

Ključne riječi: janjad, polienzimski pripravak "Polizym", tov.

MJEŠAONA STOČNE HRANE

KUŠIĆ PROMET

KUŠIĆ PROMET

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Vrši promet domaćih i uvoznih sirovina za proizvodnju stočne hrane: žitarica, uljnih sačmi, fosfata, ribljeg i mesnog brašna i stočnog brašna