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CARCASS TRAITS AND MEAT QUALITY OF LAMB FED ON RATION CONTAINING DIFFERENT LEVELS OF LEUCAENA HAY (*LEUCAENA LEUCOCEPHALA* L.)**

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Abstract: Twenty growing crossbred male lambs (¾ chios. ¼ ossimi and ½ chios. ½ ossimi) of 15.25 ± 2.00 kg initial average body weight and three months old were divided into four groups. All groups were fed on concentrate feed mixture plus 1% of live body weight wheat straw for 169 days. Four levels (zero, 200g, 400g and 600g) of leucaena hay were used. Final weight and carcass traits were evaluated. Color (L, a, b), proximate composition, pH, acidity, expressible water, water holding capacity, cooking loss, amino acid and minerals contents of meat were determined. Sensory evaluation of cooked meat was also evaluated.

The results revealed that, Hindquarter, shoulder, and sets weight were significantly ($p \leq 0.05$) different. Moisture, protein, fat and ash content of fresh meat were ranged from 73.72 to 76.23%, 20.06 to 20.80 %, 2.41 to 4.12% and 1.01 to 1.08%, respectively. Expressible water, water holding capacity and pH were significantly ($p \leq 0.05$) different. No significant ($p \leq 0.05$) differences were found in color (L, a, b), acidity and cooking loss of meat. Amino acids and minerals contents of all meat samples were varied. Cooked meat of group four had the highest scores of tenderness, juiciness, flavor and over all acceptability 4.6, 4.5, 4.4 and 4.5, respectively. This study suggested that the leucaena hay is suitable for lamb feeding. Produced lamb meat had high chemical and sensory quality.

Introduction

Meat plays a very important role in the human nutrition by contributing high quality proteins, essential minerals and trace elements, and a range of B vitamins in bio available forms (*Ponnampalam et al., 2001*). Quality of lamb

meat depends on many factors including feed type and levels of feeds, age of weaning and slaughtering, castration policy, adult size maturity, processing and post-mortem ageing (*Sanudo, et al., 1998b*).

Lamb meat is an important source of protein, fat and trace elements (Gilka, et al., 1989; Lombardi-Boccia, et al., 2005). Knowledge of the bioavailability of dietary mineral elements and the biological significance of mineral had increased rapidly during the last decade. It was possible that changes in lamb feeds might have affected the overall content of minerals in animal meat (*Lin et al., 1989*). Nutritional factors have significant effects on biochemical, structural and metabolic characteristics of muscles, and on nutritive values, organoleptic attributes and acceptability of meat from ruminants (*Horsfield and Taylor, 1976; Wood et al., 2003; Olfaz et al., 2005*).

Leucaena (*Leucaena leucocephala*) is a perennial non-climbing, non-spiny shrub or tree. Native to tropical America, two of the three subspecies now have a pan-tropical distribution facilitated by its use as a fodder, wood source and land reclamation. Leucaena as a forage crop, it has yielded as much as 20 metric tons (Mt) of dry matter per hectare (he) per year in some area. Alfalfa may yield more green forage than leucaena but the nutritive value of green and dry leucaena forage is equal or superior to that of alfalfa (*Mendoza*, *1975*). Leucaena, also is equivalent to alfalfa in digestibility and is markedly superior to alfalfa in percentage of protein. However, the protein content of green leucaena exceeded 25% (Abo El-Nor, *1991*). While its content of total digestible nutrient (TDN) is comparable to alfalfa (Suliman, *2003*). The effect of forage to concentrate on microbial protein synthesis has been the subject of many studies (*Gomes et al., 1994*), but contradictory results have been reported. A food potential should indicate the feeding level that can be achieved if a given diet is fed ad libitum with sufficient nitrogen and other essential ingredients to sustain the maximal rumen fermentation (*Qrskov, 1998*).

Improving the efficiency of lean meat production is a major economical important factor. It is well established that breed interaction can lead to significant improvements in carcass composition of lambs (*Carson et al., 1999*). However there is little information on the effect of lamb genotype on the efficiency of converting feed into meat.

The objectives of this study were to study the effect of adding leucaena in lamb diet on the feed efficiency, determine the carcass characteristics and the meat quality, and to evaluate the nutritive values of lamb meat fed on leucaena.

Material and methods

Twenty growing crossbred male lambs (¾ chios. ¼ ossimi and ½ chios. ½ ossimi) of 15.25 ± 2.00 kg initial average body weight and three months old

were used in this study. *Leucaena leucocephala* plants (two months age) was cut and collected from the farms of Agriculture Experimental Center, Shosha, Minia University. The cut plants were spread for sun drying, chopped and packaged in plastic bag until use. Animals were divided into four groups each group of 5 lambs. All groups were fed on the experimental rations containing different levels of concentrate feed mixture (CFM) protein replaced by protein. Leucaena hay were added by (0, 200, 400, 600 g) plus concentrate feed mixture (CFM) to covered the NRC (1985) requirements + with 1% of live body weight wheat straw (WS). The feeding period was 169 days. The amount of feeds was adjusted according to body weight changes. Feeds were offered twice daily at 9 am and 3 pm in two equal portions. Water was freely available along the experimental period. The lambs were weighed every two weeks until they reached the marketable weight (42-45kg).

Table 1. Feeding schedule
Tabela 1. Shema ishrane

Treatments/ Tretmani	Concentrate ration/ Koncentrovani obrok	Rough/Krmivo	Leucaena inclusion/ Uključena Leucaenamimoza
Control 1/ Kontrola 1	Concentrate feed mixture* (CFM)/ Koncentrovana smeša	1%of live body weight wheat straw/ 1% telsne mase pšenične slame	000g leucaena hay/ 000 g sena mimoze
Group 2/ Grupa 2	“ “ “	“ “ “	200g leucaena hay/ 200 g sena mimoze
Group 3/ Grupa 3	“ “ “	“ “ “	400g leucaena hay/ 400 g sena mimoze
Group 4/ Grupa 4	“ “ “	“ “ “	600g leucaena hay/ 600 g sena mimoze

* Concentrated Feed Mixture (CFM) consisted of: 31% undecorticated cotton seed meal, 22% crushed maize, 18% rice bran, 10% wheat bran, 9.55 molasses, 7% soy bean meal (44% protein), 1.5% lime stone and 1% Nacl. Block of minerals and vitamins mixture was available in the barn/
*Koncentrovana smeša (CFM) se sastojala od: 31% sačme neoljuštenog semena pamuka, 22% kukuruza, 18% pirinčanih mekinja, 10% pšeničnih mekinja, 9.55 melase, 7% sojine sačme (44% proteina), 1.5% krečnjaka i 1% Nacl. Blokovi smeša minerala i vitamina su bili dostupni u štali

Slaughter experimental

Three animals were randomly chosen from each group, fasted for 17-18 hr., fasting body weight, body weight after bleeding and dressed carcass weight were obtained. Carcasses were longitudinally split into two equal sides and the right sides were cut according to the English method of cutting mutton and lamb

Gerrad, (1953). Lion cuts were transported to Food Science Department laboratory, Faculty of Agriculture, Minia University and kept in refrigerator for 24 h. Lion muscle were cut into two parts one was used to measure the color and the cooking loss the other part was deboned, ground through meat grinder (Moulinex, HV2, Model A14, Moulinex, France) with a 4-mm hole plate, packaged in polyethylene bags and kept in refrigerator till analysis

Chemical analysis and nutritional quality of lamb meat

Dry matter (DM), crude protein (NX6.25) (CP), ether extract (EE), crude fiber and ash of leucaena hay, concentrate feed mixture (CFM) and wheat straw were analyzed using the methods of AOAC (1995 Organic matter and nitrogen-free extract were calculated. Proximate composition (moisture, protein (Nx6.25), fat and ash) of meat was determined according to the AOAC (1995)

Color evaluation:

Color (lightness L*, redness a* and yellowness b*). of meat was measured using a colorimeter (Color Tec PCM Color Meter Tec. NJ, USA).

The pH values were determined according to Lee and Yoon (2001).

Acidity was assayed by titration as the method of Keeton and Melton (1978).

Expressible water (EW) was determined according to Alvarez et al., (1992) while water-holding capacity (WHC) was calculated as following:

Water holding capacity (WHC) % = Moisture% - Expressible water (EW) %.

Cooking loss was measured using a method described by Rhee, et al., (1998).

Minerals analysis

Calcium (Ca), phosphorus (P), magnesium (Mg), iron (Fe), zinc (Zn) copper (Cu) and manganese (Mn), contents of dry ashed (550C) meat samples were measured using Atomic absorption spectrophotometer (GBC atomic absorption spectrophotometer, Australian) according to method of Ruig, (1986). Sodium (Na), potassium (K) were determined according to the methods of Jackson, (1973) using flame photometer 410, Cornning PYE Unicam PU 8650 philips, England.

Amino acids analysis

The amino acids were obtained by acid hydrolysis and determined by the method of Spackman et al., (1958) using a Beckman model 119 CL Amino acid analyzer. The data were computed automatically (Cavins and Friedman, 1968).

Sensory evaluation

Samples were randomly assigned for sensory evaluation according to AMSA (1995). Warmed samples from each group were evaluated by twelve panel members with previous experience to evaluate tenderness, juiciness, flavor and overall acceptability. A descriptive analysis method using a five point scale (tenderness, 5 = tender, 1= very tough; juiciness, 5= juicy, 1= very dry; flavor, 5= highly desirable, 1= extremely poor was used for evaluation. Sensory data means were used for statistical analysis.

Statistical analysis

Data were analyzed with GLM (General Linear Model) program using statistical analysis system (SAS, 1987). Mean values were compared by Duncan's Multiple Range Test (*Duncan 1955*).

Results and Discussion

Table 2. Proximate composition of the experimental ration (on dry weight basis)
Tabela 2. Približni sastav eksperimentalnog obroka (na bazi težine u suvom stanju)

Ingredients/ Sastojci	Dry matter% / SM	Organic matter%/ OM	Crude protein %/ SP	Ether extract %/ Sadržaj masti	Ash %/ Pepeo	Carbohydrate/ Ugljeni hidrati	
						Crude fiber %/ Sirova vlakna	Nitrogen free extract %/ Bezazotni ekstrakt
Concentrate feed mixture / Koncentrovana smeša	91.03	89.64	15.34	2.48	10.36	14.30	57.52
Wheat straw/ Pšenična slama	93.90	88.31	1.52	0.98	11.69	34.42	51.39
Leucaena hay/ Mimozino seno	88.40	94.10	27.90	9.50	5.90	20.20	36.5

Leucaena hay had the highest values of organic matter, crude protein, and ether extract% while wheat straw had the highest values of dry matter ash, and crude fibers (Table 2). Hove et al., (2001) reported that the dried leaves of *leucaena leucocephala* (LL) contained 909g/kg dry matter, 900g/kg organic matter, and 32g nitrogen/kg dried leaves. Green leucaena content 22.15% crude protein on dry weight basis (*Suliman et al., 2001 and 2003*). Tree and shrub fodders are an important source of supplementary protein, vitamin, and minerals

Table 3. Means of carcass traits of lamb fed on different levels of leucaena hay

Tabela 3. Srednje vrednosti osobina trupa jagnjadi hranjene različitim nivoima mimozinog sena

Treatments	No. of animal	Fasting body weight kg	Carcass weight kg	Fast dressed[1] %	Empty dressed[2] %	Forequarter kg	Hindquarter kg	Leg weight kg	Chine weight kg	Ends weight kg	Shoulder weight kg	Sets weight kg
Control 1	3	43.45	22.84	52.23	63.66	4.90	4.28	2.71	1.57	1.39	1.86	1.34
Group 2	3	44.43	23.19	52.59	61.34	5.49	4.57	3.16	1.42	1.18	1.58	1.89
Group 3	3	42.53	23.35	54.33	63.85	5.42	5.16	3.42	1.59	1.18	2.20	1.60
Group 4	3	43.11	22.80	52.89	63.72	5.17	4.00	2.74	1.55	1.45	1.94	1.37
±SE		±1.16	±0.65	±0.59	±1.24	±0.33	±0.43	±0.24	±0.24	±0.27	±0.13	±0.07
Significance		NS	NS	NS	NS	NS	*	NS	NS	NS	*	***
Regre. Co. of age on lamb performance		-0.03 ±0.03	-0.01±0.01	0.004±0.01	0.03±0.03	-0.01±0.01	-0.0.01±0.01	0.007±0.006	-0.007±0.005	-0.01±0.01	-0.003±0.003	0.001±0.001
Intercept		51.64±7.84	27.18±4.39	51.63±3.86	54.36±8.38	3.32±2.91	4.16±1.61	0.67±1.68	3.65±1.63	5.04±1.85	2.93±0.91	1.22±0.51

1- Fast dressed % = (Carcass weight/ fasting body weight) x 100 2- Empty dressed % = (carcass weight/ empty weight)x100

for livestock in tropics and sub-tropics areas due to the shortage of good quality feed especially during long dry season. leucaena leucocephala (LL) as a perennial non-traditional green or hay fodder seems to be a promising leguminous fodder (*Gosh and Dinda, 2000*).

Fasting body weight and carcass weight were not significantly (P≤0.05) affected by feeding the different levels of leucaena hay (Table 3). Fast dressed percentage and empty dressed percentage were ranged from 52.23 to 54.33% and from 61.34 to 63.85%, respectively. Hindquarter and shoulder weight were significantly (P≤0.05) different among groups. Leg weight was ranged from 2.71 to 3.42 kg and shoulder weight was ranged from 1.58 to 2.20 kg. Carcass weight, fast dressed % and empty dressed % were not significantly (P≤0.05) affected by the levels of leucaena.

Table 4. Color (L*, a* and b) of lamb meat that were fed on different levels of leucaena hay
Tabela 4. Boja (L*, a* i b) mesa od jagnjadi hranjenih različitim nivoima mimozinog sena

Treatments/ Tretmani	L* lightness/svetloća	a* redness/crvena boja	b* yellowness/žuta boja
Control 1/ Kontrola 1	37.04[a] ±1.88	19.90[a] ±1.57	5.23[a] ±0.93
Group 2/ Grupa 2	37.65[a] ±1.78	20.52[a] ±1.64	5.19[a] ±1.00
Group 3/ Grupa 3	37.29[a] ±1.84	20.50[a] ±1.58	5.17[a] ±0.57
Group 4/ Grupa 4	38.60[a] ±.0.98	19.25[a] ±1.66	6.72[a] ±0.97

Mean values followed by the same letter in the same column are not significantly different (p≤ 0.05)/ Srednje vrednosti iza kojih stoje slova u istoj koloni se ne razlikuju signifikantno (p≤ 0.05)

No significant differences (P ≤ 0.05) were found in L, a, b, values of all meat samples. L (lightness) values of all group were lower and a (redness) and b (yellowness) values were higher than the results reported by Santos-Silva et al., (2003) who reported that L, a, and b values of *Longissimus* muscles of lamb carcasses (30 kg weight) were 41.2, 16.1 and 4.15 respectively. Sanudo et al., (1996) stated that as slaughter weight increased, meat lightness (L*) decreased and pH, heam pigment and redness (a*) increased. All meat groups had high redness, this might be due to the high iron content in the diet, leading to higher myoglobin synthesis in muscle (*Lawrie, 1985*). Intramuscular fat content is one of the many factors affecting meat color Lanza et al., (2006).

Table 5. Chemical composition, pH, acidity and cooking loss of lamb meat that were fed on different levels of leucaena hay
Tabela 5. Hemijski sastav, pH, kiselost I kalo kuvanja mesa jagnjadi hranjenih različitim nivoima mimozinog sena

Treatment /Tretman	Moisture /Vlaga	EW	WHC/ SVV	Protein/ Protein	Fat/ Mast	Ash/ Pepeo	pH	Acid./ Kiselost	Cooking loss/ Kalo kuvanja
Control 1/ Kontrola 1	76.22[a] ±0.16	28.99[a] ±1.70	47.12[a] ±1.63	20.06[b] ±0.04	2.41[c] ±0.11	1.02[b] ±0.04	5.44[bc] ±0.01	1.15[a] ±0.09	35.90[a] ±0.80
Group 2/ Grupa 2	74.88[b] ±0.18	30.79[a] ±1.13	43.97[b] ±1.33	20.80[a] ±0.09	2.81[b] ±0.08	1.04[ab] ±0.01	5.59[c] ±0.06	1.12[a] ±0.08	35.49[a] ±0.99
Group 3/ Grupa 3	74.56[bc] ±0.44	30.46[a] ±1.20	43.61[b] ±0.94	20.38[ab] ±0.30	4.12[a] ±0.22	1.01[b] ±0.01	5.66[a] ±0.05	1.08[a] ±0.11	36.37[a] ±1.25
Group 4/ Grupa 4	73.72[c] ±0.93	24.46[b] ±1.99	48.26[a] ±0.96	20.29[b] ±0.22	3.99[a] ±0.21	1.08[a] ±0.01	5.61[b] ±0.16	1.10[a] ±0.09	35.23[a] ±1.13

[abc]Mean values followed by the same letter in the same column are not significantly different ($p \leq 0.05$)/ [abc] Srednje vrednosti iza kojih stoje slova u istoj koloni se ne razlikuju signifikantno ($p \leq 0.05$)

Meat from the control group tended to be more ($P \leq 0.05$) moist (76.22%) and showed a significantly lower ($P \leq 0.05$) fat content (2.41%) compared to meat from other groups. Meat from group 4 had the lowest value of moisture (73.72%) (Table 5). Fat content was increased with leucaena hay increased in the rations. Group 3 had the highest fat level (4.12%). Martinez-Cerezo et al., (2005) found that the moisture and fat contents of local lamb meat breed (carcass weight 30-32kg) were 75.23% and 2.79%. Protein contents ranged from 20.06 to 20.80%. This result was very close to the results found by Hoke et al., 1999 who reported that the protein content of lamb lion chop was 21.00%. All group fed with leucaena hay had higher ash content than control group. Ono et al., (1984) stated that lamb lion chop content 73.29% moisture, 20.30% protein, 5.03% fat, and 1.08% ash.

Significant differences ($P \leq 0.05$) of water holding capacity were found among samples. Group 4 and control had higher ($P \leq 0.05$) WHC than those of groups 2 and 3. No influence of the pH values on water holding capacity was found in the present study. The obtained data agree with those reported by Santos-Silva et al., (2003) who found that no relationship could be detected between the pH and WHC of *longissimus* muscles of lambs supplemented with

whole corn grain and expanded sun flour seed or whole corn grain and sunflower meal. Also Diaz et al., (2003) stated that no significant effect of pH on water holding capacity of meat for three different weight of lamb carcasses.

Cooking loss was not significantly ($P \leq 0.05$) different between all lamb groups. Cooking loss of all lamb groups were higher than the that of reported by Olfaz et al., (2005) who found that the mean cooking loss value of rams fed sugar beet pulp, partially substituting for grass hay as forage was 32.5%. With advancing the lamb age or physiological maturity of lambs, their meats requires longer cooking times and therefore lead to a greater cooking loss (Kemp et al., 1976; Russo et al., 2003). The main part of the cooking loss is water. The water is probably lost attributed to heat induced protein denaturation during cooking of the meat, which causes less water to be entrapped within the protein structures held by capillary force (*Aaslyng et al., 2003*). Cooking loss Olfaz et al., (2005) reported that L, value, cooking loss and ultimate pH were affected by diet and might be due to other factors such as stress conditions before slaughter, chilling regime and carcass processing.

PH values ranged from 5.44 to 5.66 (Table 6). A significant difference ($P \leq 0.05$) in pH values were found between groups. Group 3 had the highest pH values (5.66). The pH values of lamb carcass from three major Spanish breeds at 24 h post-mortem ranged from 5.50 to 5.58 (*Martinez-Cerezo et al., 2005*). In addition Savell et al., (2005) reported that the pH in the muscle decreases from 7 upon slaughter to approximately 5.30-5.80 pH. No significant differences ($P \leq 0.05$) in acidity values were found between lamb meat samples.

Table 6. Minerals contents (mg/100g wet weight) of lamb meat that were fed on different levels of leucaena hay
Tabela 6. Sadržaj minerala (mg/100g vlažne težine) mesa jagnjadi hranjenih različitim nivoima mimozinog sena

Treatments/ Tretmani	Na	K	Ca	Mg	P	Fe	Mn	Zn	Cu
Control 1/ Kontrola 1	34.48	172.4	21.55	10.78	116.37	5.17	0.108	2.44	0.205
Group 2/ Grupa 2	42.83	225.4	27.05	13.52	142.00	5.41	0.113	2.37	0.225
Group 3/ Grupa 3	44.05	203.31	29.37	13.55	137.80	4.86	0.113	2.82	0.192
Group 4/ Grupa 4	48.58	264.96	17.66	13.25	147.94	4.75	0.110	2.50	0.188

The element contents were varied among all lamb meat groups. The mineral content of retail cut s within any single carcass varies significantly (*Lin et al., 1989; Ono et al., 1984*). These differences in minerals contents between the four groups of lambs might be due to the differences in feeding regimens.

Group 3 had the highest values of Na, K, and P and the control had the lowest values of Na, K, Mg, P, and Mn (Table 6). The results of the present study revealed that meat lamb from all groups had higher Ca, Fe, Cu, Zn and Mn and lower Na, Mg, P, and K than those reported by (*Ono et al., 1984; Hoke et al., 1999*). It is well known that meat is an excellent food source of Fe and Zn, with higher bioavailability of these two minerals compared to that from plant (*Lin et al., 1989*). Trace element such as Fe and Cu were highest in the group 2 and lowest in the group 4. Group 3 had the highest values of Mn and Zn. In general, the feeding on different levels of leucaena hay affect the minerals contents of lamb meat.

The contents of total amino acids were varied among the four groups (Table 7). Group 4 had the highest total, essential and nonessential amino acid. Thereonine, valine, lysine and phenylalanine were higher in group 4 than those of three groups. Control group had the lowest values of methionine, valine and leucine. Moreover, the highest total non-essential amino acids were found in group 4 and the lowest was found in control. Group 4 had higher values of acidic and sulfurs amino acid than those of three groups. Control group had the highest values of basic amino acids. The results presented here were very close to the data reported by Gilka et al., (1989) who found that the same total essential amino acids of lamb meat was 30.88g/100g protein. In general, lamb fed on leuceana hay had higher total amino acids than control.

Sensory characteristics such as flavor, tenderness. Juiciness and overall acceptability indicated that there were significant differences between dietary treatments (Table 8). Group 4 had the highest score of all sensory parameters. Tenderness values of lamb meat were indeed positively correlated with carcass fatness. Different fatness could have affected meat tenderness either through a direct effect of the fat which is softer than lean and/or by an indirect effect of reduced muscle fiber shortening (Priolo et al., 2002). Flavor is one of the main characteristics in evaluating the acceptability of lamb meat for consumer. In Spain the first criteria for lamb purchase (53%) is its agreeable odor and flavor (Sanudo et al., 1998a). Group 4 and control group had higher flavor values than those of other groups. Feed treatments significantly affect juiciness, tenderness, flavor and overall acceptability. The found results disagreed with those stated by Santos-Silva et al., (2003) who reported that the production system, namely diet has little effect in shear force and sensorial attributes of lamb meat fed on diet supplemented with expanded sunflower seed.

Table 7. Amino acid composition (g/100g protein) of lamb meat that were fed on different levels of leucaena hay
Tabela 7. Sadržaj amino kiselina (g/100g proteina) mesa jagnjadi hranjenih različitim nivoima mimozinog sena

Amino Acid /Amino kiselina	Control 1/ Kontrola 1	Group 2/ Grupa 2	Group 3/ Grupa 3	Group 4/ Grupa 4
Thereonine	3.22	3.35	3.13	4.14
Methionine	1.23	1.63	1.62	1.54
Valine	4.58	4.92	4.84	6.01
Isoleucine	7.10	7.65	7.43	5.91
Leucine	6.03	6.69	6.77	6.26
Lysine	5.61	4.86	5.19	6.35
Phenylalanine	3.32	2.96	2.63	3.84
Total essential amino acids	31.09	32.06	31.61	34.05
Aspartic acid	9.18	9.93	10.15	10.71
Glutamic acid	11.08	11.31	13.46	15.14
Serine	2.84	2.85	2.60	3.10
Proline	5.66	6.10	5.79	4.45
Glycine	4.88	4.32	4.53	5.85
Alanine	6.11	5.94	5.92	6.12
Cystine	0.08	0.05	0.13	0.21
Tyrosine	1.33	1.36	1.57	1.45
Arginine	7.01	6.74	6.00	7.09
Histidine	3.40	3.78	3.81	4.33
Total non-essential amino acids	51.57	52.38	53.96	58.45
Total amino acid	82.66	84.44	85.57	92.50
Acidic amino acids Aspartic and glutamic acids	20.26	21.24	23.63	25.85
Basic amino acids Lysine, arginine and histidine	16.02	15.38	15.00	15.8
Sulfur amino acid Cystine and methionine	1.31	1.68	1.75	1.75
Ammonia	3.22	3.02	3.51	5.12

Table 8. Sensory evaluation of lamb meat that were fed on different levels of leucaena hay
Tabela 8. Senzorna ocena mesa jagnjadi hranjenih različitim nivoima mimozinog sena

	Tenderness/ Mekoća	Juiciness/ Sočnost	Flavor/ Ukus	Overall acceptability/ Opšta prihvatljivost
Control 1/ Kontrola 1	4.10 [ab] ±1.14	4.10 [ab] ±0.90	4.30 [a] ±0.64	4.20 [ab] ±0.87
Group 2/ Grupa 2	3.10 [bc] ±1.44	3.40 [bc] ±1.20	3.50 [ab] ±1.20	3.60 [bc] ±1.11
Group 3/ Grupa 3	3.00 [c] ±1.00	3.14 [c] ±1.10	3.30 [b] ±1.00	3.10 [c] ±0.89
Group 4/ Grupa 4	4.60[a] ±0.66	4.50 [a] ±0.67	4.40 [a] ±0.66	4.50 [a] ±0.50

[abc]Mean values followed by the same letter in the same column are not significantly different ($p \leq 0.05$)/ [abc] Srednje vrednosti iza kojih stoje slova u istoj koloni se ne razlikuju signifikantno ($p \leq 0.05$)

Conclusion

- From this study it could be concluded that leucaena hay (*leucaena leucocephala*) (LL) could be used as a non-traditional fodder for lambs. Produced lamb meat had high chemical and sensory quality.

Osobine trupa i kvalitet mesa jagnjadi hranjenih oborcima koji sadre različite nivoe mimozinog sena (*Leucaena Leucocephala* L.)

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Rezime

Dvadeset jagnjadi, muški melezi (¾ grčka pramenka - ¼ osemi i ½ grčka pramenka - ½ osemi), početne telesne mase od 15.25 ± 2.00 kg i uzrasta od tri meseca, su podeljena u četiri grupe. Sve grupe su hranjene koncentrovanim smešama uz dodatak 1% od telesne mase pšenične slame u trajanju od 169 dana. Četiri nivoa (nula, 200g, 400g i 600g) mimozinog sena su korišćena. Ocenjivane su finalna masa i osobine trupa. Boja (L, a, b), približni sastav, pH, kiselost, voda, sposobnost vezivanja vode, kalo kuvanja, sadržaj

amino kiselina i minerala u mesu su takođe određivani, kao i senzorni kvalitet kuvanog mesa.

Rezultati su otkrili da zadnja četvrt, plećka i delovi su bili signifikantno različiti ($p \leq 0.05$). Sadržaji vlage, proteina, masti i pepela svežeg mesa su varirali od 73.72 do 76.23%, 20.06 do 20.80 %, 2.41 do 4.12% i 1.01 do 1.08%, respektivno. Voda, sposobnost vezivanja vode i pH su bili signifikantno ($p \leq 0.05$) različiti. Nije bilo signifikantnih ($p \leq 0.05$) razlika u boji (L, a, b), kiselosti i kalu kuvanja mesa. Sadržaji amino kiselina i minerala u svim uzorcima mesa su varirali. Kuvano meso iz grupe četiri je imalo naviše ocene za mekoću, sočnost, ukus i sveukupnu prihvatljivost 4.6, 4.5, 4.4 i 4.5, respektivno. Ovim istraživanjem je utvrđeno da je seno mimoze prihvatljivo za ishranu jagnjadi. Proizvedeno jagnjeće meso je imalo visok hemijski i senzorni kvalitet.

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