THE EFFECTS OF SUPPLEMENTARY FEEDING OF LAMBS GRAZING ON GROWTH RATE AND CARCASS CHARACTERISTICS

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Abstract

This study aimed to establish optimal strategies to supplement the diet of fattening lambs on pasture exposed. Ration supplementation on pasture fattening lambs exposed, concentrated (PC), concentrates and hay (PCF) and respectively concentrated, hay and saponified fat (PCFG) led to significant improvement ($p< 0.05$) of major bioperformance materialized in growth final body weight up to 11.40 kg respectively in weight gain up to 67.8%. Positive effects of energy from the food supplement and changes in their rumen fermentation processes were reflected and browned on the indices but also the quality slaughterhouse carcasses. The highest yield at slaughter (53.82%) was achieved by lambs PCFG, due to better muscle development and also deposit a larger amount of internal fat and superficial. The lowest ratio meat/bones, considered the main commercial port of the casing cut (jigou, shoulder and loin) and the whole carcasses were recorded in the control group, leading to improved dietary supplementation of this report interests ranged 5.33 - 8.42%.

Key words: lambs, feeding system, pasture, protected fats

Many studies have been conducted on fattening lambs on pasture, citing the need for this technique for nutrition, not by increases in weight are low but the low production costs, use of pasture areas available at low cost and to benefit from agricultural products high quality (natural, the image of products "grass fed") (Keane & Pflimlin, 1996, Journet M., 1996, Keady et al., 2007, Mierlita et al., 2011). Weight gain of lambs on pasture made is influenced largely by the quality of pasture. Jaqusch et al. (1979) recorded growth rates of lambs between 47 and 183 g / day, the best results being obtained raygras + clover pastures.

Lamb fattening systems on pasture growth rates can provide better when the diet is supplemented with concentrates and lambs have appropriate genetic potential (Dawson & Carson, 2002). Management concentrates *ad libitum*, compared to their limit to the amount of 500 g / lamb / day does not have significant effects on weight gain or on carcass quality indicators (De Villiers et al., 2002). Warner & Sharrow (1984) found that weight gain is higher in lambs grazing diet which was supplemented with concentrates and is more economical than intensive fattening based on compound feed.

However, there is little information on dietary supplementation strategies for fattening lambs on pasture exposed. The purpose of this study was to investigate the effect of dietary supplementation on pasture fattening lambs exposed, concentrated, hay and saponified fats on weight gain and carcass characteristics.

MATERIAL AND METHOD

The study was conducted at the University of Oradea for 150 days from the first 15 days were used for adaptation to the types of feed rations tested. The 80 male lambs of the breed pans were assigned into 4 homogeneous groups (20 male lambs / group) were randomly assigned to one of the four forage rations tested:

•**P**: pasture without supplementation ration;

•**PC**: grazing and supplement with concentrated ration provided *ad libitum* on pasture;

•**PCF**: PC ratio supplemented with hay provided *ad libitum* on pasture;

•**PCFG**: PCF ratio in structure but mixed fodder saponified fat was introduced at a rate of 4% (% by weight of mixed concentrate). As used fat source sunflower oil saponified as described by Alexander, G. (2002).

The distribution of lamb in batches to consider health status, origin, age (93 ± 7 days) and body weight. Fattening period lasted 135 days, of which 120 days were 15 days of fattening period and finishing period.

Lambs were grazing on mountain pastures (1150 m altitude), consists of a mixture of 37% *Festuca rubra*, 18% *Phleum pratense*, 12% *Poa pratensis*, 14% *Dactylis glomerata*, 9% *Trifolim repens*. Pasture was divided into 16 paddocks of approximately 0.25 ha each, using a combination of fixed and portable electric fences. Lambs of

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about 4 lots were moved to a new paddock every seven days, so as to allow a period of rest and restoration of vegetation cover of 28 days between grazing. Distribution of grazing paddocks batch was made so that each lot for grazing during the fattening period on each of the 16 paddocks. The pasture was provided an arbor for each lot, which was moved in each paddock. Water and vitamin-mineral blocks were available for lambs at any time. The structure of compound feed and their nutritional value corresponded to the fattening phase (INRA, 1989). Samples of forage (pasture and hay) were collected each month (mid range) of the experimental period (n = 5) and then analyzed for DM (ISO 1999), NDF and ADF (Van Soest et al., 1991; Fibersac a Ankom Analyzer Technology, Fairport, NY), N (Kjeldahl method) and crude fat (AOAC, 1996).

During fattening were made following operations prophylaxis: treatment for moneziozei, bathing antiscabioasa vaccination and vaccination anticarbunoasa antiaftoasa. Lambs were trimmed before the 6 weeks before the end of the fattening period. Control was performed monthly weight gain by weighing individual on which it was calculated that the increase total weight and average daily gain. Was recorded monthly consumption of compound feed, each group of lambs, being so focused calculated consumption per one kg of growth in weight.

At the end of experimental period in each group were randomly chosen every six individuals who were sacrificed. On this occasion, were determined following elements: carcase weight, slaughter yield, the classification of carcasses graded according to the methods applied in the European Union. It should be noted that in weighing the carcase and adhering fat was present. After the assessments made in the carcasses were cut into regions by class quality butcher and then were boneless tissue structure and report to determine bone / meat case set for both overall and for the butcher cut the housing areas.

Cutting the parts business case was made after refrigeration (24 hours at 4^0C) after the whole carcass was cut on the spine line, exactly in two halves. Divide half-carcase trade in different regions according to the French system was done cutting. Tissue composition of the case established by boning a half shell, establishing the proportion of meat, fat and bones.

All final data on body mass, increase weight gain, carcass weight, yield per slaughter weight butcher regions graded, processed and interpreted were statistically using Tuckey test. Data were presented as mean values, with significance of differences caused by dietary supplementation with concentrated fattening lambs subjected, fan and saponified fats. The level of significance was declared at $p < 0.05$.

RESULTS AND DISCUSSIONS

The *table 1* summarized results on the performance of lambs in lots recorded bio experimental experimental period. In the fattening process, the evolution of total growth increment value varies dependent on the structure of feed ration tested. Although initial average weight of lambs from the four experimental groups was virtually similar, after concluding the process of weight gain is the difference between the net experimental groups, especially compared to the control group. Statistical processing of data (*tab. 2*) shows that the lowest average values of weight, determined at the end of fattening lambs are made from the control group (P) pasture-fattened without suplimentatrea ration, while the largest body weights were lambs was recorded in group PCFG, whose ratio was based on pasture supplemented with concentrates, hay and saponified fat. At the end of the fattening process, compared to lambs from the control group (P) body average weight was 9.14 kg higher for ration supplementation with concentrates (PC group) ($p < 0.001$), with 10.19 kg for ration supplementation with concentrated and fan (PCF group) ($p < 0.001$) and 11.40 kg for ration supplementation with concentrates, hay and saponified fats (group PCFG) ($p < 0.001$).

Total weight gain and average daily weight gain, respectively (*fig. 1*) recorded the entire experimental period of lambs from experimental plots compared to control group is due to additional energy intake provided by fat supplement concentrated and saponified (Ghoorchi et al., 2006), but also a change in the structure microecosistemului rumen fermentation and final product as determined browned and fat supplement concentrated and saponified by adding hay ration (Ashes et al. 1993; Piasentier E., 2003). Positive effects of energy from the food supplement and changes in their fermentation processes were reflected and browned on the degree of recovery of the food, the lowest consumption of concentrates to achieve a kg increase in weight is made of lambs in group PCFG.

The coefficient of variability, rather than recorded in all experimental groups (data not shown) indicates no selection in the direction of meat production and thus improving the production ability to the race Tsigai. Given stessante conditions (high temperatures and technological interventions and veterinary) in which the experiment was conducted, we appreciate the weight gains obtained are satisfactory for biological material used.

Table 1

Evolution gain weight and degree of recovery of concentrates (n = 20)

	P	PC	PCF	PCFG
	X ± s *x*	*X* ± s *x*	*X* ± s *x*	*X* ± s *x*
Body mass:				
- initial (kg)	19.37 ± 0.34	19.68 ± 0.37	19.43 ± 0.51	20.05 ± 0.41
- final (kg)	35.17 ± 0.72	44.31 ± 1.01	45.36 ± 0.92	46.57 ± 0.98
Total weight gain (kg/cap)	15.80 ± 0.21	24.63 ± 0.66	25.93 ± 0.54	26.52 ± 0.43
Average daily gain (g/day)	117.0 ± 4.3	182.4 ± 6.3	192.1 ± 5.7	196.4 ± 9.5
Total consumption of concentrated (kg/lamb)	-	94.40	88.7	86.3
Specific consumption of concentrated (kg/kg)	-	3.833	3.421	3.254

P = pasture, PC = pasture + concentrate, PCF = pasture + concentrate + hay,
PCFG = pasture + concentrate + hay + fat saponified

Table 2

Difference in weight between groups registered at the end of fattening (kg) and its significance

Tuckey test	P	PC	PCF	PCFG
PCFG	11.40***	2.26**	1.21*	-
PCF	10.19***	1.05 NS	-	-
PC	9.14***	-	-	-
P	-	-	-	-

P = pasture, PC = pasture + concentrate, PCF = pasture + concentrate + hay,
PCFG = pasture + concentrate + hay + fat saponified; *p< 0.05; **p< 0.01; ***p< 0.001

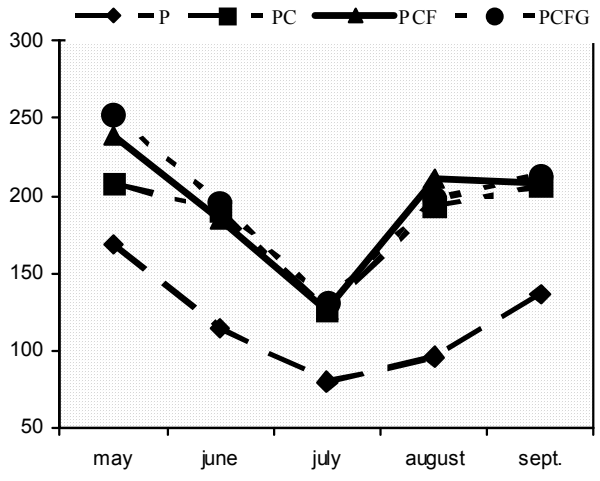

Figure 1 **Evolution of weight gain (g / day)**

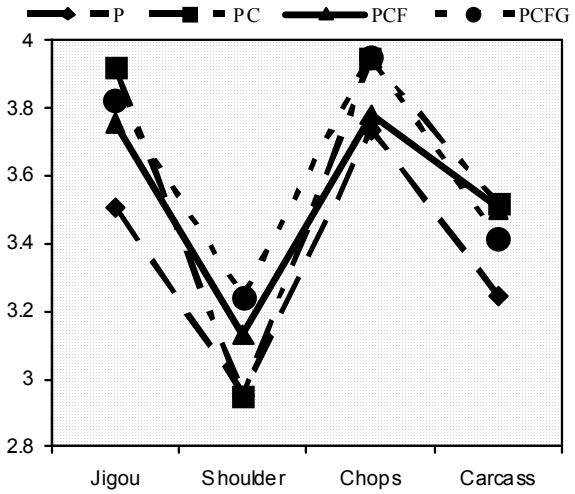

Figure 2 **Variation ratio meat : bones**

Lambs in group PCFG, whose food was supplemented along with concentrated saponified fat fan and have achieved the highest yield at slaughter (53.82%) following the submission of larger amounts of internal and superficial fat (*tab.3*). Similar values were obtained and other authors (Pascal, 2004, Voia and Drinceanu, 2006). Fattening lambs undergoing dietary supplementation on pasture caused a large increase in eye muscle area, measured at the 5-6 intercostal space, respectively 12-13. Additional mode of diet, that type of feed introduced into the food did not influence suparafata eye muscles, so as not find notable differences between the groups PC lambs (diet supplemented with concentrates), PCF (diet supplemented with concentrate and hay) and PCFG (diet supplemented with concentrates, hay and saponified fat).

Studies have shown a low degree of development of the carcasses. The analysis conducted to establish the quality of carcasses, in accordance with the methodology adopted in the European Union, shows that no case failed to meet the high quality grades, class S and U respectively (*tab. 4*). The largest percentage of carcasses obtained from all experimental groups corresponded to the specific requirements framing class O, respectively 37.5% and only 16.6% were classified as class U. The quality of lamb carcasses was recorded for the group PCFG to which they were distributed equally into three quality categories, namely U, R and O, while the control group lambs in half of cases were classified as class O and third in the last class quality (class P).

Table 3

Influence of dietary supplementation on pasture fattening lambs, the yield at slaughter (n = 6)

	P	PC	PCF	PCFG
	X ± s *x*	*X* ± s *x*	*X* ± s *x*	*X* ± s *x*
Average weight at slaughter (kg)	36.03 ± 0.17	44.72 ± 0.21	45.83 ± 0.27	46.54 ± 0.32
Carcass/chassis weight (kg)	15.90 ± 0.42	20.65 ± 0.58	21.19 ± 0.43	22.12 ± 0.51
Edible internal organs wegght (kg)	2.06 ± 0.09	2.71 ± 0.12	2.64 ± 0.07	2.93 ± 0.08
Carcass yield (%)	44.15 ± 0.10	46.18 ± 0.42	46.23 ± 0.54	47.54 ± 0.48
Commercial yield (%)	49.84 ± 0.73	52.23 ± 0.61	51.99 ± 0.65	53.82 ± 0.47
Eye muscle area (cm^2):				
- 5-6 intercostal space	5.94 ± 0.12	7.64 ± 0.25	7.88 ± 0.15	8.17 ± 0.39
- 12-13 intercostal space	10.21 ± 0.35	14.61 ± 0.31	14.21 ± 0.27	14.57 ± 0.36

P = pasture, PC = pasture + concentrate, PCF = pasture + concentrate + hay,
PCFG = pasture + concentrate + hay + fat saponified

Table 4

Classification of carcasses according to the standard of European Union (n = 6)

Class	Group			
	P	PC	PCF	PCFG
After conformation				
S (superioare)	-	-	-	-
E (excellent)	-	-	-	-
U (very good)	-	1	1	2
R (good)	1	2	2	2
O (moderate)	3	2	2	2
P (poor)	2	1	1	-
After the degree of weight gain				
1 (low)	-	1	1	1
2 (light)	1	1	1	2
3 (moderate)	2	2	2	2
4 (fat)	2	2	2	1
5 (very fat)	1	-	-	-

P = pasture, PC = pasture + concentrate, PCF = pasture + concentrate + hay,
PCFG = pasture + concentrate + hay + fat saponified

The structure and composition of housing is extremely important and common criteria used in the work of improvement, because they involve the physical composition and tissue analysis of the case and the chemical composition of meat (Tafta, 1979, Pascal, 2004). In terms of physical structure of housing, according to general commercial cutting, the best results were obtained from lambs of groups to which diet was supplemented pasture, feed used to supplement and how their association in food not weight influenced meat quality in housing structure. In the case of research quality assessment was based on assessing the weight of the basic tissues and cover up certain amount of muscle mass, the amount of bone and fat, measurements were made both for housing and for all the main parts cut (Lourenco et al. 2007). The more muscle mass involved in carcass weight, or cut areas, the commercial value thereof is higher (tab. 5).

Carcasses integrity analysis highlights different values of the main tissues. Obviously the weight of muscle mass is higher in heavier carcasses as is found in those obtained from lambs slaughtered in batches PC, PCF and PCFG whose diet was supplemented with concentrates (PC), concentrates and hay (PCF) or concentrated fan and saponified fat (PCFG). The value of housing quality is directly influenced by the ratio meat: bone (Pascal, 2004). The lowest ratio meat: bones, considered the main commercial port of the casing cut (jigou, shoulder and loin) and the whole carcasses were recorded in lambs on pasture (group P). Dietary supplementation with concentrated lambs on the pasture, hay and saponified fat (grops PC, PCF and PCFG) has improved ratio meat: bones with values ranging interests 5.33 - 8.42% (fig. 2).

Best state of fattening, carcass fat content expressed by the amount of kidney fat and tallow coating thickness (table) had a lots of lambs whose diet was supplemented with concentrates (PC), concentrates and hay (PCF) and respectively concentrated fan and saponified fat (PCFG) to the control group (P) differences were 51.2-85.4% higher carcass fat content when, with 40.4-67.5% for kidney and fat intake 61.4-67.1% for tallow coating thickness.

Table 5

Commercial boning carcasses results

chassis components (%)		P	PC	PCF	PCFG
Class I; which:		45.56	52.74	52.47	52.16
	Jigou	31.17±0.63	33.86±0.52**	33.04±0.39**	33.39±0.67**
	Thread	6.42±0.13	8.69±0.21*	9.36±0.19**	8.06±0.11*
	Chump I	7.41±0.16	10.19±0.23***	10.07±0.24**	10.71±0.30***
Class II; which:		33.67	30.41	31.12	31.07
	Chump II	8.51±0.19	9.40±0.11	9.18±0.21	9.52±0.18
	Shoulder	25.16±0.63	21.01±0.58***	21.94±0.48***	21.55±0.72***
Class III; which:		20.77	16.85	16.41	16.77
	Chest	12.06±0.19	9.34±0.27**	9.72±0.31**	9.07±0.18**
	Neck	8.71±0.22	7.51±0.19	6.69±0.21*	7.70±0.14

P = pasture, PC = pasture + concentrate, PCF = pasture + concentrate + hay,
PCFG = pasture + concentrate + hay + fat saponified; *p< 0.05; **p< 0.01; ***p< 0.001

Table 6

Tissue structure of the carcass (%) and fat distribution in carcass

Specificare		P	PC	PCF	PCFG
Tissue structure of the carcass (%):					
	- musculature	57.02	54.46	54.89	54.75
	- fat	19.42	23.40	22.91	22.61
	- bone	23.56	22.14	22.20	22.64
	- ratio meat[1] / bone	3.244 / 1	3.517 / 1	3.504 / 1	3.417 /1
Subcutaneous fat (% of carcass)		0.82	1.37	1.24	1.52
Kidney fat (g)		128.7	187.3	180.7	215.6
Fat cover (mm)		2.28	3.79	3.68	3.81
The uniformity of tallow distribution coverage		Carcass easily covered with fat, flesh visible almost everywhere	Carcass easily covered with fat but above the back and prior train remain uncovered areas.		

P = pasture, PC = pasture + concentrate, PCF = pasture + concentrate + hay,
PCFG = pasture + concentrate + hay + fat saponified. [1] meat = musculature + fat.

CONCLUSIONS

Ration supplementation on pasture fattening lambs exposed, concentrated (PC), concentrates and hay (PCF) and respectively concentrated fan and saponified fat (PCFG) led to significant improvement ($p< 0.05$) of major bio performance materialized in growth final body weight up to 11.40 kg and the total weight gain and average daily gain up to 67.8%. Positive effects of energy from the food supplement and changes in their fermentation processes were reflected and browned on the indices but also the quality slaughterhouse carcasses. The highest yield at slaughter (53.82%) was achieved by lambs whose diet was supplemented as a result of better muscle development and also deposit a larger amount of internal fat and superficial. These issues were highlighted by the larger area of the eye muscles but also the highest values recorded for housing in fat content, the amount of kidney fat and tallow coating thickness.

Carcasses had a low level of development, so any case failed to meet the Class S and E, the highest percentage of carcasses obtained corresponded to the specific requirements a framing class O, that only 37.5% and 16.6% were within class U. in the control group lambs half the cases were classified as class O and third in last grade (Class P).

The lowest ratio meat : bones, considered the main commercial port of the casing cut (jigou, shoulder and loin) and the whole carcasses were recorded in the control group, dietary supplementation resulted in improvement of this report with values ranging interests 5.33 - 8.42%.

In conclusion, dietary supplementation on pasture fattening lambs undergoing positive influence production performance and carcass quality, technological solution is dependent on market price of meat, so the additional costs of feeding lambs to be effective.

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