THE INFLUENCE OF FEEDING TYPES ON THE BIOPROUCTIVE PERFORMANCE AND CARCASS FATTY ACIDS COMPOSITION IN THE CASE OF FATTEN SUCKLING LAMBS

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Abstract

The main objective of this study involves the influence of energy density and energy-protein ratio of feed ration on production, structure and content of Omega-3 polyunsaturated fatty acids and CLA in muscle tissue and adipose fat at suckling lambs under intensive fatting. Secondly, it was established influence of different systems of feeding on performance of lambs under intensive fatting, subjected to production and consumption, and on carcass and meat quality obtained. In accordance with the objectives an experiment of the 2 x 2 factorial type was organized, using mixtures of individual fodders with two different energy levels(high: 65% concentrated, and low: 35% concentrated) which did contain or not full structure soybean bypass (5% by weight). High energy density (from 1.00 up to 1.15 UNC/kg DM) and the incorporation of integrated soybean bypass type into food caused a radical improvement in weight gain and degree of recovery of feed, and have provided larger proportion polyunsaturated fatty acids (PUFA) in intramuscular fat. The differences are statistically assured. In comparison, PUFA had a higher weight in biceps femoris muscle than in longissimus dorsi muscle. The most significant differences were recorded in the polyunsaturated fatty acids Omega 3 series (C18: 3 n-3, EPA, C22: 3 n-3, DPA and DHA) and CLA C18:2 c9, t11, C18: 2 T10, C12). The largest amount of PUFA Omega 3 fatty acids was found in muscle tissue derived from lambs fed with the ration with the highest energy density and which contained the fully protected soybean. A similar evolution has recorded for the conjugated linoleic acid (CLA). If Omega-3 PUFA concentration did not show noticeable differences between the two examined muscle tissue (longissimus dorsi and biceps femoris), the proportion of CLA was found to be higher in biceps femoris muscle for all analysed lots. Compared with muscle tissue, fat depot (subcutaneous and perinea) is characterized by a higher content in saturated and unsaturated (particularly perirenal fat) and proportionally lower polyunsaturated fatty acids and especially Omega-3 PUFA series. The influence of energy density of food and the incorporation of full protected structure soybean ration had a similar influence on fatty acid profile of fat deposits, as much as in the case of intramuscular fat.

Key words: nutrition, energy, integral soybean bypass, Omega 3 and CLA, lambs

INTRODUCTION

Nutritional quality of food animals is an important parameter, especially about the link between food and human health, a vital area of research today. International medical scientific world believe that dietary fat, and especially those of animal origin, is responsible for certain diseases, especially cardiovascular nature and those associated obesity [1], [5]. However initial research of Hu FB [5] have shown that polyunsaturated fatty acids include a special category of fat called Omega-3 fatty acids and CLA (Conjugated Linoleic Acid or fatty acid Omega 7), which are essential for developing and maintaining a healthy human body (they ensure the development of nerve cells in children, prevent obesity, and do have the potential anticancer and antioxidant, etc). They should make sure by food as they are not synthesized in the human body, especially CLA, which is present only in milk and meat from ruminants (cattle, sheep, goats), this resulting in hydrogenation

processes of linoleic acid by rumen microorganism in [7]. Due to the positive effect of Omega 3 fatty acids and CLA has on the body, foods rich in these acids are included in "functional foods".

Nutritional factors (nature of feed, type and structure of food rations, food supplement fat and their degree of saturation), besides the direct influence they do have on the bio-handling structure, they do have a major importance performance in handling structure and the content of acids fatty acids (PUFA) Omega 3 and CLA fats of animal origin [8], [12], [14].

The main objective of this study involves the influence of energy density and energy-protein ratio of feed ration on production, structure and content of Omega-3 polyunsaturated fatty acids and CLA in muscle tissue and adipose fat at suckling lambs under intensive fatting. Secondly, it was established influence of different systems of feeding on performance of lambs under intensive fatting, subjected to production and consumption, and on carcass and meat quality obtained.

MATERIALS AND METHOD

In accordance with the objectives, an experiment of 2x2 factorial types was organized (Table 1)

- two energy levels, i.e. two different relationships between forages (F), and concentrated (C) in the structure of the single feed mixture used in fattening (ratio F: C was 35:65, respectively 65:35).
- Each of the two types of single feed mixtures containing or not integrated soybean bypass type, the rate of 5% by weight.

Table 1. Characteristics of the experimental model (that had been used) used

The report forages:concentrates (F : C)	**35 : 65**		**65 : 35**	
Integrated soy, by-pass type (treated with formaldehyde 12,5%) - SFF	without SFF[1]	5% SFF[1]	without SFF[1]	5% SFF[1]
UNC / kg DM ratio * (energy density)	1,00 – 1,15		0,90 – 0,95	
Energy-protein ratio **	5,3 – 6,8		4,8 – 5,7	

[1]SFF – soia full fat; * Depending on growth phase and presence of SFF, ** single feed mixtures were isoproteic for each stage of growth

Research was conducted on a herd of 32 male lambs aged 70-78 days (immediately after weaning) that belong to the Tigaie race, divided into 4 experimental randomized, corresponding to four types of single feed mixtures made in the study.

Food was given *ad libitum* with feed mixtures of single isoprotean for different growth stage (90 days) and finishing stage (20 days). The structure has mixtures such as: ground alfalfa hay, grass naturally milled, mixed fodder with different structure for the two phases of growth and integral soybean which had been previously treated with 12.5% formaldehyde to avoid the splitting of protein and rumen fat, and promote their use in the rennet and duodenum by splitting enzyme that is more efficient [9]. The ratio energy density was of 1.0 – 1.15 UNC/kg DM in the case of the mixtures based on concentrations (65% out of DM) and of 0.9 – 0.95 UNC/kg DM in the case of those based on filamentous (65% out of DM) while the energy-protean report was varying between 5.3 – 6.8 and 4.8-5.7 respectively, corresponding to the two growth stages [6] (Table 2).

Within the growing-fattening period leading bio-indicators were registered, and at the end of experiments, a slaughterer for control were carried out, using 4 individuals for each lot, in order to establish the main indices of the slaughterhouse, carcass quality and profiling fatty acids obtained from muscle and adipose tissue. Sampling to determine fatty acids profile of muscle and adipose tissue was 24 hours after slaughter. *Longissimus dorsi* muscle was harvested from lombar and the pulp sample was harvest for analysis from muscle *biceps femoris*. Subcutaneous fat was taken from the lumb area and from perirenal area was harvested fat storage. Samples were kept at a

temperature of -20 ºC until to isolate as described fat by Folch et. al [4] method. To determine the fatty acids content, total lipid extract was etherified with methanol saturated with hydrochloric acid for 2 hours at 80ºC in closed tubes. Methyl esters were extracted in petroleum ether: benzene (8:1), purified and separated and identified isothermal for methyl esters by gas chromatography with an gas chromatographer HP 5890 II / 5972 GC-MSD coupled with mass spectrophotometer. For identification, the PUFA No 2 (Animal Source) kit was used.

All data productive effect and laboratory results were statistically processed and interpreted using the test "t" and they were presented as mean values, with significance of differences caused by the energy density of food (c), this type by full soya. Pass (S), and the effect of interaction between food energy density and the presence of protected full soya (C x S).

Table 2. The structure and nutritional value of feed single mixtures (that had been used)used

The report **forages:concentrates (F :C)**	Growth phase (90 days)				Finishing Phase (20 days)			
	35 : 65		**65 : 35**		**35 : 65**		**65 : 35**	
	L_1 - without SFF[1]		**L_2** - with SFF[1]		**L_3** - without SFF[1]		**L_4** - with SFF[1]	
a) **Composition (g / kg DM)**								
- Natural ground/milled hay	250	250	-	-	250	250	-	-
- Milled alfalfa hay	100	100	650	650	100	100	650	650
- mixed fodder *	650	600	350	300	650	600	350	300
- Full soybean bypass	-	-	-	50	-	50	-	50
Total	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*	*1000*
b) **Nutritional characteristics**								
- UNC/kg DM	1,00	1,02	0,90	0,91	1,14	1,15	0,95	0,96
- CP (% of DM)	18,7	19,1	18,8	19,3	16,5	16,8	16,7	17,0
- PDIN (g/kg DM)	118	123	110	116	106	112	104	110
- PDIE (g/kg DM)	104	106	88	91	101	103	87	90
Energy Density	1,0		0,9		1,15		0,95	
Energy-protein ratio	5,3		4,8		6,8		5,7	
*** Combined fodder structure and nutritional characteristics**								
a) Structure (%)								
- corn grein	45,5				53,5			
- triticale meal	20,0				20,0			
- soybean meal	20,0				12,0			
- sunflower meal	10,0				10,0			
- minerals and vitamins	4,5				4,5			
b) Nutritional characteristics								
- UNC/kg DM	1,35				1,41			
- CP (%)	20,33				17,31			
- PDIN (g/kg DM)	146,6				127,3			
- PDIE (g/kg DM)	121,7				116,7			

[1]SFF – soia full fat

DISCUSSION AND RESULTS

The type of food defined by structure (fibre : concentrates ratio), energy density and energy-protein ratio of single mixtures feed caused difference between the four groups of fattening lambs subjected in the performance of production and marketing of food (body weight evolution and the average daily weight gain, consumption trends and the extent of recovery of the food) (Table 3), carcass quality (carcass structure and commercial tissue) (Table 4 and 5), and fatty acid profile of muscle tissue (Table 6 and 7) and fat deposit (Table 8 and 9).

As regards the influence of energy density, i.e. the ratio forages : concentrated

food, the indices of slaughter and carcass quality can be judged by the trend that a low energy density of food has lead to a decrease in slaughter, the surface of the eye muscles; the weight of fat in the structure carcass tissues, in exchange the muscular proportion increased. The amount of storage fat (subcutaneous and pelvic) and the thickness of subcutaneous fat increased, but it had an uneven distribution on the surface carcass where many areas with visible meat are present (tables 4 and 5).

Table 3. Evolution of the main indices of production and consumption during the experimental period

The report **forages:concentrates (F :C)**	U.M.	**35 : 65**		**65 : 35**		Semnification		
		L_1 - without SFF[1]	**L_2 -** with SFF[1]	**L_3 -** without SFF[1]	**L_4 -** with SFF[1]	**C**	**S**	**CxS**
Body mass (kg):								
- Initial	Kg/cap	15,31	15,68	15,37	15,43	NS	NS	NS
- growth (90 days)	Kg/cap	35,11	36,50	31,45	33,88	**	*	NS
- Finishing (20 days)	Kg/cap	38,83	40,31	34,67	37,38	**	*	NS
Average daily growth								
- growth phase	g/cap	219,97	231,42	178,59	204,50	**	*	*
- the phase of finishing	g/cap	186,10	190,70	160,90	177,69	*	NS	NS
- average (110 days)	g/cap	213,81	224,10	175,37	199,62	**	*	NS
Daily consumption (110 days)								
- feed	Kg/cap	1,392	1,367	1,457	1,427			
- UNC	-	1,54	1,52	1,42	1,38			
- PDI	g/cap	160,9	165,8	158,8	160,6			
Specific consumption (110 days):								
- feed	Kg/cap	6,51	6,10	8,31	7,15			
- UNC	-	7,20	6,85	8,09	7,03			
- PDI	g/cap	751,9	739,5	905,3	818,2			
- Concentrates	Kg	4,24	3,97	2,91	2,50			
- Fibrous	Kg	2,27	2,13	5,40	4,65			

[1]SFF – soia full fat C – effect of the concentration proportion of S - whole soybean protected full effect;
CxS - effect of interaction between the proportion of concentrates and the presence of full protected soya

Table 4. The influence of food type and full bypass soya type to/on the main indices of slaughter-house

The report **forages:concentrates (F :C)**	**35 : 65**		**65 : 35**		Semnification		
	L_1 - without SFF[1]	**L_2 -** with SFF[1]	**L_3 -** without SFF[1]	**L_4 -** with SFF[1]	**C**	**S**	**CxS**
The average weight at slaughter (kg)	38,41	40,00	34,71	37,05	**	*	NS
Carcass/chassis weight (kg)	17,41	18,44	15,22	16,51	**	*	NS
Edible internal organs weight (kg)	2,43	2,66	2,06	2,18	NS	NS	NS
Carcass yield (%)	46,52	47,64	44,51	45,52	*	NS	NS
Commercial yield (%)	51,65	52,75	49,78	50,44	*	NS	NS
Eye muscle area (cm^2)							
- 5-6 intercostal space	7,641	7,881	6,941	7,315	*	NS	NS
- 12-13 intercostal space	14,389	14,522	13,543	13,827	*	NS	NS
The weight of body/ chassis parts:							
- gigot chop %	33,57	33,04	33,52	33,39	NS	NS	NS
- Chump%	17,72	17,63	17,81	17,67	NS	NS	NS
- Class II -%	33,3	33,48	33,07	33,17	NS	NS	NS
- Class III -%	15,41	15,85	15,60	15,77	NS	NS	NS

[1]SFF – soia full fat C –effect of the concentration proportion of S - whole soybean protected full effect;
CxS - effect of interaction between the proportion of concentrates and the presence of full protected soya

Table 5. The influence of the feeding type and of the addition full soya by-pass type on tissue structure (jigou and pork) and fat distribution in carcase (%)

The report **forages:concentrates (F :C)**	**35 : 65**		**65 : 35**		Semnification		
	L_1 - without SFF[1]	**L_2** - with SFF[1]	**L_3** - without SFF[1]	**L_4** - with SFF[1]	**C**	**S**	**C x S**
The proportion of tissues:							
- musculature	60,28	62,25	63,00	64,15	**	*	NS
- bone	19,41	19,04	19,49	19,68	NS	NS	NS
- fat	17,41	15,67	14,39	13,88	***	NS	NS
Subcutaneous fat	11,67	10,14	9,20	9,03	***	NS	NS
Pelvic fat	3,94	3,46	3,72	3,15	NS	*	NS
Fat cover (mm)	3,79	3,21	2,46	2,22	***	NS	NS
The uniformity of tallow distribution coverage	Carcass covered with fat, but above the back and prior train remain uncovered areas		Carcass easily covered with fat, flesh visible almost everywhere		-	-	-
The color of coverage tallow	white	white	yellowish white	yellowish white	-	-	-

[1]SFF – soia full fat C –effect of the concentration proportion of S - whole soybean protected full effect;
CxS - effect of interaction between the proportion of concentrates and the presence of full protected soya

Out of the data presented in tables 6 and 7 it may be noted that saturated fatty acids generally have a relatively high proportion of fat in muscle tissue structure, they are represented in particular palmitic acid (C16:0) and stearic acid (C18:0); fat from m. longissimus dorsi showing a degree of saturation higher than those of m. biceps femoris. Rations high in concentrates, namely those with high energy density and the presence of protected full soya caused a decrease in the proportion of saturated fatty acids in favour of polyunsaturated.

Food type did not alter the essential fatty acid unsaturated ratio (MUFA) from muscle tissue, they show however a clear downward trend in their share for the lambs lots fed with rations with low energy density (especially in the m. biceps femoris) or if the food was present in soybean integrated bypass type.

Rations with high energy density as well as those contained in fully protected soybean structure have provided a higher proportion of polyunsaturated fatty acids (PUFA) in muscle fat; the differences are statistically assured. In comparison, PUFA had a higher weight in biceps femoris muscle than in longissimus dorsi muscle (Fig. 1).

The most significant differences were recorded in the polyunsaturated fatty acids Omega 3 series (C18:3 n-3, EPA, C22:3 n-3, DPA and DHA), and CLA (C18:2 c9, t11, C18:2 T10, C12). The largest amount of PUFA Omega 3 fatty acids found in muscle tissue derived from lambs fed with the ration of the highest energy density and containing fully protected soybean (group 2) (6-70 to 7.65 % of total identified fatty acids), and the smallest proportion of Omega 3 occurred in the batch fed with rations of low energy density and not fully protected soybean (group L3) (3.65 to 3.71%). A similar development made it for linoleic acid conjugated (CLA), meaning that the largest amount of CLA has been recorded in muscle tissue derived from group 2 (1.9 to 2.41%) and lowest in those coming from group 3 (0.76 to 1.30%). If Omega-3 PUFA concentration did not show noticeable differences between the two examined muscle tissue (*longissimus dorsi* and *biceps femoris*), the proportion of CLA was found to be higher in biceps femoris muscle for all lots. Thus, the highest concentration of CLA in the *longissimus dorsi* muscle was 1.97% (if L2), while in *biceps femoris* muscle was 2.41% (if L2).

The best set between PUFA Omega 6 and Omega 3 PUFA (n-6 /n-3), treated as an important criterion for assessing the quality of human dietary fat was generally recorded for lambs within the lots fed with the high

energy density rations and especially when the structure of full protected l soybean ration was present.

In comparison with muscle tissue, fat depot (subcutaneous and perirenal) is characterized by a higher content in saturates and unsaturated (particularly perirenal fat) and proportionally lower polyunsaturated fatty acids and especially Omega-3 PUFA series (fig. 1. Tables 8 and 9), similar issues were reported in research conducted by Santos-Silva J. et al. [13]. The influence of energy density of food and respectively the incorporation of full protected soya structure ration, had a similar influence on fatty acid profile of fat deposit, as like as in fats of muscle tissue.

Table 6. The influence of feeding type on fatty acid profile of *longissimus dorsi* muscle (% of total fatty acids identified)

The report **forages:concentrates (F :C)**	**35 : 65**		**65 : 35**		Semnification		
	L_1 without SFF[1]	**L_2** - with SFF[1]	**L_3** - without SFF[1]	**L_4** - with SFF[1]	**C**	**S**	**CxS**
Fat (% of D.M.)	19,17	20,28	16,63	19,96	**	*	NS
Saturated fatty acids **(SFA):**							
Total SFA	43,84	40,13	47,92	45,78	**	*	NS
- C 16:0	22,08	20,19	26,24	24,76	**	NS	NS
- C 18:0	14,39	15,21	16,22	17,71	*	NS	NS
Monounsaturated fatty acids (**MUFA**):							
Total MUFA	36,47	35,40	37,35	35,89	NS	NS	NS
- C 16:1	1,09	1,36	1,22	1,40	NS	NS	NS
- C 18:1	30,86	33,74	29,71	31,18	NS	*	*
Polyunsaturated fatty acids **(PUFA**):							
- Total PUFA	19,69	24,47	14,73	18,33	***	*	*
Total **PUFA n-3**	5,16	6,70	3,56	5,12	**	***	*
- C 18:3 n-3	1,90	2,38	1,13	2,12	**	**	NS
- C 20:5 n-3, EPA	1,03	1,42	0,78	1,10	*	NS	NS
- C 22:3 n-3	0,44	0,47	0,35	0,41	NS	NS	NS
- C 22:5 n-3 DPA	0,56	0,62	0,40	0,38	*	NS	NS
- C 22:6 n-3 DHA	1,23	1,81	0,90	1,11	*	*	NS
Total **PUFA n-6**	12,99	15,80	10,41	12,24	**	**	*
C 18:2 n-6	9,21	11,71	7,24	8,53	**	*	**
C 20:2 n-6	0,60	0,83	0,49	0,96	*	*	NS
C 20:4 n-6	3,18	3,26	2,68	2,75	NS	NS	NS
CLA[2]	1,54	1,97	0,76	0,97	***	*	NS
n-6/n-3	2,51	2,36	2,92	2,39	*	*	NS
SFA/MUFA	1,20	1,13	1,28	1,27	*	NS	*
MUFA/PUFA	1,85	1,44	2,03	1,95	NS	NS	NS

[1]SFF – soia full fat C – effect of the concentration proportion of S - whole soybean protected full effect; CxS - effect of interaction between the proportion of concentrates and the presence of full protected soya

[2]CLA - conjugated linoleic acid (C 18:2 c9, t11 + C 18:2 t10, C12)

Table 7. The influence of feeding type on fatty acid profile of *m. biceps femoris* (% of total fatty acids identified)

The report **forages:concentrates (F :C)**	**35 : 65**		**65 : 35**		Semnification		
	L_1 - without SFF[1]	**L_2** - withSFF[1]	**L_3** without SFF[1]	**L_4** –with SFF[1]	**C**	**S**	**C x S**
Fat (% din SU)	17,74	48,06	13,98	15,78	**	*	NS
Saturated fatty acids (**SFA**)							
Total SFA	36,22	35,32	44,51	40,89	***	*	*
- C 16:0	20,15	18,48	21,80	20,39	NS	*	*
- C 18:0	12,50	14,29	20,19	17,66	***	**	*
Monounsaturated fatty acids (**MUFA**):							
Total MUFA	37,21	31,36	34,93	31,77	*	**	NS
- C 16:1	1,97	1,60	2,17	1,95	NS	NS	NS
- C 18:1	27,48	24,66	31,66	28,30	*	*	*
Polyunsaturated fatty acids **(PUFA**):							
Total PUFA	26,57	33,32	20,56	27,34	**	**	**
Total **PUFA n-3**	6,10	7,65	3,71	6,84	**	**	NS
- C 18:3 n-3	2,83	3,93	1,71	3,47	**	***	*
- C 20:5 n-3, EPA	0,70	1,03	0,21	1,06	*	NS	NS
- C 22:3 n-3	1,30	1,28	0,97	1,27	NS	NS	NS
- C 22:5 n-3 DPA	1,19	1,26	0,77	0,93	**	*	NS
- C 22:6 n-3 DHA	0,08	0,15	0,05	0,11	**	**	NS
Total **PUFA n-6**	18,45	23,26	15,55	19,08	**	**	NS
- C 18:2 n-6	12,62	16,38	11,45	14,47	*	**	*
- C 20:2 n-6	0,97	1,14	0,62	0,54	NS	NS	*
- C 20:4 n-6	4,86	5,74	3,48	3,80	*	*	*
CLA[2]	2,02	2,41	1,30	1,42	**	NS	NS
n-6/n-3	3,02	3,04	4,19	2,79	**	**	NS
SFA/MUFA	0,97	1,13	1,27	1,28	*	NS	*
MUFA/PUFA	1,40	0,94	1,70	1,16	*	*	NS

[1]SFF – soia full fat C – effect of the concentration proportion of S - whole soybean protected full effect; CxS - effect of interaction between the proportion of concentrates and the presence of full protected soya
[2]CLA - conjugated linoleic acid (C 18:2 c9, t11 + C 18:2 t10, C12)

The highest concentration of PUFA Omega 3 fatty acids found in fat derived from lambs fed by ration with the highest energy density and containing fully protected soybean (group 2) (1.77 to 2.06% of total identified fatty acids), and the smallest proportion of Omega 3 occurred in the batch fed rations with low energy density and containing not fully protected soybean (group L3) (1.09 to 1.51%). The conjugated linoleic acid (CLA) had a similar evolution, meaning that the largest amount of CLA was registered in fat derived from group 2 (0.90 to 1.63%) and the lowest in those coming from group 3 (0.70 to 0.76%). n-6/n-3 ratio has generally a similar trend as in muscle tissue, specifically mentioning that the subcutaneous fat of human nutrition is more favourable compared with that recorded in perirenal fat.

We have obtained result that are consistent with and supported by the scientific point of view of the conclusions reached by other authors who had studied the factors that can influence the fatty acid profile in fattened lambs case [11], [2], [3], [10].

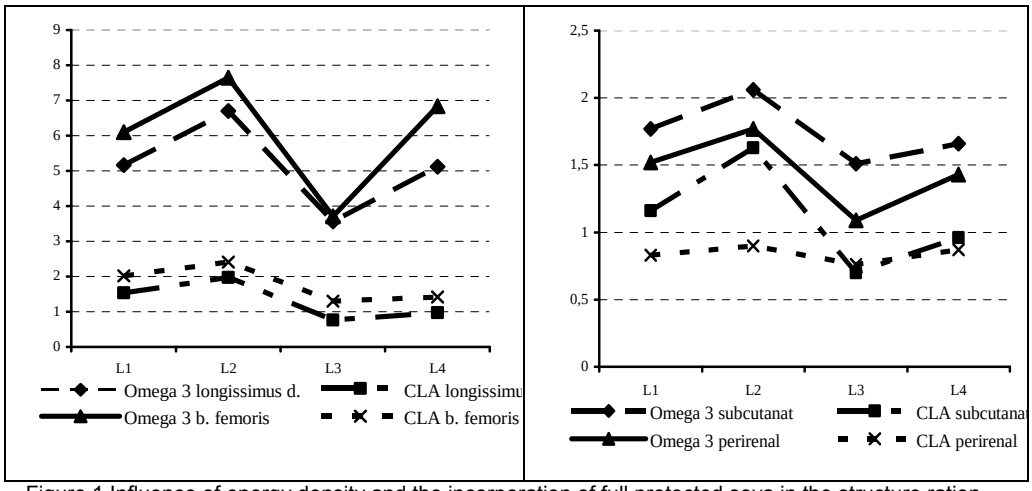

Figure 1 Influence of energy density and the incorporation of full protected soya in the structure ration on PUFA Omega 3 content and the CLA of muscle and fat tissue

Table 8. The influence of diet on fatty acid profile of subcutaneous fat depot (lumbar region) (%)

The report **forages:concentrates (F :C)**	**35 : 65**		**65 : 35**		Semnification		
	L_1 - without SFF[1]	**L_2** - with SFF[1]	**L_3** - without SFF[1]	**L_4** - with SFF[1]	**C**	**S**	**C x S**
Saturated fatty acids (**SFA**)	47,96	47,06	51,70	48,50	*	NS	*
Monounsaturated fatty acids (**MUFA**)	46,20	45,70	43,39	45,79	*	NS	*
Polyunsaturated fatty acids **(PUFA**):	5,84	7,24	4,91	5,71	*	**	**
- PUFA n-3	1,77	2,06	1,51	1,66	*	*	*
- PUFA n-6	2,91	3,55	2,70	3,09	NS	**	NS
- CLA[2]	1,16	1,63	0,70	0,96	**	*	*
n-6/n-3	1,64	1,72	1,79	1,86	*	NS	NS
MUFA/PUFA	7,91	6,31	8,83	8,02	*	NS	NS

[1]SFF – soia full fat fat C – effect of the concentration proportion of S - whole soybean protected full effect; CxS - effect of interaction between the proportion of concentrates and the presence of full protected soya
[2]CLA - conjugated linoleic acid (C 18:2 c9, t11 + C 18:2 t10, C12)

Table 9. The influence of diet on fatty acid profile of the perirenal fat depot (%)

The report **forages:concentrates (F :C)**	**35 : 65**		**65 : 35**		Semnification		
	L_1 - without SFF[1]	**L_2** - with SFF[1]	**L_3** - without SFF[1]	**L_4** - with SFF[1]	**C**	**S**	**C x S**
Saturated fatty acids (SFA)	44,43	45,43	48,40	53,35	**	*	**
Monounsaturated fatty acids (**MUFA**)	48,51	46,67	46,18	47,15	*	*	NS
Polyunsaturated fatty acids **(PUFA**):	7,06	7,90	5,42	6,20	*	NS	*
- PUFA n-3	1,52	1,77	1,09	1,43	*	*	NS
- PUFA n-6	4,71	5,23	3,57	3,90	*	*	**
- CLA[2]	0,83	0,90	0,76	0,87	NS	NS	NS
n-6/n-3	3,09	2,95	3,27	2,72	NS	NS	NS
MUFA/PUFA	6,87	5,91	8,52	7,60	**	*	**

[1]SFF – soia full C – effect of the concentration proportion of S - whole soybean protected full effect; CxS - effect of interaction between the proportion of concentrates and the presence of full protected soya
[2]CLA - conjugated linoleic acid (C 18:2 c9, t11 + C 18:2 t10, C12)

CONCLUSIONS

At the end of the experimental period (110 days), the highest body weight have been noted to lambs that were fed with ration in which the ratio of fibre concentrates was 35:65, while in the concentrated structure fully soybean treated with aldehyde formaldehyde at a rate of 5% (40.31 kilograms /head) participated, but they have recorded the highest consumption of concentrates to one kilograms in weight gain (4.24 kg concentrates / kg increase, namely by 45.7% higher than the ration with low energy density).

The incorporated integrated soya bypass type in food caused a radical improvement in weight gain and degree of recovery of fodder.

Rations with high energy density as well as those contained in fully protected soybean structure have provided a higher proportion of polyunsaturated fatty acids (PUFA) in intramuscular fat. The differences are statistically assured. In comparison, PUFA had a higher weight in *biceps femoris* muscle than in *longissimus dorsi muscle*.

The most significant differences were recorded in the polyunsaturated fatty acids Omega 3 series (C18:3 n-3, EPA, C22:3 n-3, DPA and DHA) and CLA (C18:2 c9, t11; C18:2 t10, c12). The largest amount of PUFA Omega 3 fatty acids found in muscle tissue derived from lambs fed by ration with highest energy density and which containing fully protected soybean. A similar evolution was recorded by the conjugated linoleic acid (CLA). If Omega -3 PUFA concentration did not show noticeable differences between muscle tissues (*longissimus dorsi* and *biceps femoris*), the proportion of CLA was found to be higher in biceps femoris muscle for all lots.

In comparison with muscle tissue, fat depot (subcutaneous and perirenal) is characterized by a higher content in saturates and unsaturated (particularly perirenal fat) and proportionally lower in polyunsaturated fatty acids and especially from Omega-3 PUFA series. The influence of energy density and the incorporation of full protected soybean structure in ration had a similar influence on fatty acid profile of fat deposits, as like as in intramuscular fat.

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