MEDWELL PUBLISHING
Journal of Animal and Veterinary Advances 8 (4): 799-802, 2009
ISSN: 1680-5593

The Effect of Different Rations on Carcass Characteristics in Sheep Castrated with Elastrator or Immunization Against LHRH Using Fusion Protein Ovalbumin-LHRH 7

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Abstract: The aim of this study was to investigate the effects of poor and rich rations on carcass characteristics in sheep actively immunized against LHRH using ovalbumin-LHRH-7 fusion protein. Thirty ram lambs at 19 weeks of age were used in I (immunized, n = 10), E (castrated with elastrator, n = 10) and C groups (intact, n = 10). Animals in I group were immunized against LHRH using ovalbumin-LHRH-7 (OL) protein generated by recombinant DNA technology as a primary and a booster injection at 19th and 23rd weeks of age respectively. Each group was divided into 2 subgroups (I1, n = 5; I2, n = 5; E1, n = 5 and E2, n = 5; C1, n = 5; C2, n = 5) in the 31st week of the birth. Animals were housed in groups and fed with their rations for 6 weeks. The animals in the C1, I1 and E1 groups were fed with low protein and energy ration (RI; 11.3% CP, 2290 Kcal kg^{-1} ME), whereas in the groups C2, I2 and E2 were fed with high protein and energy ration (RII; 16.2% CP, 2438 Kcal kg^{-1} ME). Rations were enriched with vitamins and minerals. At the end of the feeding period, all animals 41 weeks old were slaughtered. The results showed that testis weights and rates of the C groups were different from I end E groups both in RI and RII ($p<0.05$). However, castration with immunization or elastrator reduced testis weight. Lamb chop, internal fat, testis, back-lion, forearm, shoulder and neck weights in C group in RI were different from those in I and E groups ($p<0.05$). Forearm in C; lamb chop in I, E and C; bone weights in I were different between RI and RII treatments ($p<0.05$). Neck in I, E and C; internal fat rates in I, E and C were different in RI ($p<0.05$). Kidney and pelvic fat in I, E and C; neck in I, E and C; internal fat rates were different in RII ($p<0.05$). Pre-slaughtered live weights; warm and cold carcass weights; dressing percentage of the C group appeared to be higher than other groups in RI and RII, but these differences were not significant.

Key words: Carcass characteristics, different energy and protein levels, castrated with LHRH, elastrator, sheep

INTRODUCTION

The immunizing animals against Luteinizing Hormone Releasing Hormone (ovalbumin-LHRH-7), is an alternative method to other castration methods (Adams and Adams, 1992; Reeves *et al*., 1989; Thompson, 2000; Ülker, 2000). One recombinant LHRH fusion protein was developed by Zhang *et al.* (1999). Immunization against LHRH using LHRH proteins generated antibodies against LHRH, suppressed estrus behavior, ovarian functions, testicular development and sperm production in sheep (Ülker, 2003). This immunization had no negative effect on growth rate and carcass characteristics and caused no visible injection site lesions on the carcasses in animals (Kiyma *et al*., 2000; Ülker *et al*., 2003). It has been reported that immunizing male animals against LHRH had no negative effects on carcass quality, but the effects of rations having different level of energy and proteins on carcass characteristics were not studied thoroughly.

Ülker *et al.* (2003) did not find any differences in terms of the carcass characteristics (live weights, finishing weight, weight gain, carcass measurements, hot and cold carcass weights etc.) of ram lambs between immunized at 10 weeks age and fed in relatively poor pasture in 17 weeks period and after that housed in groups and fed *ad lubitum* with concentrate for 70 days and control treatments. Finnerty *et al.* (1996), found no effects of the rations with different energy levels on carcass characteristics in the bulls. There was no published information on describing the effects of different protein levels with immunization against LHRH by fusion protein ovalbumin-LHRH 7 on carcass characteristics in sheep.

The present study aimed to determine the effects of rations with different energy and protein levels (RI and RII) on carcass characteristics in sheep actively immunized against LHRH using ovalbumin-LHRH-7 fusion protein.

MATERIALS AND METHODS

Karakas ram lambs, a local species in Turkey, were used in this study, divided into 3 groups, control (C, n = 10), castrated with elastrator (E, n = 10) and immunized against LHRH (I, n = 10) groups. The animals in E group were castrated with elastrator bands in

Table 1: The compositions of the ratios

Feed	RI	R II	RI	RII	RI	RII
	----------DM (%)----------		----------CP (g kg^{-1})---------		----------ME* (Kcal kg^{-1})----------	
Barley	66.67	66.67	74.67	74.67	1713.42	1713.42
Onobrychis sativa	13.33	13.33	18.40	18.40	259.94	259.94
Barley straw	16.67	3.33	6.50	1.30	233.38	46.62
Cotton seed meal	3.33	16.67	13.55	67.85	83.58	418.42
Total	100.00	100.00	113.12	162.22	2290.32	2438.40

*AOAC (1996)

19 weeks age. Animals in I group were immunized against LHRH using OL protein (Ovalbumin-LHRH-7) generated by recombinant DNA technology (Zhang *et al*., 1999) as a primary and a booster injection at 19th and 23rd week of age, respectively. The animals in the C groups were not treated by any castration methods.

In 10 weeks after castrations (33rd weeks) each group was divided into 2 subgroups each with 5 animals (C1, n = 5; C2, n = 5; I1, n = 5; I2, n = 5; E1, n = 5 and E2, n = 5). Animals were housed in groups and fed with their rations (RI and RII) for 6 weeks. The animals in the C1, I1 and E1 groups were fed with rations having poor protein and energy (RI; 11.3% CP, 2290 Kcal kg^{-1} ME); in the C2, I2 and E2 groups were fed with rations containing higher rate of protein and energy levels (RII, 16.2% CP, 2438 Kcal kg^{-1} ME). All rations were supplemented with vitamin and minerals. The compositions of the rations used in the experiment are given in Table 1.

At the end of the feeding period, live weights of animals were recorded prior to slaughter. All the animals at 41 weeks old were slaughtered and skinned. Internal fat deposited around gastro-intestinal tract and on the top of the kidneys were separated and weighed. The tail, genitalia and cannons were removed. The carcass was chilled for 24 h at 4°C and weighed. The cold carcass was split into 2 symmetrical parts along the backbone and the carcass length, depth, shoulder width, chest width and loin eye muscle area were measured from the left half carcass. The left half of the carcass was cut into 6 parts according to the procedure of Colomer-Rocher *et al*. (1987) and weighed. The area of loin eye muscle was measured after cold carcasses were split between the 12 and 13th rib. From the cross section, the area was traced onto an acetate paper and the area was measured using a planimeter. Dressing percentage was calculated as a ratio of fasting weight and chilled carcass weight.

Two factors factorial analysis was used to determine the main effects between groups and applications (C1, C2, E1, E2, I1 and I2) on various carcass characteristics. Data were expressed as the least square means±standard error. Duncan's Multiple Ranges test was used to determine the differences among means after variance analysis.

Procedures used on animals were performed according to those approved by Animal Care and Use Committee of Yuzuncu Yil University (Etik Kurul, 2004).

Table 2: Slaughter and carcass characteristics (kg) and dressing percentage (%) in the groups (Mean±SE)

Characteristics	Trait	Group I	Group II
Pre slaughter weight (kg)	C	45.600±2.021	47.520±1.172
	I	41.120±1.609	43.800±0.622
	E	41.940±2.189	43.660±1.444
Warm carcass weight (kg)	C	22.280±0.683	20.160±0.849
	I	19.040±1.103	19.360±1.395
	E	17.880±1.237	19.440±0.519
Cold carcass weight (kg)	C	21.880±0.683	19.760±0.849
	I	18.640±1.103	19.000±1.397
	E	17.520±1.219	19.040±0.519
Dressing percentage	C	48.226±1.809	45.357±1.948
	I	45.494±2.766	43.504±3.538
	E	42.632±4.994	40.211±1.742

RESULTS AND DISCUSSION

The results showed that only some carcass characteristics different between in ration groups. Slaughter and carcass characteristics and dressing percentage in the groups of lambs in the experiment are presented in Table 2.

Pre-slaughter weights, warm and cold carcass weights and dressing percentage in the C group in RI group were higher than in RII group. But these differences were not significant (Table 2).

The internal fat weight in C were lower than I and E in the RI and RII groups ($p<0.05$). Simlarly Ülker *et al*. (2003) found that However, internal fat weights in RII were higher than RI ($p<0.05$). Immunization and castration with elastrator increased the internal fat (Table 3).

Forearm weights in wholesale cut characteristics in C between RI and RII groups were significantly different. Testis, back-loin, forearm, shoulder and neck weights in C were higher than I and E groups in RI. Testis and neck weights in C were higher in RII ($p<0.05$), as well as (Table 4). There are similar findings in the study of Finnerty *et al*. (1996) in bulls.

Lamb chop weight values of C, I and E groups were different between RI and RII ($p<0. 05$). Bone weights of C group were lower than I and E groups in RI ($p<0.05$). The castration techniques had no effects on any other carcass characteristics (Table 5).

Immunization reduced testis weight and rates ($p<0.05$). The testis weights increased more in C group in the RII group than in RI ($p<0.05$). The response of immunization against LHRH resulting in a decrease in testicular mass has been reported in many studies (Kiyma *et al*., 2000; Ülker *et al*., 2003) (Table 6).

Table 3: Fat weights (kg) in the groups (Mean±SE)

Characteristics	Trait	Group I	Group II
Kidney and pelvic fat weight (kg)	C	0.108±0.026	0.103±0.027
	I	0.146±0.016	0.181±0.034
	E	0.133±0.036	0.196±0.033
Tail weight (kg)	C	3.835±0.300	3.310±0.449
	I	3.126±0.447	2.823±0.405
	E	2.584±0.308	2.884±0.193
Internal fat (kg)	C	0.492±0.114b	0.521±0.141b
	I	0.759±0.051a	0.940±0.155a
	E	0.717±0.135a	1.003±0.157a

A, B; Values with different superscript in a line differ significantly ($p<0.05$); a, b; Values with different superscript in a column differ significantly ($p<0.05$)

Table 4: Wholesale cuts (kg) in the groups (Mean±SE)

Characteristics	Trait	Group I	Group II
Testis weight (kg)	C	0.221±0.021a	0.253±0.025a
	I	0.039±0.005b	0.038±0.004b
	E	0.000±0.000c	0.000±0.000c
Leg weight (kg)	C	3.006±0.107	2.776±0.114
	I	2.638±0.129	2.750±0.165
	E	2.514±0.146	2.662±0.061
Back-loin weight (kg)	C	2.057±0.080a	1.826±0.034
	I	1.710±0.077b	1.769±0.104
	E	1.655±0.112b	1.844±0.080
Forearm weight (kg)	C	1.721±0.068aA	1.468±0.036B
	I	1.479±0.062b	1.512±0.102
	E	1.378±0.076b	1.488±0.038
Shoulder weight (kg)	C	2.057±0.080a	1.826±0.034
	I	1.710±0.077b	1.769±0.104
	E	1.655±0.112b	1.844±0.080
Neck weight (kg)	C	0.801±0.032a	0.741±0.035a
	I	0.593±0.033b	0.657±0.051b
	E	0.646±0.039b	0.656±0.028b
Flank-chest weights (kg)	C	1.478±0.027	1.370±0.046
	I	1.230±0.053	1.349±0.057
	E	1.279±0.093	1.424±0.079

A, B; Values with different superscript in a line differ significantly ($p<0.05$); a, b; Values with different superscript in a column differ significantly ($p<0.05$)

Table 5: The proportion of muscle, bone and fat in the carcasses of the group assessed in the 6-12th rib area (Mean±SE)

Characteristics	Trait	Group I	Group II
Eye muscle area (cm^2)	C	12.688±0.980	10.820±0.435
	I	10.492±0.267	11.114±0.714
	E	10.712±0.644	10.834±0.384
Fat thickness 12/13th (mm)	C	0.290±0.034	0.226±0.044
	I	0.266±0.051	0.262±0.023
	E	0.242±0.041	0.234±0.041
Muscle	C	0.188±0.007	0.214±0.014
	I	0.183±0.012	0.187±0.018
	E	0.168±0.017	0.182±0.005
Lamb chop weight	C	0.462±0.015B	0.504±0.014A
	I	0.430±0.029B	0.495±0.025A
	E	0.424±0.032B	0.493±0.023A
Bone	C	0.141±0.006	0.156±0.005
	I	0.134±0.012B	0.160±0.009A
	E	0.134±0.007	0.157±0.010
Subcutaneous fat	C	0.058±0.006	0.054±0.009
	I	0.038±0.003	0.054±0.004
	E	0.044±0.008	0.056±0.008
Intramuscular fat	C	0.022±0.002	0.022±0.002
	I	0.027±0.003	0.019±0.002
	E	0.022±0.003	0.021±0.004

A, B; Values with different superscript in a line differ significantly ($p<0.05$); a, b; Values with different superscript in a column differ significantly ($p<0.05$)

Table 6: Proportional yields of wholesale carcass cuts and organs relative to cold carcass weights of the groups (%±SE)

Characteristics	Trait	Group I	Group II
Kidney (%)	C	0.507±0.023	0.513±0.032
	I	0.498±0.023	0.525±0.022
	E	0.527±0.014	0.523±0.021
Kidney and pelvic fat (%)	C	0.501±0.116	0.532±0.144b
	I	0.776±0.052	0.958±0.158a
	E	0.732±0.138	1.024±0.160a
Tail (%)	C	17.533±1.231	16.510±1.448
	I	16.488±1.405	14.506±1.467
	E	14.591±0.917	15.087±0.673
Legs (%)	C	33.160±0.351	33.992±0.712
	I	33.558±1.413	34.210±0.266
	E	33.613±0.545	32.990±0.756
Beck-loin (%)	C	22.681±0.157	22.403±0.322
	I	21.762±0.878	22.027±0.170
	E	22.099±0.463	22.787±0.622
Neck (%)	C	8.838 0.152 a	9.077±0.337a
	I	7.546 0.394 b	8.135±0.222b
	E	8.637 0.231 a	8.108±0.205b
Forearms (%)	C	18.973±0.179	18.003±0.215
	I	18.819±0.695	18.789±0.244
	E	18.434±0.173	18.434±0.379
Flank-chest (%)	C	16.360±0.435	16.806±0.449
	I	15.636±0.517	16.862±0.319
	E	17.068±0.402	17.600±0.769
Heart, liver and lungs (%)	C	4.092±0.113	3.977±0.146
	I	3.865±0.123	4.056±0.196
	E	3.745±0.322	3.443±0.168
Testis (%)	C	0.990±0.087aB	1.249±0.092aA
	I	0.000±0.000b	0.000±0.000c
	E	0.221±0.027c	0.193±0.017b
Internal fat (%)	C	0.492±0.114b	0.521±0.141b
	I	0.759±0.051a	0.940±0.155a
	E	0.717±0.135a	1.003±0.157a

A, B; Values with different superscript in a line differ significantly ($p<0.05$); a, b; Values with different superscript in a column differ significantly ($p<0.05$)

CONCLUSION

It can be concluded that immunization against LHRH using the new recombinant fusion protein (ovalbumin-LHRH-7) does not have on affect carcass weights and rates. And it is concluded that in short feeding programs (40 days), different energy and protein levels have only some effects on carcass characteristics of lambs castrated with immunization and elastrator techniques.

There are not any publishing on the effect of the different energy and protein levels on carcass characteristic of the sheep. Because of short publish about this subject, we did not discus enough the characteristics.

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