EFFECT OF ZERANOL ON CARCASS TRAITS AND MEAT QUALITY FROM LAMBS PRODUCED AT NORTHERN OF MÉXICO

Torrescano, G.[1]*, Sierra, R[1], Peñúñuri, M.F.J.[2], Velásquez, C.J.[3], Sánchez-Escalante, A.[1] and Cumplido, G.[1]
1. Department of Meat and Seafood Products. Meat Science Laboratory. Centro de Investigación en Alimentación y Desarrollo, A.C. PO Box 1735. Hermosillo, Sonora, 83000, México.
2. INIFAP-Carbó. Blvd. Bosque #7. Colonia Valle Verde, Hermosillo, Sonora, México.
3. UNISON-DAG, Blvd. Luis Encinas y Rosales, Col. Centro, Hermosillo, Sonora, México.

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Introduction

In recent years there has been an increased interest in the production of sheep in México. Actually, the ovine production has increased and competes against beef, pork, poultry and fish for the Mexican market. In this competitive environment, the sheep industry must monitor and react to changing preferences of consumers. Carcass composition is influenced by weight as well as genetics and breed differences, sex, and growth path, but the use of anabolic implants is generally used into the management practices of the finishing phase of beef (Smith *et al*, 1996), pork (Lee *et al*, 1994) and ovine (Nold *et al*, 1992) production to enhance animal performance. Anabolic agents increase weight gain in farm animals by enhancing protein deposition and improving feed conversion, as well as increasing the muscle-to-fat ratio.

The objective of the present study was to investigate the influence of zeranol, a commercial implant, on weight gain, carcass composition and meat quality of sheep.

Materials and Methods

Twelve Pelibuey and Katadhin cross lambs from the same producer were used. Two groups of six lambs consisting in intact males and females were established with the same average live weight, and the animals were housed in individual pens. All animals were allowed *ad libitum* access to feed with a commercial diet composed of protein (15%), corn (40%), barley (40%), and the appropriate amount of minerals and vitamins. Sheep were implanted with 12 mg of zeranol in the middle of the ear.

At the end of the feeding trial (90day), the sheep were transported to the plant of slaughter of the Agriculture and Cattle Department of the University of Sonora. All animals were approximately 160 days of age at the time of the slaughter. Slaughter was according to standard commercial procedures, according to welfare codes of practice. Live and hot carcass weights were collect immediately after of slaughter. Carcasses were chilled at 4 ± 1°C, and at approximately 24 h *postmortem* cold carcass weight was recorded and ribbed between the 12th and 13th ribs. Dressing percentage was calculated.

Carcass morphology measurements (carcass length, internal depth of breast, limb length and thickness) were assessed according to the methodology described by De Boer *et al.* 1974. Ribeye area (12th rib) was determined by plastic grid to measure *Longissimus* muscle area; pH and color (CIE Lab) evaluations were recorded. Dorsal fat thickness was recorded with a digital caliper. At 24 hours after slaughter Mm. *Longissimus thoracis* (LT) and *Semimembranosus* (SM) muscles were removed from carcass for sarcomere length and texture evaluations. Sarcomere length was determined by the method described by Torrescano *et al.* (2003). Shear force values was measured with a Warner Bratzler device, the samples were cooked in a water bath at 80 °C to an internal temperature of 75°C.

Significance differences ($p<0.05$) among samples were determined by analysis of variance (ANOVA) using the Least Square Difference method of the General Linear Model procedure of SPSS (SPSS, 1995).

Results and Discussion

Carcass composition traits of each group are presented in Table 1. Live weight, hot, and cold carcasses weights were not affected by the implantation of zeranol in either males or females lambs. Control cold carcass weight of female was the lightest in this study. Dressing percentage was greater ($p<0.05$) for female with zeranol implant, meanwhile the lowest dressing percentage corresponded to control intact males. Implanting tended ($p<0.05$) to increase dressing percentage. Morphological measurements on the carcass also showed significant differences between gender, principally in carcass length; where control intact males had longer ($p<0.05$) than the implanted. Implanting lambs with zeranol had no effect on *Longissimus* muscle area. Nold *et al*, (1992) also reported that zeranol implant not affect this muscle area. Significant differences was found in fat thickness ($p<0.05$), corresponding to female control to have a higher fat thickness.

Table 2 shows the values of pH and color of the carcass evaluated; in both sexes the pH values were considered as normal, this would indicate a favorable environment for anaerobic glycolysis, rigor development

and completion at 24 h postmortem. The analysis for color components for both examined muscles presented the same behavior. Anabolic implant did not ($p>0.05$) affect L*, a*, and b* values in both sexes.

Table 1. Carcass characteristics of intact male and female lambs implanted with zeranol (Mean±SD)

Item	Intact male		Female	
	Control	Zeranol	Control	Zeranol
Live wt, kg	34.25 ± 5.4[a]	35.7 ± 1.0[a]	31 ± 2.1[a]	32.35 ± 1.6[a]
Hot carcass wt, kg	19.2 ± 3.1[a]	20.1 ± 1.2[a]	18.2 ± 1.6[a]	18.9 ± 0.6[a]
Cold carcass wt, kg	17.38 ± 3.1[a]	18.1 ± 0.9[a]	16.9 ± 1.2[a]	17.8 ± 0.5[a]
Dressing percentage	50.6 ± 0.03[a]	50.7 ± 0.02[a]	54.4 ± 0.01[ab]	55.1 ± 0.02[b]
Carcass length, cm	65 ± 2[b]	63.6 ± 1.1[b]	59.9 ± 1.5[a]	61.63 ± 2.2[ab]
Internal depth of breast, cm	17.8 ± 0.9[a]	16.8 ± 1.3[a]	17.9 ± 1.5[a]	17.38 ± 1.1[a]
Limb length, cm	32.5 ± 1.2[a]	32.6 ± 0.5[a]	32.4 ± 0.5[a]	31.9 ± 0.6[a]
Limb thickness, cm	14.6 ± 1.4[a]	14.4 ± 0.8[a]	14.4 ± 0.5[a]	15 ± 1.2[a]
LT muscle area,cm^2	13.6 ± 0.5[a]	13.4 ± 2.3[a]	13.5 ± 3.2[a]	13.9 ± 0.4[a]
Fat thickness, mm	1.5 ± 0.03[b]	1.56 ± 0.13[b]	1.9 ± 0.1[c]	1.06 ± 0.1[a]

[a-b]Means on the same row bearing different superscript differ significantly (P<0.05)

Table 2. Measures of pH and color of carcass implanted with zeranol and stratified by sex

Item		Intact male		Female	
		Control	Zeranol	Control	Zeranol
pH					
	24 Hr PM	5.6 ± 0.1[a]	5.7 ± 0.1[a]	5.6 ± 0.1[a]	5.7 ± 0.1[a]
Color					
	L*	41.5 ± 0.2[b]	36.9 ± 7.6[b]	40.4 ± 0.4[a]	40.2 ± 0.5[a]
	a*	20.4 ± 0.9[a]	18.4 ± 3.3[a]	19.7 ± 1.1[b]	20.6 ± 0.7[b]
	b*	12.2 ± 1.3[a]	10.5 ± 1.8[a]	11 ± 1.8[b]	11.5 ± 0.5[b]

[a-b]Means on the same row bearing different superscript differ significantly (P<0.05)

Results of sarcomere length and texture analysis are presented in Table 3. There were no differences ($p>0.05$) in sarcomere length among lambs. These results suggest that since all sarcomeres length were shorter than 2.0 µm; it is likely that the changes in sarcomere length could affect the background toughness of *Longissimus*. Warner- Bratzler shear force (WBSF) was not different between sexes and implanted animals in both muscles, the raw meat from intact male with the anabolic implant in SM muscle presented a higher value of shear force in the two muscles evaluated. WBSF on cooked meat were tougher by implanting lambs with zeranol in both sexes in SM muscle. The intact males and females with the anabolic implant were considered tougher in SM muscles than the controls.

Table 3. Measures of sarcomere length and texture 24 h *postmortem* implanted with zeranol

Item		Intact male		Female	
		Control	Zeranol	Control	Zeranol
Sarcomere length (µm)					
	LT	1.6 ± 0.2[a]	1.7 ± 0.5[a]	1.8 ± 0.1[b]	1.8 ± 0.2[b]
	SM	1.9 ± 0.1[a]	2 ± 0.3[a]	1.9 ± 0.2[a]	1.7 ± 0.1[a]
Shear force (kgf)					
raw					
	LT	2.5 ± 1.1[a]	3.0 ± 1.1[a]	2.1 ± 0.6[a]	1.87 ± 0.5[a]
	SM	3.6 ± 1.6[b]	4.3 ± 1.4[b]	3.9 ± 0.8[a]	3.89 ± 1.2[a]
cooked					
	LT	4.1 ± 0.9[a]	4.8 ± 0.81[a]	4.1 ± 1.4[a]	4.04 ± 0.9[a]
	SM	4.9 ± 1.1[b]	5.4 ± 0.7[a]	5.2 ± 0.7[b]	5.79 ± 0.9[b]

[a-b]Means on the same row bearing different superscript differ significantly (P<0.05)

Conclusions

Zeranol implants on lambs had no a positive effect in carcass traits in both sexes in this study. However, further investigations are necessary to improve lamb meat quality with the consequent economic benefits for producers, packers, and consumers.

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