EFFECT OF CLENBUTEROL ON LAMB PERFORMANCE AND CARCASS TRAITS

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Story in Brief

Twelve fall born Dorset wethers were used to compare the effects of 0.2 mg/hd/d clenbuterol on performance and carcass traits. Lambs were allotted to one of three groups with Treatments 2 and 3 receiving clenbuterol for 21 days. Following this period lambs in group 3 were given Lasix (1ml/hd/d) for 3 days. Lambs were then slaughtered at 6 or 13 days following clenbuterol removal. Significant differences ($P < .05$) were found among treatments, with treated lambs gaining faster than controls. For carcass characteristics, Treatment 3 had significantly ($P < .10$) larger loineye areas then Treatment 1. Adjusted fat thickness, leg conformation, and yield grade differed significantly ($P < .05$) for Treatment 3 versus Treatment 1, indicating clenbuterol treated lambs produced carcasses with a higher lean to fat ratio.

(Key Words: Clenbuterol, Lambs, Average Daily Gain, Carcass Traits)

Introduction

Production of excessively fat lambs has long been a concern of the packing industry. Thus, in 1986 the American Sheep Producers Council established a "certified lean lamb program" based on the following criteria: 1) external fat thickness of .1 to .25 inches, 2) leg conformation score of average choice or higher, 3) kidney and pelvic fat of 4.5% or less, 4) USDA quality grade of low choice or higher, and 5) no evidence of ram characteristics.

Tatum et al. (1986) reported that of over 6000 carcasses surveyed, over 60% failed to meet these requirements and the overwhelming reason was failure to fit the external fat requirement.

Clenbuterol is a ß-Agonist reported to increase muscle and decrease deposition of fat. It has also been associated with an increase in average daily gain.

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The objective of this study was to determine the effect of clenbuterol on lamb performance and carcass traits, particularly fat deposition.

Materials and Methods

Twelve fall born Dorset wethers were randomly allocated across three treatment (T) groups and clenbuterol was administered for 21 days as follows: T-1 = none, T-2 = 0.2mg/head/day, T-3 = same dosage as group 2 but these lambs were given Lasix at 1 ml/head for the first three days after withdrawal of clenbuterol, in conjunction with another trial testing residue clearance time in the urine. Lambs were fed a 16% crude protein commercial diet. While on trial, lambs were weighed on a weekly basis.

Two lambs from each treatment were slaughtered at day six post withdrawal, while the remainder of the lambs were slaughtered at day 13 post withdrawal. Lambs were delivered to the Oklahoma State University Meat Laboratory and after a twelve hour shrink they were weighed and slaughtered. At 24 hours post mortem, data for USDA quality and yield grade determinations (USDA, 1982) were obtained by trained university personnel.

Data were analyzed using treatment as a single main effect. For carcass traits, hot carcass weight was included as a covariate since many carcass parameters are highly weight dependent.

Results and Discussion

Performance trait means for the 21 day administration of clenbuterol are reported in Table 1. Since Treatments 2 and 3 were not treated differently during this trial period, they were grouped together for comparison to the

Table 1. Performance traits for control and clenbuterol-treated lambs.

Item	Control	Treated[a]
Initial weight, lb.	71.50	72.75
21 d. weight[b], lb.	83.25	90.63
Average daily gain, lb.	0.56[c]	0.85[d]

[a] Clenbuterol administered (mg/day/lamb): 1 = 4 lambs at 0.0 mg., 2 = 8 lambs at 0.2 mg.

[b] Weight at end of clenbuterol administration period.

[cd] Means with different superscript letters are significantly different ($P<.05$).

control group. Means for average daily gain were significantly different ($P < .05$) for the treated versus control lambs. This coincides with a results found by Baker et al. (1984) in which lambs receiving 3.53 mg/day clenbuterol in the diet gained significantly faster than control lambs given no clenbuterol. It is important to note for the present study that there were visual differences in the rate of loineye and leg muscling changes, with treated lambs increasing in muscularity at a greater rate then controls.

Least squares means for carcass traits are presented in Table 2. There was a tendency for decreased actual fat thickness as well as kidney and pelvic fat for the clenbuterol treatment groups versus control lambs, however the means were not significantly different. When comparing adjusted fat thickness

Table 2. Least squares means for carcass traits.

Item	Treatment[a] 1	2	3
Slaughter weight, lb.	83.84	83.56	82.60
Hot carcass weight, lb.	49.63	49.63	49.63
Dressing %	60.57	60.59	60.96
Skeletal maturity[b]	1.75	2.25	2.25
Lean maturity[b]	1.70	1.77	2.03
Overall maturity[b]	1.72	2.01	2.14
Prelim. quality grade[c]	11.88	11.44	11.72
Overall conformation[c]	11.35	11.21	10.94
Final quality grade[c]	12.16	12.69	13.41
Fat thickness, in.	0.15	0.12	0.11
Adj. fat thickness, in.	0.18[d]	0.15 [de]	0.13[e]
Ribeye area, sq.in.	2.05[f]	2.17[fg]	2.22[g]
Leg conformation[c]	11.82[d]	12.47[de]	13.46[e]
Kidney and pelvic fat, %	2.08	1.97	1.70
Yield Grade	2.79[d]	2.54[de]	2.27[e]

[a] Clenbuterol administered (mg/day/lamb) to 4 lambs per treatment: 1 = none (control); 2 = 0.1 with no Lasix upon withdrawal; 3 = 0.1 with 1ml/Lasix/lamb/day for the first 3 days of withdrawal.

[b] 1 = A minus; 2 = A avg.

[c] 10 = low Choice; 11 = avg. Choice; 12 = high Choice; 13 = low Prime.

[de] Means in same row with a different superscript letter are significantly different ($P<.05$).

[fg] Means in same row with a different superscript letter are significantly different ($P<.10$).

however, means for lambs in Treatments 3 were significantly lower than the means for Treatment 1 lambs. There were also significant differences when comparing Treatment 1 to 3 for the muscling traits of ribeye area and leg conformation score. This is consistent with previous work where clenbuterol treatments have increased ribeye area versus controls. Due to advantages in trimness and muscling, yield grades were also significantly different for Treatment 3 when compared to Treatment 1. The effect of clenbuterol on muscling traits increases the lean to fat ratio in the carcass.

Lean, skeletal, and overall maturity, while tending to be higher for Treatments 2 and 3 than for Treatment 1, were not significantly different ($P > .05$). This could be due to the young age of all lambs at slaughter and to the small sample size per treatment. There was less than a third of a quality grade (high choice to low prime) difference for the 3 treatment groups, indicating that clenbuterol did not reduce the deposition amount of flank streaking or intramuscular fat.

It may be that if all lambs had been slaughter at the end of the 21 day administration of clenbuterol without a withdrawal period, more significant differences might have been seen for control versus treated lambs in regards to fat thicknesses and muscling traits.

Implications

This trial helps show that ß-Agonists can help to increase muscle mass and thus lower the percent fat in lamb carcasses. This could be an important production tool with the "lean lamb certification program". Increasing muscularity of lambs while decreasing fat thickness will help increase the percentage of lambs meeting the "lean lamb criteria". With a fast paced society and increasing health concerns, production of a uniform trim product will continue to gain importance. This will be especially true in the lamb slaughtering industry where production of excessively fat carcasses is a wide spread, consistent problem, and one that must be solved by producers and packers together.

Literature Cited

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