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Abstract

Mature cows are typically removed from the cow herd for various reasons, such as reproductive inefficiency and poor performance. It has been estimated that as much as 15 to 25% of a ranch's revenue may be from cull cows. When cows are culled from the herd, they are normally in thin condition and potentially can be fed to gain weight and increase income. Previous studies indicate that feeding a high-energy diet and implanting cull cows can improve performance and increase meat yield. Zilmax (zilpaterol hydrochloride; Intervet Inc., Millsboro, DE) is a β-adrenergic agonist approved as a growth promotant in feedlot cattle for use during the last 20 to 40 days prior to harvest. β-agonists repartition nutrients away from fat deposition and toward protein deposition. Studies in young animals have shown β-agonists to improve performance and carcass cutability characteristics. However, few studies using β-agonists in cull cows have been conducted. Therefore, the objective of this study was to determine the effects of concentrate feeding, implanting, and feeding Zilmax on performance and carcass characteristics of cull cows fed for 70 days.

Keywords

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The Combination of Implanting with Revalor-200 and Feeding Zilmax Increases Ribeye Area of Fed Cows[1]

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Introduction

Mature cows are typically removed from the cow herd for various reasons, such as reproductive inefficiency and poor performance. It has been estimated that as much as 15 to 25% of a ranch's revenue may be from cull cows. When cows are culled from the herd, they are normally in thin condition and potentially can be fed to gain weight and increase income. Previous studies indicate that feeding a high-energy diet and implanting cull cows can improve performance and increase meat yield.

Zilmax (zilpaterol hydrochloride; Intervet Inc., Millsboro, DE) is a β-adrenergic agonist approved as a growth promotant in feedlot cattle for use during the last 20 to 40 days prior to harvest. β-agonists repartition nutrients away from fat deposition and toward protein deposition. Studies in young animals have shown β-agonists to improve performance and carcass cutability characteristics. However, few studies using β-agonists in cull cows have been conducted. Therefore, the objective of this study was to determine the effects of concentrate feeding, implanting, and feeding Zilmax on performance and carcass characteristics of cull cows fed for 70 days.

Experimental Procedures

Sixty cull cows were assigned to one of five treatments: (1) grass fed on pasture (G), (2) concentrate fed (C) a grain sorghum-sorghum silage diet, (3) concentrate fed and implanted (CI) with Revalor-200 (Intervet Inc.; 200 mg of trenbolone acetate and 20 mg of estradiol), (4) concentrate fed and fed Zilmax beginning on day 38 of the feeding period for 30 days followed by a 3-day withdrawal (CZ), and (5) concentrate fed, implanted, and fed Zilmax (CIZ). Cattle were fed for 70 days before harvest and carcass data collection. Implanted cows were implanted on day 0 in the right ear with Revalor-200 per the manufacturer's instructions. Zilmax was fed at the end of the feeding period for 30 days before a required 3-day withdrawal prior to slaughter. Seven cows were removed from the study because of health, pregnancy, or death. Removal was not related to treatment.

Cows were stratified by weight, body condition score, and carcass characteristics measured by ultrasound before allotment to treatments. The two groups of G cows (six cows/group) were turned out on 50 acres of northwest Kansas native grass pasture. Concentrate-fed cows were fed a diet containing sorghum silage and ground grain sorghum (Table 1) in pens of six cows, resulting in two pens per treatment. During the initial 13 days, a step-up procedure was used to increase the proportion of ground grain sorghum in the diet. Bunks were read daily prior to feeding to establish the amount of feed to be provided. From 14 to 28 days, feed intake was closely monitored to establish a feeding level (28.0 lb dry matter/cow per day) for the remainder of the trial. A limit-feeding

[1] Funded by the Beef Checkoff

protocol was used to properly administer the correct amount of Zilmax in the diet. On day 14, all cows were treated with Dectomax Pour–On (Pfizer, Inc., La Jolla, CA) to eliminate internal and external parasites, and ears of implanted cows were palpated to confirm implant retention. Cows were ultrasounded and weighed again on days 36 and 70 of the trial. Cows were transported 130 miles to a commercial abattoir and humanely harvested.

Hot carcass weights were recorded at harvest, and all other carcass data were recorded 48 hours postmortem. Carcass data collected were evaluated by trained university personnel and included ribeye area; adjusted fat thickness; percentage of kidney, pelvic, and heart fat; marbling (100 = Practically Devoid^{00} to 1000 = Abundant^{100}); and final maturity (100 = A^{00} to 600 = E^{100}).

Data were analyzed as a completely randomized design by using the MIXED procedure of SAS. The model statement contained the respective response variables and treatment. Means were separated ($P<0.05$) by using the least significant difference procedure when the respective F-tests were significant ($P\leq0.06$).

Results and Discussion

Implanted cows fed the concentrate diet (CI and CIZ) had greater ($P<0.05$) weight gains over the first 36 days on feed than C cows, whereas concentrate-fed (C, CI, CZ, and CIZ) cows had greater ($P<0.05$) weight gains than G cows during the last 34 days on feed (Table 2). Although total gain for the entire 70-day feeding period was not statistically significant ($P=0.23$), implanted cows (CI and CIZ) had the greatest numerical weight gains, and G cows had the lowest weight gain. The CI cows had lower ($P<0.05$) feed:gain over the first 36 days than C cows; however, feed:gain for concentrate-fed cows during the last 34 days on feed and the entire 70-day feeding period was not affected by treatment ($P\geq0.39$). The lack of significant differences noted in gains for the concentrate-fed cows versus the G cows for the overall feeding period was likely the result of inherent variation in cull cows and an extremely good pasture. Rain throughout the summer allowed for abundant grass growth. Therefore, cows on grass had an ample source of nutrients, allowing them to gain weight during the trial.

During the initial 36 days on feed, ultrasound muscle depth gain was greater ($P>0.05$) for cows in three of the concentrate-fed treatments (CI, CIZ, and CZ) compared with G cows; whereas for the entire feeding period, CIZ cows had greater ($P>0.05$) ultrasound muscle depth gains than CI, C, and G cows. All concentrate-fed cows had greater ($P>0.05$) ultrasound muscle depth gains for the entire feeding period than G cows.

Dressing percentages and hot carcass weights were greater ($P<0.05$) for all concentrate-fed cows than for G cows. Carcasses from CIZ cows had the largest ($P<0.05$) ribeye areas of all treatment groups, whereas carcasses from the other concentrate-fed cows (CI, CZ and C) had larger ($P<0.05$) ribeye areas than carcasses from G cows. Adjusted fat thickness; kidney, pelvic, and heart fat; and yield grade were not affected ($P\geq0.15$) by treatment, nor were carcass maturity ($P=0.51$) or marbling score ($P=0.42$).

Implications

Concentrate-fed cull cows should exhibit increased hot carcass weights, dressing percentages, and ribeye areas compared with grass-fed cows. When fed a concentrate finishing diet, cows implanted with Revalor-200 and fed Zilmax would be expected to have the most carcass muscle as indicated by the largest ribeye areas and greatest ultrasound muscle depth gains.

Table 1. Ingredient composition of experimental diets

Ingredient	Dry matter (%)
Silage	19.7
Ground sorghum	77.3
Soybean meal/supplement[1]	3.0

[1] Supplement formulated to deliver the following per animal daily (as-fed basis): 0.50 lb soybean meal, 0.006 lb trace mineral, 0.0014 lb vitamin A, 0.022 lb calcium, 0.13 lb urea, and 0.06 lb salt. Rumensin (Elanco, Greenfield, IN) was added at 0.0006 lb; Tylan (Elanco, Greenfield, IN) was added at 0.0002 lb for cows on control diets and Zilmax cows until Zilmax was added in diet the last 30 days of the trial. Zilmax was added at 0.00023 lb.

Table 2. Performance and carcass yield data for cows fed for 70 days

	Treatment[1]						
Trait	CI	CIZ	CZ	C	G	SE	P-value
Initial body weight, lb	1120	1118	1144	1153	1135	41.7	0.96
First 36 days on feed							
Weight gain, lb	156[a]	125[ab]	110[bc]	90[c]	124[ab]	13.1	<0.01
Ultrasound muscle depth gain, in.	0.11[a]	0.29[a]	0.20[a]	0.06[ab]	-0.21[b]	0.12	0.02
Feed:gain	6.1[a]	7.4[ab]	8.4[ab]	10.5[b]	–	1.08	0.06
Second 34 days on feed							
Weight gain, lb	119[a]	159[a]	116[a]	131[a]	46[b]	15.4	0.03
Ultrasound muscle depth gain, in.	0.03	0.20	0.19	0.09	0.01	0.12	0.69
Feed:gain	8.2	6.1	8.1	7.5	–	1.38	0.42
Overall feeding period							
Weight gain, lb	275	284	227	221	170	33.5	0.23
Ultrasound muscle depth gain, in.	0.13[b]	0.50[a]	0.39[ab]	0.15[b]	-0.20[c]	0.13	<0.01
Feed:gain	7.0	6.7	7.9	8.7	–	1.11	0.39
Carcass traits							
Hot carcass weight, lb	830[a]	840[a]	819[a]	804[a]	696[b]	25.6	<0.01
Dressing percentage, %	59.6[a]	60.1[a]	59.8[a]	58.5[a]	52.6[b]	0.71	<0.01
Ribeye area, in.[2]	14.2[b]	15.6[a]	13.5[b]	13.5[b]	11.3[c]	0.59	<0.01
Adjusted fat thickness, in.	0.44	0.47	0.45	0.50	0.37	0.15	0.57
Kidney, pelvic, and heart fat, %	1.5	1.6	1.5	1.5	1.3	0.09	0.15
Yield grade	2.5	2.2	2.7	2.8	2.7	0.28	0.51
Marbling score[2]	435	414	459	426	354	39.2	0.42
Final maturity[3]	340	414	367	390	419	38.5	0.51

[1] CI = fed concentrate and implanted with Revalor-200; CIZ = fed concentrate, implanted with Revalor-200, and fed Zilmax for 30 days before slaughter; CZ = fed concentrate and fed Zilmax; C = fed concentrate; G = grazed native pasture.

[2] Marbling score: 300 = Slight[00], 400 = Small[00], etc.

[3] Final Maturity: 300 = C[00], 400 = D[00], 500 = E[00].

[abc] Within a row, means without a common superscript letter differ (P<0.05).