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Summary

A commercial feedyard experiment evaluated initial implant strategies for feedlot heifers. Heifers were administered either Revalor-IH or Synovex-H at initial processing, with both treatment groups receiving Revalor-200 as a common terminal implant. Implanting heifers initially with Revalor-IH improved feed efficiency and ADG compared to heifers implanted initially with Synovex-H. In addition, Revalor-IH implanted heifers had higher marbling scores while 58% more carcasses achieved the upper two-thirds Choice category. There were no differences in USDA yield grades. Selling Revalor-IH implanted heifers on a carcass merit basis returned $14.22/head more than Synovex-H implanted heifers. New reduced-dose initial implants can improve both feed efficiency and marbling scores, suggesting carcass quality can be positively influenced with no negative impact on growth performance.

Introduction

Growth-promoting implants have proven to be safe and effective management tools in the production of meat from beef feedlot cattle. Implanting improves feed conversion and, increases growth rate (i.e., daily gain) and finished body weight compared to non-implanted cattle. If cattle are not sold at the same fat endpoint, this increase in growth rate and lean deposition may occur at the expense of meat quality (reduction in marbling score). However, depressions in quality grade or marbling of implanted cattle when compared to non-implanted cattle results in unfair comparisons unless cattle are fed to the same end-point (fat composition). Determining proper implant strategy (number of days exposed and dosage, or combination of dosages) is important so effects on quality grade can be minimized. Such accomplishments will be economically important as the marketing of beef continues to develop into a value-based grid marketing system. New reduced-dose initial implant combinations of estradiol and trenbolone acetate (E+TBA) are available for heifers and may have different effects on animal performance and carcass quality when compared to more traditional (higher dose) initial implant products. Objectives of this study were to: 1) determine whether a reduced-dose combination of E+TBA is effective in maintaining animal performance, and 2) measure the impact of different doses of E+TBA as initial implants on carcass quality, yield grade and feeding economics of feedlot heifers.

Procedure

Crossbred beef heifers (614 lb initial BW) were received at a commercial feedlot in Western Nebraska and were allotted randomly to one of two implant regimens at initial processing (within 72 hours after arrival). Each group of incoming cattle represented a treatment replication for a total of six replications per treatment (12 pens total; 1,124 heifers). Heifers were kept separate by arrival date and assigned randomly to pens by sorting every other animal as they exited the processing chute during initial processing. Within a replication, all heifers were from the same source and arrived to the feedyard at the same time. At initial processing, heifers were individually weighed, vaccinated and treated for internal and external parasites. A lot-tag for pen identification was also administered and contained a number to allow for individual animal identification. Initial implant treatments were either Revalor-IH (8 mg estradiol, 80 mg TBA) or Synovex-H (20 mg estradiol benzoate, 200 mg testosterone propionate). After processing, heifers were group weighed to obtain an initial pen weight, just before being moved into their home pen. Number of animals in a pen ranged from 80 to 120 head, but were equal across replications.

Heifers were fed a common finishing diet twice daily throughout the study. Cattle were adapted to the finishing diet over an 18- to 21-day step-up period starting with 45% roughage and progressively replacing roughage with corn. Heifers were fed a finishing diet containing 61.3% steam-flaked corn, 10.5% dry-rolled corn, 10% wet distillers grains, 7.5% alfalfa hay, 5% liquid supplement, 3%

Table 1. Effects of Revalor-IH or Synovex-H as initial implants for feedlot heifers on carcass adjusted performance.

	Initial Implant[a]			
Item	Revalor-IH	Synovex-H	SEM	*P* - value
Number of pens	6	6	—	—
Number of heifers	535	546	—	—
Initial weight, lb	614	614	11	0.99
Final weight, lb[b]	1256	1243	7	0.15
DMI, lb[c]	19.1	19.2	0.5	0.63
ADG, lb[c]	3.65	3.57	0.1	0.10
Feed/gain[c]	5.26	5.39	0.03	0.03

[a]All heifers implanted with Revalor-200 as the common terminal implant.
[b]Calculated as hot carcass weight ÷ 63% (common dressing percentage).
[c]Calculated using carcass adjusted final weight.

Table 2. Effects of Revalor-IH or Synovex-H as initial implants on heifer carcass characteristics.

	Initial Implant[a]			
Item	Revalor-IH	Synovex-H	SEM	*P* - value
Hot carcass weight, lb	792	783	4.6	0.15
Dressing percentage	65.2	65.5	0.1	0.23
12th rib fat, in.	0.53	0.52	0.02	0.60
Empty body fat, %[b]	29.4	29.0	0.2	0.12
Ribeye area, sq. in.	14.1	14.3	0.1	0.26
Dark cutters, %	1.12	2.73	0.87	0.14
USDA Yield grade, %				
1	5.0	5.4	1.0	0.64
2	28.3	29.8	3.5	0.62
3	51.9	46.4	2.9	0.16
4	14.4	17.0	2.7	0.37
5	0.4	1.4	0.5	0.15
Calculated yield grade[c]	2.71	2.60	0.06	0.09
USDA Quality grade, %				
Prime	1.4	1.1	0.6	0.74
Upper 2/3 Choice	23.6	14.9	2.5	0.02
Low Choice	43.7	50.3	3.3	0.11
Select	30.4	32.7	2.9	0.55
Standard	0.89	0.79	0.52	0.87
Marbling score[d]	552	533	8.2	0.07
Total Choice carcasses, %	67.3	65.2	2.9	0.59

[a]All heifers implanted with Revalor-200 as the common terminal implant.
[b]Calculated from Guiroy et al., 2002 (*J. Anim. Sci.*), where empty body fat = 17.76207 + (4.68142 × FT) + (0.01945 × HCW) + (0.81855 × QG) - (0.06754 × LMA).
[c]Calculated YG = 2.5 + 2.5(FT) + 0.2(%KPH) + 0.0038 × HCW - 0.32 × REA.
[d]Marbling score: 450 = Slight [50]; 500 = Small [0]; 550 = Small [50]; 600 = Modest [0]; etc.

corn steep liquor and 2.7% tallow, and was formulated to contain 13.9% CP, 0.71% Ca, and 0.39% P. The finishing diet also provided 0.4 mg/head/day MGA, 28 g/ton DM Rumensin and 9 g/ton DM Tylan.

Replications of heifers were reimplanted with Revalor-200 (20 mg estradiol, 200 mg TBA) as the common terminal implant 81 days (range 69 to 85) before slaughter. At reimplant time heifers were removed from their pens and immediately weighed to obtain a pen weight. Heifers were then re-vaccinated, individually weighed, and reimplanted prior to being sent back to their home pen for the remainder of the feeding period. Heifers were fed an average of 177 days (range 147 to 202). All pens within a replication were marketed under identical conditions at the same commercial abattoir. Hot carcass weights were recorded on the day of harvest. Carcass fat thickness, longissimus muscle area and USDA called marbling score and yield grades were recorded following a 24 hour chill.

The economic influence of the initial implant treatment on profit/ loss returns of heifers sold on a value-based pricing grid was determined based upon the commodity grid proposed by Feuz (*2002 Nebraska Beef Report*, pp. 39-41). Carcass value was calculated based on USDA quality and yield grade, carcass weight and nonconformance (i.e., dark cutters and heavy carcasses). A carcass base price of $109.84/cwt (10 year average dressed weight price) was used for low Choice, yield grade 3 carcasses weighing 550 to 950 lb. Discounts were calculated as: $7 Select; $17 Standard; $25 dark cutters; $15 light (<550 lb) and heavy (>950 lb) carcasses; and $15 yield grades 4 and 5. Premiums were calculated as: $6 Prime; $1.50 upper 2/3 Choice; $1 yield grade 2; and $2 yield grade 1. Ration cost was calculated using 10-year average corn and alfalfa hay price. Non-feed costs were $0.28/head/day yardage, $30/head miscellaneous (medicine, processing, shipping, etc.) and 7% animal and feed interest. Initial animal cost was based upon the 10 year average 600 to 700 lb feeder heifer price of $77.43/cwt.

Animal performance, carcass data and economics were analyzed using the Mixed procedure of SAS for a randomized complete block design where pen served as the experimental unit. Model effects were initial implant treatment, while replication of cattle was treated as a blocking factor and placed into the random statement. Least squares means were separated using the PDIFF statement of SAS.

Results

Data are presented with deads and railers removed from the analysis. Feed intake and head days were adjusted accordingly for the time of removal from the pen. Feed intake was figured according to feedyard close-out information on each individual pen of cattle. Because all heifers received a common terminal

implant, initial implant treatment will be referenced when comparing treatments.

At reimplant time, initial implant checks were conducted by trained personnel for determination of abscessed, missing, crushed, or cartilage placed implants. Only 2.0 % of heifers administered Revalor-IH and 2.6 % of heifers administered Synovex-H were found to have implants that fell within these criteria. This would indicate that implants were properly administered.

Heifer performance is presented in Table 1 and is expressed on a carcass-adjusted basis using a common dressing percentage (63%). Dry matter intake was similar between treatments. Heifers implanted initially with Revalor-IH tended ($P = 0.10$) to gain faster and had improved feed efficiencies ($P < 0.03$). Carcass merit is shown in Table 2. Revalor-IH implanted heifers had 9 lb heavier ($P = 0.15$) hot carcass weights, with similar dressing percentages, 12th rib fat thickness, and longissimus muscle area when compared to Synovex-H implanted heifers. Empty body fat and USDA Yield grades were similar between treatments indicating heifers were fed to the same body fat end-point. Only calculated yield grades tended ($P = 0.09$) to be higher for heifers implanted with Revalor-IH (2.71 vs. 2.60 for Revalor-IH and Synovex-H, respectively) as a result of heavier hot carcass weights used in the calculation. Total carcasses grading Choice was not different between initial implant treatments. However, heifers administered Revalor-IH had improved ($P = 0.07$)

marbling scores with 58% more carcasses ($P = 0.02$) achieving the upper 2/3 category of Choice quality grade. These data suggest that a low-dose combination E + TBA initial implant may improve carcass quality when cattle are fed the same number of days. Presumably, feeding cattle which are implanted initially with a less aggressive implant may be required.

The simulated economic analysis of marketing cattle on a value-based carcass merit basis is presented in Table 3. Ration cost was calculated to be $126/ton (DM basis). The added cost of Revalor-IH over that of Synovex-H implants also was included in the analysis. Initial animal cost and total miscellaneous costs were similar between treatments. Heifers implanted initially with Revalor-IH returned $14.22/head more ($P < 0.05$) than those heifers initially implanted with Synovex-H. The higher number of upper 2/3 Choice carcasses along with 9 lb heavier hot carcass weights translated into greater

returns for heifers implanted with Revalor-IH.

The relatively large number of cattle grading yield grade 4 or higher would suggest that heifers in the trial may have been fed too long. However, it is not known what implications degree of finish may have on the treatments in this study.

This study provides evidence that Revalor-IH as an initial implant for feedlot heifers appears equal or better in performance to traditional heifer implants (Synovex-H), and does improve marbling, carcasses grading high Choice and feeding economics when heifers are sold on a value-based grid marketing system.

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Table 3. Feeding economics of heifers implanted with Revalor-IH or Synovex-H.

Item	Initial Implant[a]		SEM	P - value
	Revalor-IH	Synovex-H		
Ration cost, $/ton DM	126.00	126.00	—	—
Initial implant cost, $/head	1.95	0.80	—	—
Initial animal cost, $/cwt[b]	77.43	77.43	—	—
Total misc. cost, $/head[c]	101.36	100.17	—	—
Commodity grid profit(loss), $/head[d]	44.49	30.27	6.5	<0.05

[a]All heifers implanted with Revalor-200 as the common terminal implant.
[b]10 yr average 600 to 700 lb feeder heifer price.
[c]Includes $0.28/day yardage, 7% animal and feed interest, and $30/head misc. cost (processing, health, terminal implant, shipping, etc.)
[d]Calculated using $109.84/cwt carcass base price: discounts = $7 Select, $17 Standard, $15 yield grade 4&5, $25 dark cutter, $15 light & heavy carcasses; premiums = $6 Prime, $1.50 Upper 2/3 Choice, $2 Yield grade 1, $1 Yield grade 2.