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Summary

A commercial feedlot experiment was conducted using 1,807 heifers to evaluate the effects of Optaflexx fed in combination with MGA on finishing heifer performance. In heifers recieving MGA throughout the entire 126-143 day feeding period, feeding Optaflexx for the last 31-38 days increased ADG and hot carcass weight compared to heifers fed MGA but not Optaflexx. Heifers fed MGA and Optaflexx had increased DMI, improved feed efficiency and increased final live weight. Carcass quality measurements were not influenced by treatment.

Introduction

Optaflexx, the trade name for ractopamine hydrochloride, is a βeta-1 adrenergic agonist that increases weight gain the last 28 to 42 days of the finishing period. Melengestrol acetate (MGA) is an orally active progestogen that inhibits estrus and ovulation and is a product commonly fed to finishing heifers. MGA has also been shown to increase weight gain and improve feed efficiency in heifers. Data on the response to feeding Optaflexx to finishing heifers are limited. Previous heifer trials that were conducted did not include heifers fed MGA in combination with Optaflexx; therefore, the objective of this study was to determine the effect of feeding Optaflexx in combination with MGA on finishing heifer performance.

Procedure

The experiment was conducted between August 2004 and March 2005 using 1,807 heifers (714 lb ± 45.5) in a randomized block design. Following arrival, heifers were individually weighed, processed, and blocked by date received and site of procurement. During initial processing, heifers were vaccinated for viral diseases (BoviShield Gold® 4, Pfizer, Animal Health, New York City, N.Y.), treated for internal and external parasites (Dectomax Injectable®, Pfizer, New York City, N.Y.), and implanted with Ralgro® (Shering-Plough Animal Health, Union, N,J,). Heifers were determined to be bred, open, or freemartins by rectal palpation. Freemartins and heifers over 100 days pregnant were removed from the trial. Heifers less than 100 days pregnant were given Lutalyse® (Pfizer, New York City, NY). Open heifers were not given Lutalyse, therefore, some nondiagnosed early pregnancies at initial processing may have allowed some pregnant heifers to complete the trial. Heifers from the separate locations were assigned randomly to one of two treatments, and then assigned to one of 20 home pens (10 replications/treatment). Treatments were: 1) heifers fed MGA (Pfizer Animal Health, New York City, N.Y.) for the entire finishing period, and 2) heifers fed MGA for the entire finishing period and Optaflexx® (Elanco Animal Health, Greenfield, Ind.) the last 31 to 38 days. MGA was not included in step up diets. The finishing diet was formulated to provide 0.4 mg of MGA/head, 330 mg of Rumensin® (Elanco)/head, and 90 mg of Tylan® (Elanco)/head/daily. During the last 31 to 38 days of finishing, Optaflexx was included in the diet to target 200 mg/hd/daily for cattle receiving Optaflexx treatment.

Heifers were reimplanted with Synovex Plus® (Fort Dodge Animal Health) an average of 80 day preslaughter (range 73 to 87 days), with animals implanted on the same day within arrival block. The final diet contained 38% dry-rolled corn, 29.5% steam-flaked corn, 18% distillers grains, 6% alfalfa hay, 2% sorghum hay, 1.5% fat, and 5% supplement in the control diet (DM basis). The Optaflexx supplement was delivered in a pellet form, fed at 4% of the diet DM and replaced dry-rolled corn. Optaflexx supplement consisted of fine ground corn and wheat midds. The diet was formulated to contain 14.9% CP, 0.72% Ca, 0.37% P, and 6.9% fat (DM basis). Heifers were fed an average of 133 days (range 126 to 143 days).

Pen weights were taken for each pen at initial processing, reimplant, start of Optaflexx feeding, and prior to shipment on the day of slaughter. Pen weights, excluding initial weight, were shrunk 4%. Initial weights were not shrunk because animals were processed immediately upon arrival or following an overnight receiving period. Pen weights were used for performance calculations on a live-basis. Additionally carcass weights were used and adjusted to a common dressing percentage of 63.5% to calculate a carcass adjusted live weight. Carcass adjusted live weight was used to determine daily gain and feed conversion on a carcass adjusted basis.

Both pens within a block (replication) were harvested under similar conditions on the same day, at the same plant. Hot carcass weights and liver abscesses were recorded on the day of harvest. Carcass fat thickness, marbling score, kidney, pelvic and heart fat (KPH), longissimus muscle area and USDA yield grade were recorded following a 24- to 36-hour chill.

(Continued on next page)

Economic Analysis

An economic analysis was conducted to determine the return for using Optaflexx with heifers fed MGA using two scenarios for cattle prices, 2-year and 10-year cattle prices. Finishing diet cost of $120.16/ton was calculated using 10-year average prices for ingredients (*agecon.unl.edu/mark/agprices/index.htm*). Intake and days on feed along with diet cost were used to determine total feed costs. In diets containing Optaflexx, a cost of $0.26/day was added to ration cost to account for the cost of Optaflexx delivered in the bunk. Other costs included $0.35/head/day yardage, $30.00 processing, health, shipping, etc., and 7% interest on animal and feed. Initial animal cost was determined using a 10-year average feeder heifer price of $77.65 /cwt and two-year average price of $95.32 /cwt (*www.feuzmarketanalysis.com*). Live sale price was calculated using a 10-year average fed heifer price of $ 70.24 /cwt. and a two-year average of $ 84.65 /cwt (*www.feuzmarketanalysis.com*). Along with selling cattle on a live basis, a marketing grid profitability analysis was performed. Based on three different carcass grid-pricing scenarios, profit or loss for each treatment on each grid was calculated. The analysis used three different grids consisting of a quality-rewarding grid, yield-rewarding grid, and a commodity grid, as proposed by Feuz (2002 *Nebraska Beef Report,* pp.39-41). The dressed price used for the 10-year average was $111.91/cwt and $134.03/cwt (*www.feuzmarketanalysis.com*) for the two-year average. Premiums and discounts for each grid used are from Feuz (2002 *Nebraska Beef Report,* pp.39-41). Profitability was calculated from a 10-year and a two-year average dress base price with individual grid premiums and discounts applied. Grid profit or loss was calculated from a carcass breakeven calculated as with live break-even, with hot carcass weight instead of final BW as a multiplier.

Animal performance, carcass data and economics were analyzed using the Mixed procedure of SAS, with treatment as a fixed effect, and block as a random effect. Data are presented with deads and railers removed from the analysis. Fifteen animals (eight Optaflexx and MGA and seven MGA alone) were removed from the study at the feedlot. Four and three heifers were removed from the Optaflexx and MGA and MGA alone treatment, respectively, after inclusion of Optaflexx. Data were not collected from 72 rail-outs in the plant, 46 MGA only and 26 Optaflexx and MGA treated-heifers. Of the 1,720 heifers harvested, 852 were on the MGA alone and 868 were on the Optaflexx and MGA treatment, respectively. At slaughter, fetuses were observed in 82 heifers, 39 in the MGA alone group and 43 in the Optaflexx and MGA group. The pregnant heifers are included in the analysis. Feed intake was figured according to feedyard close-out information on each individual pen of cattle.

Table 1. Live and carcass adjusted performance.

Item	MGA Only	Optaflexx + MGA	Difference	SEM	*P*-value
Initial BW, lb	743.2	741.1	-2.1	13.86	0.52
Reimplant BW, lb	989.1	986.0	-3.1	18.90	0.70
Start of Optaflexx BW, lb	1153.4	1158.4	5.0	16.48	0.73
Final BW, lb	1257.4	1273.9	15.5	17.14	0.53
Overall[a]					
DMI, lb	23.39	23.77	0.38	0.46	< 0.01
ADG, lb	3.87	4.00	0.13	0.16	0.41
F :G	6.07	5.96	-0.11	0.10	0.03
Last 35 days [b]					
DMI, lb	22.86	23.53	0.67	0.28	0.01
ADG, lb	2.97	3.27	0.30	0.17	0.09
F :G	7.88	7.35	-0.53	0.26	0.07
Carcass Adjusted Performance [c]					
Final BW, lb	1263.1	1280.5	17.4	16.7	0.01
Overall[a]					
ADG, lb	4.14	4.28	0.14	0.11	< 0.01
F:G	5.66	5.57	-0.09	0.08	< 0.01
Last 35 days [b]					
ADG, lb	3.11	3.43	0.32	0.15	0.01
F:G	7.57	6.97	-0.60	0.52	< 0.01

[a]Heifer performance over the entire feeding period.
[b]Heifer performance during inclusion of Optaflexx in diet the last 35 days prior to slaughter.
[c]Carcass adjusted performance is hot carcass weight / 0.635.

Results

Performance

Heifer live and carcass adjusted performance results are presented in Table 1. Final BW ($P = 0.53$) was not different, but final BW was increased by 15.5 lb or 1.2% in Optaflexx fed heifers. However, at the start of Optaflexx feeding, heifers receiving Optaflexx and MGA were numerically heavier (1158 vs. 1153 lb). Given this 5-lb advantage in initial weight, the gain increase was reduced to 11 lb (0.8%) for heifers fed Optaflexx and MGA compared to heifers fed MGA alone. DMI was increased by 0.38 lb/d ($P < 0.01$) for heifers fed Optaflexx and MGA compared to heifers fed MGA alone over the entire feeding period. Feed conversion was improved by 1.8% ($P = 0.03$) for heifers fed MGA and Optaflexx compared with MGA alone, even though ADG was not impacted ($P = 0.41$) when comparing treatments over the entire 133 day finishing period.

The diet containing Optaflexx was formulated to provide 200 mg/head/day. However, based on DMI (range 22.3 to 25.9 lb) changes across block, actual Optaflexx intake averaged 205.0 mg/head/day (range 185.1 to 222.4 mg/hd/d). Animals consumed an average of .169 mg/lb Optaflexx (range .157 to .174 mg/lb) when calculated on a per BW basis.

When comparing treatments during the last 35 days (time heifers

Table 2. Carcass characteristics.

Item	MGA Only	Optaflexx + MGA	Difference	SEM	*P*-value
Hot carcass weight, lb	802	813	11.0	10.62	0.01
12th rib fat thickness, in	0.56	0.56	0.00	0.02	0.92
Yield Grade	2.73	2.77	0.04	0.11	0.47
Yield Grade 1, %	19.1	17.1	-2.0		
Yield Grade 2, %	44.7	45.7	1.0		
Yield Grade 3, %	29.9	31.1	1.2		
Yield Grade 4, %	5.5	5.5	0.0		
Yield Grade 5, %	0.7	0.6	-0.1		
Marbling [a]	552.9	552.2	0.70	8.57	0.89
Prime, %	1.2	1.2	0.0		
Choice+, %	4.9	6.5	1.6		
Choice0, %	20.0	17.4	-2.6		
Choice-, %	45.8	46.4	0.6		
Select, %	27.1	27.5	0.4		
Standard, %	0.9	1.0	0.1		
Longissimus area, in2	14.41	14.39	-0.02	0.21	0.91
KPH, %	1.96	1.95	-0.01	0.13	0.29
Dressing percentage, %	63.82	63.85	0.03	0.22	0.87
Empty body fat, %[b]	29.68	29.81	0.13	0.39	0.53

[a]Marbling score = 400 = Slight0, 500 = Small0 etc.
[b]Empty body fat = 17.76207 + (4.68142*12th rib fat thickness in cm) + (0.01945*carcass weight in kg) + (0.81855*marbling/100) - (0.06754*Longissmus in sq. cm.).

Table 3. Heifer economics.

Item	MGA Only	Optaflexx + MGA	Difference	SEM	*P*-value
10-year average pricing					
Total animal cost, $	898.69	909.13	10.44	8.78	0.01
Live heifer value, $	883.27	893.99	10.72	11.10	0.02
Commodity heifer value, $	875.80	885.03	9.23	11.55	0.04
Live profit or loss, $	-15.42	-15.14	0.28	7.04	0.93
Commodity profit or loss, $	-22.90	-24.10	-1.20	9.15	0.75
2-year average pricing					
Total animal cost, $	1038.61	1048.53	9.92	9.85	0.04
Live heifer value, $	1064.48	1077.40	12.92	13.38	0.02
Commodity heifer value, $	1053.34	1064.81	11.47	13.73	0.02
Live profit or loss, $	25.87	28.87	3.00	7.99	0.49
Commodity profit or loss, $	14.73	16.28	1.55	9.73	0.71

were fed Optaflexx), DMI increased ($P = 0.01$) by 0.67 lb/hd/d, which was unexpected. Feeding Optaflexx in combination with MGA increased ADG by 0.30 lb/day ($P = 0.09$) which led to a slight improvement ($P = 0.07$) in feed conversion of 6.7% for heifers fed Optaflexx and MGA compared to heifers receiving MGA alone when evaluating live performance.

When using carcass adjusted performance (HCW/.635), final live weight was increased ($P = 0.01$) 17.4 lb, or 1.4% for heifers receiving Optaflexx and MGA compared to heifers fed MGA alone. When ADG was calculated from carcass weight, heifer ADG was increased ($P < 0.01$) 0.14 lb/head/day with a significant improvement in feed conversion of 1.6% for heifers over the entire feeding period. Despite the relatively small improvement when expressed over the entire feeding period, ADG and F/G of heifers fed Optaflexx and MGA compared to heifers fed MGA alone on a carcass-adjusted basis were significantly different. When looking at only the last 35-day performance, heifers gained 0.32 lb/day more ($P = 0.01$) than the heifers fed MGA only, and feed conversion was improved 7.9% ($P < 0.01$) for heifers fed Optaflexx and MGA.

Carcass Characteristics

Carcasses of heifers in the Optaflexx and no Optaflexx treatments (Table 2) did not differ in USDA yield grade, marbling score, percentage of USDA choice and select based on Chi-Square analysis, 12th rib fat thickness, ribeye area, KPH, empty body fat, cutability, and dressing percentage. However Optaflexx-fed heifers had 11 lb heavier (1.4%) hot carcass weight ($P = 0.01$).

Optaflexx Economics

Total cost using a 10-year average (Table 3) was increased $10.44 for heifers fed Optaflexx and MGA ($P = 0.01$) due to cost of Optaflexx and increased DMI for heifers fed Optaflexx, although cost of gain was not different ($P = 0.19$). Only live and commodity grid pricing are shown in Table 3 due to similar price outputs between grids. Live pricing ($P = 0.02$) commodity ($P = 0.04$), yield rewarding ($P = 0.05$), and quality rewarding ($P = 0.03$) marketing grids showed an increase in total dollar value per animal based on the increased gain in the heifers fed Optaflexx in combination with MGA. There was no difference in profit, although when using a 10-year average price for live heifers, heifers receiving Optaflexx and MGA were numerically $0.28 ($P = 0.93$) more profitable when compared to heifers receiving MGA alone.

Total cost ($P = 0.04$) using a two-year average price (Table 3) was $9.92 higher for heifers fed Optaflexx and MGA, when compared to heifers fed MGA alone. Live pricing ($P = 0.02$) commodity ($P = 0.02$), yield rewarding ($P = 0.03$), and quality rewarding ($P = 0.02$) marketing grids showed an increase in total dollar value per animal based on the increase gain response in the heifers fed Optaflexx. However due to the incurred cost from feeding Optaflexx heifers marketed on a live basis ($P = 0.49$) were not different, but profit was numerically increased by $3.00/head. When selling heifers on commodity ($P = 0.71$),

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yield ($P = 0.76$), or quality ($P = 0.71$) rewarding marketing grids, heifers fed Optaflexx and MGA were not statistically different despite numerically higher profit ($1.43 - $1.56).

Regardless of average prices used for cattle, Optaflexx cost ($0.26/head/day) remained the same when comparing 10- and two-year averages. However, the value per pound of beef increased when using the two-year averages, causing the cattle that received Optaflexx and MGA to be numerically more profitable than heifers fed MGA alone. In both scenarios (two-year and 10-year), no significant difference was observed in profitability between heifers fed Optaflexx and MGA, or MGA alone.

Results from this experiment indicate heifers fed Optaflexx (200 mg/head/day) during the last 35 days of the finishing period responded with 11 lb heavier carcass weights and 15.5 lb (live weight) to 17.5 lb (carcass adjusted) final weight. Optaflexx can be fed to heifers receiving MGA without compromising carcass quality and yield. Due to increased costs incurred by feeding Optaflexx and increased intake of heifers fed Optaflexx and MGA in this study, an economic advantage was not observed in this study. However, when using a two-year average price for cattle compared to 10-year, when weight was worth more, Optaflexx feeding in combination with MGA was numerically more profitable.

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