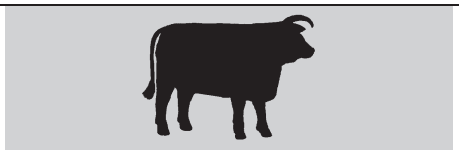
The Professional Animal Scientist 31 (2015):412–416; http://dx.doi.org/10.15232/pas.2014-01381



Effects of internal parasite infection at feedlot arrival on performance and carcass characteristics of beef steers

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ABSTRACT

Data from 36 southeastern steers (237 ± 33 kg of BW; 3.96 ± 0.46 BCS; 374 ± 117 d of age) were categorized into 2 groups (n = 23, LO; n = 13, HI) based on fecal egg count at feedlot arrival (<100 eggs/g, LO; ≥100 eggs/g, HI). Cattle were managed as a single group and slaughtered when the average 12th-rib fat thickness was 1.15 cm. Although HI BW was not different at feedlot entry (P ≥ 0.69), HI tended to have lesser BW than LO cattle throughout the feedlot phase (P = 0.08). When compared with LO, HI tended to have reduced ADG during the first 24 d on feed (P = 0.15); however, overall ADG did not differ (P = 0.61). A greater proportion of HI tended to be treated during the feedlot phase and tended to be treated more frequently (P = 0.12), resulting in a 4-fold increase in treatment cost (P = 0.08) compared with LO. When compared with LO, HI tended to have lesser back fat (P = 0.11), LM area (P = 0.06), and marbling scores (P = 0.11) at slaughter. Hot carcass weight, DP, KPH, and YG did not differ between classification groups (P ≥ 0.16). Although HI cattle effectively responded to anthelmintic intervention, they did not exhibit compensatory gain, tended to be a greater health risk, and tended to have altered carcass composition at slaughter, highlighting the importance of parasite management before feedlot arrival.

Key words: deworming, feedlot, health, parasite, performance

INTRODUCTION

Severe internal parasite infections are often associated with decreased growth, reduced performance, and clinical disease including anorexia, diarrhea, BW loss, and loss of body condition. Grazing cattle are exposed to many parasites, and appropriate deworming strategies can be used to treat, control, and prevent gastrointestinal nematode infections that cause clinical signs in cattle. It has also been reported that strategic deworming may improve pasture performance of beef cow-calf herds not demonstrating clinical disease associated with severe parasite infections (Stromberg et al., 1997).

Cattle are typically dewormed within a few days of feedlot arrival and have minimal exposure to additional parasites once placed in the feedlot. Therefore, a single deworming at feedlot arrival is generally very effective at ridding cattle of internal parasites and maximizing subsequent feedlot performance. To this point, Utley et al. (1974) demonstrated that in naturally infected feedlot heifers, those heifers medicated for parasites at initial processing gained 4% faster than their nontreated counterparts during the feedlot period. Ames et al. (1969) demonstrated that unexposed or noninfected cattle gained BW more rapidly than their infected-control and infected-medicated counterparts, suggesting that prevention of worm infections of feeder cattle may be the best means of avoiding associated production loss during the feedlot phase. Furthermore, Lawrence and Ibarburu (2007) reported that of available pharmaceutical technologies, deworming technologies had the largest estimated effect on production efficiency and cost of production.

Although it has been consistently reported that cattle perform better

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in the feedlot after being treated for internal parasites, there are limited, if any, reports available that relate internal parasite load at feedlot processing to performance, carcass characteristics, and subsequent health in the feedlot. Therefore, the objective of this analysis was to evaluate feedlot performance, health, carcass characteristics, and profitability relative to gastrointestinal nematode burden at feedlot arrival, essentially evaluating the importance of effective parasite control during the grazing period.

MATERIALS AND METHODS

Animals and Management

A retrospective data set of feedlot and carcass data from a group of 36 southeastern steers carrying a heavy internal parasite burden at feedlot arrival (237 ± 33 kg of initial BW; 3.96 ± 0.46 initial BCS; 374 ± 117 d initial age) was analyzed to assess the effect of internal parasite infection at feedlot arrival on subsequent feedlot performance, health, carcass characteristics, and profitability. Upon arrival at a southwest Iowa feedlot, fecal samples were obtained and cattle were dewormed with a label dose of eprinomectin (Eprinex, Merial, Duluth, GA). Fecal samples were obtained 24 d later for repeat analysis to determine effectiveness of parasite control strategy. Fecal samples were submitted for quantitative fecal analysis using the Modified Wisconsin Sugar Flotation technique (Bliss and Kvasnicka, 1997) to determine fecal egg count (**FEC**). Samples were also submitted and pooled for coproculture (Dunn, 1969; Garretson et al., 2009) to identify internal parasite species.

All cattle included in the present analysis received an implant containing 20 mg of estradiol benzoate and 200 mg of progesterone (Synovex-S; Zoetis, New York, NY) on arrival at the feedlot and a terminal implant containing 14 mg of estradiol benzoate and 100 mg of trenbolone acetate (Synovex Choice; Zoetis) 70 d before the initial anticipated harvest date. The β-agonist ractopamine hydrochloride (Optaflexx; Elanco Animal Health, Indianapolis, IN) was fed for the final 14 d before slaughter.

Cattle were fed as a singular pen and were harvested after 179 d on feed when the average 12th-rib fat thickness of the pen was estimated to be 1.15 cm. Serial BW and carcass data were collected by the Tri-County Steer Carcass Futurity cooperative. Cattle were fed to a visually estimated target fat cover endpoint of 1.15 cm. Final BW was measured individually before shipment of cattle to the harvest facility and used for calculation of DP. All cattle were slaughtered at the same commercial packing plant in western Iowa at approximately the same time of day. After slaughter, HCW was recorded at the packing plant; QG was determined by USDA personnel; and marbling score, fat thickness, LM area, and KPH were evaluated and recorded by trained personnel employed by the Tri-County Steer Carcass Futurity (Lewis, IA).

Statistical Analysis

All animals were individually evaluated for FEC, feedlot growth performance, health, and carcass characteristics. Therefore, animal served as the experimental unit for this analysis. For this analysis, steers were categorized into 2 groups (n = 23, LO; n = 13, HI) based on FEC at processing [<100 eggs/g (EPG), LO; ≥100 EPG, HI]. One hundred EPG was the defined breakpoint for classification because the average FEC of cattle in the study was 100 EPG. Differences between classification groups for categorical data including the proportion of cattle grading upper 2/3 Choice or greater, the proportion of cattle obtaining a carcass YG of 1 or 2, and the proportion of cattle treated after feedlot entry were analyzed using the GLIMMIX procedure of SAS version 9.3 (SAS Institute Inc., Cary, NC) with a logit link and binomial distribution. Differences between classification groups for continuous data were analyzed using the MIXED procedure of SAS. Because HI cattle were younger than LO cattle ($P = 0.02$), age at arrival was used as a covariate in the model when significant ($P < 0.15$).

Steer BW was analyzed using the REPEATED measures function of the MIXED procedure. Five covariance structures including compound symmetric, heterogeneous compound symmetric, unstructured, autoregressive order one, heterogeneous autoregressive order one, and ante-dependence were compared. The compound symmetry structure resulted in the smallest Bayesian information criterion and was used for the final analysis. The final model included the fixed effects of treatment and day, as well as the appropriate treatment × day interaction, and animal nested within treatment × day served as the random effect. Simple effects within day were generated using the SLICE function of SAS. For all variables analyzed, a P-value ≤0.05 was identified as significant, whereas a P-value >0.05 and ≤0.15 was identified as a tendency approaching significance.

RESULTS AND DISCUSSION

There was substantial variation in FEC among steers at feedlot arrival with an average total FEC at processing of 99.9 ± 117.2 EPG and a range from 0 to 463 EPG. The parasite population was 92.35% strongyles, and coproculture revealed strongyle population was 58% *Cooperia*, 14% *Hemonchus*, and 28% *Ostertagia*. Steers were effectively dewormed with a single label dose of eprinomectin as evidenced by FEC of 0 on follow-up fecal exams performed on d 24 (Table 1).

It should be noted that there is growing concern worldwide about the development of parasite resistance to available anthelmintics. Gasbarre et al. (2009) demonstrated resistance in *Hemonchus* species and *Cooperia* species to several avermectins. Bliss et al. (2008) described that "macrocyclic lactone resistance is widespread and that continued vigilance is required by the veterinary profession, since the problem now appears to be at a critical stage with millions of dollars in