The Effect of Lameness on Average Daily Gain in Feedlot Steers

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Summary

The objective of this study was to test the effects of lameness on average daily gain (ADG) of feedlot steers. We evaluated two feedlot health data sets: 1) 14,798 steers from a 14-year period (1993 to 2006) at the Meat Animal Research Center (USDA MARC) near Clay Center, Neb.; and 2) 16,766 steers from an 8-year period (2002 to 2009) at the University of Nebraska Agricultural Research and Development Center (ARDC) near Mead, Neb. The ADG for USDA MARC steers with lameness late in the feeding period (≥ 60 days) was 0.04 lb/day less than steers without lameness. The ADG for ARDC steers with lameness later in the experimental trial period (≥ 60 days) was 0.2 lb/day less than steers without lameness. Lameness in steers had a significant and meaningful negative effect on ADG later in the feeding period.

Introduction

Lameness is important to feedlot producers because there is a cost associated with foot and leg lameness. A lame animal has been estimated to be worth 53% of the original price of animals without lameness (*Feedlot Lameness* (G1159), 1993). The decrease in value includes losses from labor and medication for the animal and reduced performance. Lame cattle may be reluctant to eat or approach the feed bunk, resulting in reduced weight gain. Previous work has documented lame cattle have 0.04 lb less ADG than cattle without lameness (*Professional Animal Scientist*, 2006, 22:450-453). Lameness is also detrimental to the health and well-being of the animal because the injuries can be painful.

Some of the more common causes of lameness in feedlot cattle are joint infection, bruising and abrasions of the sole, toe abscesses, laminitis, injuries, and footrot. Footrot is one of the most commonly diagnosed diseases in the feedlot but is often misdiagnosed. Footrot typically accounts for 10% of lameness (1993, NebGuide). Because clinical signs of foot and leg lameness appear similar, it is common for the cause of cattle lameness to be misclassified. The objective of the study was to test the effect of undifferentiated lameness on ADG of feedlot steers.

Procedure

USDA MARC Data Set

We evaluated health data of 14,852 steers collected over a 14-year period (1993-2006) at USDA MARC. All the calves were born in USDA MARC pastures before entering the feedlot as calf-feds and all the animals were vaccinated based on USDA MARC protocol. Health data collected over the 14-year period for each individual animal from birth to slaughter included birth date, weaning date, days on feed (DOF), end date, weaning BW, final BW, diagnosis, treatment, and treatment date. Health records were categorized by disease system, and only the first treatment for a given disease was used in the analysis. To prevent misclassification bias, all the lameness diagnoses, for example, foot rot, laminitis, or toe abscess, were classified simply as lameness.

Variables explaining ADG were tested in a multivariable general linear mixed model with year as a random effect using PROC GLIMMIX in SAS (SAS Inst. Inc., Cary, N.C.). Significance was at alpha less than or equal to 0.05.

Lameness in the feedlot period was categorized into three periods: disease occurring less than 60 DOF (< 60 days), disease occurring more than or equal to 60 DOF (≥ 60 days) or having no disease. Sixty days was chosen to include the beginning of the growing period when the animals are introduced into the feedlot and then when the animals have been in the feedlot for greater than 60 days. The DOF variable was also categorized into three periods: less than 200 DOF, 201-300 DOF, and greater than 301 DOF. The main outcome measure of ADG was calculated by taking the final BW and subtracting the weaning BW then dividing by the number of days of feed.

ARDC Data Set

Steers are received at ARDC in the fall. There were a total of 16,766 steers in different experiments conducted over an eight-year period (2002-2009).

Health records were collected for each individual steer when they started on finishing trials as calf-feds (> 160 DOF), summer yearlings (130-160 DOF), and fall yearlings (< 130 DOF). Health data included arrival date, experiment start date, market date, DOF in the experiment, arrival BW, start BW for the experiment, final BW, diagnosis, treatment, treatment date, pen, experiment, and whether or not the steer was a calf-fed or back-grounded as a spring or fall yearling. Health records were categorized by disease system and only the first treatment date was used in the analysis.

Variables explaining ADG were tested in a multivariable general linear mixed model with pen nested within experiment with a random intercept as a random effect using PROC GLIMMIX in SAS. Significance was set at alpha less than or equal to 0.05. Diseases were categorized into three periods: disease occurring less than 60 days on experimental trial (< 60), disease occurring more than or equal to 60 days on experimental trial (≥ 60) or having no disease. ADG for this group of animals was calculated by using the HCW divided by the dressing percent then minus the start BW for experimental trial divided by the days on experimental trial.

Results

USDA MARC Data Set

Steers born from February to May were weaned between August and October. The average age at weaning was 185 days (88 to 280 days). Steers averaged 273.4 DOF (35 to 419 days).

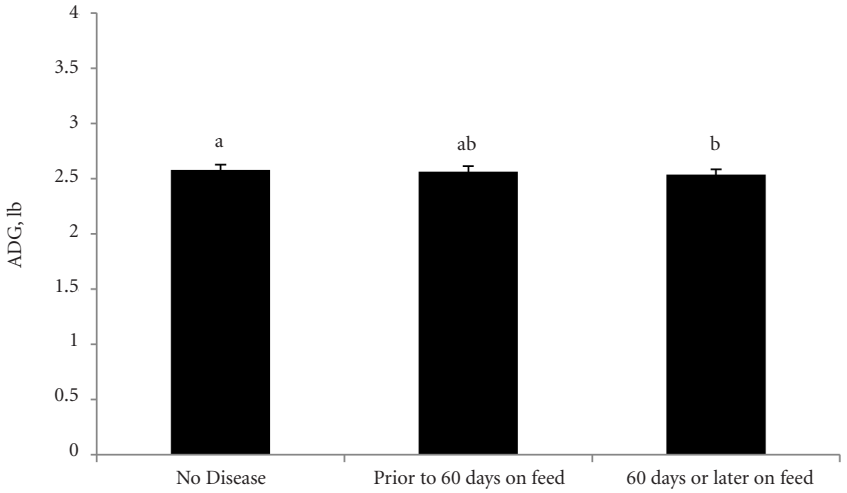

Figure 1. The estimates of ADG for lameness in the Meat Animal Research Center. Steers had a significant difference between lengths of days on feed. Error bars represent the standard error on the mean. Variables with different superscripts are statistically different ($P \leq 0.05$).

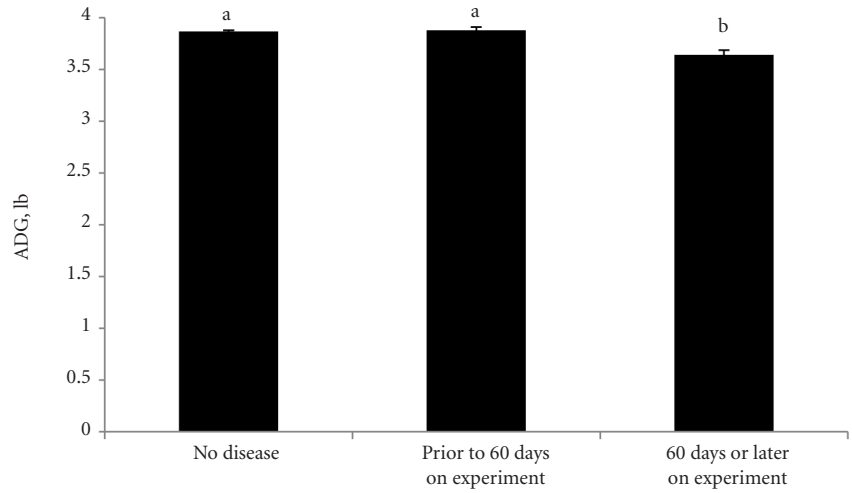

Figure 2. The estimates of ADG for lameness in the University of Nebraska's Agricultural Research and Development Center. Steers had a significant difference between lengths of days on feed. Error bars represent the standard error on the mean. Variables with different superscripts are statistically different ($P \leq 0.05$).

The average weaning and final BWs were 486.7 lb and 1,250.9 lb, respectively and ADG was 2.9 lb per day. The incidence density for lameness over the 14-year period was 25.5 cases per 100,000 animal days. The incidence rate for lameness over the 14-year period was 6.7 per 100 animals.

Variables significantly explaining ADG were lameness, DOF, the number of days between last weight and leaving the feedlot, and weaning weight. Other morbidity events also affected ADG but these events did not have a large impact on the estimates of the effect of lameness.

After adjusting for confounders, the ADG for steers with lameness prior to 60 days and 60 days or later was 0.02 lb and 0.04 lb/day less than steers without lameness, respectively (Figure 1). Steers becoming lame later in the feeding period performed worse than steers that did not become lame.

ARDC Data Set

Steers averaged 143 days on experimental trial (80 to 229 days). The average receiving BW, experiment start BW and final BW were 544.1 lb, 772.0 lb, and 1,317.9 lb, respectively and ADG was 3.9 lb/day. The incidence density for lameness over the eight-year period was 20.4 cases per 100,000 animal days. The incidence rate for lameness over the eight-year period was 2.8 per 100 animals.

Variables significantly explaining ADG were lameness, days on experimental trial, the experiment start weight, and year. After adjusting for the other variables in the model, the ADG for steers with lameness 60 days or later was 0.22 lb/d less than steers without lameness (Figure 2). There was not a significant difference between having no disease and becoming lame in the first 60 days.

There are differences in the data between the two research facilities. The ARDC data set used data collected while steers were on feedlot experiments, so health and performance over the entire growing period was not evaluated. The USDA MARC data used information for calf-feds so post-weaning growth is included in the feedlot phase. No information on experiment or pens was available in USDA MARC data. The steers in the UNL ARDC data also were on study for fewer days so there may not have been time for the steers to recover from lameness compared to the larger range of DOF for the USDA MARC data set. This could result in a larger difference between the ADG for the lame steers. Both sets included pens so individual ADG was known for each animal that became lame, but DMI is unknown for individuals due to pen feeding. Therefore, feed efficiency (G:F) cannot be evaluated to determine whether lameness decreases ADG due to lower DMI or due to poorer feed efficiency.

Lameness had a significant negative impact on ADG in both feedlots. Lameness had a greater effect on ADG if it occurred later in the feeding period and this was probably because steers did not have as much time to recover.

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