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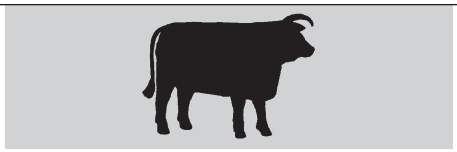

Effect of dose and duration of ractopamine hydrochloride supplementation on growth performance and carcass characteristics of feedlot heifers[1]

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ABSTRACT

Our objectives were to determine the effects of dose and duration of ractopamine hydrochloride (RAC) supplementation on growth performance and carcass characteristics of feedlot heifers. Heifers (n = 128) were allotted to 20 pens. Pens were randomly assigned 1 of 4 treatments: (1) 0 mg of RAC/heifer per d for 28 d, (2) 300 mg of RAC/heifer per d (Optaflexx 45; Elanco Animal Health, Greenfield, IN) for 28 d, (3) 0 mg of RAC/heifer per d for 41 d, or (4) 300 mg of RAC/heifer per d for 41 d. Heifers were fed a basal diet of 50% corn, 20% dried distillers grains with solubles, 20% corn silage, and 10% supplement (DM basis). Dry rolled corn, 0.454 kg/heifer, was removed from the diet, and 300 mg of RAC/0.454 kg of ground corn carrier was top-dressed to heifers fed RAC, daily. There were no day × RAC interactions ($P \geq 0.31$) on growth performance or carcass characteristics, nor main effects ($P \geq 0.11$) of duration of RAC feeding on carcass characteristics. There were no effects ($P \geq 0.22$) of RAC on DMI, ADG, or G:F; however, heifers fed 300 mg of RAC had 8.4 kg heavier ($P = 0.03$) final BW than those not supplemented with RAC, corresponding to 9 kg greater ($P < 0.01$) HCW. Carcasses from heifers fed RAC had increased ($P \leq 0.03$) LM area and DP compared with those from heifers not fed RAC. Feeding RAC did not affect ($P \geq 0.14$) marbling, back fat, KPH, or YG. There were no interactions of RAC dose and duration; however, supplementing 300 mg of RAC/heifer per d increased final BW, HCW, LM area, and DP.

Key words: beef, heifer, Optaflexx, ractopamine hydrochloride

INTRODUCTION

Beta-adrenergic agonists are nutrient repartitioning agents that increase protein accretion or decrease protein degradation, or do both (Mersmann, 1998). Ractopamine hydrochloride (**RAC**) is a category 1 β-agonist that became commercially available in 2004 under the trade name Optaflexx (Elanco Animal Health, Greenfield, IN). Optaflexx is labeled for complete feed to increase rate of gain, improve feed efficiency (at 9 to 27 mg/kg to provide 70 to 430 mg of RAC/animal per d), and increase carcass leanness (at 11 to 27 mg/kg to provide 90 to 430 mg of RAC/animal per d) and for top-dress feed (minimum 0.45 mg/kg with a maximum 880 mg/kg to provide 70 to 400 mg of RAC/animal per d) to increase rate of gain and improve feed efficiency when fed to cattle in confinement for 28 to 42 d before slaughter. A meta-analysis, conducted with 12,342 beef heifers

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from experiments that supplemented either 0, 100, 200, or 300 mg of RAC/animal per d, reported linear increases in BW gain, feed conversion, DP, HCW, and LM area as dose of RAC increased. In the same meta-analysis, there was no change in DMI, fat thickness over the 12th rib, USDA YG, or marbling score, regardless of dose of RAC fed (Pyatt et al., 2013a).

However, despite experiments evaluating the effects of RAC on feedlot heifers, there is a dearth of information regarding the effect of 300 mg of RAC/animal per d. In fact, of 16 experiments included in the meta-analysis, only 13% of the cattle were fed 300 mg of RAC/animal per d, and only 5 experiments included fed RAC for 41 d, regardless of dose supplemented (Pyatt et al., 2013a). We hypothesized growth performance, HCW, and LM area would be greater when heifers fed 300 mg of RAC/animal per d were compared with heifers fed no RAC, and the magnitude of this difference would be enhanced the longer the heifers were fed RAC. Thus, the objectives of this experiment were to determine the effects of dose, 0 or 300 mg of RAC/heifer per d, and duration, 28 or 41 d, of RAC supplementation on growth performance and carcass characteristics of feedlot heifers.

MATERIALS AND METHODS

All animal procedures were approved by the University of Illinois Institutional Animal Care and Use Committee and followed guidelines recommended in the *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching* (FASS, 2010).

Animals and Diets

Charolais-cross heifers (n = 128) were housed in confinement barns on concrete slatted floors covered in 1.91-cm-thick rubber matting at the University of Illinois Beef Cattle and Sheep Field Laboratory in Urbana, Illinois. Pens are 4.88 × 4.88 m and constructed of 5.08-cm galvanized steel tubing. Heifers were all fed the same corn-based diet (contained on a DM basis 20% high moisture corn, 30% dry rolled corn, 25% husklage, 15% dried distillers grains with solubles, and 10% vitamin–mineral supplement) for 70 d before the initiation of this experiment and were implanted with Component TE-H (140 mg of trenbolone acetate, 14 mg of estradiol; Elanco Animal Health) 60 d before the initiation of the experiment. Heifers were individually weighed before feeding on 2 consecutive d and were blocked into 2 BW blocks (heavy and light) and randomly allotted to 20 pens (10 pens per block). Pens within block were randomly assigned 1 of 4 dietary treatments in a 2 × 2 factorial arrangement: (1) 0 mg of RAC/animal per d for 28 d (2 heavy block pens; 3 light block pens), (2) 300 mg of RAC (as Optaflexx 45, 100 g of RAC/kg of DM; Elanco Animal Health)/animal per d for 28 d (3 heavy block pens; 2 light block pens), (3) 0 mg of RAC/animal per d for 41 d (2 heavy block pens; 3 light block pens), or (4) 300 mg of RAC/animal per d for 41 d (3 heavy block pens; 2 light block pens). There were 5 pens per treatment with 6 to 7 heifers per pen. Treatments were stagger-started with heifers being supplemented for 41 d (initial BW = 487 ± 38 kg) starting 13 d before those heifers being supplemented for 28 d (initial BW = 500 ± 41 kg); thus, all heifers were slaughtered on the same day.

All heifers were fed the same basal diet containing 50% corn, 20% dry distillers grains with solubles, 20% corn silage (approximately 50:50 grain:forage), and 10% supplement on a DM basis (Table 1). Heifers were fed in 3-m concrete bunks and had approximately 0.5 m of bunk space per animal. The basal diet was delivered once daily at 0800 h, and pens were managed for slick bunks. Bunks were called at 0630 h and were considered slick if less than 0.2 kg of feed per heifer remained. If bunks were considered slick for 2 consecutive days, feed delivery was increased by 0.91 kg per animal. Optaflexx was top-dressed following the delivery of the basal diet. The top-dress contained 300 mg of RAC in 0.454 kg of ground corn and was supplemented at a rate of 0.454 kg per head. Ractopamine hydrochloride concentrations were verified by Covance Laboratories (Greenfield, IN) from individual samples of both the control supplement and the RAC top-dress that were collected at 2 time points during the experiment, the first at the initiation of RAC supplementation on November 16, 2013, and the second on November 6, 2013; both analyses were within the acceptable margin of error, within 80 to 110% of claim, to supply 300 mg of RAC/animal per d. Heifers were weighed every 14 d, and final BW was recorded on 2 consecutive days before slaughter.

Sampling and Analysis

Individual feed ingredients were collected once every 2 wk, dried at 55°C for 3 d, and composited over the course of the experiment. Composited ingredients were analyzed, and individual nutrient analyses were used to calculate diet nutrient composition (Table 1). Diet ingredients were ground using a Wiley mill (1-mm screen, Thomas Scientific, Swedesboro, NJ). All composited ingredient samples were analyzed for DM (100°C for 24 h), CP (Leco TruMac, LECO Corporation, St. Joseph, MI), ADF and NDF (Ankom Technology method 5 and 6, respectively; Ankom Technology, Fairport, NY), fat (method 2; Ankom Technology), and total ash (600°C for 2 h, Thermolyne muffle oven model: F30420C, Thermo Scientific, Waltham, MA). Diet ingredients were also analyzed for mineral composition by a commercial laboratory using inductively coupled plasma atomic emission spectroscopy analysis after perchloric acid/nitric acid digestion (Method 975.03; AOAC, 1988; OARDC Star Lab, The Ohio State University, Wooster, OH).

Carcass Data Collection

Because the same days on feed was targeted with a stagger start date, all heifers were slaughtered on the same