



Effect of constant dose and step-up ractopamine-feeding programs on live performance and carcass traits of finishing pigs in a 3-phase marketing system

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ABSTRACT

The objective of this research was to determine the performance, efficiency, and carcass traits of ractopamine (RAC)-fed pigs in a step-up feeding program or a continuous dose program using a 3-phase marketing strategy. Two thousand five hundred cross-bred pigs were used in a randomized complete block design with 72 pens. Each pen initially housed 35 pigs. Twenty-six percent of the total population of pigs was sold during the first marketing period (7 d after the beginning of RAC feeding), 31% during the second marketing period (21 d after the beginning of RAC feeding), and the remaining 43% during the third marketing period (35 d after the beginning of

RAC feeding). Few differences ($P > 0.05$) were observed in performance and carcass characteristics between the 2 RAC-feeding programs. There were no differences in starting BW ($\bar{x} = 83.53$ kg; $P = 0.54$) or beginning live weight ($\bar{x} = 95.85$ kg; $P = 0.32$) among any of the 3 treatments groups. Pigs fed RAC had 0.17 kg/d (19.4%) greater ($P < 0.0001$) ADG, and had 0.07 (18.6%) greater ($P < 0.0001$) G:F than pigs not fed RAC throughout the 35-d feeding trial. Additionally, HCW were 3.81 kg (4.27%) heavier ($P < 0.0001$) and standardized fat-free lean was 1.83 kg greater (4.04%; $P < 0.0001$) in RAC-fed pigs than pigs not fed RAC. Both RAC-feeding strategies yielded similar improvements over control pigs when used in conjunction with a 3-phase marketing strategy.

Key words: three-phase marketing, Paylean, pig, step-up, ractopamine hydrochloride

INTRODUCTION

Over 95% of pigs from large farms in the United States are sold on a matrix that offers premiums when carcass weights and lean meat estimates are within a specified range and charges discounts when carcasses do not meet those specifications (Meyer, 2005). Because of that, US pork producers often market pigs from a single finishing barn over a several week time span (DeDecker et al., 2005; Gerlemann et al., 2014). By using this approach, producers can market pigs at a desired ending live weight (Patience et al., 2009; Hinson et al., 2012), manage carcass composition (Gerlemann et al., 2014), and adjust stocking densities to improve growth and performance rates of the remaining pigs (Jacela et al., 2009). At the same time, ractopamine hydrochloride (RAC; Paylean, Elanco Ani-

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mal Health, Greenfield, IN) increases growth performance (Apple et al., 2007), reduces sort loss value (Hinson et al., 2012), and increases carcass cutability (Bohrer et al., 2013) of finishing pigs. Current label requirements for RAC state that a complete ration containing at least 16% CP and a dose between 5 and 10 mg/kg be fed for the last 20.4 to 40.9 kg of gain (population average). Historical growth rate responses to RAC are greatest at the time of initiation and decrease as the time on RAC increases (Dunsha et al., 1993; Williams et al., 1994). Step-up feeding programs that have multiple marketing periods result in some pigs being fed a low dose for a short period of time, whereas other pigs are fed a lower dose or a combination of doses for an

extended period of time. It is important to understand the effects of RAC in the subsequent marketing groups to ensure label compliance and benefit to producers. Therefore, the objective of the current trial was to compare pig performance, feed efficiency, and carcass traits of finishing pigs supplemented with RAC in a step-up feeding program or a continuous dose program in a 3-phase marketing strategy with pigs not fed RAC.

MATERIALS AND METHODS

Experimental procedures during the experiment followed the guidelines stated in the Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (FASS, 2010).

Animals and Housing

Two thousand five hundred cross-bred barrows and gilts in single-sex replicates (PIC 337 sire × FAST dam) were used in a randomized complete block design. Seventy-two single-sex pens were divided into 3 dietary feeding program treatments with 24 replicates each. One pen was removed from the trial due to unforeseen mixing of pigs. Each pen initially housed 35 pigs per pen and was randomly assigned a treatment group. Detailed dietary information can be found in Table 1. All pigs were fed the same basal diet from the time pigs were allotted (d -14) to pens until dietary treatments were initiated (d 0). Briefly, the first treatment was fed a control diet formulated to meet or exceed NRC requirements and 0 mg/kg of RAC for the entire feeding trial (NRC, 1998). Diets were formulated on Lys:ME levels based upon internal company data utilizing these genetics raised in these facilities so as to not restrict growth. The second dietary feeding program included 0.91% SID lysine and 7.4 mg/kg of RAC for the entire 35-d feeding trial. The third dietary feeding program also included 0.91% SID lysine, but pigs were fed 5.0 mg/kg of RAC for the first 21 d of the trial then stepped up to 10.0 mg/kg of RAC for the final 14 d of the feeding trial. Overall pen size was 20.92 m², which resulted in 0.60 m² of floor space per pig (Table 2). Each pen had 2 watering stations with 2 nipples each and a 7-hole stainless steel dry feeder that initially provided 177 cm of linear feeder space (5.06 cm/pig). Pigs were housed in a typical commercial environment with fully slatted concrete floors and tunnel ventilation. Pigs were provided ad libitum access to feed and water throughout the 35-d feeding trial.

Treatment diets were initiated when the mean population BW weight was 95.85 ± 5.0 kg on d 0 of the feeding period and continued for up to 35 d for an average BW gain of 24.2 kg (entire population mean BW gain was between 20.4 and 40.9 kg during the entire feeding phase; Table 3). Pigs

Table 1. Dietary composition, as-fed basis

Item	Ractopamine inclusion ¹	
	Control	Ractopamine ²
Ingredient (%)		
Corn	66.4	56.1
Distillers dried grains	20.0	20.0
Soybean meal 48%	7.2	16.4
Fat, choice white grease	4.7	5.4
Limestone	1.1	1.1
Salt	0.35	0.35
L-Lys	0.22	0.33
MHA (84% Met)	0.00	0.05
L-Thr-98%	0.00	0.10
Vitamin premix	0.1	0.1
Calculated analysis		
NRC ME (Mcal/kg)	3.42	3.42
Crude fat (%)	9.38	9.91
CP (%)	13.39	17.32
Total Lys (%)	0.73	1.07
Standardized ileal digestible (SID) Lys (%)	0.60	0.91
Total P (%)	0.38	0.42
Available P (%)	0.20	0.25
Ca (%)	0.46	0.50
SID Lys (g)/NRC ME (Mcal)	1.75	2.67
SID Met + Cys:Lys	0.68	0.58
SID Thr:Lys	0.65	0.67
SID Trp:Lys	0.16	0.16
SID Ile:Lys	0.71	0.64
SID Val:Lys	0.88	0.75

¹Analyzed levels were within acceptable tolerances (75–125% of claim) for each diet.

²Provided the following inclusion of ractopamine hydrochloride (Paylean 9) per kilogram of diet: 5.0, 7.4, or 10.0. Paylean is a registered trademark of Eli Lilly and Company (Elanco Animal Health), Greenfield, Indiana.

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