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Effects of daily porcine somatotropin administration on the performance and carcass characteristics of finishing swine

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EFFECTS OF DAILY PORCINE SOMATOTROPIN ADMINISTRATION ON THE PERFORMANCE AND CARCASS CHARACTERISTICS OF FINISHING SWINE



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Summary

One hundred forty-four pigs (72 barrows and 72 gilts) were utilized in six treatments with six pens each to evaluate four levels of daily porcine somatotropin (pST) injections (0, 1, 3, or 5 mg/d) in combination with diets containing 13 or 16% crude protein (CP). One randomly selected pig from each pen was slaughtered when it reached a weight between 230 and 240 lb. Daily feed intake (ADFI), tenth rib backfat, and estimated percentage of lean pork were reduced in pigs fed the 13% CP diet and injected with 3 mg/d pST compared to pigs fed the same diet and injected daily with a placebo. Feed intake was reduced in pigs fed the 16% CP diet and injected daily with 3 and 5 mg/d pST. Improvement in feed conversion (F/G), tenth rib backfat, and estimated percentage lean pork occurred when pigs fed the 16% CP diet were injected with 1 mg/d, with greater improvements occurring at the 3 and 5 mg/d levels of pST. The improvement in F/G and the greater magnitude of response observed in pigs fed 16% CP diets compared to the response of pigs fed the 13% CP diet indicate that both the performance and carcass characteristics of pigs injected with pST are dependent on the dietary CP content.

(Key Words: Porcine Somatotropin, Finishing Pigs, Crude Protein.)

Introduction

Porcine somatotropin (pST) has been shown to be effective as a growth promotant in swine, improving growth performance and carcass characteristics. Increasing the lysine content of the diet to double the NRC recommended level in pigs treated daily with pST injections has been demonstrated to dramatically improve both performance traits and carcass characteristics. This research suggested that the lysine requirement of pST-treated pigs is approximately double the current NRC recommended level. Other researchers evaluating different dosages of pST have fed diets containing various levels of protein. The magnitude of response to pST treatment in those studies has been variable. This may have been due to the dosage of pST or to the availability of nutrients, specifically protein, in the diets. Because the lysine requirement of pST-treated pigs is greater, it would seem that the total protein requirement also would be greater. This study was designed to evaluate pigs treated with different levels of pST and fed rations containing either 13 or 16% crude protein (CP).

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Experimental Procedures

One hundred forty-four crossbred pigs (72 barrows and 72 gilts) averaging 151 lb were divided by sex and allotted by weight to six experimental treatments. Treatments included a 13% CP diet in combination with a daily injection of placebo or 3 mg pST and a 16% CP diet in combination with a daily injection of placebo or 1, 3, or 5 mg pST. Table 1 shows the composition of the experimental diets. Feed and water were provided ad libitum. There were four pigs per pen and six pens (three of barrows and three of gilts) per treatment. Pigs were housed in a modified open-front building with solid concrete floors. All pigs and feeders were weighed on d 14, 28, and 35. When the average pig weight in each pen reached between 230 and 240 lb, one pig was selected randomly for slaughter when its weight was between 230 and 240 lb. Pigs received their last pST injection 24 hours prior to slaughter.

Table 1. Diet Composition

Ingredient	Percentage crude protein	
	13	16
Corn	84.37	76.61
Soybean meal (44%)	13.60	22.00
Limestone	.92	.45
Dicalcium phosphate (18% P)	.41	.24
Salt	.30	.30
Trace mineral premix ^a	.10	.10
Vitamin premix ^b	.25	.25
Selenium premix ^c	.05	.05
<u>Calculated analysis, %</u>		
Crude protein	13	16
Lysine	.60	.83
Calcium	.5	.5
Phosphorus	.4	.4

^aContains 10% Mn, 10% Fe, 10% Zn, 4% Ca, 1% Cu, 0.4% K, 0.3% I, 0.2% Na, and 0.1% Co.

^bEach lb of vitamin premix contains: vitamin A, 1,000,000 IU; vitamin D₃, 100,000 IU, vitamin E, 4,000 IU; menadione, 400 mg; riboflavin, 1,000 mg, pantothenic acid, 2,500 mg; niacin, 5,500 mg; choline, 100,000 mg; and vitamin B₁₂, 5 mg.

^cEach lb of selenium premix contains 272.4 mg Se.

Results and Discussion

Average daily gain (ADG) was similar for pigs fed the 13% CP diet and injected daily with either placebo or 3 mg/d pST (Table 2). Average daily feed intake (ADFI) was

significantly reduced ($P < .01$) for pigs administered 3 mg/d pST, resulting in a 9% improvement in F/G. Tenth rib backfat was reduced significantly ($P < .05$) for pST-injected pigs fed 13% CP diets, with a 3% increase in percent of estimated lean pork.

Table 2. Effect of PST Dosage on Growth Performance and Carcass Characteristics of Pigs Fed a 13% CP Ration^a

Item	PST dosage (mg/d)	
	0	3
Avg daily gain, lb	1.91	1.88
Daily feed intake, lb	6.89 ^d	5.72 ^e
Feed conversion	3.60	3.29
<u>Carcass characteristics^b</u>		
Hot carcass weight, lb	171.0	168.3
Tenth rib backfat, in	1.19 ^f	.88 ^g
Longissimus muscle, in ²	5.53	5.52
Percentage estimated lean pork ^c	52.3 ^f	55.1 ^g

^aA total of 48 finishing pigs, 4 pigs/pen, 6 pens/treatment (3 of each sex), avg initial wt was 150 lb, avg final wt was 234 lb.

^bCarcass measurements determined on one pig/pen slaughtered between 230 and 240 lb live weight (six pigs/treatment).

^cCalculated by: percentage lean = $[10.5 + (\text{HCW} \times .5) + (\text{LEA} \times 2) - (10\text{th rib backfat} \times 14.9)] \div \text{HCW} \times 100$.

^{d,e}Means with unlike superscripts differ ($P < .01$).

^{f,g}Means with unlike superscripts differ ($P < .05$).

Dosage of pST had no effect on the ADG of pigs fed the 16% CP diet (Table 3). ADFI of pigs decreased ($P < .05$) with increased dosage of pST. F/G of pigs fed 16% CP diets was improved with the injection of 1 mg/d pST, with greater improvement at the 3 and 5 mg/d levels of pST administration. Tenth rib fat depth was significantly reduced ($P < .01$) for pigs injected with 3 and 5 mg/d pST. Injection of pST resulted in a 23% reduction in fat depth at 1 mg/d and a 46% reduction in fat depth at 5mg/d compared to pigs injected with a placebo. Percentage of lean pork increased significantly ($P < .05$) as pST dosage was increased to 1 mg/d, and greater improvement ($P < .05$) was observed at the two higher levels of pST dosage.

There were no significant differences in performance traits or carcass characteristics between pigs fed 13 and 16% CP diets in combination with daily injections of placebo. Pigs injected at the 3 mg/d pST dosage fed a 13% CP diet responded with a 2% reduction in ADG, a 17% decrease in ADFI, a 9% improvement in F/G, a 26% decrease in fat depth, and a 5% increase in estimated percent of lean pork compared to pigs fed the same diet with a placebo

injection. Pigs fed a 16% CP diet in combination with 3 mg pST responded with a 6% increase in ADG, a 16% decrease in ADFI, a 21% improvement in F/G, a 41% decrease in fat depth, and an 11% increase in estimated percent of lean pork compared to pigs fed the same diet in combination with placebo injections. The greater response of pigs fed the 16% CP diet in ADG, F/G, fat depth, and estimated percent of lean pork indicate that both performance and carcass characteristics of pigs injected with pST are dependent on the CP content of the diet.

Table 3. Effect of PST Dosage on Growth Performance and Carcass Characteristics of Pigs Fed a 16% CP Ration^a

Item	PST dosage (mg/d)			
	0	1	3	5
Avg daily gain, lb	1.92	1.97	2.04	1.97
Daily feed intake, lb	6.79 ^d	6.33 ^d	5.73 ^e	5.28 ^e
Feed conversion	3.54 ^d	3.22 ^e	2.81 ^f	2.80 ^f
<u>Carcass characteristics^b</u>				
Hot carcass wt, lb	169.9 ^d	170.5 ^d	168.5 ^d	164.5 ^e
Tenth rib backfat, in	1.32 ^g	1.01 ^h	.78 ⁱ	.72 ⁱ
Longissimus muscle, in ²	5.11	5.56	5.99	5.45
Percentage estimated lean pork ^c	50.6 ^d	53.8 ^e	56.4 ^f	56.5 ^f

^aA total of 96 finishing pigs, 4 pigs/pen, 6 pens/treatment (3 of each sex), avg initial wt was 152 lb, avg final wt was 234 lb.

^bCarcass measurements determined on one pig/pen slaughtered at a live wt between 230 and 240 lb (six pigs/treatment).

^cCalculated by: percentage lean = $[10.5 + (\text{HCW} \times .5) + (\text{LEA} \times 2) - (10\text{th rib backfat} \times 14.9)] \div \text{HCW} \times 100$.

^{d,f}Means with unlike superscripts differ ($P < .05$).

^{g,h,i}Means with unlike superscripts differ ($P < .01$).

Although pigs injected with pST demonstrated some improvements in both performance traits and carcass characteristics, the magnitude of response was not equal to the 35% increase in ADG and 33% improvement in F/G seen in previous findings at Kansas State University when pigs injected with pST were fed diets containing 1.2% lysine and at least 200% NRC recommendations for other amino acids. The calculated percentages of lysine in the 13 and 16% CP diets used in this experiment were .60 and .83% respectively. These fall short of the 1.2% of dietary lysine recommended by Kansas State University for pigs injected with 4 mg/d pST.