EFFECTS OF DAILY ADMINISTRATION OF PORCINE SOMATOTROPIN ON PERFORMANCE OF GROWING PIGS (55 TO 130 LB)

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Summary

Sixty crossbred barrows initially weighing 55.7 lb were used to evaluate six experimental treatments during a 5-wk growth trial. Pigs received one of three levels of dietary lysine (1.0, 1.5, or 2.0%) and were injected daily with either 3 mg porcine somatotropin (pST) or placebo. During the first 2 wk of the trial, there was no effect from either pST injection or increasing level of dietary lysine on average daily gain (ADG) or average daily feed intake (ADFI). Also, there was no effect of pST injections on feed conversion (F/G), but those pigs fed diets containing higher levels of lysine showed improved F/G. During the entire 5-wk period, pigs administered pST gained faster than placebo-injected pigs. During the 5-wk trial, there was a nonsignificant reduction in ADFI for pigs injected with pST compared with those receiving placebo injections. Increasing the level of dietary lysine also resulted in a nonsignificant reduction in ADFI. Pigs injected daily with pST showed a 10% improvement in (F/G) when compared with placebo-injected pigs. Increasing the dietary lysine level from 1.0 to 2.0% resulted in a 10% improvement in F/G for both pST- and placebo-injected pigs. Tenth rib fat depth and average backfat thickness were both reduced in pST-treated pigs compared with placebo-injected pigs.

(Key Words: GF, Repartition, Performance, Lysine.)

Introduction

Porcine somatotropin (pST) has been shown to be effective as a growth promotant in finishing swine, with daily injections improving growth performance and carcass characteristics. However, the lysine requirement of finishing pigs injected daily with pST is approximately twice that recommended by the NRC. Porcine somatotropin also has been effective as a growth promotant in growing pigs, but some work indicates that the improvements in carcass quality, growth, and feed efficiency begin to diminish 10 d after cessation of pST administration. However, researchers have not yet evaluated the effects of pST administration on the lysine requirement of growing swine. This experiment was designed to do that.

Procedures

Sixty crossbred barrows initially weighing 55.7 lb were allotted by weight and ancestry to one of six experimental treatments. Treatments included three corn-corn gluten meal-soybean meal diets (Table 1) formulated to contain either 1.0, 1.5, or 2.0% lysine in

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combination with daily injections of either placebo or 3 mg pST. L-Lysine HCl was substituted for corn in those diets containing 1.5 and 2.0% lysine. Diets were formulated to provide 200% of NRC recommended levels for all other essential amino acids, vitamins and minerals. Feed and water were provided ad libitum. There were two pigs per pen and five pens per treatment. Pigs were housed in a modified open front building with solid concrete floors. All pigs and feeders were weighed weekly and all feed additions were recorded for calculations of average daily gain (ADG), average daily feed intake (ADFI), and feed conversion (F/G). At the end of the 5 wk experiment, six pigs from each treatment were slaughtered for evaluation of carcass characteristics.

Table 1. Diet Composition

Ingredient	Percentage Lysine		
	1.0	1.5	2.0
Corn	55.31	54.67	54.03
Soybean meal (48% CP)	24.65	24.65	24.65
Corn gluten meal (60% CP)	8.95	8.95	8.95
Soybean oil	5.00	5.00	5.00
Monocalcium phosphate (21% P)	3.02	3.02	3.02
Limestone	1.38	1.38	1.38
L-lysine HCl	0.00	.64	1.28
L-threonine	0.09	0.09	0.09
Salt	0.30	0.30	0.30
Vitamin premix[a]	0.50	0.50	0.50
Trace mineral premix[b]	0.20	0.20	0.20
Antibiotic[c]	0.50	0.50	0.50
Copper sulfate	0.05	0.05	0.05
Selenium premix[d]	0.05	0.05	0.05
Calculated analysis, %			
CP	22.1	22.1	22.1
Lysine	1.00	1.50	2.00
Ca	1.20	1.20	1.20
P	1.10	1.10	1.10

[a]Each lb of vitamin premix contains: vitamin A, 1,000,000 IU; vitamin D_3, 100,000 IU; vitamin E, 4,000 IU; menadione, 400 mg; riboflavin, 1000 mg; pantothenic acid, 2,500 mg; niacin, 5,500 mg; choline, 100,000 mg; and vitamin B_{12}, 5mg.
[b]Contains 10% Mn, 10% Fe, 10% Zn, 4% Ca, 1% Cu, 0.4% K, 0.3% I, 0.2% Na, and 0.1% Co.
[c]Each lb of antibiotic contained 10 g chlortetracycline, 10 g sulfathiazole, and 5 g penicillin.
[d]Each lb of selenium premix contains 272.4 mg Se.

Results and Discussion

There was no effect of either pST injection or percentage dietary lysine on ADG or ADFI of pigs during the first 2 wk of the experiment (Table 2). However, feeding increased levels of dietary lysine improved ($P<.01$) F/G during the first 2 weeks.

During the entire 5-wk, pigs injected daily with pST demonstrated increased (P<.05) ADG compared to the placebo-injected pigs (Table 2). There was no effect of either pST injection or dietary lysine level on ADFI during 5 wk, but there was an improvement (P<.05) in F/G caused by both daily pST administration as well as increasing levels of dietary lysine. Pigs injected daily with pST showed a 10% improvement in F/G at all three levels of dietary lysine. Increasing the dietary lysine level from 1.0 to 2.0% resulted in a similar, 10% improvement in F/G. The effect of daily pST injection on ADG was not as great as the 30% improvement shown by finishing pigs treated with pST and fed diets containing high (200% of NRC) levels of dietary lysine. The non-significant reduction (P>.27) in ADFI was not expected, because results observed with finishing swine showed a dramatic reduction in ADFI which, combined with the improvement in ADG, resulted in a large improvement in F/G.

The reduction (P<.05) in tenth rib backfat and average backfat (Table 2) in pST-treated pigs compared to placebo-injected pigs demonstrates one of the major results of pST administration normally observed in finishing pigs, i.e., the improvement of carcass leanness.

Table 2. Performance and Carcass Characteristics of Pigs Injected with Placebo (0) or 3 mg/d pST.

	1.0% lysine		1.5% lysine		2.0% lysine	
pST (mg/d):	0	3	0	3	0	3
Growth Performance[a]						
Wk 0-2						
ADG, lb	1.96	1.90	1.97	1.98	1.94	2.07
ADFI, lb	3.64	3.51	3.42	3.26	3.31	3.19
F/G[b]	1.86	1.85	1.74	1.65	1.71	1.54
Wk 0-5						
ADG, lb[c]	2.00	2.15	1.95	2.10	2.06	2.19
ADFI, lb	4.71	4.50	4.46	4.34	4.36	4.13
F/G[bc]	2.35	2.09	2.28	2.07	2.12	1.89
Carcass Characteristics[d]						
Fat depth, 10th rib, in[c]	0.71	0.47	0.68	0.54	0.75	0.48
Average backfat, in[ce]	0.86	0.69	0.84	0.74	0.87	0.72

[a]A total of 60 growing pigs initially weighing 55.7 lb, 2 pigs/pen, 5 pens/treatment.
[b]Lysine effect P<.01.
[c]pST effect P<.05.
[d]A total of 36 pigs, 6 pigs/treatment.
[e]Mean of measurements taken over the first rib, the last rib, and the last lumbar vertebrae.

These results indicate that administration of 3 mg/d pST in growing pigs caused some improvements in carcass leanness and performance although they were not as dramatic as those reported in finishing pigs. The diminished effect of pST injection in growing pigs suggests that the level of naturally occurring somatotropin in this size pig may be higher than in older pigs. The improvement in ADG and F/G combined with the reduction in carcass backfat demonstrates the improved efficiency of converting feed to lean tissue rather than fat. The combined effect of pST on F/G resulting in 20% total improvement at all levels of dietary lysine suggests that the effects are additive.