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THE EFFECTS OF EXCESS DIETARY LYSINE ADDITIONS ON GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF FINISHING PIGS

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Summary

Seventy-five barrows (initial wt 136 lb) were utilized to evaluate the effects of dietary lysine levels ranging from .6 to 1.4% on growth performance and carcass characteristics. Pigs were fed a pelleted corn-sesame meal diet containing .6% lysine (17.7% crude protein) or diets containing .8, 1.0, 1.2, or 1.4% lysine provided by L-lysine HCl. All other amino acids, vitamins, and minerals were calculated to be at least double the pig's requirement (NRC, 1988), to ensure that no nutrient other than lysine would limit performance. When the pen mean weight reached approximately 235 lb, six pigs per treatment were slaughtered, and carcass data were collected. Increasing dietary lysine level resulted in no differences in average daily gain, feed intake, or feed efficiency. Furthermore, increasing lysine level had no effect on longissimus muscle area, average backfat thickness, loin weight, kidney fat weight, or percentage muscle. However, pigs fed .8% lysine had slightly less backfat and greater percent muscle than pigs fed .6% lysine. These data indicate that dietary lysine additions above .6% do not improve growth performance of finishing barrows; however, increasing the lysine level to .8% may slightly improve carcass leanness.

(Key Words: Lysine, Finishing Pigs, Growth Performance, Carcass Traits.)

Introduction

Recently, we have reported that finishing pigs injected with porcine somatotropin require 30 to 32 g/d of lysine, which is equivalent to a diet containing 1.2% lysine. However, little information is available on the effects of these excess lysine levels on performance of non-injected finishing pigs. In order to determine if the response to added lysine is observed only in pST-treated pigs, we fed non-pST-treated pigs the same lysine levels used in our previous experiments.

Experimental Procedures

Seventy-five barrows, averaging 136 lb, were allotted to one of five dietary treatments based on initial weight and ancestry. There were three pigs per pen and five pens per treatment. Pigs were housed in an open-sided building in 4 ft × 16 ft pens. Pigs were fed a control diet (.6% lysine) or diets containing .8, 1.0, 1.2, or 1.4% lysine provided by L-lysine HCl (Table 1). All other amino acids, vitamins, and minerals were calculated to be in excess of the pig's requirement, so lysine would be the only limiting nutrient. When the mean weight per pen was 230 to 240 lb, six pigs per treatment were slaughtered for carcass data collection. Criteria of response included average daily gain (ADG), average daily feed intake (ADFI), feed efficiency (F/G), loin eye area, average backfat thickness, loin weight, kidney fat weight, and percentage muscle.

Table 1. Diet Composition^a

| Ingredient | Percentage |
|-----------------------------------|------------|
| Corn | 62.25 |
| Sesame meal | 23.40 |
| Soybean meal (44%) | 5.00 |
| Soybean oil | 5.00 |
| Monocalcium phosphate | 1.29 |
| Limestone | .68 |
| Salt | .50 |
| Trace mineral premix ^b | .20 |
| Vitamin premix ^c | .50 |
| Selenium premix ^d | .05 |
| Threonine | .10 |
| Sucrose/L-lysine HCl ^e | 1.03 |
| | 100.00 |

^aAnalyzed values were 17.7% crude protein, .6% lysine, .82% threonine, .25% tryptophan, 1.0% calcium, and .8% phosphorus.

^bContained 5.5% Mn, 10.0% Fe, 1.1% Cu, 20.0% Zn, .15% I, and .1% Co.

^cEach lb of premix contained the following: vitamin A 800,000 IU, vitamin D 60,000 IU, vitamin E 4,000 IU, riboflavin 900 mg, d-pantothenic acid 24.0 g, choline chloride 92.2 g, niacin 5.0 g, B₁₂ 4.4 mg, menadione dimethylpyrimidinol bisulfate 331 mg.

^dContained 90 mg Se/lb premix.

^eSucrose was replaced by L-lysine HCl to provide dietary lysine levels of .8, 1.0, 1.2, and 1.4%.

Results and Discussion

Increasing levels of dietary lysine resulted in no improvements ($P > .50$) in growth performance or carcass criteria evaluated (Table 2). However, there was a slight decrease in backfat thickness and an increase in longissimus muscle area and percentage muscle as lysine level was increased from .6 to .8%. These data confirm previous research demonstrating that the pig's lysine requirement for maximum carcass leanness is slightly greater than that required to promote maximum growth and feed conversion. These data also indicate that the 30% increases in ADG and F/G and 50% reductions in carcass fat content observed previously were a direct response of pST increasing the pig's lysine requirement, rather than simply a response to added lysine.

Table 2. Effect of Excess Dietary Lysine on Finishing Pig Performance^{ab}

| Item | Lysine level, % | | | | |
|--|-----------------|------|------|------|------|
| | .6 | .8 | 1.0 | 1.2 | 1.4 |
| ADG, lb | 2.05 | 2.03 | 2.12 | 2.12 | 2.09 |
| ADFI, lb | 6.15 | 6.13 | 6.42 | 6.31 | 6.31 |
| F/G | 3.00 | 3.02 | 3.04 | 2.99 | 3.02 |
| Longissimus muscle area, in ² | 4.37 | 4.73 | 4.70 | 4.53 | 4.46 |
| Backfat thickness, in | 1.52 | 1.41 | 1.42 | 1.51 | 1.44 |
| Loin weight, lb | 15.5 | 15.2 | 15.1 | 14.5 | 15.1 |
| Kidney fat weight, lb | 3.75 | 3.22 | 3.50 | 3.48 | 3.42 |
| Percentage muscle | 50.9 | 52.8 | 52.5 | 51.6 | 52.2 |

^aA total of 75 barrows with an avg initial wt of 138 lb and avg final wt of 238 lb were used.

^bNo treatment effect ($P > .50$).



Kris Richardson, lab technician, analyzing samples.