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M De La Llata

Michael R. Langemeier

Michael D. Tokach

*See next page for additional authors*



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# Economics of adding fat and increasing lysine:calorie ratio in diets for growing-finishing gilts (1999)


## Authors

M De La Llata, Michael R. Langemeier, Michael D. Tokach, Robert D. Goodband, Jim L. Nelssen, and Steven S. Dritz

# ECONOMICS OF ADDING FAT AND INCREASING LYSINE:CALORIE RATIO IN DIETS FOR GROWING-FINISHING GILTS[1]

*M. De La Llata, M. Langemeier[2], S. S. Dritz[3], M. D. Tokach[4], R. D. Goodband, and J. L. Nelssen*


## Summary

A total of 1,200 gilts was used to evaluate the economics of adding fat and increasing lysine:calorie ratio in diets for growing-finishing pigs. Diets were fed in four phases and consisted of a 2 × 4 factorial arrangement with two levels of fat (0 and 6%) and four increasing lysine:calorie ratios. Eight economic scenarios combining corn, soybean meal, fat, and hog prices with two packer grading systems were created. Stochastic dominance analysis was performed on 64 alternatives (8 treatments × 8 scenarios). The third and fourth (higher) lysine: calorie ratios increased income over feed cost when fat was added to the diets, except for the high fat price scenario in which the fourth lysine:calorie ratio without added fat dominated. The first two (lower) lysine: calorie ratios were inferior under all scenarios.


(Key Words: Lysine:Calorie Ratio, Fat, Lysine, Finishing Pigs. Economics.)

## Introduction

Several experiments have demonstrated that added dietary fat increases ADG during the growing phase and decreases ADFI and F/G during the growing-finishing phase. Studies also are shown that dietary amino acid levels need to be increased in concert with increases in energy content of the diet.

Adding fat to the diets and supplementing additional dietary amino acids will increase the cost of the diets. Therefore, economics should dictate the inclusion of fat in diets for growing-finishing pigs. In other words, the extra income received for improved performance must be greater than the increase in dietary cost.

Thus, the objectives of this study were to evaluate if adding fat is cost-effective and to determine the appropriate lysine:calorie ratio based on income over feed cost in diets for growing-finishing pigs reared under commercial settings.

## Procedures

A total of 1,200 gilts (PIC C22 × 337) with an initial weight of 60 lb was used in this study. Pigs were allotted to one of eight dietary treatments with 25 pigs/pen and six pens/treatment. The building characteristics, pen dimensions, and ventilation system are described in the paper discussing growth performance results of this study (p. 88).

The corn soybean meal-based diets were arranged in a 2 × 4 factorial with two levels of fat (0 and 6% choice white grease) and four lysine:calorie ratios in each of the four phases (Table 1). A more detailed description of the diets is provided in the growth performance paper (p. 88).

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[2]Department of Agricultural Economics.

[3]Food Animal Health and Management Center.

[4]Northeast Area Extension Office, Manhattan, KS.

Diet phase changes occurred every 28 d. At the end of phase 4, all pigs were sent to a USDA-inspected packing plant for individual carcass data collection.

Income over feed cost was calculated by subtracting the feed cost from the gross income for each treatment. Gross income was determined from a base carcass price plus premiums or discounts.

A total of 64 income over feed cost alternatives were created from combinations of the eight dietary treatments; four scenarios for corn, soybean meal (SBM), fat, and base hog prices; and two different packing plant grids to determine premiums and discounts ($8 \times 4 \times 2$).

Fixed premiums and weight discounts were used in grid 1 and, therefore, the premiums and weight discounts were independent of base price. An index for premiums and discounts, which represented a percentage of the base hog price, was used for calculating income with grid 2.

The four scenarios for ingredient and hog prices are presented in Table 2. 1) Corn and SBM prices from Southwestern MN for December of 1998 with choice white grease (CWG) at \$.12/lb and hog carcass at \$41.1/CWT. 2) Same as 1, but with CWG at \$.20/lb. 3) Same as 1, but with CWG at \$.10/lb. 4) Average prices from 1997 for corn, SBM, and hogs with CWG at \$.12/lb.

Income over feed cost per pen (six pens per treatment) was used to analyze the 64 alternatives, using first and second-degree stochastic dominance. This is a technical procedure used to evaluate the profitability and riskiness of alternative production strategies. A dominant strategy is either more profitable, less risky, or both. Therefore, a less profitable strategy may be dominant if it is less risky. Riskiness can be defined as having a higher probability of low outcomes and/or a higher level of variability.

## Results and Discussion

The 64 combination alternatives for income over feed cost are presented in Table 3. The stochastic dominance analysis results (Table 4) are interpreted as follows: Strategies denoted with the number 1 or 2 are preferred alternatives, with 2 being dominant over 1. Strategies denoted with the number 0 are alternatives that will not be chosen by producers because they are more risky or are inferior in terms of income over feed cost.

In general, the fourth (highest) lysine: calorie ratio with added fat was the preferred strategy. However, when the price of fat was high in relation to corn and SBM prices, the fourth lysine:calorie ratio without added fat was preferred under both grids. The first and second lysine calorie ratios were not preferred strategies, regardless of added fat level and scenario.

Adding fat to the diets improves growth performance (p. 88); therefore, it is not surprising that the price of fat altered the income over feed cost.

For scenarios 1 and 3, adding fat to the diets was a dominant strategy for the fourth lysine:calorie ratio under the two grids. The third lysine:calorie ratio was also dominant when fat was added to the diets but only under grid 2.

For scenario 2 (high price for fat) and using grid 1, the fourth lysine:calorie ratio without added fat was favored. Using grid 2, the fourth lysine:calorie ratio was preferred regardless of whether fat was added to the diet or not.

For scenario 4, the third and fourth lysine:calorie ratios with added fat were dominant regardless of the grid used. The rest of the strategies were not preferred.

It is of interest that the third lysine:calorie ratio regimen with added fat was also preferred in scenarios 1 and 3, but

only when evaluated under grid 2. The reason for this might be the fact that grid 2 places more value on carcass weight and grid 1 on percent lean premium. Pigs fed the fourth lysine:calorie ratio with added fat had a decreased backfat depth and an increased fat-free lean index, which might explain why carcasses of similar weight were graded differently between grids. These results suggest that feeding strategies should be different when selling pigs under different grids.

One of the reasons why adding fat to the diets improved the income over feed cost is the improvement in ADG, and consequently, the improvement in carcass weight. We considered that all pigs were marketed on the same day. This increases weight discounts and decreases gross income for the pigs that grew slower (fed diets without added fat). Thus, if pig flow permits, an economic analysis should be performed to evaluate the income over feed cost using a partial marketing strategy and allowing for slower growing pigs to be sold at a similar weight as pigs fed dietary fat. The extra gross income received by allowing pigs to grow to heavier weights would have to justify the extra facility and feed costs.

**Table 1. Dietary Treatments**

| | Lysine:Calorie Ratio (g lysine/Mcal ME) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0% Fat | | | | 6% Fat | | | |
| Item | A | B | C | D | E | F | G | H |
| Phase 1 (60-100 lb) | 2.96 | 3.26 | 3.56 | 3.86 | 2.96 | 3.26 | 3.56 | 3.86 |
| Phase 2 (100-165 lb) | 2.25 | 2.50 | 2.75 | 3.00 | 2.25 | 2.50 | 2.75 | 3.00 |
| Phase 3 (165-220 lb) | 1.64 | 1.84 | 2.04 | 2.24 | 1.64 | 1.84 | 2.04 | 2.24 |
| Phase 4 (220-260 lb) | 1.12 | 1.32 | 1.52 | 1.72 | 1.12 | 1.32 | 1.52 | 1.72 |

**Table 2. Ingredient and Hog Price Scenarios**

| | Scenario | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 SW Minnesota | | 2 High Fat Price | | 3 Low Fat Price | | 4 1997 Prices | |
| Item | Grid 1 | Grid 2 | Grid 1 | Grid 2 | Grid 1 | Grid 2 | Grid 1 | Grid 2 |
| Corn $/lb | .034 | .034 | .034 | .034 | .034 | .034 | .047 | .047 |
| SBM $/Ton | 130 | 130 | 130 | 130 | 130 | 130 | 176 | 176 |
| CWG $/lb | .12 | .12 | .20 | .20 | .10 | .10 | .15 | .15 |
| Hog Carcass $/CWT | 41.1 | 41.1 | 41.1 | 41.1 | 41.1 | 41.1 | 69.3 | 69.3 |

**Table 3. Income over Feed Cost for the Dietary Treatments under Different Scenarios[a]**

| | Scenario | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 SW Minnesota | | 2 High Fat Price | | 3 Low Fat Price | | 4 1997 Prices | |
| Treatments | Grid 1 | Grid 2 | Grid 1 | Grid 2 | Grid 1 | Grid 2 | Grid 1 | Grid 2 |
| A | $52.93 | $46.35 | $52.93 | $46.35 | $52.93 | $46.35 | $96.51 | $86.81 |
| B | $57.08 | $52.48 | $57.08 | $52.48 | $57.08 | $52.48 | $102.04 | $97.20 |
| C | $59.89 | $56.22 | $59.89 | $56.22 | $59.89 | $56.22 | $106.51 | $103.76 |
| D | $61.61 | $58.91 | $61.61 | $58.91 | $61.61 | $58.91 | $109.38 | $108.54 |
| E | $57.35 | $47.11 | $50.12 | $44.41 | $53.49 | $47.79 | $97.02 | $88.94 |
| F | $57.81 | $54.82 | $55.10 | $52.10 | $58.49 | $55.50 | $104.75 | $102.19 |
| G | $60.94 | $60.53 | $58.16 | $57.75 | $61.63 | $61.22 | $111.59 | $112.26 |
| H | $62.88 | $62.37 | $60.23 | $59.73 | $63.64 | $63.03 | $113.11 | $115.08 |

[a]Growth performance and carcass characteristics data from 1,200 growing-finishing gilts (PIC C22 × 337) were used to calculate the income over feed cost for each treatment under each scenario.

**Table 4. First and Second Stochastic Dominance Results on Income over Feed Cost[a]**

| | Scenario[b] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 SW Minnesota | | 2 High Fat Price | | 3 Low Fat Price | | 4 1997 Prices | |
| Treatments | Grid 1 | Grid 2 | Grid 1 | Grid 2 | Grid 1 | Grid 2 | Grid 1 | Grid 2 |
| A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| G | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 2 |
| H | 2 | 2 | 0 | 2 | 2 | 2 | 2 | 2 |

[a]For each scenario, the preferred treatments are indicated with the numbers 1 and 2, where 2 is preferred over 1, and 0 is a not preferred alternative.

[b]The data from 1,200 growing-finishing gilts (PIC C22 × 337) were used for the analysis of each scenario.