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ADDED FAT IN DIETS FOR PIGS IN EARLY AND LATE FINISHING

E.C. Baudon, J.D. Hancock, and N. Llanes

Summary

A total of 416 pigs, with an average initial body weight of 127 lb, was used to determine the effect of adding fat in diets for early and late finishing on growth performance and carcass characteristics. Treatments were: a no added fat control; addition of fat in early finishing (127 to 219 lb body weight); addition of fat in late finishing (219 to 280 lb body weight); and addition of fat throughout finishing (127 to 280 lb body weight). For the first period (127 to 219 lb body weight), ADG and F/G were improved by 5 and 9%, respectively, when fat was added in the diet ($P<0.03$). For the second period (219 to 280 lb body weight) and overall (127 to 280 lb body weight) ADFI was less for pigs fed fat ($P<0.003$). Also, overall ADG and F/G were improved with inclusion of fat ($P<0.07$), with the greatest response from inclusion of fat in both phases. Hot carcass weight and carcass yield were increased with inclusion of fat in the diets ($P<0.001$), and this effect was more pronounced when fat was added in late finishing vs early finishing ($P<0.02$). In conclusion, the addition of fat to diets for finishing pigs improved growth performance without decreasing carcass leanness. However, adding fat for only the first or second part of the finishing phase was less effective than adding fat for the entire finishing period.

(Key Words: Fat, Finishing, Carcass)

Introduction

Feed-grade fat sources are commonly added to diets for growing-finishing pigs to

improve growth performance and especially feed efficiency. Indeed, review of experiments at Kansas State University indicates that for every 1% added fat, there should be about a 2% improvement in feed efficiency. This improvement in efficiency of growth must be balanced against the likely increase in diet cost when fat is added, but if prices are right, adding fat to swine diets can improve efficiency and economy of gain. However, there are anecdotal reports that the response to adding fat is greatly reduced or even nonexistent in late finishing. Thus, we conducted an experiment to determine the effect of including fat in early vs late finishing on growth performance, carcass measurements, and economy of gain.

Procedure

A total of 416 pigs in two groups (one in fall-winter and one in winter-spring), with an average starting weight of 127 lb, was blocked by sex and weight and assigned to pens. The 32 pens held 13 pigs each and had half slatted/half solid concrete flooring. They were equipped with a nipple waterer and two-hole self feeder to allow ad libitum consumption of feed and water. Treatments were: a no added fat control; addition of fat in early finishing (127 to 219 lb body weight, fed for 42 d); addition of fat in late finishing (219 to 280 lb body weight, fed for 30 d); and addition of fat throughout finishing (127 to 280 lb body weight, fed for 72 d).

The diets (Table 1) were formulated to meet or exceed all NRC suggested requirements. Lysine:calorie ratios were kept con-

stant for all diets in early and late finishing, and additions of vitamin and minerals also were adjusted to keep constant ratios with caloric content of the diets. The pigs and feeders were weighed at the beginning and the end of each portion of the experiment to allow calculation of ADG, ADFI, and F/G. Furthermore, at an average weight of 280 lb, the pigs were slaughtered to allow collection of routine carcass measurements (i.e., hot carcass weight and backfat thickness).

All data were analyzed using the PROC MIXED Procedure of SAS with orthogonal contrasts used to separate treatment means. Finally, hot carcass weight was used as a covariate for analyses of the data for dressing percentage and backfat thickness.

Results and Discussion

For the period from 127 to 219 lb body weight (Table 2), inclusion of 6% soybean oil improved ADG by 5% ($P<0.03$) and F/G by 9% ($P<0.0001$). Also, ADFI decreased from 6.3 lb to 5.99 lb when fat was added to the diets ($P<0.0001$). These results are in general agreement with previous research in that fat inclusion in diets for growing pigs generally results in greater rate and especially efficiency of gain.

For 219 to 280 lb body weight (Table 3), ADFI was less ($P<0.003$) for the pigs fed diets with added fat. Overall (i.e., 127 to 280 lb),

ADG, ADFI and F/G were improved with fat added to the diets ($P<0.07$). There also was improved ADG and F/G with addition of fat throughout finishing compared to fat addition being restricted to only a portion of the finishing period ($P<0.004$). Improvements in ADG, ADFI, and F/G were 6, 4, and 9% when fat was added during both phases vs the control. It is important to note there were no interactions among the treatments with fat added in the first vs second portion of the finishing phase, thus indicating there is no carryover effect when feeding fat in early vs late finishing.

As for carcass measurements, we noted that HCW and carcass yield (i.e., dressing percentage) were increased as fat was added in the diets ($P<0.001$). Also, HCW and carcass yield were greater with fat added late in finishing vs early in finishing and then being removed ($P<0.02$).

In conclusion, adding fat improved overall growth performance of pigs without decreasing carcass leanness. The best results were obtained when fat was included for the entire finishing phase. However economics may dictate that a high inclusion of fat during the finishing phase is not the best option. Thus, level of inclusion of fat during the finishing period must be chosen with careful attention to expected responses in growth performance and the price of fat vs other energy sources (e.g., corn) at any given time.

Table 1. Diet Composition^a

| Ingredient (%) | Phase 1 (127 to 219 lb) | | Phase 2 (219 to 280 lb) | |
|-------------------------|-------------------------|-------|-------------------------|-------|
| | No fat | Fat | No fat | Fat |
| Corn | 74.21 | 68.21 | 81.73 | 75.55 |
| Soybean meal, 46.5% | 23.41 | 23.19 | 16.14 | 16.14 |
| Soy oil | 0.00 | 6.00 | 0.00 | 6.00 |
| Monocalcium phosphate | 0.60 | 0.70 | 0.50 | 0.59 |
| Limestone | 1.03 | 0.98 | 1.00 | 0.95 |
| Salt | 0.35 | 0.38 | 0.30 | 0.33 |
| Vitamin premix | 0.15 | 0.17 | 0.13 | 0.14 |
| Trace mineral premix | 0.15 | 0.16 | 0.10 | 0.11 |
| Antibiotic ^b | 0.10 | 0.11 | 0.10 | 0.11 |
| L-Lysine HCl | 0.00 | 0.12 | 0.00 | 0.10 |

^aPhase 1 diets had a lysine/calorie ratio of 2.7 g/Mcal; Phase 2 had a lysine/calorie ratio of 2.1 g/Mcal.

^bProvided 80g/ton tylosin.

Table 2. Added Fat and Growth Performance in Early Finishing

| Item | Treatment | | SE | P value |
|-------------------------|-----------|------|------|---------|
| | No fat | Fat | | |
| Phase 1 (127 to 219 lb) | | | | |
| ADG, lb | 2.16 | 2.26 | 0.06 | 0.03 |
| ADFI, lb | 6.30 | 5.99 | 0.26 | 0.001 |
| F/G | 2.91 | 2.66 | 0.07 | 0.001 |

Table 3. Effects of Added Fat on Growth Performance in Late Finishing and on Carcass Measurements

| Item | Treatment | | | | SE | No fat vs other | Nf/fat+F/Nfat vs Fat | Nf/fat vs F/Nfat | Interaction Phase1XPhase2 |
|-------------------------|-----------|---------------|----------------|-------|------|--------------------|-------------------------|---------------------|------------------------------|
| | No fat | No fat/fat | Fat/ no fat | Fat | | | | | |
| Phase 2 (219 to 280 lb) | | | | | | | | | |
| ADG, lb | 1.92 | 1.92 | 1.81 | 1.95 | 0.06 | - | - | - | - |
| ADFI, lb | 6.91 | 6.60 | 6.72 | 6.55 | 0.17 | 0.003 | - | - | - |
| F/G | 3.60 | 3.44 | 3.71 | 3.36 | 0.12 | - | - | - | - |
| Overall | | | | | | | | | |
| ADG, lb | 2.04 | 2.08 | 2.04 | 2.16 | 0.04 | 0.07 | 0.004 | - | - |
| ADFI, lb | 6.53 | 6.46 | 6.25 | 6.29 | 0.21 | 0.001 | - | 0.005 | - |
| F/G | 3.20 | 3.11 | 3.06 | 2.91 | 0.06 | 0.001 | 0.001 | - | - |
| Carcass characteristics | | | | | | | | | |
| Hot carcass wt, lb | 199.8 | 207.0 | 201.4 | 210.5 | 5.7 | 0.001 | 0.002 | 0.02 | - |
| Yield, % | 72.2 | 73.7 | 72.6 | 73.2 | 0.7 | 0.001 | - | 0.003 | - |
| Backfat, in | 0.84 | 0.84 | 0.83 | 0.87 | 0.04 | - | 0.08 | - | - |
| Lean, % | 52.8 | 53.3 | 53.0 | 53.2 | 0.4 | 0.06 | - | - | - |

Dashes indicate P = 0.15 or greater.