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## Full-Fat Soybeans for Growing-Finishing Swine

D. T. Lafferty and R. H. Hines

### Summary

Pigs fed full-fat, processed soybeans (FFPS) in place of soybean meal (SBM, 44% CP) gained adequately and produced carcasses with lean measurements equal to those of pigs fed soybean meal. Backfat and belly fat were considerably softer on carcasses of pigs fed FFPS, and total fat content of loin eye muscle was greater in FFPS carcasses than in carcasses of pigs fed SBM.

Taste panel observations showed no differences in flavor, juiciness, tenderness or over-all acceptability of pork chops produced by either diet. Barrows gained faster than gilts regardless of treatment and barrows had firmer carcasses. Gilt carcasses had a larger percentage of lean cuts, more loin eye area, more length, less backfat, and higher ham-loin indexes than barrow carcasses regardless of treatment.

### Procedure

Twenty-five barrows and twenty-five gilts averaging 103.0 pounds were used. Five gilts and five barrows were assigned to each of these treatments: 1. (S) - sorghum grain plus soybean meal ration (18% CP); 2. (IR) - sorghum grain plus infra-red roasted whole soybeans substituted on a pound-for-pound basis for soybean meal; 3. (E) - sorghum grain plus extruded whole soybean substituted on a pound-for-pound basis for soybean meal; 4. (PE) - (Protein equivalent) sorghum grain plus soybean meal balancing the crude protein level with the (IR) and (E) rations; 5. (EE) - (Energy equivalent) sorghum grain plus soybean meal plus vegetable oil to equal the protein and energy levels of (IR) and (E) rations. Table 8 lists the rations fed.

All pigs were self-fed their respective pelleted diets in the K.S.U. totally slatted floor finishing barn until they reached a weight of approximately 220 lbs. All pigs were slaughtered at the K.S.U. meat lab where carcass data was collected 24 hours post-mortem. Pigs were removed for slaughter as they individually reached approximately 220 lbs.

Table 8. Whole-soybean Study Rations<sup>cd</sup>

|                          | (S)  | (IR) | (E)  | (PE) | (EE) |
|--------------------------|------|------|------|------|------|
| SBM (44% CP)             | 400  | ---  | ---  | 350  | 350  |
| IR soybeans              | ---  | 400  | ---  | ---  | ---  |
| Ext. soybeans            | ---  | ---  | 400  | ---  | ---  |
| Sorghum grain            | 1495 | 1495 | 1495 | 1545 | 1510 |
| Veg. oil                 | ---  | ---  | ---  | ---  | 35   |
| Vitamin mix <sup>a</sup> | 75   | 75   | 75   | 75   | 75   |
| Mineral mix <sup>b</sup> | 25   | 25   | 25   | 25   | 25   |
| ASP-250                  | 5    | 5    | 5    | 5    | 5    |

<sup>a</sup> Each pound of vitamin mix contains: 99,000 I.U. Vitamin A; 49,500 I.U. Vitamin D; 50 mg. Riboflavin; 300 mg. Niacin; 300 mg. ca Pantothenate; 1,000 mg. Choline; 0.2 mcg Vitamin B<sub>12</sub> 99 I.U. Vitamin E; 10 mg. Thiamine; 17 mg. Pyridoxine; 8 mg. Folicin; and 1.5 mg. Biotin.

<sup>b</sup> Each pound of mineral mix contains: 10.5% Phosphorus; 15.5% Calcium; 2.25% Potassium; 3.5% Magnesium plus trace minerals.

<sup>c</sup> One ton of the above rations were fed; then 25 lbs. of soybean preparation in each formula was replaced with sorghum grain, ASP-250 was removed, and the vitamin and mineral mixes were changed to 60 and 40 lbs., respectively.

<sup>d</sup> Diet (S) contained approximately 18% CP while all remaining diets contained approximately 15% CP. Diets (IR), (E) and (EE) contained approximately 5.3% ether extract while the remaining diets possessed 2.50 to 3.0% ether extract.

### Results and Discussion

Table 9 presents performance data from the various treatments; table 10 shows the carcass data of the ten pigs per treatment.

Pigs fed the 18% CP soybean meal ration had a lower feed-gain ratio than pigs fed any other treatment; they also tended to gain fastest. Because all other rations contained approximately 15% CP, the increased crude protein of the (S) diet is assumed to be responsible for the better performance of that group. The soybean meal diet of equal protein content did not improve gains or feed efficiency over those from pigs fed diets containing full-fat soybeans. Neither did the soybean-meal diet of equal energy improve gains or feed efficiency.

Backfat, length, loin eye area, percent lean cuts, and hamloin index were not affected by treatment. Backfat and belly fat firmness, however, were significantly ( $P < .01$ ) softer in pigs

fed full-fat soybeans than in those fed SBM containing diets. This increase in softness is a reflection of the increased content of polyunsaturated fatty acids in the full-fat soybeans.

An experienced 5 member, taste panel found no difference in flavor, juiciness, tenderness, or over-all acceptability in pork chops of pigs fed any of the rations.

Table 9. Performance Data

| Treatments             | (S)   | (IR)  | (E)   | (PE)  | (EE)  |
|------------------------|-------|-------|-------|-------|-------|
| No. of pigs            | 10    | 10    | 10    | 10    | 10    |
| Avg. initial wt., lbs. | 102.9 | 102.5 | 103.0 | 105.2 | 101.6 |
| Avg. final wt., lbs.   | 222.4 | 223.0 | 217.4 | 222.1 | 216.3 |
| Avg. days on test      | 68.9  | 70.5  | 76.5  | 72.4  | 78.1  |
| Avg. daily gain, lbs.  | 1.74  | 1.72  | 1.50  | 1.61  | 1.47  |
| Feed intake/day, lbs.  | 5.68  | 5.90  | 5.79  | 6.36  | 5.19  |
| Feed/lbs. gain         | 3.27  | 3.44  | 3.87  | 3.96  | 3.52  |

Table 10. Carcass Data<sup>a</sup>

| Treatments                  | (S)   | (IR)  | (E)   | (PE)  | (EE)  |
|-----------------------------|-------|-------|-------|-------|-------|
| Backfat, (in.)              | 1.29  | 1.36  | 1.29  | 1.35  | 1.22  |
| Length, (in.)               | 30.0  | 30.6  | 30.2  | 30.1  | 30.2  |
| LEA, (sq. in.)              | 5.50  | 5.38  | 5.28  | 5.28  | 5.58  |
| B.F. firmness <sup>b</sup>  | 2.5   | 3.5   | 3.5   | 2.5   | 3.0   |
| Belly firmness <sup>b</sup> | 3.0   | 3.5   | 3.5   | 3.0   | 3.0   |
| Lean cuts, %                | 59.8  | 59.5  | 59.9  | 60.2  | 60.7  |
| H-L Index                   | 114.6 | 112.3 | 116.8 | 112.3 | 114.6 |

<sup>a</sup> Values the average for both barrows and gilts

<sup>b</sup> Based on a 5-point scale; 1 = hard, 5 = oily