## Literature Cited

Harvey, Walter R. 1960. Least-squares analysis of data with unequal numbers. Agricultural Research Service. U.S.D.A. ARS-20-8.

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# Reproductive Performance of Sows Fed at Two Levels During Gestation

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Level of feed intake at various stages of reproduction greatly influences sow productivity. Previous research with swine has shown that increasing the nutrient intake of the female prior to breeding increases the number of ova shed, but continued heavy feeding during gestation leads to high embryonic mortality. The recommended practice is to flush sows (increase their feed intake) about 10-12 days prior to breeding and then reduce their feed intake immediately after breeding. This limited intake is recommended for about the first 90 days of pregnancy, and then slightly higher levels are recommended during the last month of gestation since the unborn pig makes most of his growth during this period.

The requirements for sows will be affected by their size and growthness, environmental temperatures, and housing conditions. However, in view of the results obtained at this station and in other investigations, there may be a tendency to overfeed during gestation in many cases and this results in a waste of feed and lower productivity.

Since feed cost is one of the major items in swine production, the present study was initiated in the spring of 1965 to study the effects of reduced feed intake during gestation on reproductive performance of sows and gilts.

## Materials and Methods

This study was conducted in the spring and summer of 1965 using 20 gilts and 20 sows from the OK 14 (Hampshire) breeding herd at Stillwater. All sows and gilts were managed in a similar manner prior to breeding. On April 1, the ration listed in Table 1 was increased from 5 lbs. per day to 7 lbs. per day for gilts and from 6½ lbs. per day to 8 lbs. per day for sows. The breeding period started on April 12 and continued for six weeks. Each female was hand mated twice daily while in heat and sows and gilts were each randomly assigned to one of the two feeding levels described in Table 2 at breeding.

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**Table 1. Sow Gestation and Lactation Ration.**

| Ingredient | TotalPounds |
|---|---|
| Milo-Western Yellow | 1200.0 |
| Oats | 400.0 |
| Soybean Meal (50 Percent) | 224.0 |
| Dehydrated Alfalfa Meal (17 Percent) | 100.0 |
| Tankage (60 Percent) | 40.0 |
| Dikal | 12.8 |
| Ground Limestone | 8.0 |
| Salt | 10.0 |
| Vitamin-Mineral-Antibiotic Premix | 5.2 |
| Total | 2000.0 |

**Table 2. Amounts of Feed Provided for Sows and Gilts During Various Periods of Production.**

| Feeding Level | | Period | Lbs. Feed Per Day Per: Gilt | Sow |
|---|---|---|---|---|
| Low | I | April 1, to breeding | 7 | 8 |
| | II | breeding to June 30 | 3½ | 4 |
| | III | July 1, to farrowing | 5 | 6 |
| | IV | lactation (wn. at 6 wks.) | self-fed | self-fed |
| High | I | April 1, to breeding | 7 | 8 |
| | II | breeding to farrowing | 7 | 7 |
| | III | lactation (wn. at 6 wks.) | self-fed | self-fed |

To insure adequate control over the daily intakes specified in Table 2, individual sow feeding stalls were used during gestation. Four outside lots that were essentially barren during the duration of this study were used and sows and gilts were kept in separate lots in groups of 10 females per lot.

All sows were brought to the farrowing barn 109 days after breeding. Approximately 3 days after farrowing, sows and their litters were moved to individual pasture lots and gilt litters remained in confinement until weaning in order to accurately measure consumption during lactation.

Each sow was weighed at breeding and at the 109th day of gestation. Weight of sow at farrowing was determined by subtracting litter birth weight from her 109-day weight. Sow and pig weights were also obtained 21 and 42 days after farrowing. All litters were given access to creep at 21 days.

## Results and Discussion

The production records for sows and gilts maintained on the high and low intakes during gestation are summarized in Table 3, and feed records are presented in Table 4.

**Breeding and Gestation Performance:** Breeding performance appeared normal for both groups. Thirty-five females conceived at first service, and three of the five females that failed to settle at first heat conceived when exposed to the boar during their second heat period. Two sows on the high level failed to conceive when rebred at three consecutive heat periods.

Differences in weight gain during pregnancy between the high and low levels were similar (Table 3) for both sows and gilts (58 lbs. and 56 lbs. respectively). Sows were scored from 1 to 9 on the basis of their condition each time they were weighed. Notice in Table 3 that the condition score difference between high and low levels for sows (6.8 vs 5.4) was smaller than for gilts (8.1 vs 5.3).

**Farrowing Performance:** Level of feeding had no great influence on farrowing performance. The gilts on restricted intake farrowed larger litters of live pigs than those on the high level of feed intake (11.0 pigs vs 10.1 pigs), but no differences in litter size were noticed between the two levels for sows (Table 3).

Pig birth weights were heavier ($P<.01$) for sows than for gilts in this study. Although level of feeding did not significantly affect either litter size or pig birth weights, litter birth weight (total pounds of live pigs per litter at birth) tended to favor the low level of feeding ($P<.10$).

**Birth-to-Weaning Performance:** Although feeding level had only a minor influence on farrowing performance, sows and gilts on the re-

**Table 3. Performance of Sows and Gilts Fed at Two Levels During Gestation.**

| | Sows | | Gilts | |
|---|---|---|---|---|
| | High | Low | High | Low |
| No. of sows farrowing | 8 | 10 | 10 | 10 |
| Sow wt. at farrowing, lbs. | 575.2 | 528.1 | 422.2 | 388.6[1,2] |
| Sow condition score at farrowing[4] | 6.8 | 5.4 | 8.1 | 5.3[1] |
| Sow weight gains: | | | | |
| Gestation, lbs. | 159.0 | 101.1 | 167.1 | 111.0[1] |
| 1st 21 days after farrowing, lbs. | —22.9 | + 3.6 | —23.2 | —10.5[1] |
| 1st 42 days after weaning, lbs. | —34.4 | —10.0 | —42.8 | —23.0[1] |
| Farrowing data: No. live pigs per litter | 10.8 | 11.0 | 10.1 | 11.0 |
| No. dead pigs per litter | 0.8 | 0.4 | 0.4 | 0.2 |
| Pig birth wt., lbs. | 3.01 | 3.16 | 2.84 | 2.81[2] |
| Litter birth wt., lbs. | 32.5 | 34.8 | 28.7 | 30.9[2,3] |
| 21-day data: No. pigs per litter | 7.1 | 8.6 | 7.7 | 8.9[3] |
| Av. pig wt., lbs. | 11.2 | 11.8 | 9.7 | 9.1[2] |
| Litter wt., lbs. | 79.8 | 101.0 | 74.9 | 80.6[2,3] |
| 42-day data: No. pigs weaned per litter | 7.0 | 8.6 | 7.6 | 8.6[3] |
| Avg. pig wt., lbs. | 26.6 | 26.8 | 20.7 | 19.2[2] |
| Litter wt., lbs. | 185.8 | 230.0 | 157.3 | 165.1[2] |
| Survival rate to weaning, percent | 64.8 | 78.2 | 75.2 | 78.2[3] |

[1] Difference between high and low significant at 5 percent level.
[2] Difference between sows and gilts significant at 5 percent level.
[3] Difference between high and low rate significant at 10 percent level, thus merely indicating a trend.
[4] Condition scores ranged from 1 to 9: 1=poor; 5=average; 9=fat.

stricted diets during gestation tended to have slightly more pigs at 21 days and at weaning than did females maintained at higher rates during pregnancy ($P<.10$). The fact that the high level sows were 47 pounds heavier than the low level sows at weaning (575 lbs. vs 528 lbs.) may be a factor contributing to the higher death losses among pigs in this group. The survival rate among low level sows was equal to that for low level gilts.

Litter weaning weights favored the low level sows and gilts, but these differences were not significant. However, sow litters were significantly ($P<.05$) heavier than gilt litters at birth, 21 days, and weaning.

**Feed Consumption and Feed Costs:** The feed records summarized in Table 4 revealed that the high level sows consumed 251 lbs. more feed than the low level sows during gestation, and the difference between the high and low group of gilts was 348 lbs. When sow ration cost was estimated at $55 per ton, these differences in feed consumption between high and low groups during pregnancy resulted in cost differences of $6.90 for sows and $9.57 for gilts. It is generally recognized that cost of feed is the largest single expense in producing pork; in most analyses it constitutes 70 to 80 percent of the total production cost. Table 4 illustrates how the two levels of feeding in this study affected efficiency. Since high level of feeding did not increase production, the additional feed consumed by those on the high level of intake merely increased production costs. The average cost of sow feed per live pig farrowed was $2.14 for the high level compared to $1.28 for the low level.

Since facilities were available to hold only 20 litters in confinement from farrowing to weaning, sows had to be moved to pasture after farrowing and the only feed consumption data available for the lactation period in this study was for the gilts maintained on concrete. Notice that low level gilts consumed an average of 56 lbs. more feed during the preweaning period (422 lbs. vs 366 lbs.), but the total consumption

**Table 4. Feed Consumption and Sow Feed Costs for Two Levels of Feeding.**

| | Sows | | Gilts | |
|---|---|---|---|---|
| | High | Low | High | Low |
| *Sow Feed Consumption* | | | | |
| Gestation: Total feed per sow, lbs. | 819. | 568. | 809. | 461. |
| Sow feed per pig farrowed, lbs. | 75.8 | 51.6 | 80.1 | 41.9 |
| Lactation: First 3 wks. after farrowing, lbs. | | | 160. | 181. |
| Second 3 wks. after farrowing, lbs. | | | 206. | 241. |
| Total feed per gilt during lactation, lbs. | | | 366. | 422. |
| Breeding to weaning: Total feed per gilt, lbs. | | | 1175. | 883. |
| Sow fed per pig weaned, lbs. | | | 154.6 | 102.6 |
| *Sow Feed Cost*[1] | | | | |
| Gestation: Feed cost per sow | $22.52 | $15.62 | $22.25 | $12.68 |
| Sow feed cost per pig farrowed | $ 2.08 | $ 1.42 | $ 2.20 | $ 1.15 |
| Breeding to Weaning: Fed cost per sow | | | $32.31 | $24.28 |
| Sow feed cost per pig weaned | | | $ 4.25 | $ 2.82 |

[1] Sow ration cost estimated at $55 per ton.

from breeding to weaning was still 292 lbs. less for the low level gilts than for the high level gilts. The average feed cost from breeding to weaning for the high level gilts was $32.31 compared to $24.28 for the low level gilts. This difference of $8.03 per gilt in feed cost represents a difference of $1.43 in sow feed cost per pig weaned between the two groups ($4.25 vs $2.82). Creep feed consumed by each litter from 21 to 42 days after farrowing was essentially the same for each group.

## Summary and Conclusions

Twenty sows and 20 gilts were fed at two levels of intake during pregnancy to study the influence of feeding level on productivity and production costs. Sows farrowed and weaned heavier pigs and heavier litters than gilts, but differences in litter size for sows and gilts were not significant.

The difference in performance between the two levels of feeding were not large, but tended to favor those on the restricted level of feeding. Sows were self-fed from farrowing to weaning and the gilts on the restricted diet during pregnancy consumed an average of 56 lbs. more feed during the six-week lactation period than did the gilts maintained at the higher level during gestation. However, the high level gilts consumed an average of 292 lbs. more feed than those on the low level during the entire period from breeding to weaning. The average sow feed cost from breeding to weaning for the high level gilts was $32.31 compared to $24.28 for the low level gilts. The cost of sow feed per pig weaned was $4.25 for the high level and $2.82 for the low level in this study.

Since sow nutrient requirements are influenced by growthiness and level of productivity of the sow plus season of the year and other environmental conditions, this study was not intended to determine specific optimum feeding-level recommendations. The present investigation was undertaken to study the influence of reduced level of intake during gestation on level of productivity under existing conditions. These data illustrate the poor economics of overfeeding sows during gestation and the importance of controlling feed intake in the sow herd. Gestating sows should be fed according to existing conditions, but care should be taken not to overfeed after breeding.

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# Effect of Pre-Weaning Plane of Nutrition on Growth and Development of Beef Calves

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The ultimate goal of the beef industry is to produce a product which will continue to satisfy consumer demands. The industry is confronted with increasing competition from other protein foodstuffs as well as changing trends in consumer demands. In an attempt to reduce caloric