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FAT IN SOW DIETS:

EFFECTS ON REBREEDING AND SUBSEQUENT LITTER SIZE¹

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Summary

Two on-farm trials with a total of 264 sows were conducted to evaluate the effects of added fat in the diet during the last seven days of lactation and/or during the period from weaning to remating on days from weaning to first service and to evaluate the effects of added fat prior to breeding on subsequent litter size. In Trial 1, by feeding sows 1 pound of fat 7 days prior to weaning litters and 7 days postweaning did not improve rebreeding performance. The subsequent farrowing rate was not affected by the fat addition but there was a slight improvement in farrowing rate for gilts (24 vs. 33%). The fat addition tended to increase the size of the farrowing litter by .9 pig. In Trial 2, adding 1 pound of fat daily to the feed from weaning until first service did not improve rebreeding performance. Fat addition did not affect subsequent litter size.

Introduction

One of the major problems in the swine industry is delayed return to estrus. Seasonal variation in intervals from weaning to first service is quite pronounced. The number of sows in estrus within 10 days after weaning and overall conception rates diminish dramatically in the summer months. Effects of temperature, daylength and reduced feed intake probably are associated with seasonal variations in reproductive performance. Producers often report that sows with the highest SPI (Sow Productivity Index) are the ones that do not remate within 10-day period after weaning. Previous studies in Kansas and North Carolina suggest that addition of fat increases caloric intake in sows and decreases the interval from weaning to remating in the summer.

Experimental Procedure

In Trial 1, 177 sows were allocated randomly by parity and previous litter performance to one of two treatments, a control (grain-soybean meal diet fed free choice) compared to fat supplementation. For a week before weaning the litters from the sows, the fat supplemented group received 1.7 pounds of dried fat² (1 pound of actual fat) top dressed on the lactation feed every day. At weaning the control sows were fed 5 pounds of grain-soybean meal diet per day and the treated sows received 5 pounds of control diet plus 1.7 pounds of the dry fat product daily for 7 days.

¹We acknowledge Keesecker Farms and River Valley Farms for allowing these trials to be conducted. Also we acknowledge the contribution of Merrick Foods in donating the fat product used in these studies.

²Merrick Food 7-60

In Trial 2, 87 sows were allotted to treatments based on previous litter performance and parity. From the day of weaning control sows received 4 pounds of sorghum-soybean meal diet daily until first service. The fat supplemented sows were fed 4 pounds of the control diet top dressed with 1.7 pounds of the fat product per day from weaning until first service.

Results and Discussion

Trial 1. In table 1 the effect of fat addition on litter performance is shown. Data are expressed over the two reproductive cycles. The first reproductive cycle was the period during which fat was fed the last 7 days of lactation and the second reproductive cycle was the subsequent litter performance. No differences were observed in the number of pigs born live and the number of pigs weaned. The fat addition to the lactation diet the last week increased ($P < .10$) the 28-day litter weight by approximately 7.7 pounds. This increase in litter weight may be due to an increase in milking ability or creep feeding response, since the baby pigs were competing with the sow for the fat product.

Of the 86 sows that had litters in the control group, 51 sows had litters in cycle 2; whereas, of 91 sows in the fat group, 52 had litters in the second cycle. Fat tended ($P = .11$) to increase subsequent litter size by .9 live pigs compared to the control.

In table 2 the effect of the number of litters (parity) is shown. Results of the sows that have had more than 7 litters were pooled. The first and second parity females farrowed fewer live pigs but there were no differences among the parities on the number of pigs weaned. The gilts had lighter 28-day litter weights than older sows. The first and second parity females expressed estrus one day later than older sows.

In table 3 the farrowing rate is shown by parity for the control group and sows fed additional fat. Farrowing rate was defined as the number of females farrowing in the subsequent cycle divided by the number of females initially farrowed. There were no differences between the sows fed the fat and control diets in farrowing rate or in the average number of days to estrus.

Trial 2. Table 4 shows the effect of fat addition on litter performance. Data are expressed as in table 1. There were no differences between the treatments on the average number of pigs born live, the number of pigs weaned and the 21-adjusted litter weights. The control diet tended ($P = .10$) to increase the average SPI by approximately 5%.

The effect of parity on sow performance is shown in table 5. As would be expected, the sows with parity greater than 3 outperformed the first-litter sows in the number of pigs born live, the number of pigs weaned and 21-day adjusted litter weights during the first reproductive cycle. An interesting observation of this trial is that first-litter sows tended to have their first service earlier than multiparous sows.

The farrowing rate is shown by parity in table 6. There were no farrowing rate differences between the sows fed fat (98%) and the control sows (91%). Even though there were no differences on the average days to breeding the addition of fat reduced this interval by 42%.

Table 1. Effect of Fat Addition on Litter Performance (Trial I)

| Reproduction Cycle | Item | Control | Fat ^a |
|--------------------|--|------------------------------|------------------|
| 1 | No. sows | 86 | 91 |
| | Total no. born | 10.51 \pm .29 ^b | 10.65 \pm .65 |
| | No. born live | 9.91 \pm .26 | 10.15 \pm .26 |
| | No. born dead | .59 \pm .13 | .51 \pm .12 |
| | No. weaned | 9.70 \pm .16 | 9.77 \pm .16 |
| | Avg. 28 d-litter wt, lbs. ^c | 163.8 \pm 3.44 | 171.7 \pm 3.3 |
| 2 | No. sows | 51 | 52 |
| | Total no. born ^d | 10.30 \pm .49 | 11.17 \pm .40 |
| | No. born live | 9.73 \pm .45 | 10.62 \pm .37 |
| | No. born dead | .57 \pm .15 | .54 \pm .12 |
| | No. weaned | 8.87 \pm .44 | 8.92 \pm .36 |
| | Avg. 28 d-litter wt, lbs. | 173.2 \pm 4.0 | 179.2 \pm 3.2 |

^aFat was top dressed on to the sows' feed at 1.0 kg per day for 14 days (7 days prior to weaning and 7 days postweaning).

^bMean \pm standard error of mean

^cTreatment difference (P<.10)

^dTreatment difference (P=.13)

Figure 1

Table 2. Effect of Parity on Sow Performance (Trial I)

| Reproductive Cycle | Item | Parity | | | | | | | |
|--------------------|----------------------------------|--------|-------|-------|-------|-------|-------|-------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | No. females | 65 | 35 | 20 | 22 | 14 | 13 | 8 | - |
| | No. born live ^a | 8.29 | 8.86 | 10.03 | 9.99 | 11.70 | 10.65 | 10.71 | - |
| | No. born dead | .61 | .60 | .72 | .33 | .46 | .28 | .84 | - |
| | No. weaned | 9.44 | 9.28 | 9.74 | 9.91 | 10.02 | 9.94 | 9.80 | - |
| | 28-d litter wt, lbs ^a | 154.6 | 160.6 | 164.7 | 180.4 | 175.0 | 175.8 | 163.1 | - |
| | Days to estrus ^a | 5.1 | 5.3 | 4.8 | 4.4 | 4.4 | 4.1 | 4.1 | - |
| 2 | No. females | - | 19 | 22 | 12 | 17 | 11 | 10 | 6 |
| | No. born live | - | 9.22 | 9.84 | 9.67 | 10.59 | 9.71 | 11.36 | 10.82 |
| | No. born dead | - | .08 | .22 | .74 | .34 | .82 | .64 | 1.06 |
| | No. weaned | - | 9.70 | 9.71 | 8.66 | 9.17 | 8.38 | 8.99 | 7.68 |
| | 28-d litter wt, lbs | - | 173.5 | 175.6 | 174.6 | 176.5 | 174.8 | 169.7 | 188.7 |
| | | | | | | | | | |

^aParity difference (P<.05)

Table 3. Effect of Fat Addition of Reproductive Performance (Trial I)

| Item | Control | Fat |
|---------------------|--|-------------------|
| | No. farrowed cycle 2/No. farrowed cycle 1: | |
| Parity 1 | 7/29 (24) ^a | 11/36 (33) |
| Parity 2 | 13/20 (65) | 9/15 (60) |
| Parity 3+ | <u>31/37</u> (84) | <u>31/40</u> (78) |
| Total | 51/86 (59) | 52/91 (57) |
| Avg. days to estrus | 4.6 ± .2 ^b | 4.7 ± .2 |

^aFarrowing rate in parentheses

^bMean ± standard error of mean

Table 4. Effect of Fat Addition on Litter Performance (Trial 2)

| Reproduction Cycle | Item | Control | Fat ^a |
|--------------------|------------------|--------------------------|------------------|
| 1 | No. sows | 44 | 43 |
| | No. born live | 10.54 ± .52 ^b | 10.07 ± .45 |
| | No. weaned | 9.10 ± .20 | 9.06 ± .17 |
| | Litter wt., lb | 104.9 ± 5.0 | 101.2 ± 4.3 |
| | SPI | 176.8 ± 4.0 | 174.2 ± 3.4 |
| 2 | No. sows | 39 | 41 |
| | No. born live | 10.90 ± .44 | 10.16 ± .39 |
| | No. weaned | 9.11 ± .15 | 9.15 ± .14 |
| | Litter wt., lb | 115.0 ± 4.6 | 118.8 ± 4.2 |
| | SPI ^c | 190.6 ± 3.9 | 181.9 ± 3.6 |

^aFat was supplemented in the sows' feed at 1.0 lb. per day from weaning until first service

^bMean ± standard error of mean

^cTreatment effect (P=.10)

Table 5. Effect of Parity on Sow Performance (Trial 2)

| Reproductive Cycle | Item | Parity | | | | | |
|--------------------|-----------------------------------|--------|-------|-------|-------|-------|-------|
| | | 1 | 2 | 3 | 4 | 5 | > 6 |
| 1 | No. females | 11 | 35 | 13 | 11 | 6 | 11 |
| | No. born live ^a | 9.12 | 9.81 | 10.85 | 10.27 | 10.92 | 10.86 |
| | No. weaned | 8.46 | 9.02 | 9.62 | 9.04 | 8.68 | 9.65 |
| | Litter wt., lb ^a | 84.3 | 105.0 | 110.2 | 100.5 | 109.4 | 108.8 |
| | SPI ^a | 176.2 | 173.4 | 180.0 | 169.4 | 178.6 | 175.1 |
| | Days to breeding, ^a | 6.5 | 9.8 | 7.1 | 20.3 | 13.2 | 10.3 |
| | Farrowing int., days ^a | 155.8 | 159.7 | 156.1 | 170.4 | 162.6 | 158.8 |
| 2 | No. females | | 11 | 32 | 12 | 10 | 15 |
| | No. born live ^a | | 9.55 | 9.94 | 9.87 | 11.93 | 11.38 |
| | No. weaned | | 9.02 | 9.34 | 9.20 | 9.17 | 8.92 |
| | Litter wt., lb | | 116.0 | 124.2 | 118.5 | 112.7 | 113.2 |
| | SPI | | 179.4 | 186.0 | 177.5 | 194.7 | 193.5 |

^aParity difference (P<.10)

Table 6. Effect of Fat Addition on Reproductive Performance (Trial 2)

| Item | Control | Fat |
|------------------|--|---------------|
| | No. farrowed cycle 2/No. farrowed cycle 1: | |
| Parity 1 | 6/6 (100) ^a | 5/5 (100) |
| Parity 2 | 16/18 (89) | 17/17 (100) |
| Parity 3 | 5/5 (100) | 7/8 (88) |
| Parity 4 | 6/6 (100) | 5/5 (100) |
| Parity 5 | 1/1 (100) | 5/5 (100) |
| Parity 6 | 6/8 (75) | 3/3 (100) |
| Total | 40/44 (91) ^b | 42/43 (98) |
| Days to Breeding | 14.2 \pm 3.8 ^c | 8.2 \pm 2.9 |

^aFarrowing rate in parentheses

^bAll animals missing in Cycle 2 were culled

^cMean \pm standard error of the mean