THE EFFECT OF DIET DURING LACTATION ON THE REPRODUCTIVE PERFORMANCE OF FIRST-LITTER SOWS

R.H. KING*, I.H. WILLIAMS* and I. BARKER**

SUMMARY

Eighty first-litter sows in a commercial piggery were assigned to two feeding treatments during a 26-day lactation. A commercial diet containing an estimated 15% crude protein (CP), 0.65% lysine and 12.5 MJ digestible energy (DE)/kg was offered to sows in the control group which consumed 3.04 kg/day. Sows in the treatment group were given a higher quality diet containing 16.4% CP, 0.83% lysine and 13.1 MJ DE/kg and they consumed 3.61 kg/day.

Provision of sows with the higher quality diet during lactation reduced (P < 0.05) losses of live weight and backfat during lactation and reduced (P < 0.05) the average weaning-to-mating interval. More sows in the treatment group exhibited oestrus within eight days (31/40 vs 20/40; \( \chi^2 = 6.5, P < 0.05 \)) and within 28 days (37/40 vs 27/40; \( \chi^2 = 7.8, P < 0.01 \)) of weaning than control sows. Neither ovulation rate nor subsequent litter size were adversely affected by the higher quality diet during lactation.

INTRODUCTION

Reproductive efficiency of first-litter sows in commercial piggeries is often limited by low litter size and prolonged post-weaning anoestrus (Paterson et al. 1980). Often, only about 50 per cent of sows exhibit oestrus within one week of weaning their first litter (King and Williams, 1981).

We have shown that the weaning-to-mating interval of first-litter sows is related to liveweight and backfat losses during the preceding lactation (King et al. 1982). The incidence of post-weaning anoestrus amongst first-litter sows may be minimised by providing sows with high intakes of energy and protein during lactation (Reese et al. 1982; King 1982).

This experiment was conducted in a commercial piggery to determine whether increased nutrient intake during lactation would reduce fat loss and, subsequently, reduce the number of first-litter sows with a prolonged interval between weaning and mating.

MATERIALS AND METHODS

At parturition, eighty gilts in an intensive piggery (Baconfield, Rogold Investments, East Bullsbrook, W.A. 6084) were paired on the basis of date of farrowing and liveweight. One animal from each pair was randomly assigned to the control group and the other to the treatment group.

During lactation, sows in the control group were given a commercial diet, containing (on air-dry basis) an estimated 15 per cent crude protein (CP), 12.5 MJ digestible energy (DE)/kg, and 0.65 per cent lysine. Feed was offered on the basis of an ascending scale beginning at 1.8 kg/day two days after farrowing.

* Dept. of Animal Science, University of Western Australia, Nedlands, W.A. 6009.
** Baconfield Piggery, East Bullsbrook, W.A. 6084.
† Present address: Animal Research Institute, Werribee, Vic. 3030.
and increasing over two weeks to a maximum of 5.5 kg/day. Sows in the treatment group were given a wheat/barley-based diet containing 10% soyabean meal and 2.5% fish meal which was analysed to contain (on air-dry basis) 16.4 per cent CP, 13.1 MJ DE/kg, and 0.83 per cent lysine. Feed was offered on an ascending scale but maximum feed intake was reached within one week of parturition.

Creep feed for piglets was introduced 10-14 days after farrowing but little was consumed prior to weaning. Piglets were weaned at 20-31 (mean 25.8 ± SE 0.6) days of age and the sows moved into individual pens adjacent to boars. After weaning sows were observed daily for signs of oestrus and were mated on successive days when possible. Sows which did not exhibit oestrus within 28 days of weaning were culled. Backfat depth was measured ultrasonically at 4.5 cm (C) and 8 cm (K) from the midline at the level of the last rib. Live weight and backfat ((C+K)/2) measurements were recorded within one week prior to farrowing and at weaning.

Liveweight loss at farrowing was estimated by multiplying the number of piglets born by 1.3 and adding 3.0 kg for placental weight (Petchy and Jolly 1979).

Laparoscopy was performed on sows 7-14 days after mating to determine ovulation rate. Sows which failed to exhibit oestrus within 13 days of weaning were laparoscoped and were subsequently laparoscoped every 14 days until mating. Litter size was recorded at the subsequent farrowing and embryo mortality was calculated as the difference between ovulation rate at conception and total number of pigs born as a percentage of ovulation rate.

The t-test was used to determine significance of difference between the lactation feeding treatments. Farrowing rate (percentage of animals which farrowed to their first post-weaning mating) and the number of sows exhibiting oestrus within 8 and 28 days of weaning were examined by Chi-squared analysis.

RESULTS

Sows in the treatment group consumed more (P < 0.05) feed than the control sows because of the more rapid increase in feed intake allowed early in lactation and because a greater proportion of animals consumed the maximum daily amount of 5.5 kg. As anticipated, higher feed intake resulted in sows losing less (P < 0.05) live weight and backfat during lactation (Table 1). Pigs sucking sows in the treatment group grew faster (P < 0.05) from birth to weaning than pigs sucking the control sows (Table 1). Ovulation rate was not effected by feeding during lactation but embryo mortality was greater (P < 0.05) in the control sows resulting in a smaller (P < 0.05) litter size at the subsequent farrowing (Table 1).

Farrowing rate was not affected by feeding during lactation: 74% in the control group against 81% in the treatment group ($\chi^2 = 0.5$, P > 0.05). However, more sows in the treatment group exhibited oestrus within eight days (31/40 vs 20/40; $\chi^2 = 6.5$, P < 0.05) and within 28 days (37/40 vs 27/40; $\chi^2 = 7.8$, P < 0.01) of weaning than control sows.

DISCUSSION

Delayed oestrus after weaning is a major problem with first-litter sows in commercial piggeries (King and Williams 1981). In this piggery only about half of the sows exhibit oestrus within eight days of weaning their first litter (King et al. 1982). However, provision of sows with a higher quality diet during lactation reduced losses of live weight and backfat during lactation and increased the percentage of sows which exhibited oestrus within 8 days of weaning from 50 to 78 per cent.
TABLE 1. The effects of diet during lactation on the performance of first-litter sows and their piglets

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Treatment</th>
<th>LSD (P = 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sow feed intake during lactation (kg/day)</td>
<td>3.04</td>
<td>3.61</td>
<td>0.23</td>
</tr>
<tr>
<td>Live weight (kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- prior to farrowing</td>
<td>161.5</td>
<td>159.0</td>
<td>6.2</td>
</tr>
<tr>
<td>- 1 day after farrowing</td>
<td>144.2</td>
<td>141.8</td>
<td>6.2</td>
</tr>
<tr>
<td>- losse during lactation</td>
<td>21.2</td>
<td>13.8</td>
<td>5.5</td>
</tr>
<tr>
<td>Backfat (mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- prior to farrowing</td>
<td>22.5</td>
<td>22.3</td>
<td>1.3</td>
</tr>
<tr>
<td>- losse during lactation</td>
<td>4.8</td>
<td>3.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Piglet growth rate between birth and weaning (g/day)</td>
<td>160</td>
<td>175</td>
<td>11</td>
</tr>
<tr>
<td>Weaning-to-mating interval*(days)</td>
<td>16.1</td>
<td>10.5</td>
<td>4.1</td>
</tr>
<tr>
<td>Ovulation rate at mating</td>
<td>15.3</td>
<td>14.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Second litter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Number born</td>
<td>8.8</td>
<td>10.6</td>
<td>1.8</td>
</tr>
<tr>
<td>- Number born alive</td>
<td>8.3</td>
<td>9.4</td>
<td>1.7</td>
</tr>
<tr>
<td>- Embryo mortality (%)</td>
<td>39.4</td>
<td>26.3</td>
<td>12.3</td>
</tr>
</tbody>
</table>

* A value of 20 days was used for sows which did not exhibit oestrus and were culled.

Sows in the treatment group consumed higher daily intakes of DE, CP and lysine during lactation (47 MJ, 590 g and 30 g vs 38 MJ, 450 g and 20 g). The results of Reese et al. (1982) suggest that restriction of energy intake during lactation was responsible for the poor weaning-to-mating interval of first-litter sows. However King (1982) has shown that restriction of either protein or energy intakes to low levels will delay the onset of oestrus after weaning.

Increased feed intake during lactation had no effect on subsequent ovulation rate which agrees with observations by Varley and Cole (1976) and King (1982). However the greater embryo loss in control sows significantly reduced subsequent litter size. Embryo mortality and second litter size of control sows in this experiment were inferior to the average performance of sows receiving a similar lactation feeding regime during previous years. The average ovulation rate at mating, embryo mortality and second litter size (total born) at Baconfield piggery during 1980/81 were 15.4, 32.7 per cent and 10.2 respectively (King et al. 1982). We suggest that the control sows in this experiment were not a representative sample of the population of first-litter sows in this piggery in terms of embryo mortality and second litter size.

Piglets sucking control sows grew slower prior to weaning than piglets sucking sows receiving the higher quality diet. Pepper et al. (1977) suggested that the minimum acceptable preweaning growth rate of piglets was about 200g/day. The growth rate of piglets sucking control sows was low (160 g/day) suggesting that the milk yield of control sows was limiting growth. Low feed intake may have reduced milk yield thereby affecting the growth rate of piglets up to weaning.
The results obtained from this commercial piggery show that increasing both the energy and protein intake of sows during their first lactation can reduce the average weaning-to-mating interval without adversely affecting subsequent ovulation rate or litter size.

REFERENCES