Effect of age and parity on litter size in pigs

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Summary. Litter size increased ($P < 0.01$) as the age of the dam at farrowing increased. However, previous reproductive experience (parity) had no direct effect on litter size of dams of the same age.

Introduction

A number of studies have documented that litter size (number born) in primiparous sows is larger than that in gilts and that litter size increases through the fourth or fifth pregnancy (Carmichael & Rice, 1920; Lush & Mollin, 1942; Olbrycht, 1943; Perry, 1956; Lynch, 1965). The ability of multiparous females to produce larger litters than primiparous females is generally attributed to two factors: age and previous reproductive experience (parity). However, most data relating age and parity to litter size have been collected under normal production conditions in which the two factors are highly confounded. Determining the relative contribution of age and previous reproductive experience to litter size is of considerable importance in directing future research on uterine and ovarian factors which affect fecundity of swine. Therefore, an experiment was conducted to determine if prior reproductive experience had a beneficial effect on litter size which was in addition to the effect of age of the dam.

Materials and Methods

In spring 1975, 45 newly born Yorkshire gilts were assigned at random to three treatment groups. The sows in Group 3 farrowed in spring 1976, fall 1976, and spring 1977; those in Group 2 farrowed in fall 1976, and spring 1977; while those in Group 1 farrowed in spring 1977. Different feeding levels were necessary because some were pregnant or lactating while others were not. However, an effort was made by visual appraisal of weight and condition to ensure that all groups were similar. Litter size was recorded at all farrowings and a pre-farrowing body weight was taken for the last farrowing. The results were assessed by analysis of variance and covariance. Within treatment variances were tested for heterogeneity with Bartlett’s test (Steel & Torrie, 1960).

Results

Mean litter size was not affected by parity in sows aged 1.5 or 2 years (Table 1). Pre-farrowing body weights at 2 years of age were similar for all the sows, being $255 \pm 7$ (s.e.m.), $245 \pm 6$ and $247 \pm 6$ kg for those in Groups 1, 2 and 3, respectively. The correlation ($r = 0.26$) between litter size and pre-farrow body weight at 2 years of age was not significant, and analysis of covariance using body weight as a covariate failed to detect differences among treatment groups ($P = 0.28$). Age was an important source of variance in litter size with the linear effect ($P < 0.01$) amounting to 3 pigs per year over the interval studied.
Table 1. Mean (+s.e.m.) litter sizes of sows of the same age but of differing parities

<table>
<thead>
<tr>
<th>Group (and parity)</th>
<th>No. of sows</th>
<th>Age (years)</th>
<th>1</th>
<th>1.5*</th>
<th>2†</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>12.2 ± 0.9</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>—</td>
<td>10.6 ± 0.8</td>
<td>11.7 ± 0.8</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>9.2 ± 0.8</td>
<td>9.3 ± 0.6</td>
<td>12.8 ± 0.6</td>
<td></td>
</tr>
<tr>
<td>Pooled‡</td>
<td>45</td>
<td>9.2 ± 0.8</td>
<td>10.0 ± 0.5</td>
<td>12.2 ± 0.5</td>
<td></td>
</tr>
</tbody>
</table>

* Difference between treatments not significant (P = 0.21); error mean square = 6.57.
† Differences among treatments not significant (P = 0.69); error mean square = 10.76.
‡ Linear effect of age significant (P < 0.01); error mean square = 7.86.

Discussion

These results do not support the tenet that previous reproductive experience has an effect on litter size. The idea that previous reproductive experience can increase litter size of pigs has been promoted in at least one textbook on reproductive physiology (Nalbandov, 1976). The idea seems to be based on the results of examination of a number of herd production records showing (1) a quadratic relationship between litter size and age of dam at first farrowing in which increased age of dam beyond 15 months produced little or no further increase in litter size (Johansson, 1929; Stewart, 1945; Korkman, 1947), and (2) a relationship between litter size and parity in which litter size continued to increase through the fifth parity or approximately 3 years of age (Carmichael & Rice, 1920; Lush & Mollin, 1942; Olbricht, 1943; Perry, 1956; Lynch, 1965). The difference between these two findings could be construed as evidence for a beneficial effect of parity or previous reproductive experience. An alternative explanation is that the data on the relationship between litter size and age of the dam at first farrowing (Johansson, 1929; Stewart, 1945; Korkman, 1947) have been misinterpreted. In normal husbandry conditions slower growing gilts would reach puberty (and hence be bred) later in life than their faster growing contemporaries. Such an effect would introduce a serious bias into those studies concluding that age effects cease at 15–16 months of age. Our data indicate that litter size continues to increase as the age of the dam at farrowing increases (until at least 2 years of age) and that parity has little or no direct effect on litter size.

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References


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