Preliminary Studies on the Performance of Landrace, Duroc and their Crossbreds in a Tropical Environment

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SUMMARY

A study on the performance of pigs at the Pig Unit, Universiti Pertanian Malaysia, was made. The birth weight per pigling of Landrace-Duroc crossbreds was significantly higher (P<0.01) than the mean of the parental breeds in the first and second farrowing. The crossbreds also showed general improvement in litter size at birth, litter size at weaning, weaning weight, age at first estrus and age at first farrowing. The only exception was the weaning weight at second farrowing in the crossbreds where their performance was lower than the purebreds. This could be attributed to a change of feed. Repeatability estimates of 0.1461 and 0.2416 for litter size at birth in Landrace and Duroc were obtained.

INTRODUCTION

In recent years the trend of swine production in Malaysia has been towards the use of exotic breeds and their crosses. Mahendranathan (1971) has estimated that the Local Chinese Pig accounts for less than 0.5% of the local pig population. In the same paper the reasons for the decline in the popularity of the Local Chinese pig were enumerated. Currently, the popular exotic breeds of pigs in the country are Landrace, Duroc, Yorkshire, Hampshire, Chesterwhite and their crosses. Research data on the reproductive and general performance of these breeds are, however, limited.

The object of this study was to document some of the reproductive and performance data of two of these popular exotic breeds and their crosses.

The observations in this study were made at the Pig Unit at Universiti Pertanian Malaysia in Puchong, about 8 miles from the main Campus. The Pig Unit is located on a hill slope at the fringe of a jungle reserve with a good running stream. Built in 1975, it initially comprised a breeder barn, a farrowing house and nursery house. In 1977, a growing-finishing house was added to the Unit. The farm to-day has a capacity for 40 sows and 250 growing-finishing pigs.

MATERIALS AND METHODS

The farm came into operation in early 1976. Initially, 13 Duroc and 10 Landrace gilts together with two boars of each breed were purchased from the Government Multiplication Station at Serdang. The animals were acquired when they were between three to five months of age. The crossbreds are the progenies of the original stocks.

The current practice at the farm is to keep gilts in pens with four animals to a pen and the boars in individual pens next to the gilts. The object we of this arrangement is to stimulate the gilts to come to early maturity. Feeding is on an ad lib. basis with a proprietary grower's ration of 16% crude protein for both the gilts and boars.
When the animals reach a liveweight of about 90 kg, feed intake is restricted to 2.3 kg a day, twice daily, to avoid excessive fatness. Water is available at all times through automatic water nipples.

Careful observations are made as to periods the gilts come into heat and the dates are recorded. Gilts which come into first heat at between five to six and a half months of age, have their mating delayed until they are between seven to eight months of age. It is hoped that the delayed mating will result in a larger litter size as the number of ova shed per estrus increases gradually over the first several estrus cycles (Pond and Maner, 1974). Gilts which come into their first estrus after seven months are, however, bred at their first heat since it is not economical to wait longer than this. Matings are by natural service. Gilts of one breed are mated to boars of the other breed i.e. Duroc gilts are mated to Landrace boars and vice versa. Gilts are mated a second time 12-24 hours after the first mating as this practice is associated with a higher conception rate resulting in one or two extra pigs per litter.

Once the gilts have been bred, they are restricted to 2.3 kg of a commercial breeder mash and put under observation to see whether they come into heat again 19-24 days later. When pregnancy is confirmed the animals are moved into gestation stalls and kept there until about one week before farrowing. The animals are then moved out of the gestation stalls, thoroughly scrubbed and moved into the farrowing stalls in the farrowing house.

A livestockman is present at all farrowings. When the piglings are born their needle teeth are clipped, their ears are notched for identification and they are weighed within six hours of birth. At three days of age an intramuscular injection of 100 mg iron dextran is given into the ham muscles. Male piglings are castrated at two weeks of age. Piglings are weighed at weekly intervals. The daily amount of feed given to the lactating sow is based on the number of piglings she produces. Each sow receives a maintenance ration of 1.36 kg plus 0.45 kg for every pigling she has. For example, if a sow has given birth to eight piglings she receives 4.9 kg of a breeder ration per day. Piglings are introduced to creep feeding at ten days of age. Weaning is at five weeks. All deaths and their causes are recorded.

Ten good gilts based on general appearance, growth rate and feed efficiency were selected from this first mating for our own farm use. Their management is similar to that described for the pure breeds. Mating of the cross-bred gilts is by the criss-cross method.

Observations in this study were made under the management conditions described above.

**RESULTS**

Table 1 shows the mean values of litter size at birth, birth weight per pigling, weaning weight per pigling and number of piglings weaned. The Landrace-Duroc crossbreds were found to have bigger litter size compared to the Landrace and Duroc in the first farrowing. The same trend was seen in the second farrowing. However, the differences among the various types of pigs were not significant in both the first and the second farrowing.

<table>
<thead>
<tr>
<th>Type of Pigs</th>
<th>No. of Sows</th>
<th>Litter Size at Birth</th>
<th>Birth Wt. per Pigling (kg)</th>
<th>Weaning Wt. per Pigling (kg)</th>
<th>Litter Size at Weaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st Farrowing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landrace</td>
<td>9</td>
<td>8.11 ± 0.70</td>
<td>1.34 ± 0.06</td>
<td>9.03 ± 0.65</td>
<td>7.22 ± 0.80</td>
</tr>
<tr>
<td>Duroc</td>
<td>12</td>
<td>8.17 ± 0.78</td>
<td>1.14 ± 0.05</td>
<td>6.81 ± 0.30</td>
<td>7.92 ± 0.76</td>
</tr>
<tr>
<td>Landrace-Duroc crossbred</td>
<td>8</td>
<td>9.15 ± 0.82</td>
<td>1.47 ± 0.46</td>
<td>7.94 ± 0.46</td>
<td>8.88 ± 0.79</td>
</tr>
<tr>
<td><strong>2nd Farrowing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landrace</td>
<td>7</td>
<td>9.29 ± 0.42</td>
<td>1.31 ± 0.07</td>
<td>8.58 ± 0.52</td>
<td>8.43 ± 0.53</td>
</tr>
<tr>
<td>Duroc</td>
<td>7</td>
<td>9.43 ± 1.13</td>
<td>1.22 ± 0.06</td>
<td>9.69 ± 0.76</td>
<td>9.43 ± 1.13</td>
</tr>
<tr>
<td>Landrace-Duroc crossbred</td>
<td>8</td>
<td>9.50 ± 0.91</td>
<td>1.53 ± 0.06</td>
<td>7.43 ± 0.40</td>
<td>9.13 ± 0.90</td>
</tr>
</tbody>
</table>

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PERFORMANCE OF PIGS IN TROPICAL ENVIRONMENT

The birth weight of the crossbreds differed at a highly significant level from that of the Duroc as well as the Landrace and Duroc combined ($P<0.01$) in the first farrowing. The amount of heterosis, estimated by comparing the mean of the crossbreds with that of the parents, was $20.15\%$. In the second farrowing, the birth weight of the crossbreds was also significantly different from that of the Landrace ($P<0.05$) the Duroc, as well as the Landrace and Duroc combined ($P<0.01$), while the heterotic advantage was $20.68\%$.

Weaning weight in crossbreds in the first farrowing was higher than that of the Duroc, and the Landrace and Duroc combined, but was lower than that of the Landrace. These differences, however, were not significant. In the second farrowing the weaning weight of the crossbreds was significantly lower than that of the Duroc, and the Landrace and Duroc combined ($P<0.05$). This significant difference may be due to the change of feed given to the Duroc, which caused them to show unusual increase in weaning weight.

The crossbreds showed a higher number of piglets weaned when compared to the Landrace and Duroc in the first farrowing. In the second farrowing the number of piglets weaned was slightly higher than the mean of the Landrace and Duroc. In both cases there were no significant differences.

As shown in Table 2, the crossbreds exhibited a lower age at first estrus and at first farrowing; the Duroc was intermediate in values in these two characteristics studied. The differences were, however, not significant.

The repeatability estimate of litter size as calculated according to the method by Becker (1975) is shown in Table 3. Duroc showed a higher repeatability estimate than Landrace.

**DISCUSSION**

A litter size at birth of 7.8 and 8.1 in Landrace in the first and second farrowing respectively was reported by Mahendranathan and Mellish (1972). These values are lower than those shown in Table 1 for Landrace. Anuwar (1968) reported the litter size for Landrace to be 8.09 in the first farrowing. This is in agreement with the value of 8.11 obtained by us. However, his observation of 7.85 in the second farrowing is much lower than our value of 9.29 for Landrace (Table 1). In the crossbreds (different types), Selvarajah (1967) found the litter size to be 8.2 and 9.6 for the first and second farrowing respectively while Mahendranathan and Mellish (1972) obtained values of 8.9 and 9.6 respectively on commercial farms. The Landrace-Duroc crossbreds in our study had a litter size of 9.15 and 9.50 for the first and second farrowing respectively. The three values obtained for litter size in the second farrowing appear to be in general agreement.

Mahendranathan and Mellish (1972) reported the litter size for Landrace at weaning to be 6.5 and 6.6 in the first and second farrowing respectively; and for the crossbreds, the litter size at weaning was 8.3 in the first farrowing. In our study, the Landrace figures of 7.22 and 8.43 for litter size at weaning in the first and second farrowing were higher than those reported by them, while our crossbreds had a litter size at weaning of 8.88 (Table 1).

Age at first estrus and age at first farrowing were 185.38 and 336.25 days respectively. These figures were lower than those for the purebreds (Table 2). Though the differences were not statistically significant, the early maturity and early farrowing in crossbred sows could be of advantage to commercial pig farmers.

**Table 3**

<table>
<thead>
<tr>
<th></th>
<th>No. of sows</th>
<th>No. of litters</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landrace</td>
<td>7</td>
<td>25</td>
<td>0.1461 ± 0.2202</td>
</tr>
<tr>
<td>Duroc</td>
<td>7</td>
<td>25</td>
<td>0.2416 ± 0.2315</td>
</tr>
</tbody>
</table>

**Table 2**

Mean values of age at 1st estrus and age at 1st farrowing

<table>
<thead>
<tr>
<th></th>
<th>No. of sows</th>
<th>Age at 1st Estrus (days)</th>
<th>Age at 1st Farrowing (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landrace</td>
<td>10</td>
<td>208.30 ± 12.43</td>
<td>373.50 ± 24.22</td>
</tr>
<tr>
<td>Duroc</td>
<td>13</td>
<td>205.38 ± 7.40</td>
<td>348.54 ± 6.49</td>
</tr>
<tr>
<td>Landrace-Duroc crossbred</td>
<td>8</td>
<td>185.38 ± 6.01</td>
<td>336.25 ± 5.24</td>
</tr>
</tbody>
</table>
The repeatability estimate of 0.2416 for litter size in Duroc appears to be high compared to the Landrace which had a repeatability estimate of 0.1461 (Table 3). The high standard error of repeatability was due to the very small sample size in both cases. Repeatability estimates of litter size in sows vary from 0.12 to 0.18 (Pirchner, 1969). Turner and Young (1969) indicated that repeatability estimates can be used for predicting the increase in lifetime production which can be achieved through early selection.

On the basis of the results of this limited study it would appear that crossbred sows generally perform better than purebred ones.

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REFERENCES


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