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Reproductive performance of Polish Large White and Polish Landrace sows

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Abstract. Analyses of traits were conducted on six farms breeding Polish Large White pigs and six breeding Polish Landrace pigs. Farms were selected for the analysis based on their similar environmental conditions and the average size of the sow herds, which ranged from 18.8 to 34.9 sows. The sows were housed in groups in pens with straw. The material for analysis consisted of data from breeding documentation covering the period of 2011–2012. The Polish Large White and Polish Landrace sows on the farms analysed were characterized by a high average number of piglets born alive per litter (11.5–13.3). The high variation in this parameter on many farms confirms that further selection is advisable. The average number of litters obtained per sow per year on most of the farms analysed was lower than in countries in which pig breeding is more advanced. In order to be competitive in pork production, breeders should try to improve the number of litters per sow per year. This can be achieved by means of early weaning of piglets and the earliest possible fertilization of sows after lactation. All of this, however, requires optimal living conditions for the animals and their overall well-being.

Keywords: sows, farrowing, piglets, litter

Introduction

The reproductive results of a herd of sows have a significant impact on the profitability of the entire pig breeding establishment (Okularczyk, 2004). For this reason the reproductive performance of sows is still a current subject of research and analysis. From an economic perspective, the chief aim in the reproductive performance of sows is to obtain as many piglets as possible per sow per year, which determines their production cost. The number of litters obtained per sow per year depends on the length of the farrowing interval. When these indicators are not monitored in the herd, the frequency of farrowing is reduced, while in countries in which pig breeding is more advanced the number of litters per sow per year ranges from 2.2 to 2.4 (Pejsak, 2012). Low reproductive utilization of sows in the herd is often caused by poor organization in the area of reproduction. Highly productive pig breeding enterprises wean from 20 to 26 piglets per sow per year, while the average in Poland is about 17 (Skormacki, 2008). In a study by Okularczyk (2004), a fecundity level below 16 piglets resulted in the highest costs of rearing piglets. The author considers this level of fecundity to be critically low, indicating that the sows should be culled from the herd. In terms of the economics of breeding, fecundity at a level of 16 piglets can be considered a threshold value, as the costs of producing one piglet at this level of fecundity were higher over the entire period of the study than market price quotations, i.e. they brought financial losses (Okularczyk, 2004).

Another trait that influences economic results in the herd is the sows’ age at first farrowing. First service either too early or too late is detrimental to production and can cause measurable economic losses in pig production. Mating gilts too early inhibits their somatic development, thus reducing their productivity and the length of their reproductive lives. On the other hand, beginning reproductive life too late increases the risk of problems with fertilization and raises the costs of keeping the animals. The age at which gilts reach breeding maturity depends on a number of factors. The most important of these include genotype, nutrition and housing system (Klocek, 1998; Walkiewicz et al., 1999; Szostak, 2001). Many authors (Matsyiak et al., 2007; Szostak and Przykaza, 2010) believe that the parameters (age and body weight) for a gilt beginning its reproductive life should be continually updated and adapted to the conditions of the farm on which it is kept. According to Katsarov et al. (2002), the number of unproductive days per sow per year depends mainly on the number of litters per sow per year and the length of the lactation period, while the number of piglets weaned per sow per year is correlated only with the number of litters obtained per year. The authors found that on large farms the percentage of sows that did not participate in reproduction ranged from 2.7 to 20.0%, mainly influenced by variation in the number of litters per sow per year.

The aim of the study was to analyse the age at first farrowing, number of piglets born alive per litter, length of the farrowing interval, and the number of litters per sow per year in Polish Large White and Polish Landrace sows.

Material and methods

An evaluation of the reproductive performance of Polish Large White and Polish Landrace sows was conducted based on the following traits: age at first farrowing, number of piglets born alive per litter, farrowing interval, and number of litters per sow per year. An analysis of these traits was conducted on six farms breeding Polish Large White pigs and six farms breeding Polish Landrace pigs. Farms were selected for the analysis based on their similar environmental conditions and the average size of the sow herds, which ranged from 18.8 to 34.9 sows. This breeding herd size is typical of farms in south-eastern Poland. The farms analysed are monitored by the Lublin branch of the Polish Pig Breeders and Producers Association “POLSUS”. The sows were housed in groups in pens with straw. They were fed according to norms developed for domesticated animals (Nawrocki and Grela, 2011).
The material for analysis consisted of data from breeding documentation covering the period of 2011–2012. Reproductive performance traits in the sows were characterized based on the arithmetical mean, standard deviation (SD) and the coefficient of variation (CV). The number of farrowings per sow per year was calculated by dividing the number of days in a year (365) by the length of the farrowing interval.

Results and discussion

The average age at first farrowing and the number of piglets born alive per litter in the Polish Large White sows are presented in Table 1. Analysis of the data concerning age at first farrowing in this breed reveals substantial variation. On one of the farms, the mean age at first farrowing was 313.3 days (farm 1), which was 62 days shorter than on farm 6. Sows on farm 1 were fertilized earliest, at an age of above 6.5 months.

Most specialists believe that a gilt should have its first litter before the age of 12 months. On one of the farms analysed this age was exceeded, as the average age at first farrowing was 375 days, which means that the gilts had been fertilized at an age of over 8.5 months. The possibility of lowering the age of sows at first service without negatively affecting their future productivity has been discussed by Kapelańska et al. (2001). Szulc et al. (2009) observed that litter size had a tendency to increase with the age of sows at first farrowing. Many authors claim that from an economic perspective the optimal time for the first service is between the ages of 200 and 260 days (Schukken et al; 1994; Xue et al; 1996). The average number of piglets born alive per litter was high, from 11.6 to 12.4. On one of the farms the coefficient of variation of this parameter was high (14.9-21.0%), which indicates that selection for fertility in sows is advisable. For the population of Polish Large White sows in the Lublin region, the average fertility in 2012 was 12.1, while the “POLSUS” (Mucha, 2012). These data indicate that the number of litters per sow per year in Polish Large White sows over the last two years was exceeded, as the average age at first farrowing was very low, at 298.7 days, which means that the Polish Landrace sows on this farm were fertilized just after they had reached the age of 6 months. On the remaining farms, the average age at first farrowing in sows of this breed ranged from 306.8 to 346.1 days.

Table 1. Age of the first farrowing and number of piglets born alive per litter in the Polish Large White sows

<table>
<thead>
<tr>
<th>Farms</th>
<th>Average number of sows</th>
<th>Age of the first farrowing (days)</th>
<th>Number of piglets born alive per litter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>CV (%)</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>CV (%)</td>
</tr>
<tr>
<td>I</td>
<td>22.1</td>
<td>313.3</td>
<td>10.7</td>
</tr>
<tr>
<td>II</td>
<td>26.6</td>
<td>339.2</td>
<td>35.2</td>
</tr>
<tr>
<td>III</td>
<td>34.9</td>
<td>357.4</td>
<td>53.9</td>
</tr>
<tr>
<td>IV</td>
<td>33.2</td>
<td>358.3</td>
<td>39.0</td>
</tr>
<tr>
<td>V</td>
<td>24.3</td>
<td>333.6</td>
<td>38.9</td>
</tr>
<tr>
<td>VI</td>
<td>27.3</td>
<td>375.0</td>
<td>26.2</td>
</tr>
</tbody>
</table>

The average age at first farrowing and the average number of piglets born alive per litter in the Polish Landrace sows are presented in Table 3. On one of the farms analysed, the average age at first farrowing was very low, at 298.7 days, which means that the Polish Landrace sows on this farm were fertilized just after they had reached the age of 6 months. On the remaining farms, the average age at first farrowing in sows of this breed ranged from 306.8 to 346.1 days.

The Polish Landrace breed is characterized by early reproductive maturity, so the sows' first service at the age of 6–7 months did not negatively affect their further reproductive performance (Kapelańska et al., 2001).

Figure 1 illustrates the positive changes in age at first farrowing in Polish Large White and Polish Landrace sows over the last two years. The coefficient of variation of this trait, which on most of the farms analysed was over 10%, indicates that it could be further
The study showed variation in the age at first farrowing and the length of the farrowing interval in the Polish Large White and Polish Landrace sows raised on the farms analysed. These are traits which are to a large extent determined by the breeder, who decides on the age at which the gilt will be fertilized and on the length of the lactation period and open period, which make up the farrowing interval.

The Polish Large White and Polish Landrace sows on the farms analysed were characterized by a high average number of piglets born alive per litter (11.5–13.3). The high variation in this parameter on many farms confirms that further selection is advisable.

The average number of litters obtained per sow per year on most of the farms analysed was lower than in countries in which pig breeding is more advanced. In order to be competitive in pork production, breeders should try to improve the number of litters per sow per year. This can be achieved by means of early weaning of piglets and the earliest possible fertilization of sows after lactation. All of this, however, requires optimal living conditions for the animals improved by means of selection. The average number of piglets born alive per litter was high, from 11.5 to 13.3. The average number of piglets born alive per litter for the entire population of Polish Landrace sows in 2011 was 11.7 (Mucha, 2012).

The average length of the farrowing interval in the Polish Landrace sows on the farms analysed ranged from 159.8 to 194.7 days (Table 4.). On the farm with the shortest farrowing interval (159.8 days), a high number of litters per sow per year was obtained – 2.3. On the remaining farms, the number of litters per sow per year in Polish Landrace sows can also be considered high.

Analysis of the results of the swine evaluation contained in the Report on pig breeding in Poland (2012) reveals that farrowing interval length has shown a downward trend in all breeds bred in Poland. This is due to the high level of competition in the pork market both in the European Union and worldwide.

### Conclusions

The study showed variation in the age at first farrowing and the length of the farrowing interval in the Polish Large White and Polish Landrace sows raised on the farms analysed. These are traits which are to a large extent determined by the breeder, who decides on the age at which the gilt will be fertilized and on the length of the lactation period and open period, which make up the farrowing interval.

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### References


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**Table 3. Age of the first farrowing and number of piglets born alive per litter in the Polish Landrace sows**

<table>
<thead>
<tr>
<th>Farms</th>
<th>Average number of sows</th>
<th>Age of the first farrowing (days)</th>
<th>Number of piglets born alive per litter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>I</td>
<td>18.8</td>
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<tr>
<td>II</td>
<td>23.5</td>
<td>298.7</td>
<td>30.6</td>
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<tr>
<td>III</td>
<td>24.2</td>
<td>346.1</td>
<td>34.1</td>
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<tr>
<td>IV</td>
<td>31.4</td>
<td>320.8</td>
<td>24.3</td>
</tr>
<tr>
<td>V</td>
<td>26.0</td>
<td>335.5</td>
<td>31.8</td>
</tr>
<tr>
<td>VI</td>
<td>22.9</td>
<td>315.9</td>
<td>16.4</td>
</tr>
</tbody>
</table>

**Table 4. Period of time between each farrowing and number of farrows from 1 sow in the year for Polish Landrace sows**

<table>
<thead>
<tr>
<th>Farms</th>
<th>Average number of sows</th>
<th>Period of time between each farrowing (days)</th>
<th>Number of farrows from 1 sow in the year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>I</td>
<td>18.8</td>
<td>175.1</td>
<td>32.7</td>
</tr>
<tr>
<td>II</td>
<td>23.5</td>
<td>185.9</td>
<td>18.2</td>
</tr>
<tr>
<td>III</td>
<td>24.2</td>
<td>159.8</td>
<td>13.7</td>
</tr>
<tr>
<td>IV</td>
<td>31.4</td>
<td>194.7</td>
<td>18.7</td>
</tr>
<tr>
<td>V</td>
<td>26.0</td>
<td>191.3</td>
<td>22.7</td>
</tr>
<tr>
<td>VI</td>
<td>22.9</td>
<td>163.5</td>
<td>15.7</td>
</tr>
</tbody>
</table>

**Figure 1.** The age of first farrowing of gilts Polish Large White and Polish Landrace breed in period 2011–2012 year at pig breed farms in Lublin province.


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