

## THE INFLUENCE OF THE INTENSITY OF THE GROWTH OF GILTS ON THE REPRODUCTION PERFORMANCE IN FIRST FARROW

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**Abstract.** The objective of the research was to estimate the influence of the intensity of the growth of Polish Landrace gilts on the fertilization effectiveness, farrow leveling and the number of born and reared pigs in the first farrow. The division of animals into groups was made on the basis of day growth from birth to the moment of the evaluation of the fattening features in a group of gilts aged 150–210 days. Five groups of gilts were distinguished. The first group comprised gilts gaining daily from 500 to 550 grams, the second group – from 551 to 600 grams, the third group – from 601 to 650 grams, the fourth – from 651 to 700 grams, and the fifth group – from 701 to 750 grams. The group of gilts gaining daily from 501 to 550 grams was characterized by the highest percentage of fertilization (79.6%), the group of gilts with the highest rate of growth (from 651 to 700 grams) was characterized by the lowest percentage of fertilization (65.7%). The youngest to farrow were the gilts with the highest rate of growth (from 651 to 700 grams), differing significantly from the gilts from group 1, gaining from 450 to 500 grams. The number of pigs at birth and in the twenty-first day of life was substantially higher in primiparous gilts with the rate of growth from 450 to 500 grams and from 501 to 550 grams, in comparison to the gilts with the highest rate of growth.

**Keywords:** gilts, intensity of the growth, reproductive performance

### INTRODUCTION

The rate of growth of contemporarily reared swine races is rapid and applies both to mother and father breeds [Eckert and Żak 2010]. Now, gilts intended for reproduction much sooner gain the weight of 110–120 kg, which has often been, and still is, the criterion for taking the decision concerning the time of the first mating. This too rapid growth rate and a small amount of fat may have a negative effect on the reproductive functions of primiparous gilts [Koczanowski et al. 2004, Matysiak et al. 2010, Szostak 2010]. The author's own research [Szostak 2010] concerning the influence of gilts' growth rate on the development of reproductive organs proved much better parameters of weight and the size

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of the reproductive system in gilts who had a moderate rate of growth. Kirkwood and Ah-erne [1985] state that age, weight and backfat thickness in gilts have influence on the number of ova shed (potential fertility) of primiparous gilts. The authors state that within the same race, sexual maturity is gained sooner by animals showing a more rapid rate of growth. Cotswold [1995] suggests that the best age for the first mating of purebred gilts is 225 days, at the weight of 130 kg, which means that a mean daily bodily gain of these animals is 573 g. Defining the optimal age and weight of gilts at the first mating, which results from the intensity of growth of the animals, is very important practically. It may contribute to reducing the number of reproductive failures, which are especially common in primiparous gilts. The research over the improvement of the reproductive effectiveness is still conducted and the relations between the parameters are still examined [Michalska and Nowachowicz 2000, Walkiewicz et al. 2004].

The research carried out was to analyse the influence of the intensity of the growth of Polish Landrace gilts on the fertilization effectiveness, farrow leveling and the number of pigs born and reared in the first farrow.

## MATERIAL AND METHODS

The research was carried out on the basis of data concerning 350 Polish Landrace gilts, kept in the conditions of an insemination farm, characterized by an average production scale (about 250 sows of the main herd). Throughout the whole examined period, the animals were kept in identical environmental conditions, ensuring adequate living conditions. The gilts were kept in crates, partly scaffolded, 12 gilts in one crate, with a guaranteed crate area of 1.1 m<sup>2</sup> per one gilt. They were fed in accordance with the Swine Feeding Norms [1993]. The division of the animals into groups was made on the basis of the daily bodily growth from birth to the moment of evaluation of the live fattening values in a group of gilts aged 150–210 days (results of the live evaluation, carried out by POLSUS – Polish Association of Pig Breeders and Producers). Five groups of gilts were distinguished, depending on their daily growth: group 1 – gaining daily from 500 to 550 grams, group 2 – from 551 to 600 grams, group 3 – from 601 to 650 grams, group 4 – from 651 to 700 grams, and group 5 – from 701 to 750 grams.

The gilts were mated naturally, twice during heat, in accordance with the mating programme. Heat was monitored using a heat-check boar, twice a day, after the morning and afternoon feeding. The data concerning the number of fertilized gilts in each group were taken from the breeding documentation kept in the farm archives. On the basis of the data the fertility effectiveness was assessed, which was expressed in percentages.

The analysis of the reproduction performance of gilts in the first farrow was carried out on the basis of the following features: age of the first farrowing, farrow leveling, the number of live piglets born in a farrow and the number of piglets aged 21 days. The farrows treated as leveled were those in which there were no piglets with the weight below 1.5 kg.

The accumulated data underwent a statistical analysis using the method of one-way analysis of variance.

## RESULTS AND DISCUSSION

Table 1 and Fig. 1 illustrates the results defining the fertilization effectiveness of gilts in relation to their growth rate. A mean fertilization effectiveness of the whole group of gilts was 74.3%. As for replacement gilts, this result can be regarded as a good one. The group of gilts gaining daily from 501 to 550 grams was characterized by the highest percentage of fertilization (79.6%) and the group of gilts with the highest rate of growth (from 651 to 700 grams) was characterized by the lowest percentage of fertilization (65.7%). This low effectiveness of fertilization in gilts often results from the fact that behavioural signs indicating heat are often not clear [Stasiak et al. 2006], and the so called silent heat occurs. The author's own research concerning the influence of the intensity of gilts' growth on the morphological features of the reproductive organs of gilts proved that among the gilts characterized by the most rapid growth rate there were more cases of infantile ovaries and infantile reproductive systems [Szostak 2010]. Grudniewska [1998] points out that in the feeding of gilts which are to become part of the basic herd an appropriate and harmonious development of the whole organism, that is the development of the skeletal, muscular and reproductive systems, should be taken into account. According to the author, aiming at very rapid and great body growth of young animals may bring more drawbacks than advantages. Kasprzyk and Babicz [2007], examining the changes in the reproductive performance of Polish landrace pigs, found that 30% of gilts selected to replace gilts in a herd were culled after the first farrowing. Breeding gilts too soon, even those showing appropriate sexual behavioural reactions, may lead to the lowering of the reproduction indicators [Szostak and Katarov 1997, Tummaruk et al. 2001, Imboonnta et al. 2007]. Table 2 summarises the results characteristic of the first farrowing and farrow leveling in gilts at different growth levels. The gilts characterised by the highest bodily gain (from 651 to 700 g) were the youngest to farrow for the first time. This group differed significantly from the gilts in group 1 (gaining from 450 to 500 g). The obtained results confirm the findings of Kirwood and Ahern [1985] that, within their race, animals growing faster, become sexually mature much sooner than those growing slower. In group 5 a mean age of the first farrowing was very young (308 days), which means that gilts in this group became impregnated at the age of about 6.5 months. Modern reproductive gilts are younger and younger and become heavier and heavier at their first mating. The age of the first farrowing of gilts in the whole Polish landrace population reared in the Lubelskie Region decreased by 14 days in comparison to the year 2008, and was 325 days [Szostak and Przykaza 2010]. Impregnating gilts too soon has bad influence on, among other things, issuing leveled farrows. The gilts with a high growth rate, which farrowed much sooner for the first time (group 5), were characterized by a much lower rate of leveled farrows (79.2%) in comparison to group 2, in which the rate of leveled farrows was the highest – 94.1%. Farrow leveling is very important because, to a great extent, the number of reared piglets and their better development depend on it.

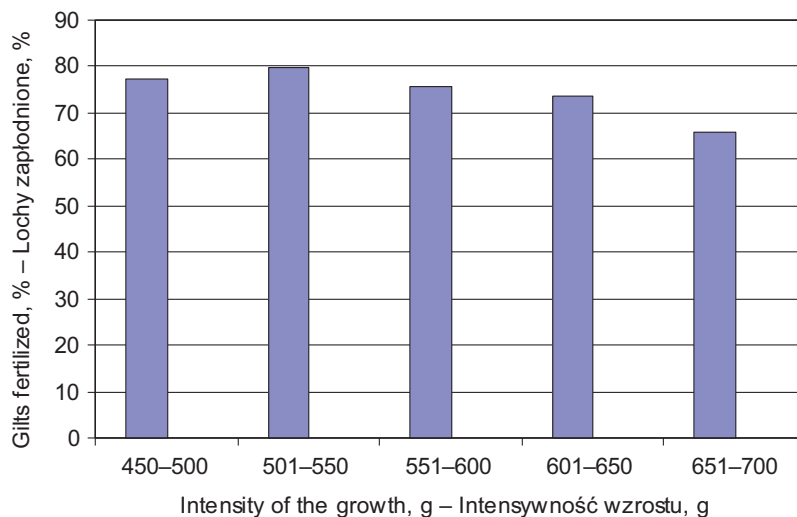


Fig. 1. Effectiveness fertilization gilts with various rate of growth

Rys. 1. Skuteczność zapłodnień loch w różnym tempie wzrostu

Table 1. Effectiveness fertilization gilts with various rate of growth

Tabela 1. Skuteczność zapłodnień loszek o różnym tempie wzrostu

Group Grupa	Intensity of the growth of gilts, g Intensywność wzrostu loszek, g	Number of gilts for breed, n Liczba loszek do rozrodu, n	Number of gilts fertilized, n Liczba loszek zapłodnionych, n	Gilts fertilized, % Loszki zapłodnione, %
I	450-500	75	58	77.3
II	501-550	64	51	79.6
III	551-600	70	53	75.7
IV	601-650	68	50	73.5
V	651-700	73	48	65.7
Total - Razem		350	260	74.3

Table 3 shows the number of live piglets born in a farrow and those 21 days old in relation to the gilts' growth. The analysis of the data shows that the number of born piglets and the number of piglets 21 years old was much higher in primiparous gilts gaining from 450 to 500 g and from 501 to 550 g in comparison to gilts from group 5. The difference in the number of live piglets in a farrow between the gilts in group 1 and 5 was 1.82 pig, and in the number of piglets reared until the 21st day of life – 1.77 pig, and it was statistically important. The results we obtained confirm the suggestions made by other authors that a too rapid increase in the weight of reproductive gilts brings about their earlier impregnation, which in turn negatively influences their reproductive performance [Łyczyński 1995]. Although age at the first mating cannot, on its own, be an optimal indicator of gilts' productivity due to a complex character of reproductive features, still many authors underline

that there are some positive relations between the age of the first mating and the number of piglets born and reared in the first farrow [Iniarska et al. 1991, Matysiak et al. 2010]. The results of our research are in an opposition to that which proves that gilts characterized by a high growth rate have, as sows, a bigger number of farrows and more numerous litters [Tummaruk et al. 2001]. The opinions concerning an optimal age of the first mating of gilts are very different. Tywończuk and Lipiński [2001] claim that a gilt may be mated between the 220th and 230th day of life, at the weight of 120–130 kg. Taking into account these parameters, a gaily growth until the first mating is between 545–565 g. According to American norms, gilts intended for breeding should be fed in such a way so that they could reveal their potential abilities of growth and meat increase before they weigh 100 kg, and after this period they should obtain a limited amount of energy to gain a weight required for mating [NRC 1998]. Before taking a decision about starting the reproductive performance of gilts, the results of a particular herd should be analysed, taking into account the race and the conditions of keeping.

Table 2. Age of first time farrow and farrow leveling gilts with various rate of growth  
Tabela 2. Wiek pierwszego oproszenia i wyrównanie miotów loszek o różnym tempie wzrostu

Group Grupa	Intensity of the growth Intensywność wzrostu	n	Age of first time farrow Wiek pierwszego oproszenia		Farrow leveling Wyrównanie miotów	
			average średnia	%	n	%
I	450–500	58	354a	16.10	53	91.4
II	501–550	51	339	18.27	48	94.1
III	551–600	53	325	17.81	47	88.6
IV	601–650	50	319	20.31	43	86.0
V	651–700	48	308a	22.42	38	79.2

Means followed by the same letters at  $P \leq 0.05$  differ significantly.

Średnie oznaczone tymi samymi literami różnią się statystycznie istotnie przy  $P \leq 0,05$ .

Table 3. Number of pigs born alive and in the twenty- first day of life

Tabela 3. Liczba prosiąt żywo urodzonych i w 21. dniu życia

Group Grupa	Intensity of the growth Intensywność wzrostu	n	Age of first time farrow Wiek pierwszego oproszenia		Farrow leveling Wyrównanie miotów	
			average średnia	%	n	%
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## CONCLUSION

The results gained in the research show that a high rate of growth in Polish Landrace gilts (daily bodily gain over 600 g) negatively influences their reproductive functions. It particularly concerns such features as: impregnation effectiveness, first farrow leveling and the number of piglets born and reared in the first farrow.

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## WPLYW INTENSYWNOŚCI WZROSTU LOSZEK NA WYNIKI UŻYTKOWOŚCI ROZPLODOWEJ W PIERWSZYM MIOCIE

**Streszczenie.** Przeprowadzone badania miały na celu ocenę wpływu intensywności wzrostu loszek rasy polskiej białej zwislouchej na skuteczność zapłodnień, wyrównanie miotów oraz liczbę urodzonych i odchowanych prosiąt w pierwszym miocie. Podział zwierząt na grupy dokonano na podstawie przyrostów dobowych od urodzenia do momentu przeprowadzenia oceny przyżyciowej cech tucznych, w przedziale wiekowym 150.–210. dnia życia. Wyodrębniono pięć grup loszek. Do I grupy zaliczono loszki o przyrostach dobowych od 500 do 550 g, do II grupy – 551–600 g, do III grupy – 601 do 650 g, do IV – 651 do 700 g i do V grupy loszki o przyrostach 701–750 g. Najwyższym procentem zapłodnień (79,6%) charakteryzowała się grupa loszek o przyrostach dobowych mieszczących się w granicy 501 – 550 g, a najniższym (65,7%) loszki o bardzo wysokim tempie wzrostu (651–700 g). Najniższym wiekiem pierwszego oproszenia charakteryzowały się loszki o najwyższych przyrostach (651–700 g), istotnie różniąc się od loszek z grupy I,

o przyrostach w granicy 450–500 g. Zarówno liczba prosiąt przy urodzeniu, jak i w 21. dniu życia były istotnie wyższe u loch pierwiastek o przyrostach w granicy od 450 do 500 g i 501 do 550 g w porównaniu z loszkami o najwyższych tempie wzrostu.

**Słowa kluczowe:** intensywność wzrostu, loszki, użytkowość rozplodowa

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