

## REPRODUCTIVE QUALITIES OF SOWS WITH DIFFERENT DURATION OF THE SERVICE PERIOD AND LACTATION

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### Abstract

*Reproduction is the main and most difficult element of the technological process of pork production. The most important signs of reproductive qualities are the live weight of piglets at birth, the safety of piglets, and the multiple pregnancy of sows. The studies were carried out in the conditions of a reproducer of an industrial pig-breeding complex, in which the influence of the duration of the service period and lactation of sows (suckling period) on their large-fruited, fertility and safety of piglets was studied. The most significant increase in large-fruited was revealed depending on the duration of the service period when only one sow's heat was missed. In the group of sows weaned at 18, 21 and 24 days with a service period of 21-28 days, the large size was 0.054-0.197 kg more than when using sows with a service period of 1-7 days. Multiple pregnancies of the group of sows inseminated in the second heat, with a service period of 21-28 days, and a group of sows with a service period of 45 days or more, increased by 2.34 and 2.39 heads compared to the group of sows without missing heat ( $P < 0.001$ ).*

**Key words:** lactation period, large-fruited, multiple, safety of piglets, service-period.

### INTRODUCTION

In modern conditions of pork production for industrial purposes, one of the most important tasks is the intensification of pig breeding and an increase in meat production. One of the main ways to solve this problem is to increase the reproductive and productive qualities of the pig population through the full use of the production potential of the industry.

The basis for the flow technology of pork production is the reproduction of a herd of pigs therefore one of the main tasks of specialists in the pig industry is to improve the efficiency of using sows. To achieve these goals, the correct organization of herd reproduction is important, which ultimately determines the profitability of the entire industry (Narizhny, 2017).

The reproductive qualities that characterize the productivity of the brood of pigs are economically useful. These include multiple pregnancies, large-fruited, milk production of sows, the safety of piglets during the suckling period, the live weight of pigs at weaning. There are many factors that affect the reproduction quality of sows. Considering that reproductive qualities belong to low heritable indicators, the degree of manifestation of these qualities in the phenotype of sows is more

influenced by different factors. Due to the rational use of environmental factors, it is possible to increase the rates of reproduction. Due to the low heritability of reproductive qualities, scientists have begun to develop more modern genetic methods that would quickly increase the economic profit of the pig industry (Kuiper et al., 1996).

In the conditions of industrial technology, a significant number of pigs do not show their potential capabilities (Mysik, 2016; Pokhodnya, 2002; Pokhodnya, 2015).

A possible condition for improving the reproductive qualities of the brood is a decrease in the number of stillborn piglets and an increase in their health status (Ponomarev, 2003). It is necessary to provide such conditions in which the sow would be able to maximize the possibilities of reproductive function (Bogdanovich et al., 2014).

A whole complex of factors affects the reproductive qualities of sows. Among the most important indicators of the reproductive qualities of sows, there are large-fruited, or live weight of piglets at birth, multiple births of sows, the safety of piglets, as well as the live weight of piglets at weaning.

According to some researchers, early weaning of piglets can reduce the loss of live weight of

sows during the suckling period carry out earlier insemination to obtain the next farrowing. It becomes possible to receive 2.5 farrowings and 25 piglets from each sow per year (Kabanov, 2007; Komlatsky, 2014). The live weight of piglets at birth is of great importance in the practice of pig breeding, since it is the initial value of the body weight, from which the growth of animals continues after their birth (Pokhodnya, 2013).

Piglets born with a live weight of more than 1.0 kg subsequently grow normally, develop and have a high safety. At the same time, piglets born with a live weight of less than 1 kg do not withstand competition for life in nests with larger animals, and 60-80% of them die in the first days of life, and the surviving ones lag far behind in growth, due to what are subject to rejection (Goldobina et al., 2015; Zatsarinin, 2015; Ivanova, 2008; Kuznetsov, 1996).

## MATERIALS AND METHODS

The studies were carried out in the conditions of the reproducer of the pig-breeding complex of the Penza region in 2017-2020 with a capacity of 110 thousand heads of pigs. The experimental part of the work was organized in an industrial zone of a pig-breeding complex on hybrid pigs. In the reproducer of the pig-breeding complex for the production of pork, Topigs Norsvin hybrids were used.

Topigs Norsvin sows were represented by the TN70 line, obtained by crossing two breeds of large white (line Z) and Norsvin Landrace. Uterine pigs TN70 are characterized by good efficiency during the lactation period. The TN70 line combines high productivity and a positive effect on fattening indicators. TN70 has been in use on the farm since 2014. The pigs of this line combine high prolificacy, a large number of pigs grow at weaning, high

viability and a positive heterotic effect in terms of fattening livestock indicators.

The aim of the study was to establish the influence of the duration of the service period and lactation in sows on their subsequent large-fruited, multiple births and the safety of suckling piglets. For the research, nine groups of hybrid sows were formed with different service periods and lactation periods (Table 1).

The weaning-to-insemination interval is one of the main indicators of the efficiency of the use of sows. This interval is defined as the time elapsing from weaning of piglets from a sow to her first, following this, fruitful insemination. Therefore, in order to have as few unproductive days as possible, there is always an interest in reducing this interval as much as possible.

It is known that this interval is associated not only with the unproductive period, but it is also capable of exerting a much greater influence on other indicators of reproduction than was previously thought.

The aim of the study was to establish the influence of the duration of the service period and lactation in sows on their subsequent large-fruited, multiple births and the safety of suckling piglets. The experiments were carried out in the conditions of the reproducer of the "Cherkizovo-Pig Breeding" complex in the Penza region. For the research, nine groups of hybrid sows were formed with different duration of the service period and lactation (Table 1). The livestock of sows was kept in a typical production facility with a high level of mechanization of production processes. The parameters of the keeping of pigs of different sex and age groups, the peculiarities of the microclimate of the pig-breeding premises corresponded to generally accepted standards. Sows were kept in individual pens with an area of 1.26-1.37 m<sup>2</sup>.

Table 1. Scheme of the experiment

Group of sows	The duration of the suckling period (lactation of sows), days	Service period (days)
1st	Eighteen	1-7
2nd	Eighteen	21-28
3rd	Eighteen	45 and more
4th	21	1-7
5th	21	21-28
6th	21	45 and more
7th	24	1-7
8th	24	21-28
9th	24	45 and more

## RESULTS AND DISCUSSIONS

Among all the reproductive qualities of sows, the large-fruited or live weight of piglets at birth is especially distinguished, which largely determines the growth rate of young animals in subsequent age periods. Piglets with low birth weights tend to have low live weights at weaning and are more likely to die and morbidity during the suckling period. Therefore, in order to prevent the birth rate of piglets with a low live weight, it is necessary to pay attention to the genetic aspects, conditions of keeping and feeding, the organization of mating, the state of health of sows and technological measures in the prenatal period (Bilkei, 1999; Trukhachev, 2008).

Diversity determines the number of young animals going to fattening and the total volume of meat produced. The safety of piglets ultimately determines how many young pigs will be fed and pork would be obtained.

Analysis of large off-springs of all groups of sows (Table 2) using weaning piglets for 18, 21 and 24 days showed that the average large off-springs were 1.408 kg. The lowest large-fruited

yield of 1.355 kg was observed during insemination of sows in the first heat after weaning of piglets (service period 1-7 days). In the context of individual farrows, the lowest large-fruited - 1.282 kg - was recorded in the first farrowing with a service period of 1-7 days. When a group of sows was inseminated in the second heat of the weaning field, a significant increase in large-fruited was observed, which was 1.480 kg, which is more than the indicator of a group of sows with a service period of 1-7 days by 0.106 kg ( $P < 0.001$ ). In the group of sows with a service period of 45 days or more, the fruit yield was 1.401 g, which is 46 g more than in the group of sows with a service period of 1-7 days.

Thus, the studies revealed the highest effect on large off-springs of skipping only one hunt after weaning piglets, the effect of missing two hunts was less pronounced. The most significant influence of the number of farrowing on large fertility was noted only in the second farrowing, and later on there was a gradual decrease in large fertility in the dynamics of farrowing.

Table 2. Large size of sow groups on average for all weaning dates of piglets,  $M \pm m$

Farrow	Sow service period						Average	
	1-7 days		21-28 days		45 days or more		n	$\bar{X} \pm m$
	n	$\bar{X} \pm m$	n	$\bar{X} \pm m$	n	$\bar{X} \pm m$		
1	210	1.282 $\pm$ 0.035	189	1.487 $\pm$ 0.038	200	1.390 $\pm$ 0.027	604	1.393 $\pm$ 0.026
2	204	1.344 $\pm$ 0.017	200	1.493 $\pm$ 0.027	203	1.427 $\pm$ 0.019	607	1.421 $\pm$ 0.018
3	207	1.380 $\pm$ 0.028	194	1.443 $\pm$ 0.019	204	1.418 $\pm$ 0.023	605	1.414 $\pm$ 0.019
4	205	1.380 $\pm$ 0.021	195	1.415 $\pm$ 0.025	206	1.398 $\pm$ 0.028	606	1.398 $\pm$ 0.020
5	206	1.373 $\pm$ 0.018	202	1.447 $\pm$ 0.029	206	1.385 $\pm$ 0.021	614	1.401 $\pm$ 0.021
6	205	1.373 $\pm$ 0.025	208	1.480 $\pm$ 0.028	203	1.387 $\pm$ 0.020	616	1.413 $\pm$ 0.022
Average	1237	1.355 $\pm$ 0.020	1188	1.461 $\pm$ 0.025	1222	1.401 $\pm$ 0.020	3647	1.408 $\pm$ 0.018

Analysis of the data on the multiple births in sows at weaning of piglets at 18 days, depending on the duration of the service period, showed a higher multiple birth rate with the longest service period. The highest number was recorded - 88 piglets received in a group of sows with a service period of 45 days or more. Only three piglets less were obtained in the group of sows with a service period of 21-28 days. And the smallest number of offspring- in a group of sows with a service period of 1-7 days - 75 heads.

Over the course of six farrowings with a service period of 1-7 days, abundance averaged

12.50 heads. With a service period of 21-28 days, the prolificacy was 14.17 heads. And with a service period of 45 days or more, the prolificacy reached 14.67 heads. The greatest increase in the number of obtained viable piglets with an increase in the service period was noted in the group of sows with a service period of 21-28 days (Table 3).

Based on the data on the multiple fertility of sows at weaning of piglets at 21 days of age, depending on the duration of the service period, a higher multiple fertility was also noted in animals with an increase in the service period. The largest number of piglets, 89 heads, was

obtained in the group of sows with a service period of 21-28 days. Five piglets were less in the group of sows with a service period of 45 days or more. And the smallest number of litters was obtained in the group of sows with a service period of one to seven days - 73 heads. When analyzing the multiple fertility in sows when weaning piglets at 24 days of age, depending on the length of the service period, a higher multiple fertility was also noted with a longer service period, as well as when weaning piglets at 18 and 21 days of age. The largest

number of piglets was obtained in the group of sows with a service period of 45 days or more - 89 heads. There were two piglets less in the group of sows with a service period of 21-28 days. And the least number of offspring- in the group of sows with a service period of one to seven days - 77 heads.

The preservation and the number of weaned piglets of sows in the experimental groups on average for all weaning periods are presented in Table 4.

Table 3. Multiple pregnancies in sows of experimental groups on average for all weaning periods (head)  $M \pm m$

Indicator	Sow service period			Average
	1-7 days	21-28 days	45 and more days	
1st farrowing	11.40± 0.39	12.69 ± 0.55	12.60 ± 0.65	12.23 ± 0.44
2nd farrowing	12.52 ± 0.42	16.03 ± 0.45	16.04 ± 0.57	14.86 ± 0.41
3rd farrowing	12.55 ± 0.33	14.81 ± 0.38	14.40 ± 0.58	13.92 ± 0.42
4th farrowing	12.51 ± 0.41	14.73 ± 0.44	15.31 ± 0.65	14.18 ± 0.47
5th farrowing	12.32 ± 0.44	14.12 ± 0.38	14.68 ± 0.71	13.71 ± 0.54
6th farrowing	11.40 ± 0.38	14.37 ± 0.47	14.04 ± 0.66	13.27 ± 0.44
Piglets received for 6 farrowings	225	261	261	747
Average	12.12 ± 0.30	14.46 ± 0.47	14.51 ± 0.54	13.70 ± 0.40

Table 4. Safety and number of weaned piglets of sows in experimental groups on average over all weaning period,  $M \pm m$

Indicator	Number of weaned pigs			Average
	Sow service period			
	1-7 days	21-28 days	45 days and more	
1 <sup>st</sup> farrowing	12.43±0.30	11.44±0.31	11.29±0.34	11.72±0.29
2nd farrowing	10.04±0.30	14.27±0.27	14.86±0.33	13.06±0.28
3rd farrowing	11.22±0.33	13.41±0.27	13.31±0.29	12.65±0.28
4th farrowing	11.15±0.47	13.44±0.29	13.84±0.28	12.81±0.33
5th farrowing	10.40±0.54	12.59±0.43	13.80±0.34	12.26±0.41
6th farrowing	10.36±0.29	13.06±0.44	12.56±0.77	11.99±0.48
Total quantity after 6 farrowings	201	235	239	675
Average	10.94±0.35	13.04±0.31	13.28±0.39	12.42±0.35
Piglet safety during the weaning period, %	89.3	90.0	91.5	90.3

Table 4 shows that the average number of weaned pigs was 12.42 heads per nest. During insemination of sows in the first heat, the average number of weaned piglets was 10.94 heads per nest of sows. When one hunt was missed, this figure was 13.04 heads and when two hunts were missed - 13.28 heads. The increase in the number of weaned piglets when missing one heat in comparison with the group

of sows inseminated in the first heat was 2.1 heads ( $P < 0.001$ ). The increase in the number of weaned piglets when missing two hunts in comparison with the group of sows inseminated in the first hunt was 2.34 heads ( $P < 0.001$ ). The difference between the indices of the groups of sows inseminated during the second and third estrus was only 0.24 heads.

The variability of this indicator, depending on the serial number of the farrowing, ranged from 11.72 to 13.06 heads. The largest number of weaned piglets was noted in the second survey, which amounted to 13.06 heads, which was 1.34 heads more than in the first farrowing ( $P < 0.01$ ). A sharp decrease in the number of weaned litters was observed in the sixth farrowing - 11.99 heads, which was less than the data of the second farrowing by 1.07 heads ( $P < 0.05$ ). Apparently, from the sixth farrowing, there was an age-related decrease in the functions of the reproductive system of sows, which was reflected in the number of weaned piglets.

Groups of sows with a service period of 21-28 days for six farrowings had 235 heads of weaned pigs, which is 34 heads more than groups of sows with a service period of 1-7 days. The difference in the number of weaned pigs between the groups of sows with service periods of 21-28 and 45 days or more was only 4 heads.

The survival rate of suckling piglets in the group of sows with a service period of one to seven days was 89.3%, and in the group of sows with a service period of 21-28 days it reached 90.0%, which is 0.7% more compared to a group of sows with a service period of one to seven days. In the group of sows with a service period of 45 days or more, the survival rate increased to 91.5%, which is 2.2% higher compared to the group of sows with a service period of one to seven days. Thus, with an increase in the service period of sows, an increase in the safety of piglets is observed.

## CONCLUSIONS

Thus, the studies carried out indicate that some technological features of the use of sows in reproduction, namely the duration of the service period and lactation, have a significant impact on the final indicators of the reproductive qualities of sows. In the conditions of large pig breeding enterprises, the technologies being developed will help to significantly increase the yield of piglets from brood of pigs. In particular, skipping one sow hunt will significantly increase the large-fruited, multi-fertile sows and the safety of the piglets obtained from them.

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