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REPRODUCTIVE QUALITIES OF SOWS AT DIFFERENT DURATIONS OF PREVIOUS LACTATION

Ruslan SHVACHKA[1*], Mykola POVOD[1*], Olekasndr MYKHALKO[1*], Mykola SHPETNYI[1], Olga KORZH[1*], Tetyana VERBELCHUK[2], Olena SHCHERBYNA[3]**

[1]Sumy National Agrarian University, *Department of Feed Technology and Animal Feeding, **Department of Animal Breeding and Selection and Aquatic Bioresources, 160, H. Kondratiiev St., Sumy, Ukraine, Phones: +38(093)1466517, +38(066)2871386, +38(095)5488087, +38(050)3072033, E-mails: ruslans19hvachka@gmail.com, nic.pov@ukr.net, snau.cz@ukr.net, nshpetny@gmail.com, korg.olga@ukr.net
[2]Polissia National University, Department Livestock Production Technologies of Animal Products, Staryi Boulevard, 7, Zhytomyr, Ukraine, Phone: +38(098)2482590, E-mail: ver-ba555@ukr.net
[3]Kherson State Agrarian and Economic University, Department of processing and storage technologies of agricultural products, 23, Stritenska St., Kherson, Ukraine, Phone: +38(099)0394812, E-mail: lenanej@ukr.net

Corresponding author: snau.cz@ukr.net

Abstract

To achieve the goals of our study, we investigated the dependence of reproductive qualities of sows on different duration of previous lactation. For the study, three hundred pigs were selected into two separate groups with an equal number of 150 animals in each, taking into account the age, genotype and fatness. The first group included sows that had previous lactation for 28 days and the second group included sows that had previous lactation for 21 days. After seventh week of gestation, including results of ultrasound scanning, all pregnant sows were transferred into two identical sections for keeping females with established gestation, where they were kept in stable groups of 60-65 heads. On 110 day of gestation, all sows were transferred to the farrowing branch where they were kept during pregnancy and lactation under identical feeding conditions and microclimate. As a result of the study it was found that duration of previous lactation had no impact on gilts productivity besides the indicator weight of piglets nest at birth, which was 3.15% higher in sows with traditional duration of lactation. There was no difference in the growth intensity of suckling piglets in sows with traditional and reduced lactation.

Key words**:** *oestrus, durations of previous lactation, pregnancy, farrow, growth intensity*.

INTRODUCTION

Pig farming has been a traditional branch of animal husbandry in Ukraine since ancient times, which today provides a third of the population's demand for meat products [7]. In Ukraine, as in most developed countries, it is characterized by intensification and concentration of production. This in turn requires a constant increase in pig productivity to ensure the competitiveness of the industry in the meat market [15, 4]. One of the methods of intensification of pig breeding is to reduce the duration of the sows suckling period [14, 6, 19, 24]. This is due to the use of the latest advances in genetics, biochemistry, physiology, feed production technology and improved housing conditions for sows and their offspring [9, 16].

The advantage of early piglets weaning, according to scientists from different countries [29, 2, 27], is more intensive use of sows by reducing its reproductive cycle, which provides more piglets from them and more efficient use of production areas of farrowing buildings.

Different countries use different terms of weaning piglets, so in the USA and Canada piglets are weaned at 14-16 days, while in the EU they are weaned at the age of 28 days [10, 5, 18]. At the same time, in most countries

with developed pig breeding, the duration of lactation of sows is 21 days [12].

There is no consensus among scientists and pork producers today about the age of weaning piglets and its effectiveness. Thus, researchers in pig breeding [11, 20, 21, 22, 25, 28] point to the positive results of early piglets weaning from sows.

However, there is a dissenting opinion of other scientists [3, 26], which indicates the negative effects of reducing the lactation period on the further growth and development of piglets and sow health. At the same time, according to studies by scientists [1, 8], no probable divergence was obtained in the effectiveness of traditional and shortened weaning of piglets from sows.

Thus, we observe the lack of an unambiguous approach to assessing the dependence of sow productivity on lactation.

In order to study the impact of the duration of lactation of sows on its further productivity and economic efficiency of different weaning periods of piglets, we conducted a comprehensive study in an industrial pig farm.

MATERIALS AND METHODS

The experiment compared the reproductive qualities, technological and economic parameters of local sows of Irish origin, which had a previous lactation for 28 and 21 days.

For this purpose, according to the scheme of the experiment, three hundred pigs were selected into two separate groups with an equal number of 150 animals in each, taking into account the age, genotype and fatness (Table 1). The control group (group 1) included sows who had previous lactation for 28 days. The experimental group (group 2) included their analogues, whose previous lactation was 21 days.

All experimental sows were placed in pairs into the conditions of the industrial pigsty of Globinsky Pig Complex LLC, Poltava region, Ukraine, where they were artificially inseminated with mixed boars semen of the synthetic terminal line MaxGro genetic company HermitageGenetics. During the idle and conditionally pregnant period, sows in both groups were reared in identical individual pens measuring 0.7 by 2.4 m on a partially slotted concrete floor with standardized feeding, which was regulated by means of volumetric feed dispensers. Watering of sows was carried out from drinking bowls of a constant level. On the seventh week of gestation, after ultrasound scanning, all pregnant sows were transferred into two sections for keeping females with established gestation. They were kept there in stable groups of 60-65 heads, on a fully slotted concrete floor at the rate of 2.2 m^2 per head. Feeding of experimental animals was dosed using BigDutchman's Calmatic feed stations with compound feeds, which were produced at their own compound feed plant for conditionally pregnant sows. The indoor ventilation system for both groups was similar.

Our current research respond to the basic principles of behavior with experimental animals defined in the "European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes" (1986) and requirements of the Law of Ukraine "On the Protection of Animals against Cruelty" (2006).

Factor analysis of the study results was performed by Statistica v.10.

Table 1. Scheme of the experiment for research gilts reproductive characteristics at different durations of the previous suckling period

Indicators	Group I, n = 150	Group II, n = 150
Duration of previous lactation, days	28	21
Number of sows at insemination, heads	150	150
Number of sows on farrowing, heads	120	120
Duration of the studied lactation, days	28	28

Source: Own calculations.

On 110 day of gestation, all sows were transferred to the farrowing branch of farm, where they were kept during pregnancy and lactation under identical feeding conditions and microclimate. Farrowing and suckling piglets were carried out in a farrowing branch with 60 heads in each section in pens measuring 1.8 by 2.4 m. The floor was completely slotted and made of cast iron for sows and of polymer for piglets. Each pans was equipped with a water heating mat and an

infrared lamp to create a local microclimate for the piglets.

From the second day of lactation, sows were fed eat at will, using individual feed dispensers of Sowmax company HogSlat Ukraine. Their watering was carried out from an individual nipple autodrinker located near the feeder. The piglets of both groups were fed from 7 days of age with Cargil pre-starter feed, using a removable round feeder, which was attached to the lattice floor. And the piglets were watered from a bowl autopouler located in the rear part of the pans.

The experiment studied the following indicators of sow productivity: duration of idle period, duration of gestation, duration of the reproductive cycle, the proportion of sows that came in time after weaning piglets, fertility of sows after weaning piglets, the percentage of their farrowing, the duration of the study feed for the reproductive cycle and the frequency of pans using for farrowing sows, total quantity of piglets born, sow fertility and the quantity of piglets weaned from the sow, high fertility and nest weight of piglets at weaning. In the process of weaning piglets of both experimental groups were outweighed and on the basis of these data was calculated the intensity of their growth.

RESULTS AND DISCUSSIONS

No statistically probable divergence in sows of both group was obtained for the total quantity of born offspring, sow fertility, piglets weight at birth, the quantity of piglets weaned from the sow, piglet preservation, nest weight of piglets at weaning. However, all these indicators tended to increase in animals with longer lactation. A significant excess of 0.55 kg ($p \leq 0.05$) was observed in animals of the group I over analogues from the experimental group II only for indicator of the weight of piglet nest at birth (Table 2).

Thus, the duration of previous lactation had no impact on gilts productivity besides the indicator weight of piglets nest at birth, which was 3.15% higher in sows with traditional lactation duration (group 1).

There were also no significant differences in the intensity of growth of suckling piglets. Both absolute and average daily and relative gains did not depend on the duration of previous lactation (Table 3).

Table 2. Dissemblance in reproducible characteristics of gilts at different durations of the previous period of sucking

Indicators	Group I, n = 150	Group II, n = 150
Total quantity of born offspring, heads	14.62±0.249	14.45±0.170
Sow fertility, heads	13.43±0.203	13.31±0.145
Piglets weight at birth, kg	1.39±0.05	1.36±0.005
The weight of piglet nest at birth, kg	18.67±0.176[1]	18.10±0.189
The quantity of piglets weaned from the sow, heads	11.56±0.232	11.47±0.216
The middle-weight of piglets weaned from the sow, kg	7.83±0.175	7.76±0.091
Piglet preservation,%	86.11±0.331	86.17±0.41
The nest weight of piglets at weaning, kg	90.49±1.112	89.01±1.235

Source: Own calculations.

[1] - $P < 0.05$.

Table 3. Growth intensity of suckling piglets at different suckling durations

Indicators	Group I, n = 150	Group II, n = 150
Absolute gain, kg	6.44±0.232	6.40±0.217
Average daily gain, g	238.5±0.328	237.0±0.352
Relative gain, %	139.70±0.128	140.35±0.135

Source: Own calculations.

The duration of the studied lactation was almost the same in sows of both groups. Pre-lactation was 7.07 ($p \leq 0.001$) days longer in group I gilts comparatively to group II gilts. As a result, the gilts of group I had a longer idle period by 0.42 ($p \leq 0.01$) days (Table 4).

Also in animals of group II the gestation period was longer by 0.39 days ($p \leq 0.05$). However, despite the longer idle and gestation periods, due to the reduction of the term of sucking by 7.07 days, the length of time of the reproductive cycle in sows of the experimental group was probably 6.26 days shorter ($p \leq 0.001$). This made it possible to receive 0.11 more farrowings from each sow during the year, and due to the shorter lactation period to use 2.6 times more often each of the farrowing pens available on the breeder. The increase in the quantity of feed consumed by 36.3 kg was due to an increase in the time spent by animals in the department of conditionally pregnant and pregnant sows. The reason for the increase in this stay was the reduction of the suckling period in sows of group I. The cost of additional feed consumed was 8.6 EUR.

Table 4. Technological and economic indicators of sows for different durations of the previous weaning period

Indicators	Group I, n = 150	Group II, n = 150
Duration of the previous sucking period, days	27.83±0.107[3]	20.76±0.102
Duration of idling period, days	4.71±0.091	5.13±0.107[2]
Duration of pregnancy, days	115.32±0.103	115.71±0.112[1]
Duration of the reproductive cycle, days	147.86±0.109[3]	141.60±0.114
Number of farrowings per year, times	2.47	2.58
Achieving oestrus after weaning,%	89.33	86.0
Number of piglets received per year, heads	33.17	34.35
Number of weaned piglets per year, heads	28.55	29.59
The cost of additional products, EUR	-	25.1
Fertility of sows after weaning piglets, %	96.27	93.80
The percentage of farrowing, %	95.35	93.39
Duration of the studied sucking period, days	27.79±0.101	27.67±0.144
The frequency of use of the pans for farrowing, times	10.4	13.0
The duration of idle and offspring periods per year, days	286.0	300.5
Average daily feed intake during the growing season, kg	2.5	2.5
Feed consumed by pregnant sows during the year, kg	715.0	751.3
The cost of feed consumed by pregnant sows during the year, EUR	168.9	177.5
Quantity of days of sucking period during the year, days	79.0	64.5
Feed consumed by suckling sows during a day, kg	6.1	6.0
Feed consumed by suckling sows during the year, kg	482.0	371.5
The cost of feed consumed by suckling sows during the year, EUR	167.9	129.4
The cost of feed consumed per year, EUR	336.8	306.9
Difference, EUR		-29.9

Source: Own calculations.
[1] – P < 0.05; [2] – P < 0.01; [3] – P <0.001.

Animals of the experimental group consumed 8.6 EUR more cheaper feed due to the increase in the duration of keeping in the department of conditionally pregnant and pregnant gilts. At the same time, they spent 14.5 days less in the farrowing branch and consumed 110.9 kg less expensive feed for suckling sows, the cost of which was 38.5 EUR. In general, 336.8 EUR were spent per year on feeding one sow during the traditional duration of lactation, while for the shortened suckling period the cost of feed was 29.9 EUR less. With a reduced weaning period of piglets (group II) from one sow per year received 34.35 piglets, of which 29.59 heads were weaned, while the traditional duration of the lactation period (group I) per year was obtained by 1,18 heads or 3.56% and weaned by 1.04 heads or 3.64% of piglets less compared to sows who had reduced lactation. The cost of additional products at today's prices is 25.0 EUR.

But with the positive results of reducing the duration of the sucking period in our experiment we revealed its negative consequences. Thus, sows with reduced lactation were 3.33% worse at achieving oestrus after weaning piglets. Of sows that achieved oestrus after weaning the piglets were fertilized after insemination by 2.47% less and part of them on 1.96% less reached farrowing. In general, after weaning the piglets and before the next farrowing sows with a reduced duration of lactation had 7.76% more technological dropout and death.

Thus, sows with a reduced suckling period had an 8,9% longer service period, a 0.34% longer gestation period and a 4.42% shorter reproductive cycle, which allowed to obtain 0.11 farrowings per year and 1.26 more piglets per year. Due to the reduction of the duration of lactation by 7.07 days, the intensity of use of the farrowing pens increased by 25.0% and decreased by 29.9 EUR feed cost of keeping a sow. At the same time, 7.76% less sows in the experimental group started the next farrowing. The reason for this, we believe their poorer achieving oestrus after weaning piglets, their poorer fertility and higher rates of their disposal after farrowing. Thus, like [1, 8], we can say that a significant direct effect of weaning on reproductive quality and growth intensity of piglets has not been established. Simultaneously, it contradicts with our previous study [23], which found a significant effect of increasing lactation on improving indicators of the weight of one head at birth by 1.45-5.76%, the average daily gain of piglets by 0.61-15.03% and indicators preservation of piglets 0.60-3.59%. Also, our conclusion does not coincide with study [13], which states that with a shorter weaning period, the total number of weaned piglets is higher ($p < 0.05$). However, the study found a positive effect of early weaning on the efficiency of the farm's production facilities and the growth of economic benefits from the use of this method, as claimed by other scientists [11, 20, 21, 22, 25, 28]. However, our findings coincide with reports [10, 5, 3] about some negative impact of reducing the lactation period on the indicators of the achieving oestrus after weaning piglets, their subsequent fertilization and the duration of the service period.

In our study, we obtained worse characteristics of fertilization and farrowing due to the reduction of the duration of the lactation period, which corresponds to the data obtained by other authors [17].

CONCLUSIONS

The duration of previous lactation had no impact on gilts productivity besides the indicator weight of piglets nest, which was 3.15% higher in sows with traditional duration of lactation, but for all indicators of reproductive characteristics there was a tendency to increase in animals with traditional suckling duration. There was no difference in the growth intensity of suckling piglets in sows with traditional and reduced lactation. Gilts, whose suckling term was shorter, had a 4.42% shorter reproductive cycle, which allowed to receive 3.64% more farrowings and 3.56% of piglets per sow per year and wean 3.64% more, which gave additional products in the amount of 25.0 EUR. Due to the reduction of lactation duration by 7.07 days, the intensity of use of the farrowing pens increased by 25.0% and decreased by 29.9 EUR feed cost of keeping a sow. At the same time, due to achieving oestrus after weaning piglets of sows with a reduced suckling period after weaning, worse fertilization and more care during the gestation period, less than 7.76% of them came from weaning to the next farrowing.
Sows with reduced lactation duration had an 8.90% longer service period and a 0.34% longer gestation period.

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