EFFECT OF GESTATION LENGHT OF SOWS ON NUMBER OF STILLBORN PIGLETS AND THEIR LOSSES BEFORE WEANING IN REPOPULATED HERD

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Abstract

The aim of this work was to analyze gestation lenght of sows in relation to numbers of stillborn piglets and losses of piglets from birth to weaning before repopulation (status A) and after repopulation (status B). 160 sows were included in the experiment. The repopulated group of sows showed longer gestation, particularly 116.90 ± 3.62 days, compared to sows before repopulation, with 115.31 ± 1.48 days of gestation. At the same time with longer gestation, lower losses of piglets were recorded (1.18 ± 1.44 piglets and 7.48 ± 8.62 %) from birth to weaning contrary to shorter gestation with highly statistically significantly ($P \leq 0{,}001$) higher losses, particularly 2.05 ± 1.43 piglets and 17.29 ± 10.49 %. With shorter gestation lenght, also number of stillborn piglets increased (1.88 ± 1.55 piglets and 13.45 ± 10.33 %). With longer gestation, the number of stillborn piglets decreased (1.21 ± 1.53 piglets and 7.18 ± 8.34 %) with highly and very highly statistically significant difference ($P \leq 0.01$; $P \leq 0.001$ respectively). The results indicate that repopulation of sows positively influences numbers of stillborn piglets and losses of piglets before weaning.

Key Words: reproduction, sow, piglet, losses

Breeding of sows is from both farming and economical perspectives one of the most difficult parts of pig breeding. The objective of breeding sows is to produce quality piglets for own rearing or sale and achieve profit. A certain presumption of effectivity of breeding sows is assuring good health status of animals and high performance characterized by numbers of reared piglets per sow (Boudný and Špička, 2012). Parameter of reared piglets is at the same time not only an indicator of reproductive intensity, but also an indicator of economical effectivity of piglets production. Roehe and Kalm (2000) consider the number of reared piglets per sow the most important parameter within pig breeding optimization. Hellbrügge *et al*. (2008) report, that despite improving performance, nutrition and housing conditions in farming of sows, significant mortality of piglets remains substantial problem. This is confirmed also by Fix *et al.* (2010) with finding that the largest share on losses within slaughter pig production are covered by losses of piglets from birth to weaning. According to Panzardiho *et al*. (2013) the factors contributing to the mortality can be also connected to low growth intensity of piglets before weaning. Finch *et al*. (2004) indicate low birth weight as the main factor influencing piglets mortality. According to Devillers *et al*. (2007) the losses of piglets associated with low birth weight are connected to lower intake of colostrum and subsequently milk as a result of competitive disadvantage and also to higher susceptibility to disease and worse ability to cope with negative effects of stress factors. Fix *et al.* (2010) point out the important effect of parity, when higher parity increased losses of piglets from birth to weaning ($P < 0.01$). Borges *et al*. (2005) evaluated effect of number of parity on the level of intrapartal losses and found 1.7 times higher probability of stillborn piglets after the 5th and higher parity compared to the 2nd to the 5th parity ($P < 0.05$). Canario *et al*. (2006) state, that the probability of stillborn piglets decreased slightly from the first to the second parity, then continuously increased up to the fifth and higher parities. Some authors assume that also gestation lenght of sows can affect the losses of piglets (Rydhmer *et al*., 2008).

Material and Methods

The aim of the work was to analyze gestation lenght of sows in relation to numbers of stillborn piglets and losses of piglets from birth to weaning in sows before repopulation (status A) and after repopulation (status B). 160 sows were included in the experiment (80 sows in status A, 80 sows in status B).

The original population of sows was removed before repopulation. Before bringing the repopulated sows the stable was thoroughly decontaminated and strict provisions of biosecurity protecting from introduction of pathogenic agents were applied on the farm.

Technologies and stabling and feeding techniques were the same for both groups of sows. In the category of inseminated sows, both groups of experimental animals were stabled individualy from the beginning of estrus, at the period of insemination up to the detection of gravidity, i.e. for one month. This category of sows was fed with loose dry feed mixture by the means of individual feed discharger according to individual condition. Pregnant sows were moved to group static pens for 15-20 animals. Animals were equipped with transponders for identification and dosing of feed ration from feed station (feed compident). Pregnant sows were fed with moistured feed mixture. The sows were kept in these pens until 5 days before farrowing on average. In the category of sows in high stage of pregnancy, farrowing sows and lactating sows the animals were stabled in individual farrowing pens with whole slatted plastic floors and the farrowing house was divided into sections. This category was also fed with dry loose feed mixture automatically. Air exchange, both in farrowing section and in section for inseminated and pregnant sows, was conducted in an automated manner. Optimal microclimate for piglets was ensured with the use of heating pads. Additional feeding of piglets was done from the 3rd day after birth. For easy identification, the piglets were marked with individual code by the means of ear notching after birth. Castration of male pigs was carried out before the 5th day after birth. The piglets were weaned at the mean age of 28 ± 3 days.

In both groups of sows, phenotypic level of selected parameters was observed:

- lenght of gestation (days)
- number of stillborn piglets (piglets/litter)
- losses of piglets before weaning (piglets/litter)

Statistical analysis was performed using statistical software QC-Expert 3.2 and Microsoft Excel 2010. Processed values of observed parameters are presented by basic statistical characteristics, namely mean, standard deviation, coefficient of variation, minimum value, median and maximum value. Statistical significance of differences between mean values of observed parameters is evaluated as follows: NS statistically insignificant difference ($P \geq 0.05$); * statistically significant difference ($P \leq 0.05$); ** highly statistically significnt difference ($P \leq 0.01$), *** very highly statistically significant difference ($P \leq 0.001$). Correlation analysis between parameters was also performed.

Results and Discussion

Analyzis of effect of gestation lenght on the number of stillborn piglets and losses of piglets revealed differences (Tab 1) between observed groups of sows before and after repopulation. The gestation lenght of the repopulated group of sows was longer, particularly 116.90 ± 3.62 days compared to the sows before repopulation with 115.31 ± 1.48 days of gestation. At the same time, lower losses of piglets (1.18 ± 1.44 piglets and 7.48 ± 8.62 %) were recorded with the longer gestation of sows contrary to very highly statistically significantly ($P \leq 0.001$) higher losses, 2.05 ± 1.43 piglets and 17.29 ± 10.49 %, with shorter gestation.

Also the number of stillborn piglets increased (1.88 ± 1.55 piglets and 13.45 ± 10.33 %) with shorter gestation. With longer gestation the number of stillborn piglets decreased (1.21 ± 1.53 piglets and 7.18 ± 8.34 %) with highly and very highly statistically significant difference ($P \leq 0.01$; $P \leq 0.001$) respectively.

Hoy *et al*. (2009) described the gestation lenght of 115.2 days in their evaluation of fertility of sows. Baxter *et al*. (2008) found 115.1 days as the most frequent gestation lenght, within their observation they analyzed the effect to gestation lenght on the number of stillborn piglets. They found no significant relation between the lenght of gestation and the number of stillborn piglets. Neither evaluation of an effect of gestation lenght on the losses of piglets from live -born before weaning revealed any significant differences, however the piglets coming from gestation lasting 115 days had higher survivability than piglets coming from 114 days long gestation. Also Rydhmer *et al*. (2008) conclude that selection on longer gestation lenght could improve survivability of piglets after birth and their growth. Canario *et al*. (2006) recorded shorter gestation in their experiment. Large White sows with gestation lenght 113.7 days had total number of piglets of 12.2, of which 10.6 were live-born and the proportion of stillborn piglets was 6.5 %. Hybrid sows Duroc x Large White with 113.6 days long gestation had 12.8 piglets in total, 11.6 piglets were live-born and 4.8 % of piglets were stillborn.

Table 1. Basic statistical characteristics of gestation lenght of sows in relation to stillborn piglets and losses of piglets from birth to weaning before and after repopulation

Parameter	Status	n litters	Mean	S_x	V_x	Min	Me	Max	t test
Gestation lenght (days)	**A**	80	115.31	1.48	1.28	113	115	119	***
	B	80	116.90	3.62	3.08	114	117	147	
Number of stillborn piglets (piglets/ litter)	**A**	80	1.88	1.55	82.87	0	2	6	**
	B	80	1.21	1.53	126.34	0	1	8	
Number of stillborn piglets (%/litter)	**A**	80	13.45	10.33	76.82	0.00	12.5	40.00	***
	B	80	7.18	8.34	116.16	0.00	5.88	40.00	
Losses of piglets (piglets/litter)	**A**	80	2.05	1.43	69.81	0	2	8	***
	B	80	1.18	1.44	122.45	0	1	7	
Losses of piglets (%/litter)	**A**	80	17.29	10.49	60.66	0.00	16.67	50.00	***
	B	80	7.48	8.62	115.18	0.00	6.07	37.00	

** = highly statistically significant difference ($P \leq 0.01$); *** = very highly statistically significant difference ($P \leq 0.001$)

Lewis *et al*. (2009), who analyzed relation of health problems of sows with numbers of stillborn piglets, found 3.00 stillborn piglets per litter of ill gilts and 0.60 stillborn piglets per litter of healthy gilts and their study also emphasis that gilts have higher numbers of stillborn piglets. Schneider *et al*. (2011) point out that the number of stillborn piglets is determined by size of the litter, which affects also lenght of farrowing. Longer farrowing leads to higher number of stillborn piglets. Von der Lage and Hoy (2008) note that repopulation of herd increases numbers of reared piglets and leads to decrease of losses. Tuchschere *et al*. (2000) found out that the survivability of piglets is influenced by the lenght of farrowing and order of piglets. Piglets born between the last ones in a litter died more than piglets born between the first ones. Baxter *et al*. (2008) evaluated survivability of piglets and recorded the losses of piglets from live-born before weaning of 11.9 %. Brüssow and Wähner (2008) in their study on reproductive performance of sows consider the losses below 10 % as non problematic.

Tab 2. presents correlation dependences between gestation lenght of sows and numbers of stillborn piglets and losses of piglets from birth to weaning in sows before and after repopulation. There is an evident negative correlation between the gestation lenght and number of stillborn piglets in both groups, however it is statistically insignificant. Statistically insignificant is also correlation dependence found between the lenght of gestation and losses of piglets. Rydhmer *et al*. (2008) who studied gestation lenght in relation to losses of piglets found negative correlation between gestation lenght and losses of piglets in their observation.

Table 2. Correlation analysis between gestation lenght of sows and number of stillborn piglets and losses of piglets from birth to weaning

Parameter	Number of stillborn piglets (piglets/ litter)	Losses of piglets (piglets/litter)
Gestation lenght (days)	Status A	
	-0,137 ^{NS}	0,088 ^{NS}
	Status B	
	-0,133 ^{NS}	0,137 ^{NS}

NS = statistically insignificant difference ($P \geq 0.05$)

Conclusion

The results of this work show that repopulation of sows, which is used for improvement of health status in herd, influences the lenght of gestation. In repopulated group of sows the gestation lenght increased of 1.59 day ($P \leq 0.001$). The resuts indicate that longer gestation of sows lowers the numbers of stillborn piglets ($P \leq 0.01$) and their losses before weaning ($P \leq 0.001$).

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