

Number of piglets born and reared by sows with different number of mammary teats

ANNA REKIEL¹, JUSTYNA WIĘCEK¹, MARTA PARUCH¹,
JAROSŁAW PTAK², TADEUSZ Blicharski²

¹Department of Pigs Breeding, Warsaw University of Life Sciences – SGGW

²Polish Pig Breeders' and Producers' Association "POLSUS"

Abstract: *Number of piglets born and reared by sows with different number of mammary teats.* The purpose of the studies was to determine the number of piglets born (NPB) and reared until 21 day (NPR) by the sows of Polish Landrace and Polish Large White breeds, differing in the number of teats. For calculations, the results from breeding pig houses of the Mazovian region, collected during the years 2004–2009, were employed. Three groups of females were distinguished for the particular breeds: those ones, possessing 14, 15 or 16 teats. The number of records for Polish Large White was equal to 1,019 and for Polish Landrace, it was 1,732. The statistically confirmed differences were revealed in respect of NPB by the groups of females, possessing 14, 15 or 16 teats ($P \leq 0.01$) and NPR until the age of 3 weeks by the sows of the same breed, possessing 14 or 15 teats ($P \leq 0.05$). The differences in NPB and NPR in the sows which possessed 14, 15 or 16 teats were not statistically confirmed ($P \leq 0.05$). Any univocal relationships between the deaths of the piglets until 21 day of life and the number of teats in the sows of the examined breeds were not found; the level of losses varied from 10.60 to 12.65%. The obtained results indicate that the number of teats in the sows may affect the results of rearing the piglet until 21 day. The access to mother milk is not, however, the only one indicators of success in rearing of the progeny.

Key words: sows, number of teats, born piglets, reared piglets

INTRODUCTION

The number of teats in Suidae reveals considerable species and breed differentiation (Haley and Lee 1992, Komosińska and Podsiadło 2002 as cited by Paruch 2011). Heritability index (h^2) of the mentioned trait was determined for pigs of different breeds, *inter alia* for Polish Landrace and Polish Large White and their crossbreds as well as for Landrace, Yorkshire and Hampshire swine. The differences in its value depending on the breed (purebreds/hybrids) and the site of teats (front/rear) were found (McKay and Rahnefeld 1990, Haley and Lee 1992, as cited by Paruch 2011). The calculated values of h^2 for the number of teats amounted to 0.226–0.45 (McKay and Rahnefeld 1990, Lewczuk et al. 1991, Haley and Lee 1992, cited by Paruch 2011) and less than 0.1 (Lechowska and Ruda 2000). The studies confirmed also the incidence of specific relationship between the position in the group hierarchy, body weight of the piglets and the mother teats, suckled by her progeny (Surdacki and Józwiakowska-Rekiel 1988, Valros et al. 2002). Additionally, Lee and Wang (2001) found that the number of teats, their conformation and distribution were not only the traits

subject to control and selection but also revealing effect on development of the piglets.

The aim of the study was to determine the number of the piglets born (NPB) and reared until 21 day (NPR) by Polish Landrace and Polish Large White sows with different number of teats.

MATERIAL AND METHODS

The analysis employed the results, obtained in breeding pig houses of the Mazovian region, as collected in the years 2004–2009. The number of the records for Polish Large White breed was equal to 1,019 and for Polish Landrace – 1,732. The number of the piglets born and reared until 21st day was calculated separately for the sows of each breed; three groups of the females were distinguished i.e. those ones having 14, 15 or 16 teats. In the calculations (one-factor variance analysis), the package SPSS (2006) was applied.

RESULTS AND DISCUSSION

Statistically confirmed differences were revealed for NPB in the Polish Landrace sows possessing 14, 15 or 16 teats ($P \leq 0.01$) and for NPR up to the age of 3 weeks in the sows of the same breed possessing 14 or 15 teats ($P \leq 0.05$) – Table 1. The differences in NPB and NPR in Polish Large White sows who possessed 14, 15 or 16 teats have not been statistically confirmed ($P > 0.05$). Any univocal relationships between the deaths of the piglets until the 21st day of life and the number of teats in the sows of the

TABLE 1. Number of piglets born and reared by the PLW and PL sows with a differentiated number of teats (14–16)

Number of teats	Polish Large White					Polish Landrace				
	N	Number of piglets born		Number of piglets reared until 21 day		N	Number of piglets born		Number of piglets reared until 21 day	
		X	Se	X	Se		X	Se	X	Se
14	621	11.48	0.054	10.46	0.047	931	11.26 A	0.046	10.32 a	0.042
15	283	11.53	0.079	10.54	0.070	559	11.46 A	0.059	10.47 a	0.054
16	115	11.66	0.124	10.67	0.110	242	11.59 A	0.090	10.50	0.082
14–16	1019	11.56	0.052	10.56	0.046	1732	11.44	0.039	10.43	0.036

N – number of observations; X – mean number of piglets in the litter; SE – standard error; a, A – significance at $p \leq 0.05$; A, A – significance at $p \leq 0.01$ (in columns).

examined breeds were not found; the level of the losses varied from 10.60 to 12.65% (Table 2).

the number of teats of the sows, their correct conformation and distribution has a significant effect on development of the

TABLE 2. Losses of piglets in the litters until 21 day of rearing according to the number of teats of their mothers

Number of teats	Polish Large White		Polish Landrace	
	Losses in the litter			
	heads	%	heads	%
14	1.013	11.63	0.941	10.60
15	0.987	11.38	0.988	11.32
16	0.995	11.61	1.092	12.65

Mazaraki (1961) and Janiszewska et al. (1991), as cited by Paruch (2011), have not recorded any statistically significant effect of the number of teats in the sows on NPB and NPR. The results of own studies are confirmed by the results, obtained by Janiszewska et al. (1991) and Buczyński et al. (1996), as cited by Paruch (2011). They observed that when the sows possessed 15 teats and more, NPB and NPR revealed a growing tendency. They stated also that in case of the increased number of teats in the sows (≥ 15), the level of piglets' death during rearing by mothers was lower and the weight of the litter was higher; the differences were not, however, statistically significant. Jungst and Kuhlert (1983), as cited by Paruch (2011), studied the effect of all teats of Duroc and Landrace sows (situated in front of navel, anal teats and crater teats) on the number of piglets on 21st day of rearing and did not find any relations. Also, they did not find any effect of the sow's teats, having a correct conformation and of defective (crater) teats on weight of the litter on 21st and 42nd day of life. On the other hand, Lee and Wang (2001) stated that

piglets. They are important performance traits, being subject to control and selection, therefore the attempt to develop the effective models of selection, oriented towards the number of teats in breeding sows have been undertaken.

Buds of mammary teats are generated as early as during fetal life period. Morphogenesis of the mentioned glands may reveal a high interspecies as well as in-species, in-breed or in-line variability (Zaks 1969, as cited by Paruch 2011). In opinion of Hotchkiss et al. (2007), the increased expression of androgens in fetal period may bring about to disturbances in correct development of female, including inhibition of teats and reproduction system development. The changes in the level of the mentioned hormones affect the phenotypic modifications in adult females (masculinization and defeminization). Slob et al. (1980) and Warren et al. (1973), as cited by Paruch (2011), state a lack of evidence indicating the origin of androgens from developing ovaries in female fetuses. Most probably, placenta (Baum et al. 1991 and Houtsmuller et al. 1995, as cited by Paruch 2011) and adrenal glands (Stahl et al. 1991, as cited

by Paruch 2011) are the source of these hormones in female fetuses. Androgens may be also of maternal origin (vom Saal 1999, as cited by Paruch 2011) or come from male fetuses which are found in a defined intrauterine position (Ryan and Vandenberg 2002, as cited by Paruch 2011). The mentioned phenomenon supplements and explains one-direction flow of blood via uterus or fetal membranes. It is considered that effect of intrauterine position of on reproduction abilities in pigs is small. Proportion of gender of fetuses in uterus has a greater effect on the number of teats than their mutual distribution has (Clark et al. 1993 and Saala et al. 1999, as cited by Paruch 2011). Drickammer et al. (1999) and Ryan and Vandenberg (2002) report that the greater participation of males in the litter causes decrease of the number of teats in females (masculinization of females) as compared to females, originating from the litter with greater participation of females (feminization of females). The studies of Orzechowska et al. (2002), Górecki (2003) and Rekiel et al. (2012) confirm the relationship between the number of males in the litter from which the sow derived, and her reproduction results. Górecki (2003) indicates also to the increased number of teats in the females coming from the litters in which there was a domination of female individuals vs. males. In own studies, such relationships were not analyzed and only the effect of the number of teats in sows on NPB and NPR, what was confirmed in some cases.

The number of teats is hereditary similarly as quantitative traits; it reveals a high variability and is probably the ef-

fect of cooperation of many genes simultaneously, therefore, it is very difficult to choose the best selection method and the progress in respect of the trait is revealed at a very long time and to a minimal degree. High possibilities in this respect are found in BLUP model, e.g. in French model, the teats are considered (EPSPA 2007). It seems to be justified because – as it was shown in own studies (unpublished data) – their too small number in sows (13 and less) contributes to more than 6% increase of index of piglets' deaths during rearing period. The results of the studies of Kim et al. (2005) also indicate the justness of leaving the gilts with 14 teats and more for repairing of the herd. Their greater number causes the increase of the number of piglets born in the litter and of the piglets reared until 21st day. There is a possibility of regression of the discussed medium-heritable trait in the progeny in relation to the mean value of the trait in the population, therefore the control of mating and improvement of the trait are important in breeding work. In own studies, the sows, being evaluated in respect of NPB and NPR possessed the required number of teats but also, their number higher than minimum was connected with the improvement of the studied reproduction and rearing parameters what has been confirmed in literature (Lee and Wang 2001, Kim et al. 2005). The increase of breeding progress in respect of the traits connected with reproduction is possible owing to intensively developing molecular genetics. The traits differ in heritability; their expression may occur at later age or only in one gender. Control of the discussed traits is possible via study of

DNA polymorphism and mapping of genome, connected with the incidence of QTL – *loci* of economically significant quantitative traits, including the number of active teats (Bidanel and Rothschild 2002, Dekkers 2004, Rodriguez et al. 2005, Sato et al. 2006). Mc Kay and Rahnefeld (1990) determined the heritability of front and rear teats in purebred pigs of maternal and paternal breeds and their crossbreds and demonstrated that the heritability coefficient for front *vs.* rear teats was lower in purebred pigs (0.15–0.21 *vs.* 0.20–0.39) and crossbreds (0.03–0.18 *vs.* 0.08–0.29). The discussed traits, as affected by long-lasting selection, reveal a low genetic variability what causes that the heritability coefficient has low values; such values for the number of teats were also given by Lechowska and Ruda (2000).

CONCLUSIONS

The results of own studies indicate that the number of teats in sows may affect the results of rearing the piglets until 21st day of life. The access to and the utilization of mother's milk is not, however, the only one indicator of success in rearing of the progeny.

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- Streszczenie:** Liczba prosiąt urodzonych i odchowanych przez lochy o różnej liczbie gruczołów sutkowych. Celem badań było określenie liczby prosiąt urodzonych (LPU) i odchowanych do 21. dnia (LPO) przez lochy rasy PBZ i WBP, różniące się liczbą gruczołów sutkowych. Do obliczeń posłużyły wyniki z chlewni zarodowych rejonu mazowieckiego zgromadzone w latach 2004–2009. Wyróżniono dla ras po trzy grupy samic, tj. mających 14, 15 lub 16 sutków. Liczba rekordów dla rasy WBP wyniosła 1019, a dla rasy PBZ 1732. Różnice potwierdzone statystycznie wykazano w LPU przez grupy loch PBZ mające 14, 15 lub 16 sutków ($P \leq 0,01$) i w LPO do wieku 3 tygodni przez lochy tej rasy mające 14 lub 15 sutków ($P \leq 0,05$). Różnice w LPU i LPO przez lochy WBP, które miały 14, 15 lub 16 sutków nie zostały potwierdzone statystycznie ($P > 0,05$). Nie stwierdzono jednoznacznych zależności między upadkami prosiąt do 21. dnia życia a liczbą sutków u macior badanych ras; poziom strat wahał się od 10,60 do 12,65%. Uzyskane wyniki wskazują, że liczba sutków u loch może wpływać na wyniki odchovu prosiąt do 21. dnia. Dostęp do pokarmu matki nie jest jednak jedynym wyznacznikiem powodzenia w odchowie potomstwa.
- MS. received in November 2013*
- Authors' address:**
Wydział Nauk o Zwierzętach SGGW
Katedra Szczegółowej Hodowli Zwierząt
ul. Ciszewskiego 8, 02-786 Warszawa
Poland
anna_rekiel@sggw.pl