Short Communication

A main factors affecting average number of teats in pigs

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The influence of factors (breed, year and season of farrowing, herd, parity order, sire of litter, total number of born piglets – TNB, number of piglets born alive – NBA, number of weaned piglets – NW, and linear and quadratic regression) on the number of teats, found for all piglets in the litter till ten days after born, expressed as arithmetic mean for each litter as sum of all teats number of each piglet in appropriate litter divided by number of piglets in this litter at first litter (ANT1) and second and subsequent litters (ANT2+) were analysed. The coefficient of determination was 0.46 and 0.33 for ANT1 and ANT2+, respectively. The statistically high influence (*P* <0.001) on ANT1 and ANT2+ was determined for year and season of farrowing, herd, parity order (only for ANT2+) and sire of litter effects. Impact of breed was found only on ANT2+ (*P* <0.001). The rest of factors have negligible of no impact on traits. Based on the data available for analyses, obtained results will serve as a relevant set-up in developing the model for genetic evaluation for these traits.

Keywords: pig, teat average number, parity, dam breed

1 Introduction

Specification and potential quantification of influence of factors affecting traits is useful in formulating management and selection decisions (Shi et al., 1993; Gutiérrez et al., 1997). The genetic evaluation of Czech dam pig breeds has been performed through a four-trait animal model with lean meat content, average daily gain from birth till the end of the field test, number of piglets born alive in the first litter and number born alive in the second and subsequent litters, since 2005 (Wolf et al., 2005). This guaranteed an incessant growth of the number of piglets born alive over years. In the situations when there is an increase in litter size it is necessary to provide sufficient nutrition for all piglets in the litter during the lactation period. Then the number of teats can become the limitation factor for effective pig breeding at the commercial level. The main factors affecting on alternative trait "average number of teats" was analysed as the objective of presented study.

2 Material and methods

The analyses were based on data in Czech Large White and Czech Landrace dam pig breeds. All data were collected by nucleus farms stuff. The total numbers of teats has been found for all piglets in the litter till ten days after born. Then, the arithmetic mean was calculated for each litter as sum of all teats number of each piglet in appropriate litter divided by number of piglets in this litter expressed as average number of teats. The minimum age at first farrowing was 300 days. The farrowing interval was between 130 and 300 d. The effect parity order was adjusted in follows: parity class codes 1 to 4 were used for parities 1 to 4, code 5 included parities 5 and 6 and code 6 contains parities form 6 to 10. Parities greater than 10 were not considered. The average number of teats was analysed separately for data from first litters (ANT1) and for data from second and subsequent litters (ANT2+). The general Linear Model (GLM) procedure implemented in statistical package SAS® (SAS Institute Inc., 2008) were used to investigate the influence of various factors on ATN1 and ANT2+. The factors considered were: breed, year and season of farrowing, herd, parity order (only for ANT2+), sire of litter, total number of born piglets (TNB), number of piglets born alive (NBA), number of weaned piglets (NW), linear and quadratic regression on age at first farrowing (for ANT1) and linear and quadratic regression on farrowing interval (for ANT2+). Estimated least square means of traits were compared using Scheffe's multiple-range tests.

3 Results and discussion

Total number of observations for average teat number measured for piglets at first parity was 1508. Appropriate coefficient of determination, coefficient of variation, root of mean square for error and arithmetic mean for ATN1

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Table 1 Degrees of freedom, sum of squares and F values of analysed factors influenced on ANT1 and ANT2+ traits

Source	Degree of freedom		Sum of square		*F* value	
	ATN1	ATN2+	ATN1	ATN2+	ATN1	ATN2+
Breed	1	1	10.93	0.36	40.81***	1.21
Year and season of farrowing	40	40	50.46	117.54	4.70***	9.82***
Herd	4	7	36.69	72.00	34.15***	34.38***
Parity order	–	4	–	8.32	–	6.95***
Linear regression	1	1	0.08	0.04	0.30	0.14
Quadratic regression	1	1	0.23	0.01	0.86	0.02
Sire	214	299	151.02	383.21	2.63***	4.28***
Total number of born piglets	20	11	3.74	3.60	0.24	1.09
Number of born piglets alive	11	24	9.42	12.70	1.75*	1.77*
Number of weaned piglets	9	9	7.31	4.65	3.02***	1.73*

was 0.46, 3.47, 0.52 and 14.94, respectively. Altogether 4531 observations were analysed for ANT2+. Coefficient of determination was 0.33 for ANT2+. The arithmetic mean for ANT2+ was 14.88. The less than half of the total variability was explained by used general linear models for both traits. Degrees of freedom, sum of squares and F values of analysed factors influenced on ANT1 and ANT2+ traits are summarized in Table 1.

Following figures given in this table, trait ANT1 was statistically highly significantly (*P* <0.001) influenced by breed, year and season of farrowing, herd, sire of litter and number of weaned piglets effects. Number of born piglets alive significantly (*P* <0.05) influenced ANT1. Linear and quadratic regression of age at first farrowing and total number of piglets born has no significant influence on ANT1. Factors with statistically high significance (*P* <0.001) of influence on ANT2+ were: year and season of farrowing, herd, parity order and sire of litter effects. NBA and TNB effects has statistically significant on ANT2+. Breed, linear and quadratic regression of farrowing interval and TNB has no impact on ANT2+. The highest part of variability was explained by sire of litter (25.43%, 20.84%), year and season of farrowing (8.50%, 6.39%) and herd (6.18%, 3.92%) for ANT1 and ANT2+, respectively. The no statistical influence of total number of born piglets on ANT1 and ANT2+ can indicate on negligible relationship between these traits, which is in agreement by Zhang et al. (2000) and Lundeheim et al. (2013).

The least square means with standard errors and statistical differences for analysed breed herd effects influenced on ANT1 can be seen in Table 2.

The significant differences (*P* <0.05) were found between analysed breeds, where higher values reached piglets of CL breed (14.88) than CLW piglets (14.67). The statistically significant differences were observed, when ANT1 was compared among analysed herds 1 to 5. The highest ANT1 was found for piglets from herd 4 (15.13). On the other side, lowest ANT1 reached piglets from herd 3 (14.51). Similarly to ANT1, the piglets of CL (15.21) have had higher ANT2+ than CLW piglets (14.44). The Scheffe's multiple-range test wasn't significant. Differences between classes of herd effect were significant for ANT2+, also. The range between highest and lowest ANT2+

Table 2 The least square means with standard errors and statistical differences for analysed breed and herd effects influenced on ANT1

		μ ±s(μ)	Multiple range test
Breed	CLW (1)	14.67 ±0.09	1 : 2*
	CL (2)	14.88 ±0.09	
Herd	1	14.55 ±0.10	1 : 4, 5*** 2 : 3**; 2 : 4*** 3 : 2, 5** 4 : 1, 3***; 4 : 2** 5 : 1, 3**
	2	14.84 ±0.11	
	3	14.51 ±0.09	
	4	15.13 ±0.09	
	5	14.84 ±0.10	

within herds levels was 1.05. The least square means for ANT2+ were 17.80, 14.80, 14.7, 14.69 and 14.90 for parity classes two to five, respectively. Statistically high differences (*P* <0.001) were found out between classes two and four, and three and four. Statistically differences (*P* <0.05) was between classes two and four. All other differences were no significant.

In general, factors included in the linear models affect ANT1 and ANT2+ traits more or less significantly. Based on the data available for analyses, obtained results will serve as a relevant set-up in developing the model for genetic evaluation for these traits.

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