EVALUATION OF REPRODUCTIVE TRAITS OF DAM AND SIRE PIG BREEDS

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Abstract

The aim of our experiment was to evaluate reproductive traits of dam and sire pig breeds. These breeds were used: Czech Large White (CLW) and Czech Landrace (CL) as dam breeds and Duroc (D) and Czech Large White – sire line (CLW-SL) as sire breeds. In dam breeds better results in production of all (16.70), live born (13.90) and weaned (12.00) piglets were reached in sows of Czech Large White in comparison with Czech Landrace sows with number of all born piglets (13.20), live born (12.20) and weaned (10.70) piglets. Sows of Czech Large White breed reached better results in number of live born piglets per sow and year (33.80) compared to Czech Landrace sows (29.40). In sire breeds better results in reproductive traits were reached in sows of Czech Large White – sire line in comparison with Duroc breed. In sows of Czech Large White – sire line 12.50 of all born, 10.90 live born and 9.80 weaned piglets were recorded. Production of live born piglets per year reached 26.30 piglets. In sows of Duroc breed an average of 11.90 of all born, 9.50 of live born and 8.50 of weaned piglets was reached. Production of live born piglets per year and sow was 21.70 piglets. Birth weights of sire breeds piglets were statistically conclusively higher in comparison with dam breeds. The highest average birth weight (1.77 kg) was recorded in Large White – sire line piglets then in Duroc piglets (1.48), contrarily the lowest average birth weight (1.24 kg) was recorded in Czech Landrace piglets.

Key Words: Birth weight of piglets, boar, sow, reproduction

Pig reproduction has an important role in pork meat production. Globally pork meat market production is growing in accordance on continual number´s growth of consumers of this source of animal protein. Improvement of reproductive yield, respective intensity is a way how to deal with an increase of demand.

Fertility is a basic precondition for maintaining and dissemination of animal population. It holds an important position in breeding of every farm animal species. It is decisive for profitability and good health condition. Only healthy animal in a good condition has good and regular fertility. An optimal reproduction can´t be reached without good health condition of sows (Lambert et al., 2012).

Duration and intensity of fertility are specific and depend on breed, genotype and primarily on living conditions. Good reproductive functions are going on during favourable breeding conditions only. With a breach of basic animal needs during one-sided selection or excessive using of animals a malfunction of fertility or infertility appear.

Till recent time selection breeding programs for sows were aimed on efficiency improvement of productive and reproductive traits (Kim, Weaver, Shen a Zhao, 2013), characteristics with direct impact on piglets performance. As a consequence of this situation a genetic selection in pig breeding resulted in highly profitable genotype with production of bigger litters with heavier piglets while sows have more lactation yearly and enter faster into following reproductive cycle (Ball, Samuel a Moehn, 2008).

In dam breeds selection aim includes: big body frame, high number of born piglets in a litter with excellent milking capacity of the sows and excellent milk glands with high number of weaned piglets. Next the aim is to have easy start of heat and high turnover rate with short interval. In sire breeds the biggest force is put on growth ability and meatiness of breeding animals. In meatiness the back fat thickness and deep of dorsal muscle is measured with ultrasound.

Material and Methods

The aim of our experiment was to evaluate reproductive traits of dam and sire pig breeds. Experiment took place in Genetic Pig Centre which is aimed on production of high quality genetic material of dam and sire pig breeds and boars used in C position. Breeding is engaged into health program SCHHP with strict biological protection. Capacity is 500 sows of dam and sire breeds. All breeding pigs are registered in an official breeding book of the Czech Republic.
These breeds were used: Czech Large White (CLW) and Czech Landrace (CL) as dam breeds and Duroc (D) and Czech Large White – sire line (CLW-SL) as sire breeds.

In studied sows these traits were evaluated: all born, live born and weaned piglets, number of litters per sow and year and number of live born piglets per year. Next milking capacity and length of interval were monitored. Results of successful mating (percentage of impregnating) and number of born piglets per year were observed too. Evaluation of results in sow´s insemination is expressed with percentage of impregnating and with number of born piglets. Impregnating is evaluated by proportion of inseminated and impregnated sows. Gravidity is evaluated after the first insemination in heat after the weaning of piglets and gilts after the first insemination. Into this number non-impregnated sows and gilts are not counted. With evaluation of number of born piglets we express level of fertility via average number of born piglets per one litter. Born piglets were individually weighted in their birth day with hanging digital scale with accuracy on 10 g. These basic statistic characterizations were determined in studied file of sows: average, standard deviation, minimum and maximum of the studied trait. Data were evaluated with statistical program STATISTICA 10 and for test of difference conclusiveness among groups they were tested with statistical method ANOVA, Tukey HSD test. Testing was done on a level of importance $P \leq 0.05$, $P \leq 0.01$ a $P \leq 0.001$.

Results and Discussion

In table 1 there are results of sow´s reproduction of dam breeds Czech Large White and Czech Landrace. Mentioned parameters show a number of all, live born and weaned piglets. Next monitored traits were: number of litters per sow per year and live born piglets per year. Better results in production of all born (16.70), live born (13.90) and weaned (12.00) piglets were reached in Czech Large White sows compared to Czech Landrace with all born (13.20), live born (12.20) and weaned (10.70) piglets. Both breeds reached the same results in number of litters per sow per year (2.40). In number of live born piglets per sow per year sows of Czech Large White reached better results (33.80) in comparison with Czech Landrace sows (29.40). Matoušek and Kernerová (2006) mention these traits of pig efficiency control for the year 2005: 11.40 live born piglets in Czech Large White and 13.70 live born piglets in Czech Large White – super-fertile line per litter. Kováč and Vaňo (2002) evaluated Czech Large White breed in 2001 and they mention 11.20 all born, 10.70 live born and 9.90 weaned piglets, milking capacity 57.10 kg and turnover rate 2.04.

Numerous publications refer about differences in reproductive traits between Large White and Landrace breeds. Gilts L reach maturity earlier in comparison with LW gilts (Hutchens at al.,1982, Bidanel et al.,1996), they have lover level of ovulation and higher prenatal survival in comparison with LW gilts (Bidanel et al., 1996).

Table 2 shows the results of piglets´ production in sire breeds sows Duroc and Czech Lrge White – sire line. In Duroc breed with 139 litters these results were reached: an average number of all born piglets 11.90, 9.50 live born and 8.50 weaned piglets. Live born piglet production was 21.70 piglets per sow and year with 2.30 litters per sow and year. Czech Large White – sire line breed shows year-on-yearly better results: all born 12.50, live born 10.90, weaned 9.80 piglets. Czech Large White – sire line sows reached better results in number of live born (26.30) piglets and 2.40 litters per sow and year. According to Blasc et al.(1995) worsened characters of Duroc breed are manifested especially as higher piglet mortality till weaning.
Sire breeds generally are characterized by lower values of reproductive traits in comparison with dam breeds as is evident from table 1 and 2.

In Table 3 there is a length of the interval and milking capacity in CLW and CL sows. In Table 4 there is a length of the interval and milking capacity in D and CLW – SL sows. Breeding reaches excellent results in milk production expressed with litter weight in age of 21 days.

Milking capacity was determined in dam breeds on a level of 75.70 kg (CLW) and 72.90 kg (CL), in sire breeds on a level of 70.30 kg (Duroc) and 77.70 kg (CLW – SL).

Matoušek and Kernerová (2001) presents milking capacity in CLW: 50.7 kg, CL: 59.6 kg, D:34.8 kg and CLW – SL:50,7kg.

Length of interval was in CLW 149.10 days, in CL 149.70 days, in CLW – SL 146.10 and in 148.70 days. Matoušek and Kernerová (2001) mention length of interval in CLW 170,5 days, CL 169,6 days, D 174,5 days and in CLW – SL 170,5 days. Length of interval in dam and sire breeds is optimal for high number of litters per sow and year without any bigger effect on health condition of sows.

Length of interval depends on impregnating after the first insemination – with increasing of impregnating percentage length of interval is reduced (Čeřovský,1997). In Tables 5 and 6 there are results of impregnation of studied breeds. Results are better in dam breeds and it is typical characteristic for them.

In Table 6 there are mentioned dam and sire breeds piglets birth weights. Statistically conclusive higher birth weights were determined in piglets of sire breeds in comparison with dam breeds. The highest birth weight (1.77 kg) was determined in piglets of Czech Large White – sire line, next in Duroc (1.48 kg), on the contrary the lowest birth weight (1.24 kg) was determined in piglets of Czech Landrace. Piglets with birth weight lower than 1 kg are piglets with problems and if we do not take special care about them during the first week of their life, they usually die of hungry. Piglets with weight lower than 0.8 kg are not good for breeding. Magnabosco et al. (2015) confirmed in their study that piglets with lower birth weight than 1.1 kg have higher mortality and lower growth ability because of lower colostrum intake in comparison with piglets with higher birth weight. Optimal weight of live born piglet should be in an interval 1.3 – 1.6 kg. Birth weight of piglets is one of the most important factors with an influence on survival and viability of piglets till weaning (de Almeida et all., 2015).

Table 1: Reproductive traits of dam breeds

	CL	S_x	CL	S_x
Number of litters	558	x	246	x
Number of all born piglets (animals)	16.70	3.60	13.20	3.50
Number of live born piglets (animals)	13.90	3.30	12.20	3.30
Number of weaned piglets (animals)	12.00	3.30	10.70	3.20
Number of litters per sow/year	2.40	x	2.40	x
Number of live born piglets per sow/year	33.80	x	29.40	x

Table 2: Reproductive traits of sire breeds

	Duroc	S_x	CLW - SL	S_x
Number of litters	139	X	65	x
Number of all born piglets (animals)	11.90	2.60	12.50	3.50
Number of live born piglets (animals)	9.50	2.70	10.90	2.90
Number of weaned piglets (animals)	8.50	2.70	9.80	2.50
Number of litters per sow/year	2.30	X	2.40	x
Number of live born piglets per sow/year	21.70	X	26.30	x

Table 3: Milking capacity and length of interval in dam breeds

	CLW	S_x	CL	S_x
Number of litters	558	x	246	x
Milking capacity (kg)	75.70	16.70	72.90	16
Interval (days)	149.10	17.80	149.70	16.80

Table 4: Milking capacity and length of interval in sire breeds

	Duroc	S_x	CLW – sire line	S_x
Number of litters	139	x	65	x
Milking capacity (kg)	70.30	26.80	77.70	10.50
Interval (days)	148.70	15.1	146.10	9.80

Table 5: Results of impregnation in dam and sire breeds

	CLW	CL	Duroc	CLW - SL
Inseminated (number of animals)	624	292	186	76
% impregnation (%)	87.3	84.6	81.3	83.8
Number of live born piglets per litter (animals)	13.9	12.2	9.5	10.9

Table 6: Birth weight of piglets in kg according to breed

Breed	N	Average	S_x	X_{min}	X_{max}
CL	321	$1,29^{c,d}$	0.32	0.50	2.38
CL	176	$1,24^{a,b}$	0,33	0.40	1.90
Duroc	131	$1,48^{a,c}$	0.33	0.80	2.35
CLW – sire line	8	$1,77^{b,d}$	0.50	1.00	2.35

P≤ 0,001: a,b,c P≤ 0,05: d

Conclusion

On the base of reached results it is possible to say that better results in reproductive traits were determined in sows of dam breeds in comparison with sire breeds. In dam breeds Czech large White had more all born, live born and for 1.30 weaned piglets in comparison with Czech Landrace. In sire breeds Czech Large White – sire line reached better results in reproductive traits in comparison with Duroc breed. In sows of Czech Large White – sire line there were determined for 1.3 weaned piglets per sow and litter more in comparison with sows of Duroc breed. Excellent results were determined in both dam and sire breeds in milk production expressed with litter weight in age of 21 days which was from 72.90 to 77.70 kg.

A higher average piglets´ birth weight was determined in piglets of sire breeds in comparison with dam breeds.

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