EFFECT OF COMMERCIAL PROGRAMS ON REPRODUCTIVE PERFORMANCE IN SOWS

Nevrkla P., Hadaš Z., Kamanová V., Čechová M.

Mendel University in Brno, Czech Republic

Abstract

The aim of this study was to evaluate selected reproductive parameters the sows and the piglet losses from birth to weaning. Monitored parameters were evaluated for two commercial programs. Experimental population consisted of 90 sows (45 in commercial program A and 45 in commercial program B). The total number of born piglets from sows in commercial program A reached 15.96 against 15.42 piglets in commercial program B. Total number of live-born piglets from sows in commercial program A reached 14.82 against 14.43 piglets in commercial program B. Sows in commercial program A had 1.14 stillborn piglets per litter while those in commercial program B had 0.99 stillborn piglets. The result of experiment were 13.11 reared piglets per litter in commercial program A and 13.64 reared piglets per litter in commercial program B. In the commercial program A the loss amounted 1.81 piglets against 0.79 piglets in commercial program B. The percentage of loss of piglets was 12.21 in commercial program A and 5.47 in commercial program B. Values of selected reproductive parameters found in the experiment within both programs can be considered very competitive.

Key Words: commercial program, reproduction, sow, piglet

Breeding sows is from the farming and economical aspects one of the most exhausting branches of pig breeding. The aim of breeding sows is to produce piglets and to gain a profit. A prerequisite of efficiency of breeding sows is ensuring good health and high performance of sows characterized by a number of reared piglets per sow (Boudný and Špička, 2012). It is constantly poited out, that particularly the number of reared piglets per sow is the cause of problems in Czech farms and also that there is a fundamental difference between our and successful foreign farms (Rozkot, 2012). Rodríguez *et al.* (2012) consider the number of reared piglets for a major economic effect of breeding sows. Regarding the fact that the Czech Republic is now a member country of EU, it should be said that Czech pig farmers are under a strong pressure from the side of their foreign competitors (Nejedlý, 1999). As mentioned by Rodríguez *et al*. (2012), the continuously stricter and stricter EU regulations concerning welfare of sows make production of piglets more and more complicated. According to Ahmadi *et al*. (2011), it can be expected that these tendencies will continue also in future.

The aim of this study was to evaluate selected reproductive parameters the sows and the piglet losses from birth to weaning. Monitored parameters were evaluated for two commercial programs.

Material and Methods

Experimental population consisted of 90 sows (45 in commercial program A and 45 in commercial program B). In the category of served sows there were two groups of sows stabled individually from the onset of estrus to the detection of pregnancy thus for one month. The pregnant sows were subsequently moved into static group pens for 15 to 20 pieces. The sows were provided with transponder for their identification and allocation of feed rations at the feed station. In these pens they were until an average of five days before giving birth. In the category of sows in advanced stage of pregnancy, farrowing and lactating, the sows were stabled in individual farrowing pens with slatted plastic floor and the farrowing house was divided into sections. All the above mentioned categories were fed by automatic distribution of feed. Air exchange both in farrowing section and in section of served and pregnant sows was solved by automatic methods. Optimal microclimate for piglets was ensured using heated plates, supplementary feeding followed from the fifth day after birth. The piglets were weaned at the mean age of 28 ± 3 days. The experiment ran in the term from April to June. In both groups of sows (commercial program A, B) phenotypic levels of selected reproductive parameters were observed, namely the total number of born piglets,

the number of live-born piglets, the number of stillborn piglets, the number of reared piglets and the number of piglets lost from the birth to the weaning.

The obtained reproductive parameters and the loss of piglets in the commercial program A were compared to the parameters obtained for commercial program B and elementary statistical characteristics for differences in evaluated parameters between the groups of sows were analysed and relevance based on the t-test. The symbol * stands for $P < 0.05$ a NS stands for $P > 0.05$. The statistical evaluation was done using the programs STATISTIKA version 12.0 and Microsoft Excel 2010.

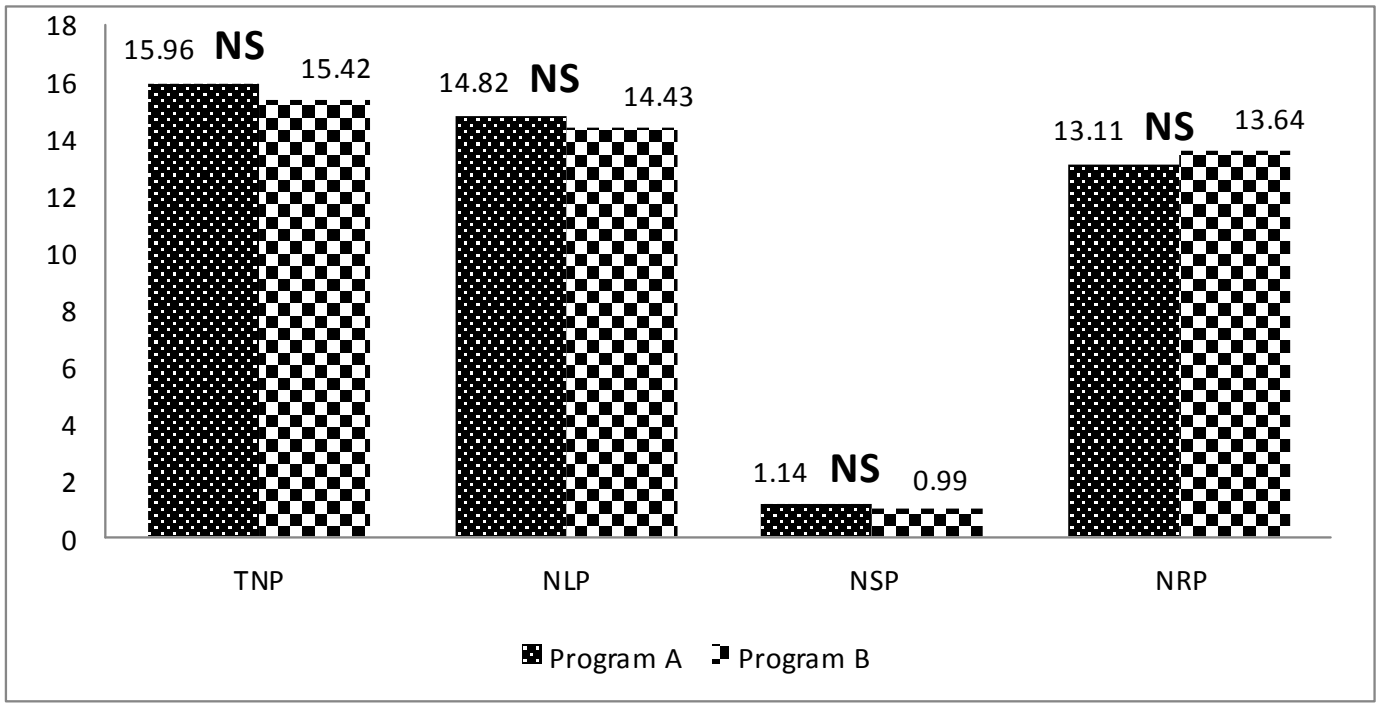
Results and Discussion

Fig. 1 displays numbers of all, live-born, stillborn and reared piglets per a litter within two commercial programs. The results indicate that the phenotypic level of reproductive parameters is not significantly different between the evaluated commercial programs.

The total number of born piglets from gilts in commercial program A reached 15.96 against 15.42 piglets in commercial program B. The difference between the programs was 0.54, however this difference is not statistically significant. Nguyen *et al.* (2011) state that the litter size at birth is influenced by many factors. By examination of performance of five hundred hybrid sows he found 12.3 piglets born per litter and notes that first litter sows have less numerous litters than older sows. According to Wolf *et al.* (2008), the aim of the present genotypes of sows is to give birth to the highest possible number of viable piglets. His experiment showed 13.70 piglets born per litter. Damgaard *et al.* (2003) point out that litter size affects survival of piglets after birth.

Total number of born piglets is important parameter, however for pig farmers the number of live-born piglets is even more significant. The numbers in Figure 1 show 14.82 live-born piglets in commercial program A against 14.43 in commercial program B. The difference between the two programs was 0.39 piglet, which is not statistically significant. According to Cozler *et al*. (1998) besides the genotype also breeding management, genetics of sows and the order of litter have an impact on the number of live-born piglets. This is confirmed by Smith *et al.* (2008) who found following numbers of live-born piglets of Dandbred sows in normal breeding conditions: in the first litter 9.80, in the second litter 10.10, in the third litter 9.50 and in the forth litter 11.00. Gained values of number of live-born piglets in both evaluated programs demonstrate excellent health of sows.

Figure 1. Reproductive parametres of sows by the commercial program (pcs/litter)



TNP = total number of piglets, NLP = number of live-born piglets, NSP = number of stillborn piglets, NRP = number of reared piglets, NS = statistically insignificant difference ($P > 0.05$)

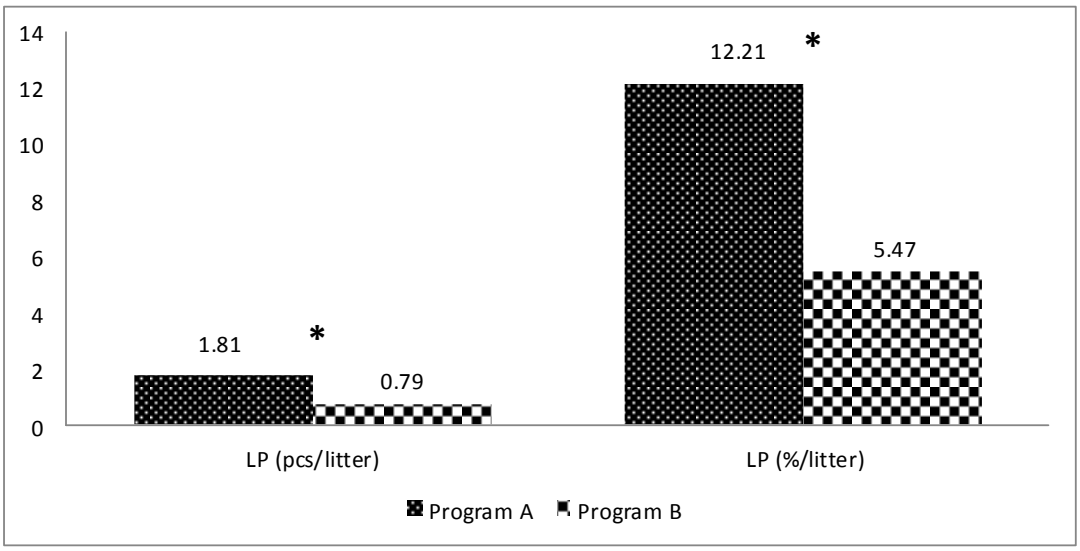
The Fig. 1 also displays numbers of stillborn piglets per litter. Sows in commercial program A had 1.14 stillborn piglets per litter while those in commercial program B had 0,99 stillborn piglets.

The difference between the programs was not statistically significant and amounted to 0.15 piglet. Schneider *et al*. (2011) points out that the number of stillborn piglets is determinated by size of the litter, which also influences parturition length. Longer parturition means higher number of stillborn piglets. Vanderhaeghe *et al*. (2010) found 2.02 ± 1.61 stillbirths per litter with 14.70 ± 3.19 all born piglets. Similar results were also demonstrated by Arango *et al*. (2006) who observed 2.10 stillbirths.

The number of reared piglets is considered the most important effect of breeding sows. The result of experiment were 13.11 reared piglets per litter in commercial program A and 13.64 reared piglets per litter in commercial program B. The difference between the programs was 0.53 piglet. Statistical evaluation did not prove a significant difference. Knauer *et al*. (2011) state that the aim of modern pig breeding is the highest number of reared piglets from a sow per year while minimizing production costs. According to Cozler *et al*. (1998) the number of reared piglets is used to express the performance of sows. These authors note that productivity of sows depends mainly on genetics and farm management, which includes also appropriate health programs. It is important to use suitable management from the first litter, which significantly affects the number of reared piglets.

Fig. 2 show losses of piglets from birth to weaning per litter. In the commercial program A the loss amounted 1.81 piglets against 0.79 piglets in commercial program B. The percentage of loss of piglets was 12.21 in commercial program A and 5.47 in commercial program B. The statistical analysis demonstrated statistically significant difference ($P \leq 0.05$) between evaluated programs. Rohe and Kalm (2000) highlight that the highest losses of piglets are recorded during the first week of life, which is confirmed by Arango *et al*. (2006) and in their work they add that of the piglets lost from birth to weaning, the loss during first day is around 4 %, the second day after birth the mortality is the highest up to 17 % and the following days it declines, the third day 16 %, the fourth day 9 % and the fifth day 7 %. From the sixth day, the mortality is stabilized at 4 %. Lee and Haley (1995) report that loss of piglets significantly affects size of the litter and the associated birth weight of piglets, genetics of animals and they add that hybrid sows carry the genes for survival of piglets. Wolf *et al*. (2008) point out that loss of piglets from birth to weaning has a relatively high heredity, therefore the choice of suitable genetics is an important way to reduce losses of piglets. For the sows of Czech Large White the mean loss of piglets is referred to be 1.80 ± 2.00 pieces and 13.00 ± 12.50 % per litter, which are higher values then those recorded in the experiment. Kozlowski and Wilk (1984) say that in large-scale production conditions the loss of piglets before 28th day should not exceed 10 %. This is confirmed by Vrbanec *et al*. (1995). Also Vaillancourt *et al*. (1992) say that an intensive production of sows is accompanied by certain critical phases. Loss of piglets from birth to weaning is considered an important one, either as a result of infectious diseases or non-pathogenic causes, therefore monitoring of piglets allows its optimization. They also point out that in problematic herds, the losses can be very high. For example in England, the worst herds reached 12–30 % of loss of piglets before weaning, 17.6 % in Croatia and 22.2 % in Slovenia. The loss of piglets observed in the experiment can be considered satisfactory, however it is evident that even in SPF conditions of production farms attention has to be paid to the genetics of animals, which plays an important role in this respect.

Figure 2. Losess of piglets by the commercial program



LP = loss of piglets, * = statistically significant difference ($P < 0.05$)

Conclusion

The experiment did not reveal statistically significant differences in selected reproductive parameters of gilts between evaluated commercial programs in production farm, which indicates high genetic quality of sows used in observed herd. Evaluation of loss of piglets showed statistically significant difference ($P < 0.05$), which suggests that genetic basis of piglets is crucial for their survival to weaning. Values of selected reproductive parameters found in the experiment within both programs can be considered very competitive.

References

AHMADI, B. V., STOTT, A. W., BAXTER, E. M., LAWRENCE, A. B., EDWARDS, S. A., 2011: Animal welfare and economic optimisation of farrowing systems. *Anim. Welfare,* 20, 57–67.

ARANGO, J., MISZTAL, I., TSURUTA, S., CULBERTSON, M., HOLL, J. W., HERRING, W., 2006: Genetic study of individual preweaning mortality and birth weight in Large White piglets using threshold-linear models. *Livest. Sci.,* 101, 208–218.

BOUDNÝ, J. and ŠPIČKA, J. 2012. The effect of production efficiency on economic results in pig breeding. *Res. pig breeding,* 6: 1–8.

COZLER, Y. L., DAGORN, J., LINDBERG, J. E., AUMAITRE, A., DOURMAD, J. Y., 1998: Effect of age at first farrowing and herd management on long-term productivity of sows. *Livest. Prod. Sci.,* 53, 135–142.

DAMGAARD, L. H., RYDHMER, L., LØVENDAHL, P., GRANDINSON, K., 2003: Genetic parameters for within-litter variation in piglet birth weight and change in within-litter variation during suckling. *J. Anim. Sci.,* 81, 604–610.

KNAUER, M. T., CASSADY, J. P., NEWCOM, D. W., SEE, M. T., 2011: Phenotypic and genetic correlations between gilt estrus, puberty, grouwth, and structural conformation traits with first-litter reproductive measures. *J. Anim. Sci.,* 89, 935–942.

KOZLOWSKI, M., WILK, S., 1984: Výsledky užitkového křížení prasat ve velkovýrobních podmínkách. Intenzifikační faktory ve výrobě vepřového masa. Brno: Vysoká škola zemědělská v Brně, 83–87.

LEE, G. J., HALEY, C. S., 1995: Comparative farrowing to weaning performance in Meishan and Large White pigs and their crosses. *Anim. Sci.,* 60, 269–280.

NEJEDLÝ, J., 1999: Co lze očekávat na přelomu tisíciletí v technologiích chovu prasat. Sborník referátů z celostátní konference. Aktuální problémy chovu prasat. Praha, 29– 34.

NGUYEN, K., CASSAR, G., FRIENDSHIP, R. M., REWEY C., FARZAN, A., KIRWOOD, R. N., 2011: Stillbirth and preweaning mortality in litters of sows induced to farrow with supervision compared to litters of naturally farrowing sows with minimal supervision. *J. Swine Health Prod.*, 19, 214–217.

RODRÍGUEZ, S. V., PLÀ, L. M. and ALBORNOZ, V. M. 2012. Modeling tactical planning decisions through a linear optimization model in sow farms. Livest. Sci., 143, 162–171.

ROEHE, R., KALM, E., 2000: Estimation of genetic and environmental risk factors associated with pre-weaning mortality in piglets using generalized linear mixed models. *Anim. Sci.,* 70, 227–240.

ROZKOT M., 2012: Chov prasat – perspektivy a další možnosti. Aktuální problémy chovu prasat. Kostelec nad Orlicí: Výzkumný ústav živočišné výroby, 54–55.

SCHNEIDER, J. F., REMPEL, L. A., ROHRER G. A., BROWN-BRANDEL, T. M., 2011: Genetic parameter estimates among scale activity score and farrowing disposition with reproductive traits in swine. *J. Anim. Sci.,* 89, 3514–3521.

SMITH, A. L., STALDER, K. J., SERENIUS, T. V., BASS, T. J., MABRY, J. W., 2008: Effect of weaning age on nursery pig and sow reproductive performance. *J. Swine Health Prod.,* 16, 131–137.

VAILLANCOURT, J. P., MARSH, W. E., DIAL, G. D., 1992: Internal consistency of preweaning mortality datacollected by swine production. *Prev. Vet. Med.,* 14, 115–128.

VRBANAC, I., BALENOVIĆ, T., YAMMINE, R., VALPATIĆ, I., KRSNIK, B., 1995: Preweaning losses of piglets on a state farm in Bosnia and Herzegovina. *Prev. Vet. Med.,* 24, 23–30.

WOLF, J., ŽÁKOVÁ, E., GROENEVELD, E., 2008: Within-litter variation of birth weight in hyperprolific Czech Large White sows and its relation to litter size traits, stillborn piglets and losses until weaning. *Livest. Sci.,* 115, 195–205.

Corresponding Address:
Ing. Pavel Nevrkla, Ph.D.
Department of Animal Breeding
Faculty of AgriSciences
Mendel University in Brno
Zemědělská 1, 613 00 Brno
Czech Republic
E-mail: pavel.nevrkla.uchhz@mendelu.cz.

This study was supported by the project of MENDELU internal grant agency, Faculty of Agriculture No. TP 2/2013 and the NAZV Project No. QI 111A166 of the Ministry of Agriculture of the Czech Republic.