ANALYSIS OF FLOOR EFFECT ON SOWS LIFESPAN

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Abstract

The paper studies two nucleus pig farms which have same genotype and same feeding system but different breeding technology (solid floor and slatted floor). The comparative examination was based on the causes of culling. To the analysis of culling reasons was applied the Kaplan-Meier method and estimate the difference between the farms was used the Cox-model.

In spite of the fact that the genetics of sows and feed technology were the same on the two examined farms there was significant difference between the lifespan of sows. The investigation showed that there was significant difference ($p < 0.05$) between the farms according to the longevity of the culled sows due to lameness. The sows kept on solid floor have stayed in production longer than on slatted floor.

Key words: culling, lifespan, survival analysis, floor type

INTRODUCTION

The sow replacement problem is today one of the most important challenges in sow herd management (Rodriguez et al., 2009). According to the herd type 35–36% herd replacement is usually recommended. Higher replacement is necessary in nucleus herds in order to achieve a faster transfer of genetic gain (Houška, 2009).

Several culling factors were found to influence sow longevity and thus the efficiency of sow's production. The removal of nonproductive sows along with the introduction of replacement gilts is an essential part of maintaining herd productivity at a constant high level. The reasons for culling sows and the rate of removal may be influenced by many factors including genotype, nutrition, environment, health, behaviour, management policies and diseases (Sasaki and Koketsu, 2010).

During the last several years, culling rates have climbed to levels approaching 50% (Dijkhuizen et al., 1989; Rodriguez-Zas et al., 2003; Patterson 2010). Several studies have measured life length of sows in commercial herds. Increased sow mortality, combined with reproductive problems such as not conceiving, not farrowing, poor performance or physical problems (e.g., lameness) are the major reasons for this increase in replacement rates in commercial sow units (Dial and Koketsu, 1996; Friendship et al., 1986). These high replacement rates result in the need for

larger gilt pools and therefore the purchase or production of more breeding gilts. Furthermore, high replacement rates may be associated with animal welfare, since some of the causes of culling could be indicators of a welfare compromise for the animals involved. A better knowledge of the causes of culling would be useful when providing practical recommendations for the management of gilts in order to increase their productive lifespan.

The objective of present study was to investigate the culling reasons in two Hungarian commercial pig farms comparing the different floor types.

MATERIAL AND METHOD

This study was based on data from two commercial piglet producing herds in the Great Plain region of Hungary. The genetics of the sows were Dutch Large White and Dutch Landrace crossbred that were originally imported from Topigs Company in Netherlands.

In the herds there was similar feeding but different breeding technologies. Sows were kept on solid floors in Herd A and on slatted floors in Herd B. The feed was liquid feed that was produced by the pig herds.

The source data of the sows was collected electronically with the assistance of the herd manager. The database was from the farm-led monitoring programme.

The time period examined was from 2004 to 2010, in which time was observed the life length for sows (2281 animals from Herd A and 3646 animals from Herd B).

From the data collected was analysed the lifespan of sows according to the different culling reasons.

All analyses were performed using SPSS. Survival analysis using Kaplan Meier method and Cox proportional hazards model was applied to compare the farms and the significance of differences was calculated with log-rank test.

RESULTS AND DISCUSSION

On the farms led to breeding program were found several reasons for the sow removal, from which were categorized five groups: (1) fertility, (2) productivity, (3) lameness (4) mortality and (5) other removal reasons. “Fertility” included no observed puberty in gilts, anoestrus of sows, return to estrus, negative pregnancy diagnosis and abortion. “Productivity” included low number of pigs born alive, low number of weaned pigs, mammary problems, inadequate performance, thin sow syndrome and old age. “Lameness” included lameness, downer and joint locomotors problems. “Mortality” included dead and euthanized sows and “Other” included no

reasons recorded and transferred sows. Therefore, this classification included three culling reasons (1-3) and one removal type (4).

Sows without culling dates mean the censored data (sows in alive or not recorded culling date). Thus, 1633 sows were censored and 4294 sows were culled in the examined period.

The survival probability curves indicating estimates of the baseline survival function were separately obtained for the two farms (Fig. 1). The active sows were treated as censored observations.

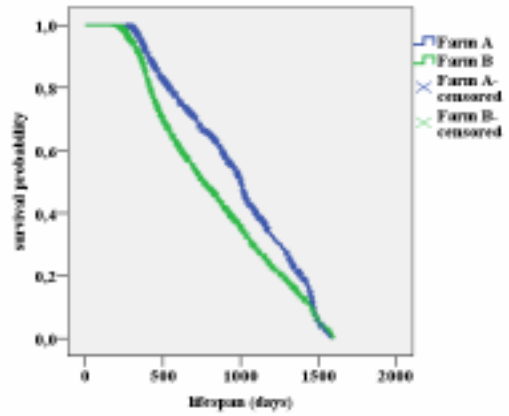

Fig. 1 Survival curves of farms

In spite of the fact that the genetics of sows and feed technology were the same on the two examined farms there was significant difference between the lifespan of sows ($\chi 2$=56.432 and $p \leq 0.001$). The sows kept on the solid floor stayed in production longer than those on the slatted floor.

Table 1 shows a comparison between the farms using survival analysis according to the culling reasons. For all causes - with the exception of "Others" - there were significant differences ($P \leq 0.05$) between the lifespan of the two farms.

Table 1

Results of survival analysis

Cause of culling	Median of lifespan in Farm A	Median of lifespan in Farm B	$\chi 2$	Sig.
Fertility	457	588	18.009	***
Productivity	1150	1188	11.160	***
Lameness	963	611	66.058	***
Mortality	722	571	4.892	*
Others	865	533	1.361	ns

* denotes statistically significant differences at the level of $P \leq 0.05$; *** at level of $P \leq 0.001$; ns = not significant difference

In the study the leg problems was one of the most frequent reasons for sow removals (about 20% on both farms).

Sows culled due to lameness in Farm A had a longer lifespan (the median was 963 days) which differed significantly ($P \leq 0.001$; hazard ratio=0.57) from the other farm. It means that the slatted floor have a negative effect on the welfare of pigs.

In Farm B sows culled due to reproductive causes (fertility and productivity) showed greater survival rates but the differences between the farms were not so significant than in case of culling due to lameness.

CONCLUSION

In conclusion, it can be said that the different quality of flooring (solid floors and slatted floors) had a statistically significant effect on the lifespan of sows. For standing slatted flooring is significantly worse than solid floors.

Sows culled due to leg problems remained in production longer in farm with solid floors than in farm with slatted floors. The productive time of sows that were removed due to mortality was also better on the solid floor.

Based on my results, it can be stated that satisfying animal welfare conditions may contribute to sows' long term high-quality production.

REFERENCES

1. Balogh P., Ertsey I., Fenyves V., Nagy L., 2009, Analysis and optimization regarding the activity of a Hungarian Pig Sales and Purchase Cooperation, Studies in Agricultural Economics, 109, pp. 33-54.
2. Boyle L., Leonard F.C., Lynch B.; Brophy. P., 1998, Sow culling patterns and sow welfare, Irish Veterinary Journal, 51, pp. 354-357
3. Dial G.D., Koketsu Y., 1996, Factors influencing the postweaning reproductive performance of sows on commercial farms, Theriogenology, 47, pp. 1445-1461
4. Dijkhuizen A.A., Krabbenborg R.M.M., Huirne R.B.M., 1989, Sow replacement: A comparison of farmers' actual decisions and model recommendations, Livestock Production Science, 23, pp. 207-218
5. Engblom L., Lundeheim N., Dalin A.M., Andersson K., 2007, Sow removal in Swedish commercial herds, Livestock Science, 106, pp. 76-86
6. Fernández de Sevilla X., Fábrega E., Tibau J., Casellas J., 2008, Effect of leg conformation on survivability of Duroc, Landrace, and Large White sows, Journal of Animal Science, 86, pp. 2392-2400
7. Friendship R.M., Wilson M.R., Almond G.W., McMillan I., Hacker R.R., Pieper R., Swaminathan S.S., 1986, Sow Wastage: Reasons for and Effect on Productivity, Can J Vet Res., 50, pp. 205-208
8. Houška L., 2009, The relationship between culling rate, herd structure and production efficiency in a pig nucleus herd, Czech Journal of Animal Science, 54, pp. 365-375

9. Jørgensen B., 2000, Longevity of breeding sows in relation to leg weakness symptoms at six months of age, Acta Veterinaria Scandinavica, 41, pp. 105-121
10. Jørgensen B., 2003, Influence of floor type and stocking density on leg weakness, osteochondrosis and claw disorders in slaughter pigs, Animal Science, 77, pp. 439-449
11. Kilbride A.L., Gillman C.E., Ossent P., Green L.J., 2008, A cross-sectional study of the prevalence and associated risk factors for capped hock and the associations with bursitis in weaner, grower and finisher pigs from 93 commercial farms in England, Preventive Veterinary Medicine, 83, pp. 272-284
12. Lucia T., Dial G.D., Marsh W.E., 2000, Lifetime reproductive performance in female pigs having distinct reasons for removal, Livestock Production Science, 63, pp. 213-222
13. Patterson J.L., Beltranena E., Foxcroft G.R., 2010, The effect of gilt age at first estrus and breeding on third estrus on sow body weight changes and long-term reproductive performance, Journal of Animal Science, 88, pp. 912-938
14. Pluym L., Van Nuffel A., Dewulf J., Cools A., Vangroenweghe F., Van Hoorebeke S., Maes D., 2011, Prevalence and risk factors of claw lesions and lameness in pregnant sows in two types of group housing, Preventive Veterinary Medicine, 56, pp. 101-109
15. Rodriguez-Zas S.L., Southey B.R., Knox R.V., Connor J.F., Lowe J.F., Roskamp B.J., 2003 Bioeconomic evaluation of sow longevity and profitability, Journal of Animal Science, 81, pp. 2915-2922
16. Sasaki Y., Koketsu Y., 2010, Culling intervals and culling risks in four stages of the reproductive life of first service and reserviced female pigs in commercial herds, Theriogenology, 73, pp. 587-594
17. Szabó P., Balogh P., Komlósi I., Kusza Sz., Bálint A., Bíró T., 2009, A sertéstenyésztés jövőjéről, In: Nagy J., Jávor A. (szerk): Debreceni álláspont az agrárium jelenéről, jövőjéről, Budapest, DE-AMTC, pp. 325-346
18. Szőke Sz., Nagy L., Kovács S., Balogh P., 2009, Examination of pig farm technology by computer simulation. Apstract – Applied Studies In Agribusiness And Commerce, 3, pp. 25-30
19. Van Wijk H.J., Arts D.J., Matthews J.O., Webster M., Ducro B.J., Knol E.F., 2005, Genetic parameters for carcass composition and pork quality estimated in a commercial production chain, Journal of Animal Science, 83, pp. 324-333
20. Voslářová E., Chloupek P., Steinhauser L., Havlíček J., Večerek V., 2010, Influence of Housing System and Number of Transported Animals on Transport-induced Mortality in Slaughter Pigs, Acta Veterinaria Brno, 79, pp. 79-84.