

INFLUENCE OF GENOTYPE AND LIVE WEIGHT OF GILTS ON THE LITTER SIZE AND LITTER GROWTH

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SUMMARY

Influences of genotype and weight of gilts were evaluated for number born alive, daily gain and weight at first, twentyfirst and eightysecond day postpartum of piglets under commercial management. The influence of genotype was significant ($P < .05$) only for live-born weights of piglets. Also, weight of gilt did not affect weight and daily gains of piglets.

INTRODUCTION

It is well established that reproductive traits are lowly heritable and, under selection, progress is slow. However, faster progress should be possible if different breeds or lines are crossed. This would be mainly due to effects of heterosis. Effects of heterosis are not always positive and depend mainly on choice of parents and selection applied in parental lines (breeds). The primary task in crossing two breeds is to combine good traits of both and establish crossbreds with improved commercial traits. There are large numbers of studies of crossbred performance of white pigs. Investigations of Markovic et al. (1988), Peric (1984), Nesovski et al. (1969), Milojevic et al. (1978), Ignjatovic (1984) and Rajic (1989) showed advantages of crossbred over purebred sows for piglet production. Also, Sreckovic and Nikolic (1973), Nikolic et al. (1977) and Ignjatovic, (1985) reported higher fertility for purebred than crossbred gilts. Evidence of lower mortality of Swedish Landrace (SL) compared to Large White and Swedish Landrace crosses (LWxSL) has been reported by Markovic et al. (1980).

The objective of the present study was to evaluate reproductive performance of gilts and growth of piglets in the first litter in SL, crossbreds of F_1 generation (SLxLW) and crossbreds produced with back crossing with SL and LW. Also, the influence of the gilts' weight on growth and weight of piglets was determined.

MATERIALS AND METHODS

Data for the analyses were obtained from the pig farm located near Gradsko on the Vardar valley (Mediterranean climate), Macedonia. The farm is of industrial type with annual production of more than 30000 pigs.

All the gilts included in the database were part of the commercial herd and had no special treatment. Litter characteristics were analyzed for four crossings and four weight groups (Table 1). The means, standard errors of the means, and probability values of the t-test statistic were obtained for number of live-born and weaned piglets, weight, average daily gain and mortality of the piglets.

Table 1. Number of gilts by genotype and live weight

crosses ^{a,b}	no. of gilts	weight (kg)	no. of gilts
SL x SL	40	95-104	33
SL x LW	38	105-114	28
(SL x LW) x SL	45	115-124	35
(SL x LW) x LW	36	125-134	64
total number	159	total number	160

^aFirst parent is mother

^bSwedish Landrace (SL) and Large White (LW)

RESULTS

Purebred SL and the combination (SLxLW)xLW farrowed approximately an equal number of live piglets (Table 2).

Table 2. Means and standard errors of the first litter by genotype of the gilts.

trait	genotype ^{a,b}			
	SLxSL	SLxLW	(SLxLW)xSL	(SLxLW)xLW
piglets born alive	9.20±.35	8.90±.37	8.72±.38	9.19±.35
weaned piglets	7.85±.24	7.92±.25	7.70±.23	7.98±.29
mortality, %	14.67	11.01	11.83	13.17
weight of piglets, kg				
on birth ^c	1.41 ^d ±.02	1.41 ^d ±.02	1.50 ^e ±.03	1.46±.02
on 21 st day	5.48±.15	5.24±.16	5.10±.11	5.44±.12
on 82 nd day	24.28±.44	23.83±.39	23.96±.28	24.11±.39
ADG ^c , g				
nursing period	194±.01	182±.01	171±.01	189±.01
21 st to 82 nd day	308±.01	305±.01	309±.01	306±.01

^aSwedish Landrace (SW) and Large White (LW)

^bFirst parent is mother

^cADG-average daily gain

^dRows with different superscripts differ significantly (P<.05)

The other two crosses (SLxLW)xSL, and (SLxLW)xLW produced lower numbers of live born piglets (8.9 and 8.72) compared to SLxSL and (SLxLW)xLW (9.2 and 9.19) but the difference wasn't significant ($P > .05$). The mortality during the nursing period was lower for crossbreeds that resulted in a higher number of weaned piglets in simple and back crosses with LW boars (7.92 and 7.98). The backcrossed piglets had the birth weight of 1.50 and 1.46 kg that was higher ($P < .05$) than purebred and simple crosses (1.41 kg). There was no significant difference among genotypes for the live weights and daily gains.

Live weight of gilts did not influence various traits of the first litter (Table 3).

Table 3. Means and standard errors of the first litter by live weight of gilts, kg.

trait	weight groups, kg			
	95-104	105-114	115-124	125-134
piglets born alive	9.14±.35	8.93±.38	9.12±.45	8.84±.30
weaned piglets	7.88±.23	7.79±.31	7.97±.29	7.80±.19
mortality, %	13.79	12.77	12.61	11.77
weight of piglets, kg				
on birth	1.42±.02	1.46±.02	1.42±.02	1.45±.02
on 21 st day	5.26±.16	5.52±.18	5.41±.13	5.17±.10
on 82 nd day	23.59±.47	24.42±.56	24.01±.30	24.10±.27
ADG ^a , g				
nursing period	183±.01	193±.01	190±.01	177±.01
21 st to 82 nd day	301±.01	310±.01	305±.01	310±.01

^aADG-average daily gain.

DISCUSSION

Successful application of crossbreeding in animal improvement is a complicated task. This is especially true for reproductive traits. In the study conducted by Nikolic et al. (1977), two and three breed crosses, LWxGerman Landrace and (LWxGerman Landrace)xBelgian Landrace had a smaller average litter size by 2 piglets at farrowing and the 21st day compared to purebred Swedish Landrace. However, the crossbreeds had significantly better results in meat yield. Also, Sreckovic et al. (1976) reported 1.11 less live born piglets for SLxLW crossbreeds compared to purebred SL. In this study purebred SL also had higher (non significant) litter size than crossbreeds. However, purebred SL also had a higher mortality rate than crossbreeds and therefore both purebred and crossbreeds end up with a similar number of weaned piglets. According to Gaic (1982), SLxLW crosses have lower fertility than purebred SL. Also, Ignjatovic (1985) concluded that the number born and live born piglets is higher for purebred LW than LWxSL and SLxLW crosses. However, in the same study, the number of weaned piglets and their birth weight was higher for crossbreeds. It is important to highlight that England and Day (1971) and Milojic et al.

(1978) reported a great variation of investigated traits which was the case in this study (23.1-29.3%). A number of studies showed that crossbred sows are superior compare to the purebreds (Gajic, 1989, Nesovski et al.,1969, Ignjatovic and Dimitrija, 1984 and Peric, 1984).

There were no significant differences between the weight groups. It was interesting that mortality of the piglets went down with the higher weight of the gilt. A study similar to this but with a higher and lower group weights would be informative in describing a relationship between weight of gilts and mortality of piglets. There are reports that live weight of sows could have an influence on the litter weight (Grudev, 1956, Vangelov et al., 1974, and Heinze et al., 1991, Heidler and Henne, 1991), however, this could not be confirmed in the present study. Another interesting observation, though non significant, was that the ADG during the nursing period was the lowest for the heaviest gilts. It is an indication of lower nursing abilities of heavier mother.

REFERENCES

- ENGLAND, D.C. and DAY, P.E. (1971) *J. Animal Sci.* 33:198-199.
- GAJIC, I. (1982) VII Skup svinjogojaca Jugoslavije, Pristina, 110-120.
- GAJIC, I. (1989) *Stocarstvo*, 43:91-102.
- GRUDEV, D.I. (1956) *Zivotnovodstvo*, 9:52-60.
- HEIDLER, W. and HENNE, I. (1991) *Pig News and Information*, 12:344.
- HEINZE, A., HUHN, U. and BIEDERMANN, B. (1991) *Pig News and Information*, 12:346.
- IGNJATOVIC, I. and DIMITRIJE, K. (1984) *Stocarstvo*, 38:257-261.
- IGNJATOVIC, I. (1985) VIII Skup svinjogojaca Jugoslavije, Cetinje, 233-234.
- MARKOVIC, Z., GLUHOVIC, M. and MATEJIC, D. (1988) Review of Research Work, Livestock Research Institute, Beograd, 23-31.
- MILOJIC, M., NIKOLIC, D. and MITIC, N. (1978) *Arhiv za poljoprivredne nauke*, 31 (116) 81-94.
- NESOVSKI, P., PANEVA, L. and PANEV, G. (1969) Yearbook of Faculty of Agriculture, Skopje, 22:161-166.
- NIKOLIC, M., UREMOVIC, M. and TEODOROVIC, M. (1977) Review of Research Work Faculty of Agriculture, Novi Sad, 139-147.
- PERIC, I. (1984) *Stocarstvo*, 38:179-186.
- SRECKOVIC, A. and NIKOLIC, M. (1979) Problemi stocarske proizvodnje, 225-235.
- SRECKOVIC, A., Nikolic, M., and BRUNDZA, V. (1976) Works of the Agriculture Faculty of the University in Sarajevo, 24:137-146.
- VANGELOV, K. and ZELEV, A. (1974) *Zivotnovodni nauki*, 11:51-56.

