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Research Article

Characteristics and Effect of Intakes in Crossbreeding Piglets

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Key words: piglets, crossbreeding, group, season, farm, pig genotypes in LBWT, etc.

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Abstract

Crossbreeding is a successful management practice for improving litter productivity in swine. Five pig groups were used to investigate the effecs on litter performance under the season conditions. Data records spanning a 2 years period of collected from the different farms and were analyzed using least squares procedure. Database included genetic group of litter, year and season of farrowing, and genetic group and season of farrowing interaction. Traits evaluated included litter sizes and weights at farrowing and at weaning, including pre-weaning viability. These studies dealt mainly with two-breed crosses involving the local pigs with any of the several exotic pig breeds in Albania, the Large White, Hampshire, and Landrace. Results showed significant effect of genetic group for all the litter traits studied. The crossbred groups were superior in most of the litter traits studied except litter birth weight where the LW purebred group recorded the heaviest litter weights.

1. Introduction

This mating system, by exploiting heterosis, is known to improve prolificacy, piglet viability and post-weaning gain. Results of several crossbreeding studies in the different season have indicated varying levels of heterosis for sow productivity traits. Extension of these studies to evaluate backcrosses involving local pigs and the Large White (the most common exotic breed in Albania) would provide extra information about the comparative performance of different genetic combinations involving both breeds. This study analyzed swine breeding data involving local pigs, the Large White and their F^1 and backcrosses, in order to ascertain which of the breeds or breed combinations would give optimal performance, in terms of litter viability to weaning age.

2. Materials and Method

The breeding stocks included local pigs and the Large White. The animals were grouped into pens according to breed, sex and physiological status (pregnant, suckling, growers, finishers). Each pen was provided with feeder and water troughs. The husbandry system was intensive, but animals were occasionally allowed on pasture. The open pasture areas were also provided with water and feeder troughs. Boars were introduced to sows and mature gilts on heat. Standard management practices were followed through mating, gestation and weaning. Pregnant sows were fed about 2.0 kg of a gestation diet (about 20% crude protein) daily. As the projected parturition date approached, sows were taken to farrowing pens that had been cleaned and disinfected.

After farrowing, data were recorded on litter size and weight at birth - number dead and number alive were noted. As from two weeks of age, piglets were fed a commercial creep feed ad libitum until weaning at 42 d. It is to be noted that the quality and availability of the diets as well as the overall management of the unit could have fluctuated over the years.

3. Results and Discussion

Litter size at farrowing (LSF) ranged from 1 to 12 piglets with an overall mean of 7.60 piglets. Genetic group of litter had a significant effect on this trait (P<0.05). Litters resulting from the L×LW and (L×LW) ×LW genetic groups recorded the largest live LSF. Litters from the (L×LW) ×L and LW×LW were intermediate and comparable (P>0.05) while L×L recorded the lowest LSF (P<0.05). The performance ranking above was also reflected in the rainy season means of LSF for the genetic groups. However, in the dry season period, the mean performance of (L×LW) and LW×LW matings fluctuated, indicating a significant genetic group by season of farrowing interaction effect for this trait. For the LW×LW group, higher LSF values were recorded in the summer and springer season period (P < 0.05), while the reverse case was observed for the L×LW group. Other genetic groups were not affected (P>0.05). Genetic group and season of farrowing had marked effects on litter birth weight (LBWT). Litters from the LW×LW matings recorded the heaviest LBWT, followed by the (L×LW) ×LW, while litters from the L×LW and (L×LW) ×L were similar (P>0.05) and heavier than litters from the L×L group (P<0.05). This observed trend in LBWT could be due to the large size of LW sows and boars - about twice the size of the L. Significant differences between pig genotypes in LBWT have been reported.

Table nr 1. Effect of genetic group on litter birth weight (kg).

Genetic group	Wintry season		Summer season		Overall	
	n	mean ± se	n	mean ± se	n	mean ± se
L×L	24	6.77±0.55	18	6.80±0.65	42	6.79±0.60
LW×LW	16	12.42±0.30	14	13.64±0.38	30	13.03±0.35
L×LW	13	11.59±0.33	15	10.17±0.36	28	10.85±0.35
(L×LW)×LW	17	11.33±0.30	13	12.00±0.33	30	11.70±0.32
(L×LW)×L	18	9.94±0.40	14	10.39±0.37	32	10.20±0.38
All (pooled)	88	10.41±0.38	74	10.60±0.48	162	10.51±0.44

The same trend described above for LSF was reflected in the least squares means for litter size at weaning (LSW) table 4. LSW ranged between 1 and 9 weaners with an overall mean of 7.12. The highest LSW was recorded by the L×LW and (L×LW) ×LW. Such superior performance could be attributed to heterotic effect resulting from crossbreeding. Several have reported highly significant differences between purebred and crossbred genetic groups of pigs in litter traits at farrowing and at weaning. Litter size at weaning is a function of LSF and the rate of pre-weaning mortality. In the present study, it was observed that the genetic groups that recorded large LSF also maintained that superiority up to weaning. This development could be attributed to the greater liveability on the part of the crossbred L×LW litters due to hybrid vigour and improved maternal ability on the part of the crossbred L×LW sows mated to LW boars. These reports further justify the main incentive for the wide use of crossbreeding in commercial swine production, which is due primarily to the exploitation of hybrid vigour and improved maternal performance of crossbred sows.

Table nr 2. Least squares means of litter sizes at weaning for genetic groups of pigs.

Genetic group	Wintry season		Summer season		Overall	
	n	mean ± se	n	mean ± se	n	mean ± se
L×L	24	5.58±0.14	18	5.47±0.14	42	5.53±0.11
LW×LW	16	6.91±0.29	14	7.21±0.37	30	7.10±0.23
L×LW	13	8.12±0.60	15	7.27±0.46	28	7.70±0.38
(L×LW)×LW	17	8.00±0.65	13	8.08±0.62	30	8.04±0.45
(L×LW)×L	18	7.14±0.54	14	7.29±0.14	32	7.22±0.35
All (pooled)	88	7.15±0.40	74	7.06±0.37	162	7.12±0.31

The data shows the least squares means of litter weaning weight (LWWT) in two farrowing seasons. The heaviest litters at weaning were recorded by the LW×LW genetic group, followed by the (L×LW)×LW group, while the LWWT for the L×LW and the (L×LW)×L) were similar (P> 0.05). This trend could be attributed to large LSW since both traits (LSW and LWWT) are highly positively correlated. The observed differences between genetic groups in LWWT are also due to dissimilarities in body weights and sizes of the original parental breeds.

Table nr 3. Least squares means and standard errors of litter weight at weaning (kg) for groups of pigs.

Genetic group	Wintry season		Summer season		Overall	
	n	mean ± se	n	mean ± se	n	mean ± se
L×L	24	32.76±2.63	18	32.16±2.66	42	32.46±2.50
LW×LW	16	74.28±1.70	14	77.87±2.16	30	76.08±1.38
L×LW	13	72.41±3.49	15	63.25±2.68	28	67.83±2.20
(L×LW)×LW	17	70.40±3.79	13	67.06±3.63	30	68.70±2.62
(L×LW)×L	18	57.12±3.36	14	58.17±2.68	32	57.66±2.06
All (pooled)	88	61.39±2.44	74	59.70±2.22	162	60.54±2.01

Litters from (L×LW) ×LW displayed the highest viability at 6 weeks. This genetic group showed 13.8% and 8.00% higher liveability at 42 d than litters from purebred L×L and LW×LW respectively. This result may indicate some inherent advantages (e.g. improved viability) in the crosses derived from (L×LW)×LW which essentially is 75% LW and 25 % L. The performances of (L×LW) ×L and L×LW were similar and higher than the LW×LW purebred.

The lowest pre-weaning survival rate (85%) was recorded by the L purebred group, which agrees with the upper limit of 85% pre-weaning survival rate for local sows raised under intensive management. Any genetic group should consider other measures of performance evaluation, including fertility levels in different seasons, average daily gain and feed efficiency. In addition, other breeds as Landrace Hampshire and breed combinations need to be evaluated for performance traits in order to determine their comparative advantages for profitable pork production.

4. Conclusions

This study showed significant genetic group effect on prolificacy and piglet viability to weaning and food intake. The F1 and backcross involving the (L×LW) sows mated to LW showed the most superior performance in terms of highest liveability to weaning. Further cross-breeding studies involving other breeds as Landrace under different management systems should be conducted so as to determine the most suitable breed combinations for pig meat production under season conditions.

References

1. Bereskin B., 1983. Performance of selected and control lines of Duroc and Yorkshire pigs and their reciprocal crossbred progeny. Journal of Animal Science 57(4): 867-878.
2. Fahmy M H., Hottman W. B., Macintyre T. M., and Moxley J. E., 1978. Evaluation of piglet mortality in 8 two-breed crosses among breeds of pigs. Animal Production 26: 277-286.
3. Falconer D. S., and Mackay., TFC 1996. Introduction to Quantitative Genetics, 4th Edition, Longman. pp 285-286.
4. Gaughler H. R., Buchanan D. S., Hintz R. L., and Johnson R. K., 1984. Sow productivity comparisons of four breeds of swine: purebred and crossbred litters. Journal of animal Science, 59 (4): 941-947.
5. Johnson R. K., 1980. Heterosis and breed effects in swine. North Central Regional Publication Number 262, USA.
6. Kuhlers D. L., Jungst S. B., and Morre R. A., 1988. Comparison of specific crosses from York-shire-Landrace, Chester - White -Landrace and Chester-White-Yorkshire sows. Journal of Animal Science 66 (5):1132-1139.
7. McLaren D. G., Buchanan D. G., and Johnson R. K., 1987. Industrial heterosis and breed effects on post-weaning performances and carcass traits in four breeds of swine. Journal of Animal Science 64: 83-88.
8. Schneider J. F,, Christian L. L., and Kuhlers, D., 1982. Crossbreeding in swine: genetic effects on litter performance. Journal of Animal Science 54 (4): 739–746.