ANALYSIS OF THE REPRODUCTIVE PERFORMANCE RECORDS OF AN INTENSIVE PIGGERY IN AUSTRALIA

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SUMMARY

The records of 9,519 farrowings over eight years in an 800 sow commercial piggery were examined, and the relationships between the variables of reproductive performance and parity and breed were considered. Litter size was low and identified as the major factor limiting productivity. The most important variation in litter production was associated with parity. The performance of first litter sows had a marked influence on the overall performance of the herd since first parity sows produced 25.4% of all litters. First litter sows had smaller litters (7.48 born alive) than sows of all other parities (9.05) and took longer to return to service after weaning (11.9 days) than older sows (6.8 days). Crossbred sows produced 10.3% more pigs per sow per year for marketing than the pure bred parental lines, indicating their superiority under the conditions in this piggery.

INTRODUCTION

Although some reports on the reproductive performance of pigs under Australian conditions have been published (Henry 1969; Holder 1970; Hubbard *et al.* 1976), few data are available on the long-term performance of large numbers of sows under intensive conditions. Such long-term data are an essential basis for systematic studies of reproductive performance of pigs and to define problem areas of reproduction for investigation. To provide these types of data the records of an intensive commercial piggery were used to establish relationships between sow performance, parity and breed.

MATERIALS AND METHODS

Records were analysed from an intensive piggery ("Baconfield", Bullsbrook, W.A.) housing 800 sows of Large White, Landrace and crossbred stock and mating between 35 and 45 animals each week with natural service. Matings are supervised and most sows are served on each of two successive days. During gestation sows are either tethered with chains and collars in individual stalls or confined in pens in groups of six, and they are fed 2.2 kg/day of a diet based on wheat and barley containing an estimated 12.5 MJ of metabolisable energy per kg of air-dry matter and 15% crude protein.

Data on the number of piglets born alive and born dead per litter, the number lost between birth and marketing, the production interval (days from weaning one litter to the weaning of the next) and the interval from weaning to re-service were examined for 2,549 individual females which farrowed 9,519 litters between December 1969 and September 1977. These variables were examined at each parity for each breed. Data from a subsample of 433 sows which produced five litters each were used to calculate the relationship between the number of piglets born in the first litter and the sow's cumulative performance up to parity 5 to assess the predictive value of the first litter performance on subsequent productivity.

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RESULTS

Data from the 9,519 farrowings showed that the 'average' sow in the herd had 8.67 live piglets per litter, farrowed 2.4 litters per year and, after losses, produced 18.2 pigs per sow per year (Table 1).

TABLE 1 Variables for litter performance for all farrowings

Measured variables	No. of sows	Mean and SE
Number born alive	9,519	8.67 ± 0.029
Number born dead	9,519	0.55 ± 0.012
Number lost	9,519	1.18 ± 0.015
Production interval (d)	9,519	149.9 ± 0.20
Weaning to mating (d)†	8,082	8.2 ± 0.10

Parameters calculated (per sow per year): Litters 2.14; Pigs born alive 21.1; Pigs produced 18.2.

† Some sows were culled at weaning.

The changes with parity in all variables for litter production are shown in Table 2. The number of piglets born alive increased with parity up to parity 6 and remained at this level until parity 9 and above, when they decreased slightly. This increase in the number born alive was partially offset by an increase in the number of piglets lost. The number of piglets born dead also increased with parity.

TABLE 2 Litter performance variables (mean and SE) for each parity

Parity	Born alive	Born dead	No. lost	Weaning to mating interval (d)	
1 n=2459	7.48 ± 0.049	0.42 ± 0.021	1.00 ± 0.026	11.9 ± 0.25	(n=2143)
2 n=1903	8.03 ± 0.064	0.37 ± 0.024	0.99 ± 0.031	7.6 ± 0.16	(n=1649)
3 n=1422	8.88 ± 0.073	0.49 ± 0.027	1.06 ± 0.034	7.0 ± 0.26	(n=1233)
4 n=1103	9.50 ± 0.081	0.58 ± 0.035	1.32 ± 0.045	6.4 ± 0.15	(n= 947)
5 n= 842	9.75 ± 0.090	0.68 ± 0.040	1.43 ± 0.053	6.3 ± 0.27	(n= 712)
6 n= 616	9.94 ± 0.110	0.73 ± 0.044	1.54 ± 0.066	6.2 ± 0.21	(n= 521)
7 n= 448	9.84 ± 0.169	0.86 ± 0.064	1.54 ± 0.077	6.6 ± 0.48	(n= 361)
8 n= 306	9.71 ± 0.154	0.94 ± 0.085	1.54 ± 0.087	6.1 ± 0.32	(n= 250
>9 n= 420	9.64 ± 0.129	1.13 ± 0.078	1.57 ± 0.083	4.2 ± 0.28	(n= 418)
2-9 n=7060	9.08 ± 0.034	0.60 ± 0.014	1.25 ± 0.018	6.8 ± 0.09	(n=5939)
1 vs 2-9	P < 0.001	P < 0.001	P < 0.001	P < 0.001	

Sows in their first parity took longer (P < 0.001) to return to the boar after weaning than animals in any other parity (Table 2). Only 70% of the first litter sows returned within 10 days of weaning compared with 92% of sows of other parities (Table 3).

TABLE 3 Effect of parity on the interval from weaning to mating expressed as a percentage of sows returning in the time specified

Parity		Days after weaning 0-10	11-23	24-30	30
1	(n = 2143)	70.6%	14.8%	8.1%	6.5%
2-9	(n = 5939)	92.4%	4.8%	1.9%	0.9%
		P < 0.001	P < 0.001	P < 0.001	P < 0.001

The samples of both lines of purebred sows included more first and second litters than did the crossbred sample. The crossbreds were superior to the purebreds for each of the variables examined (Table 4) which resulted in a 10.3% increase in the number of pigs marketed per sow per year.

TABLE 4 Mean performance for each breed adjusted for parity

Breed	Born alive (mean and SE)	Born dead (mean and SE)	Number lost (mean and SE)	Interval weaning to mating	Pigs/ litter	Pigs/sow year
Crossbred n=8861	8.72±0.030	0.54±0.012	1.18±0.015	6.8±0.09	7.54	18.4
Landrace n=221	8.09±0.185	0.85±0.127	1.20±0.080	8.8±0.83	6.89	16.2
Large White n=437	8.39±0.141	0.65±0.059	1.45±0.080	7.3±0.41	6.94	16.7
Mean of Purebreds n=658	8.29	0.72	1.37	7.8	6.92	16.5
Cross minus Pure	+ 0.43	- 0.18	- 0.19	- 1.0	+ 0.62	+ 1.9
Cross vs Pure (%)†	+ 5.2	-25.0	-13.9	-12.8	+ 9.0	+ 11.5

† % difference of crossbred over purebred.

DISCUSSION

The mean production interval in this herd was short due to the early weaning system and the high conception rate (85%). The resulting mean number of litters per sow per year of 2.4 is high compared to that reported in other Australian herds (Henry 1969; Holder 1970; Hubbard ***et al.*** 1976). It is probably an overestimate because sows which were remated but subsequently failed to produce litters and were culled did not appear in the records. Even using this inflated figure for the number of litters per year, the low mean litter size results in only 18.2 pigs per sow per year. This figure is 1.3 pigs per year below the average production in the U.K. and 3.8 pigs per year below the standard classified as 'good' for a herd operating a three to four week weaning system in that country (Ridgeon 1977). This indicates that low litter size is limiting production in this piggery, as has been suggested for other Australian piggeries (Penny ***et al.*** 1971; Hubbard ***et al.*** 1976).

Mean litter size increased with parity in a similar manner to that reported by Lush and Molln (1942) and Rasbech (1969), but fewer sows contribute to the data for higher order parities. This reflects a heavy culling for poor litter size, injury or disease so that the increase in litter size with parity reflects,

to some extent, the removal from the herd of inherently poor producers. Nevertheless, sows in their first parity produced 25.8% of all litters in the herd, and had smaller litters than sows in other parities. This high proportion of records from young sows is, to some extent, the result of the herd starting with a complement of only gilts. The number born alive at parity 1 accounted for only 13% of the total variation in lifetime performance of sows and is therefore a poor predictor of productivity. This finding agrees with that of Strang and King (1970) who suggested that the first two litters were not a good guide to subsequent litter size and performance of sows.

It is clear that parity 1 sows differ from older sows in their ability to return to oestrus quickly and synchronously after weaning. The differences observed can not be fully explained on the basis of parity 1 sows having a silent or unobserved oestrus four to ten days after weaning because differences between the two classes of sows were not confined to the period of an expected second ovulation (days 24-30). A greater proportion of parity 1 sows than older sows returned to service in the periods 11-23 days and 31 days after weaning. At present no physiological basis of this phenomenon can be advanced.

Crossbred sows performed better than sows of both pure breeds. Since the data were corrected for the effects of parity the differences observed can be attributed to hybrid vigour. The exact genotype of the crossbred sows in the Baconfield herd was unknown but their superiority of 5.2% in the number born alive was the same as that found by Smith and King (1964) between first and second generation crossbred sows and their purebred parents. In addition, the advantage of the Baconfield crossbred sows in the number of pigs per litter reaching market was in close agreement with the report of Smith and King (1964) who found litters from crossbred sows were 8.2% larger than those from purebred sows eight weeks after birth.

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