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Comparative Performance Among Different Genetic Groups of Large White Yorkshire Crossbred Pigs

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ABSTRACT

The Present investigation was carried out to analyse the data on growth and reproductive traits in Large White Yorkshire (LWY) crossbred pigs. A total of 1635 records of two genetic groups i.e. 50% crossbred (n=845) and 75% crossbred (n=790) LWY x Desi, spread over the 16 years (1994 to 2010) were taken from the animals maintained under All India Coordinated Research Project on pigs, at Livestock Farm, JNKVV, Adhartal, Jabalpur (M.P.) At slaughter age, 75%LWY were found to be slightly heavier than the 50% LWY crossbreds. The genetic group and year had significant effect (Pd"0.05) on almost all body weights. A significant year effect (Pd"0.05) was observed for all the traits. Littersize at birth had a significant (Pd"0.05) effect on litter weight at birth.

Keywords: Crossbred; Large White Yorkshire; Growth traits; Reproductive traits

In India Piggery remain primitive and unorganized amongst the rural farmers, until recent initiative that brought about some improvement due to tremendous market demand. Pig is one of the most prolific and efficient feed converting domestic animal amongst the livestock. They grow very rapidly, mature quickly and provide quick and maximum return. Pork is considered as most nutritious meat with high energy value in the human diet. Pork is the most widely consumed meat in the world, followed by poultry, beef and mutton. With the increase in population the demand of meat particularly pork is tremendously increasing day by day, although consumption varies widely from place to place (Kayer *et al*., 2013). It requires less capital investment but generate viable and quick source of income for the rural farmers. As per 18th livestock census the population of pigs in India was 11.134 million (1.56 % of the total world's population, BAHS, 2012) with an annual growth rate of -4.74%.

In order to bridge the wide gap between large requirements and low availability of animal protein, it is essential to improve and multiply all efficient meat-producing animals in the country. In India, the pigs are mostly non-descript type (except Gungroo and Niyan Megha of indigenous breed), and their production potential including growth rate, feed conversion efficiency, littersize and dressing percentage is quite low as compared to many of the exotic breeds of the world. Thus, there is a great need to improve the local stock so as to meet the growing animal protein demand of the country. The demands of exotic and crossbred piglets is on an increase as they mature early, grow rapidly and are highly prolific and economic to rear. It is expected that even though industry may develop in India to any extent, but piggery shall continue to be a subsidiary occupation and a major source of income for backward class and landless tribes of India.

MATERIALS AND METHODS

Data were collected from the records of Large White Yorkshire grades maintained at AICRP on Pigs, Livestock Farm, JNKVV, Adhartal, Jabalpur (M.P.), covered over a period of fifteen years (1994-2010). Overall 1635 observations of Large White Yorkshire constituted the sample size for the present study. These animals were kept in captivity and their feeding, management including health cover were done as per the technical programme of All India Coordinated Research Projects on Pigs. These animals were bred in a manner to avoid inbreeding in the farm. The time of mating and farrowing were synchronized in such a way that all the genetic groups had the same breeding season. Information about body weights at various stages, littersize at birth and weaning (2 months) and litter weight at birth and weaning (2 months) were recorded. The managemental practices remained similar during the entire period of study. Animals were group fed *ad-lib* and had free access to water.

The data was analyzed by least squares analyses using “mixed model least squares and maximum likelihood computer program PC-2”, developed by Harvey (1990) as follows:

For sow productivity traits (Littersize and litter weight):

$$Y_{ijkl} = \mu + G_i + F_j + N_k + e_{ijkl}$$

For body weight at birth and monthly body weights at different ages upto slaughter:

$$Y_{ijklm} = \mu + G_i + F_j + M_k + N_l + e_{ijklm}$$

Where, Y_{ijkl} = i^{th} observation of an animal belonging to i^{th} genetic group, j^{th} season of farrowing in k^{th} year; Y_{ijklm} = m^{th} observation of an animal belonging to i^{th} genetic group, j^{th} season of farrowing and k^{th} sex in l^{th} year; μ = overall mean; G_i = effect of i^{th} genetic group, (i=1, 2); F_j = effect of j^{th} season of farrowing (j=1,2,3); M_k = effect of k^{th} sex (l=1, 2); N_l = effect of l^{th} year (k=1994-2010); N_k = effect of k^{th} year (k=1994-2010); e_{ijkl} = random error normally independently distributed; e_{ijklm} = random error normally independently distributed.

RESULTS AND DISCUSSION

The least squares mean values of body weights from birth to 8 month of age along with S.E. of 50% LWY and 75% LWY are presented in Table 1.The LSM values of

Table 1: Least-squares means for body weights of LWY crosses

Cross	Birth	1 month	2 months	3 months	4 months	5 months	6 months	7 months	8 months
50% LWY	$0.92^{a} \pm 0.02$	$4.73^{a} \pm 0.05$	$8.77^{a} \pm 0.05$	$13.21^{b} \pm 0.08$	$17.94^{b} \pm 0.15$	$23.54^{b} \pm 0.15$	$29.64^{b} \pm 0.18$	$36.93^{a} \pm 0.28$	$42.29^{b} \pm 0.27$
75% LWY	$0.93^{a} \pm 0.04$	$4.76^{a} \pm 0.06$	$8.78^{a} \pm 0.04$	$13.61^{a} \pm 0.07$	$18.65^{a} \pm 0.14$	$24.48^{a} \pm 0.15$	$30.41^{a} \pm 0.18$	$36.73^{b} \pm 0.24$	$43.51^{a} \pm 0.31$
Overall	0.92 ± 0.01	4.74 ± 0.03	8.77 ± 0.02	13.40 ± 0.05	18.28 ± 0.11	23.99 ± 0.13	30.01 ± 0.16	36.83 ± 0.23	42.88 ± 0.26

[a-b]Values within columns with different superscripts differ significantly ($P < 0.05$).

body weights from birth to weaning (2 months) of 50% LWY and 75% LWY grades ranged from 0.92±0.02 to 8.77±0.05 and 0.93±0.04 to 8.78±0.04 kg respectively. The weight at slaughter age (8 months) of 50% LWY and 75% LWY grades were 42.29±0.27 kg and 43.51±0.31 kg respectively. The body weights from birth to weaning showed non-significant difference, however at slaughter age weight were significantly different from each other. The present body weights were found comparable with the findings of Phookan*et al.* (2009) in the indigenous pigs of Brahmputra valley, Assam, while Bendangyanger*et al.* (2009) reported the average birth weight to be little lower i.e. 0.475±0.02 kg in indigenous pigs of Nagaland. The present findings are in close agreement with the reports of Jogi (1990) and Sharma (2009) in LWY grades.

The linear trend of body weights suggests that a piglet born with higher body weight as a result of maternal influence leads to higher weaning weight which, in turn, affects the succeeding body weights. This clearly indicates that future body weight including weaning weight depends on the birth weight. If birth weight is higher, then a piglet naturally gets a higher start for its struggle for existence in comparison to its fellow weaklings. It could also be concluded that higher birth weight and weaning weight provide better opportunity for struggle of existence and faster growth rate is possible, if proper feeding and management is provided to the animal.

Table 2: Least squares means for littersize and litter weight for LWY crosses

Cross	littersize		litter weight	
Birth	weaning	birth	weaning	
50% LWY	7.78^{a} ±2.18	6.943^{a} ±2.27	7.18^{a} ±0.24	61.03^{a} ±2.58
75% LWY	7.16^{b} ±2.18	6.461^{b} ±2.27	6.61^{b} ±0.24	55.82^{b} ±2.58
Overall	7.49±0.18	6.70 ±0.21	6.88±0.185	58.562±1.742

$^{a-b}$Values within columns with different superscripts differ significantly ($P < 0.05$).

The Least squares means with standard errors for littersize and litter weight at birth for LWY crosses are presented in Table 2. The genetic group had a significant effect on the littersize and litter weight at birth for LWY grades. The LSM for littersize at weaning followed the similar trend as that of littersize at birth. Litter weight at birth is closely associated with the littersize at birth. Animal from heavier litter weight at birth normally have better viability and grow faster and are likely to influence the overall productivity of sow. The performances of sows were almost the same in all the three seasons. LSM value had difference between 50% LWY and 75% LWY grades which is greater for half-breeds of LWY i.e. 7.78±2.18 than 75% LWY (7.16±2.18) grades. It could be attributed to the fact that as the blood inheritance approaches towards more purity, then the breed requires their own environmental conditions and performance is reduced in the unfavorable conditions.

Table 3: Least squares analysis of variance for effect of various factors on littersize and litter weight at birth for LWY crosses

Source	litter size						litter weight					
	At birth			At weaning			At birth			At weaning		
	d.f.	MSS	F	d.f.	MSS	F	d.f.	MSS	F	d.f.	MSS	F
Year	14	10.46	3.54*	14	6.64	1.56	1	29.03	5.148*	14	1164.26	4.247*
Season	2	0.82	0.27	2	2.02	0.47	2	0.38	0.067	2	204.78	0.747
Breed	1	20.29	6.87*	1	10.6	2.49	1	40.62	7.205*	1	625.86	2.283
Error	181	2.95		178	4.25		42	5.64		181	274.14	

* Significant (P<0.05)

These findings are in comparison to Jogi (1990), Arora (1993) and Sharma (2009).

Litter Weight at Weaning also reflects the mothering ability of the sow as only good mother with more milk yield can provide a litter with heavier weights. The genetic groupwise LSM of litter weight at weaning were 55.82±2.58 and 61.03 ±2.58 kg for 75% and 50% LWY grades, respectively. This follows the same trend of litter weight at birth. These findings are in disagreement with Johar *et al.*(1974) and Singh (1984). The LSM for littersize at weaning followed the similar trend as that of littersize at birth. Post monsoon season showed the highest LSM value due to good availability of fodder and the maternal influence for both LWY and TMW crossbreds. These findings are in agreement with Johar *et al.*(1974) and Sharma (2009).

The LSM for litter weight at birth and weaning were 7.18±0.24 kg for 50% and 6.61±0.24 kg for 75% LWY crossbreds. These values was in agreement with the findings of Arora (1993), Jogi and Lakhani (2000) and Sharma (2009). However, Gawande (2005) recorded a significant effect of genetic group on litter weight at birth.

There was a significant effect (Pd”0.05) of year and genetic group. The season was found to be non-significant (P<0.05). The performances of sows were almost the same in all the three seasons. However, there is a significant difference between 50% LWY and 75% LWY crosses which is greater for half-breeds of LWY i.e. 7.78 ±2.18.Table 3 depicts the least square analysis of variance for non-genetic and genetic effects on littersize and litter weight at birth for both LWY grades showed significant year effect and breed birth, weaning and slaughter weights are useful for selection of pigs for breeding. This will be helpful in increasing the profit under field conditions.

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