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Genetic studies on sow productivity traits of large white yorkshire crossbred pigs

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ABSTRACT

Sow productivity traits are very important in swine production and formulating its breeding strategies. In present study a total of 1076 records of two different genetic groups *i.e*. 50% (n=760) and 75% (n=712) Crossbred Large White Yorkshire (LWY) x Desi, from the year 1999 to 2008 maintained at AICRP on Pigs, Livestock Farm, JNKVV, Adhartal, Jabalpur (M.P.) were considered for the study. Least square analysis of variance was performed to study the effect of years, seasons and genetic groups on litter size and litter weights at birth and weaning ages. Least square means of litter weights at birth were observed to be lowest (5.38+0.49) in year 1999 and highest (7.92+0.31) in year 2008 and for litter weights at weaning the lowest (46.48+7.13) in year 2004 and 67.33+6.91 in year (2003). No definite trend over the years were observed, these difference among the years could be due to difference in management practices and hygienic conditions. The genetic group-wise Least Square Means ranged from 7.10±0.31 (75% LWY) to 7.85±0.31 (50% LWY) for litter size at birth while 6.41±0.25 (75% LWY) to 6.92±0.25 (50% LWY) litter size at weaning. The h^2 estimate was quite low 0.189 and 0.101 for the litter size at birth and weaning respectively. It can be concluded that 50% exotic germ plasm of LWY is more suitable in terms of sow productivity traits than 75% in tropical-hot-humid environment.

Keywords: Large White Yorkshire Crossbred, Litter size, Litter Weight, Heritability

BACKGROUND

Swine husbandry has become very important livestock practices in India due to increased demand of pork and pork products. About 40% of Indian population is living below the poverty line and majority of them have special liking for livestock farming .Among different practices, pig rearing gets an important place. In India, pig rearing is a traditional occupation of tribal and some weaker section of the society. Presently all classes of people are showing their kin interest towards pig farming in rural, semi urban and urban areas for subsidiary income and as a part of full time employment also. Economic viability of piggery industry depends upon mainly sow productivity traits of pigs. The goal of higher sow productivities traits have been achieved through selection and suitable breeding policy.

The large litter sizes & litter weights at birth and weaning are very important parameter in the success of swine enterprises(Jogi ,1990). As after this period the mortality is considerably reduced. Therefore, the necessity of evaluating the breeding potential of breeding animal at an early age in terms of litter size and litter weight at birth has been realized by livestock breeder. The litter size and weight at birth influence their survival, while litter size and weight at weaning is a measurement of net merit of performance of swine. So it is desirable to access the sow performance along with genetic parameter. The trend of these traits over the years was different to the finding(Jogi,1990 and Arora ,1993)

The present investigation was carried out to study the influence of different factors such as year, season and genetic group on litter size and litter weight at birth and weaning at the agro-climatic of Kymore Plateau & Satpura Hills of India.

MATERIAL AND METHODS

A total of 1076 records of two different genetic groups *i.e.* 50% (n=760) and 75% (n=712) Crossbred Large White Yorkshire (LWY) x Desi, from the year 1999 to 2008 maintained at AICRP on Pigs, Livestock Farm, JNKVV, Adhartal, Jabalpur (M.P.) The data collected for the total number of piglets born to gilt or sow at one farrowing was taken as the litter size at birth. The number of piglets weaned from each gilts or sows at sixty days of age was recorded as liter size at weaning, data for gross weight of the piglets born to gilt or sow at one farrowing was taken as the litter weight at birth and the gross weight of number of piglets weaned from each gilt or sow at 60^{th} day of age was taken as litter weight at weaning were analyzed for the present study.

Managemental Practices

It was maintained more or less similar during the entire period of study. Animals were fed according to similar feeding scheduled which was provided *ad-lib* in a group and had free access to water.

Experimental Animals

The experimental animals belonged to two genetic group's viz. 50% and 75 % Large White Yorkshire Crossbred Pigs

Non–Genetic factors

The non–genetic factors considered for analyses were years (1999-2008) and seasons (pre-monsoon, monsoon and post-monsoon).

Statistical analysis

Least square analysis of variance was performed to study the effect of years, seasons and genetic groups on litter size and litter weights at birth and weaning ages. The data was analyzed by least squares analyses using "Mixed Model Squares and Maximum Likelihood Computer Program PC-2", developed by (Harvey,1990). The various genetic parameters like heritability and genetic correlation were estimated by using half sib analysis as described by(Backer,1975).

RESULTS AND DISCUSSION

Significant differences (Pd"0.05) were obtained between the year and genetic group while the season had non-significant effect on litter size and litter weight (Table 1). Year-wise least square means (LSM) showed a wide variation from 5.38±0.67 (1999) to 7.92±0.01 (2008) and 5.42±0.63 (1999) to 7.98±1.56 (2002) for litter size at birth and weaning respectively (Figure 1 & 2). Least square means of litter weights at birth were observed to be lowest (5.38+0.49) in year 1999 and highest (7.92+0.31) in year 2008 and for litter weights at weaning the lowest (46.48+7.13) in year 2004 and 67.33+6.91 in year (2003) (Figure 3 & 4). No definite trend over the years were observed, these difference among the years could be due to difference in managemental practices and hygienic conditions. These findings are in comparison to(Jogi,1990 and Backer ,1975). The performances of sow were almost same in all

Table 1: Least square means (LSM±S.E) of sow productivity traits obtained in different years, season and genetic groups

Effects	Litter size at birth (LSM±SE)	Litter size at weaning (LSM±SE)	Litter weight at birth (LSM±SE)	Litter weight at weaning (LSM±SE)
Overall mean	7.481±0.177	6.669±0.202	6.896±0.156	58.498±1.818
YEAR	*	*	*	*
1999	5.38±.67[f]	5.42 ±0.63[h]	5.38 ±0.49[g]	48.54 ±5.67[l]
2000	6.38 ±0.57[de]	6.34±0.73[ef]	6.38 ±0.57[ef]	51.95 ±6.57[j]
2001	6.66 ±0.36[cd]	7.07 ±0.70[b]	6.66 ±0.55[de]	56.47 ±6.36[h]
2002	6.85 ±0.02[c]	7.98 ±1.56[a]	6.85 ±1.21[d]	66.35 ±4.02[c]
2003	7.30 ±0.90[b]	7.72 ±0.77[a]	7.30 ±0.60[c]	67.33 ±6.91[b]
2004	6.15 ±0.13[e]	5.82 ±0.79[g]	6.15 ±0.61[f]	46.48 ±7.13[m]
2005	7.37 ±0.01[b]	6.86±0.55[bc]	7.37 ±0.42[c]	62.46 ±5.01[f]
2006	6.62 ±0.20[cd]	6.39±0.46[def]	6.62 ±0.36[de]	53.36 ±4.20[i]
2007	7.57 ±0.43[ab]	6.73±0.49[bcd]	7.57 ±0.36[bc]	65.59 ±4.43[d]
2008	7.92 ±0.01[a]	6.07±0.44[fg]	7.92 ±0.31[b]	63.32 ±4.01[e]
SEASON	N.S	N.S	NS	NS
Pre-Monsoon	7.44 ±0.75[a]	6.68±0.30[a]	6.84 ±0.23[a]	58.04 ±2.75[b]
Monsoon	7.60 ±0.26[a]	6.44±0.36[b]	6.95 ±0.27[a]	56.55 ±3.26[c]
Post-Monsoon	7.38 ±0.77[a]	6.87±0.30[a]	6.89 ±0.23[a]	60.89 ±2.77[a]
BREED	*	*	*	*
50% LWY	7.85 ±0.31[a]	6.92±0.25[a]	7.20 ±0.19[a]	60.85 ±2.31[a]
75% LWY	7.10 ±0.31[b]	6.41±0.25[b]	6.59 ±0.19[b]	56.14 ±2.31[b]

*Significantly differ P<0.05 and NS =Non-significant

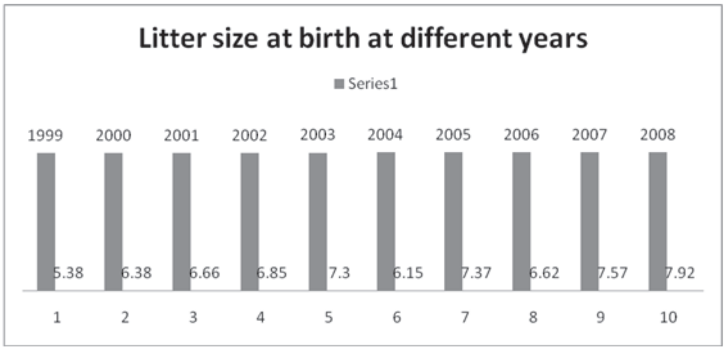

Fig.1: Litter size at birth at different years

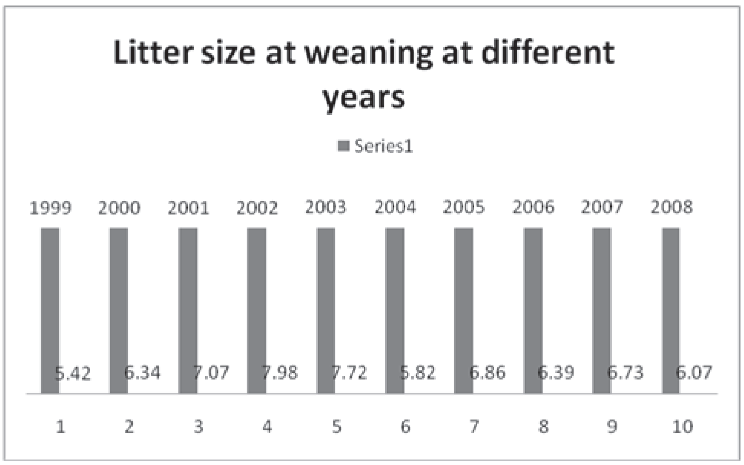

Fig. 2: Litter size at weaning at different years

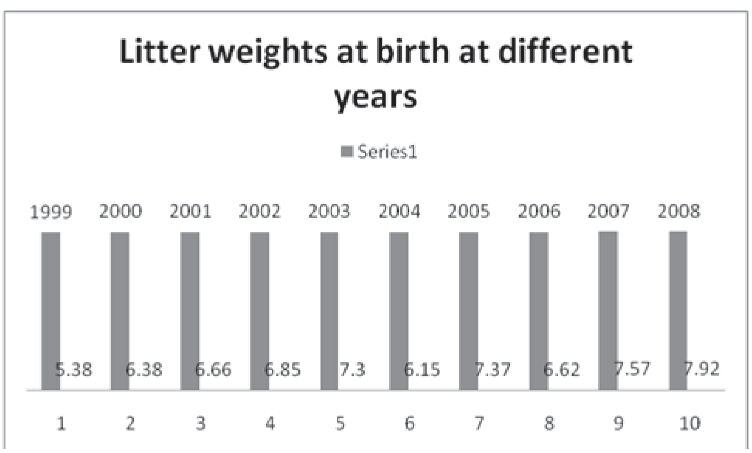

Fig. 3: Litter weights at birth at different years

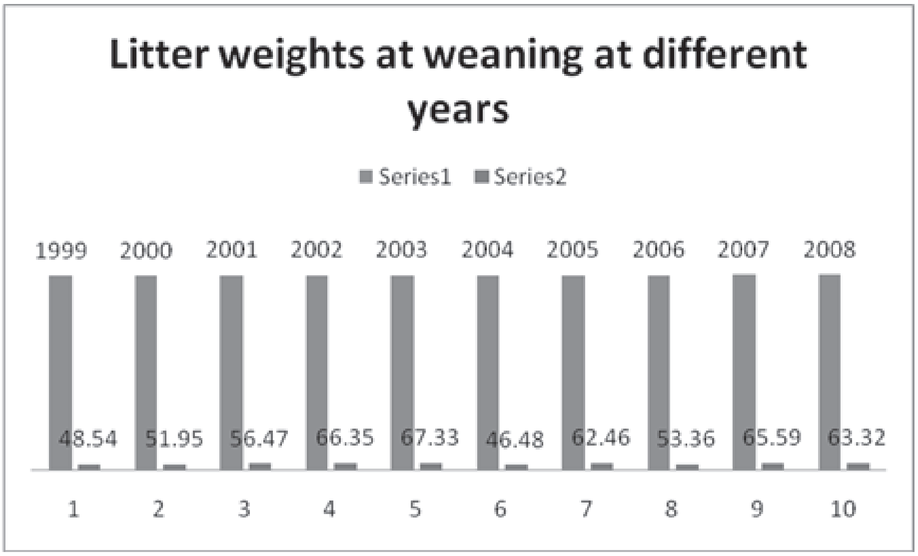

Fig. 4: Litter weights at weaning at different years

the three seasons. The genetic group-wise LSM ranged from 7.10±0.31 (75% LWY) to 7.85±0.31 (50% LWY) for litter size at birth while 6.41±0.25 (75% LWY) to 6.92±0.25 (50% LWY) litter size at weaning. The genetic group-wise LSM differences were 60.85+2.31 and 56.14+2.31 in 50% and 75% LWY respectively. Significant effect of genetic group on litter size and litter weight at birth and weaning were in confirmation with the finding of (Lakhani and Jogi ,2001) various exotic and Desi crossbred pigs. Significantly lower litter size at weaning was reported (Kumar,1999 ,Khalkho ,2004) in various crossbred pigs. It could be attributed due to the fact that as the blood inheritance approaches to more purity, the species require their own environmental conditions and their performance reduces in unfavorable condition. In the same line less heterotic effect was found in 75% in comparison to 50% LWY.

3.1 Genetic Parameter

The heritability (h^2), genetic and phenotypic correlation of these traits are presented in Table2. The h^2 estimate was quite low 0.189 and 0.101 for the litter size at birth and weaning respectively, which are in agreement with the in exotic, desi and crossbreds and contrary to the findings of (Batabayal,1969,Johar *et al*,1974,Mishra *et al* ,1989). The h^2 estimate was high for the litter weight at birth (0.574) and weaning (0.361) (Table-2) contrary to the present finding(Pandey and Singh ,2010) reported very low heritability for litter weight at birth and weaning in Landrace, landrace and Desi cross and Desi pigs, which might be due to the results of mothering ability of sow *i.e.*, how does the sow nourishes the piglets and the availability of milk for the piglets. For these traits, the genetic and phenotypic correlation was positive at higher side. In general the phenotypic correlation is higher than the genetic correlation for the traits. Environmental correlations also followed the same trend. It shows that there was high influence of environmental factors on the sow productivity traits. The environment is a cause of correlation so far as any two characters are influenced by the same differences on environmental conditions(Jogi,1990).

Table 2: Heritability (diagonal), genetic correlation (below diagonal), phenotypic correlation (above diagonal) and environmental

	LSB	LSW	LWB	LWW
LSB	0.189 ±3.725	0.852 (0.866)	0.946 (1.105)	0.816 (0.897)
LSW	0.816	0.101 ±3.700	0.804 (0.969)	0.942 (1.029)
LWB	0.902	0.850	0.574 ±3.775	0.845 (0.873)
LWW	0.650	0.851	0.855	0.361±3.759

LSB- Litter Size at Birth, LSW- Litter Size at Weaning, LWB- Litter Weight at Birth and LWW- Litter Weight at Weaning

CONCLUSION

The present finding revealed that, genetic groups and years except season had a significant ($P<0.005$) effect on sow productivity traits, which emphasized that 50% exotic germ plasm of LWY is more suitable in terms of sow productivity traits than 75% in tropical-hot-humid environment. Year-wise difference in the present finding indicated that improve managemental and hygeneic practices improve these traits, which ultimately improved the overall economic return from piggery. Genetic correlation among all these traits are positive indicating that selection for one trait would result in genetic improvement in others.

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