

## Analysis of litter traits in three genetic groups of pigs

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Received: May 2015; Revised: June 2015; Accepted: July 2015)

### Abstract

Data on 180 farrowings belonging to Large White Yorkshire, Duroc & crossbreds of Large White Yorkshire x Ankamali maintained at Center for Pig Production & Research, Mannuthy were subjected to least squares analysis to study the effect of genetic & non-genetic factors. Significant effect on litter traits due to breed, season of farrowing & age of sows was observed. Mean litter sizes were 09.73±0.16 at birth & 06.78±0.16 at weaning while the corresponding mean litter weights were 11.25±0.21kg & 54.92±1.32kg at weaning. The crossbred sows produced significantly higher number of piglets during birth & weaning. First parity females had significantly higher number of piglets at weaning, whereas litter weight at weaning was high in the second parity. Season of farrowing had significant influence on litter size at weaning.

**Keywords:** Litter size, litter weight, seasons of farrowing

### Introduction:

The pig is an important meat producing livestock capable of withstanding diverse agro ecological conditions & management practices. They are fast growers having high feed efficiency with ability to utilize agro industrial byproducts. Among livestock, pig is one of the most prolific breeders with short generation interval & better reproductive efficiency. They contribute significantly to the economy of the rural people & convert the waste from households, hotels, vegetable markets & slaughterhouses into valuable animal protein. Reproductive traits play a major role in determining the efficiency of production in livestock species. The number of piglets born & their survivability influence the financial status of pig production. Increasing the number of piglets weaned per sow will maximize returns for pig producers with minimal additional input. Present investigation has been conducted to find the performance of three genetic groups namely Large White Yorkshire (LWY), Duroc (D) & Ankamali x Large White Yorkshire crossbred pigs under Indian conditions.

### Materials & Methods

This study included 180 sows farrowed during June 2011 to January 2012 (98 Large White Yorkshire, 25 Duroc & 57 crossbreds of Large White Yorkshire x Ankamali) from Center for Pig Production & Research, Mannuthy. Animals are maintained

under optimum management conditions & weaning of piglets was done at 45 days after birth. Data on Litter size at birth (LSB), Litter weight at birth (LWB), Litter size at 45 days of weaning (LSW) & Litter weight at 45 days of weaning (LWW) were recorded along with details on age, breed of the sow & season of farrowing. Data were analyzed using least square mixed model as described by [1] to find out the effect of age, breed & season of farrowing. Model used was

$$Y_{ijkl} = \mu + A_i + S_j + B_k + e_{ijkl}$$

Where,  $Y_{ijk}$  =  $l^{\text{th}}$  observation of  $k^{\text{th}}$  breed of  $j^{\text{th}}$  season of farrowing of  $i^{\text{th}}$  age group,

$\mu$  = General mean,

$A_i$  = Effect of  $i^{\text{th}}$  age group,

$S_j$  = Effect of  $j^{\text{th}}$  season of farrowing,

$B_k$  = Effect of  $k^{\text{th}}$  breed,

$e_{ijkl}$  = Random error

### Results & Discussion

The effect of age, breed & season of farrowing on litter traits were estimated using Least square mixed model method [1] & analysis of variance results are presented in Table 2. The overall means for LSB, LSW, LWB & LWW were  $9.73 \pm 0.16$ ,  $6.78 \pm$

0.16,  $11.25 \pm 0.21$ kg &  $54.92 \pm 1.32$ kg respectively. The LWW showed maximum variation of 32.10% followed by LSW with 31.70%, LWB with 24.98% & LSB with 22.60%. Least square means of litter size at birth, litter size at weaning, litterweight at birth & litter weight at weaning for different breeds, season of farrowing & age of the sows are presented in Table 1.

The crossbred had more piglets during birth & weaning with an average of  $10.36 \pm 0.29$  &  $7.30 \pm 0.29$  respectively & they differed ( $P < 0.05$ ) from other two breeds. The crossbred sows had higher number of 1.20, 0.97 piglets at birth compared to Duroc & LWY. They also produced more number of weaned piglets of 1.26, 0.63 than Duroc & LWY sows. These factors also proven to be important in other studies on total number born & number weaned on pigs of different breeds [3, 5, 6, 7]. The litter weight at weaning in LWY differed ( $P < 0.01$ ) with mean weight of  $59.25 \pm 1.81$ kg than that of others. In similar to the present study a significant effect of genetic group on litter weight at weaning was observed in different breeds [4, 5, 6]. However, [10] reported a non-significant influence of genetic group on litter traits in purebred landrace & Yorkshire.

The higher litter size at birth of  $10.15 \pm 0.56$  was observed in the sows farrowed during June - September but it is statistically insignificant. The litter size at weaning differed ( $P < 0.01$ ) was recorded for the sows farrowed between June & September with the mean of  $8.48 \pm 0.57$ . The litter weight at birth found to be higher for the females farrowed during October to January with an average of  $11.32 \pm 0.23$ , but it is not statistically significant. Sows farrowed during October - January has higher litter weight

at weaning with an average of  $54.95 \pm 1.43$  followed by  $54.67 \pm 3.65$  in June- September. Season of farrowing had significant effect on litter size at weaning. The present study was in consonance with other studies on different breeds [2, 8].

Least square analysis showed that age had ( $P < 0.01$ ) on litter size at weaning. The sows in the age group of 1 to 1.5 years had produced significantly higher number of weaned piglets compared to sows with 2-2.5 year's age; however, no significant difference was noticed between other age groups, though it was low number of weaned piglets. Litter weight at weaning was significantly high ( $60.41$ kg) for sows in the age group of 1.5-2 years compared to 1-1.5 & 2-2.5 age groups, though it was higher than other group but not significant. Litter size at birth & litter weight at birth was not significantly influenced by age. Similar findings of significant influence of age on litter size was observed in different breeds [9].

### Conclusion

The crossbred (Large White Yorkshire x Ankamali) females produced significantly higher number of piglets during birth & weaning. Season of farrowing had significant influence on litter size at weaning. Females in the first parity had significantly higher number of piglets at weaning, whereas litter weight at weaning was high in the second parity. The significant influence of season of birth and breed on litter traits indicated the potential for optimizing production performance of pigs by providing optimal environmental conditions and by selection of suitable breed.

**Table-1 Least square means ( $\pm$  SE) of litter traits for different breeds, season of farrowing & age of the sows**

Effect	LSB (Nos)	LSW (Nos)	LWB (kg)	LWW (kg)
Over all	$9.73 \pm 0.16$	$6.78 \pm 0.16$	$11.25 \pm 0.21$	$54.92 \pm 1.32$
Breed	*	*		**
Crossbred (57)	$10.36^a \pm 0.29$	$7.30^a \pm 0.29$	$11.26^a \pm 0.36$	$51.84^a \pm 2.13$
Duroc (25)	$9.56^b \pm 0.40$	$6.04^b \pm 1.56$	$11.86^a \pm 1.41$	$46.05^b \pm 3.68$
LWY (98)	$9.39^b \pm 0.22$	$6.67^b \pm 0.21$	$11.08^a \pm 0.30$	$59.25^c \pm 1.81$
Season of farrowing		**		
June-Sep (21)	$10.15^a \pm 0.56$	$8.48^a \pm 0.57$	$10.68^a \pm 0.61$	$54.67^a \pm 3.65$
Oct-Jan (158)	$9.67^a \pm 0.17$	$6.56^b \pm 0.16$	$11.32^a \pm 0.23$	$54.95^a \pm 1.43$
Age		**		**

1-1.5 (30)	10.00 <sup>a</sup> ±0.42	7.50 <sup>a</sup> ±0.47	10.89 <sup>a</sup> ±0.45	48.66 <sup>a</sup> ±3.10
1.5-2 (16)	9.13 <sup>a</sup> ±0.49	7.06 <sup>a</sup> ±0.43	11.34 <sup>a</sup> ±0.71	60.41 <sup>c</sup> ±3.50
2-2.5 (48)	9.38 <sup>a</sup> ±0.31	6.00 <sup>b</sup> ±0.32	10.87 <sup>a</sup> ±0.35	52.10 <sup>b</sup> ±2.80
2.5-3 (41)	9.56 <sup>a</sup> ±0.35	7.00 <sup>a</sup> ±0.29	11.57 <sup>a</sup> ±0.47	57.93 <sup>c</sup> ±2.08
3-3.5 (44)	10.30 <sup>a</sup> ±0.33	6.84 <sup>a</sup> ±0.32	11.57 <sup>a</sup> ±0.48	57.45 <sup>c</sup> ±2.96

\*Significant ( $P < 0.05$ ), \*\* Highly significant ( $P < 0.01$ ). Means bearing same superscript don't differ significantly ( $P > 0.05$ ). Figures in parentheses are number of observations.

**Table-2 Least squares analysis of variance (Mean squares only) for the effect of breed, age & season of furrowing different litter traits in pigs**

Traits	Breed (2)	Age (4)	Season (1)	Error	R <sup>2</sup> - value (%)
LSB	04.35*	01.33	00.06	04.77	04.40
LSW	01.84*	12.64**	24.60*	04.30	09.90
LWB	00.08	06.68	05.01	07.87	03.60
LWW	528.35*	902.90**	709.87	316.30	09.00

\*Significant ( $P < 0.05$ ), \*\* Highly significant ( $P < 0.01$ ). Means bearing same superscript don't differ significantly ( $P > 0.05$ ). Figures in parentheses indicate the degrees of freedom.

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