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Study the effect of genetic and non-genetic factors on the pre weaning mortality in Landrance, Desi and their crossbred piglets

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Abstract
The study was carried out on the data of pigs breeding farm spread over a period of 20 years from 1982 to 2001 belonging to three genetic groups *viz.* Landrace, Desi (local-non descript) and their half breeds maintained and it was found that Genetic group had a significant effect on the mortality particularly up to 1st two weeks of ages and non-significant thereafter up to 8th weeks of ages. Significantly highest mortality was observed in Landrance than LR x D and desi (local-non descript) during first two weeks.
The whole data were grouped in to 4 seasons on the basis of climatological data *viz.*, winter (December to February-cold), summer (March to May-dry-hot), Rainy (Jun to August-hot humid)and autumn (September to November-moderate) and the Seasons of farrowing had significant influence on piglets mortality during 0-1, 1-2, 0-2 and 0-8 week of age, but it had non-significant influence during 2-8 weeks of age. The season should have in fact its effect on newly born Piglets upto 2nd week of age as seen in the present study. Parity had non-significant influence on pre-weaning mortality rate in the present study.

Keywords: Genetic, non genetic, pre-weaning, mortality

Introduction
Economic viability of piggery industry depends upon reducing losses due to piglet's mortality with better production performance and higher growth rate. Pre weaning mortality affected by genetic and some non-genetic factors such as season, litter size, birth weight, weaning weight etc. Piglets are usually weaned from their mothers at around average 56 days of age, at which time they can feed themselves on feeds of both animal and plant origin, and have developed the capacity to resist infection from the environment. However, out of the litters of piglets that are born, some 10 to 15% do not survive till weaning time and this mortality rate can be much higher due to various factors. Predisposing non-genetic factors like overcrowding, bad ventilation, malnutrition, susceptibility to viral and bacterial infection and extremes of weather, and some common factors like enteritis caused by coli bacilli, sow health and litter size are major contributing factors of Preweaning piglet mortality. Inadequate spatial arrangements and nursing care of piglets cause more than half of the Preweaning deaths during the first 48 hours of life and during the following 1 to 2nd week.

Objective: Study the effect of various genetic and non genetic factors responsible for pre weaning mortality of piglets.

Methodology
The study was carried out on 1301 pigs spread over a period of 20 years from 1982 to 2001 belonging to three genetic groups *viz.* Landrace (378), Desi (local-non descript) (288) and their half breeds (625) maintained at pig breeding farm Ranchi veterinary college (Jharkhand). The pre-weaning mortality was recorded up to the weaning age of 8 the weeks. The whole data were grouped in to 4 periods comprising of 5years in each period *viz.*

Table 1: The group of period seasons in this Months's

S. N.	Groups	Period (Year)	Seasons	Month's
1	P₁	(1982 to1986)	Winter	December to February
2	P₂	(1987 to1991)	Summer	March to May
3	P₃	(1992 to1996)	Rainy	Jun to August
4	P₄	(1997 to2001)	Autumn	September to November

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Least squires – analysis was done to see the effect of genetic and non genetic factors on weight at different ages. The differences was tested by Duncan Multiple Range Test (1957).

Mortality Rate
Least squares model for pre weaning mortality rate used were given below

$$Y_{ijklm} = \mu + G_j + S_j + L_k + P_l + b_{yx} (X_{ijklm} - X) + e_{ijklm}$$

Where,

Y_{ijklm} = The value of mth animal belonging to i^{th} genetic group, j^{th} sex, k^{th} parity and l^{th} period of birth

μ = Population mean

G_j = Effect of ith genetic group

S_j = Effect of jth sex

L_k = Effect of Kth parity

P_l = Effect of Ith parity

b_{yx} = Regression of mortality rate on inbreeding coefficient

e_{ijklm} = Random error associated with Y_{ijklm} which is normally and independently distributed with mean zero and variance $\sigma^2 e$.

Results and Discussion
Mortality: Factors affecting pre-weaning mortality, Genetic Group

Genetic group had a significant effect on the mortality particularly upto 1st two weeks of ages and non-significant thereafter up to 8th weeks of ages. Significantly highest mortality was observed in Landrance than LR x D and desi during first two weeks. Pre-weaning (0-8 weeks) mortality was significantly lowest in Landrace half-breeds, than desi and Landrace. The results are in good agreement with the finding of kumar *et al.* (1990) [1], Mukhopadhyay *et al.* (1989) [7], Sharma and Singh (1995) [5], Kumar (1999) [2] and Khalko (2004) [3] who also had similar findings.

In desi the average pre-weaning mortality observed in the present study is in good agreement with the finding of Sharda and Singh (1982) [4], and Mukhopadhyay (1989) [7] who reported the pre-weaning mortality to be 20, and 20.75% respectively. Whereas Mishra *et al.* (1985) [6] and Kumar *et al.* (1990) [1] observed comparatively higher pre-weaning mortality which might be due to poor manage mental conditions and inferior indigenous stock.

Table 1: Least square analysis of variance for various factors affecting pre-weaning mortality in pigs data pooled overall genetic group:

Source of Variances	Mean-squares						
	Mortality 0-1 week	Mortality 0-2 week	Mortality 1-2 week	Mortality 2-4 week	Mortality 4-6 week	Mortality 6-8 week	Mortality 0-8 week
Factors: Genetic Group	408.78** (2)	257.33** (2)	196.20** (2)	63.34^{NS} (2)	98.01^{NS} (2)	41.41^{NS} (2)	414.45** (2)
Seasons of birth	413.72** (3)	92.20** (3)	120.84** (3)	19.24^{NS} (3)	10.52^{NS} (3)	11.19^{NS} (3)	410** (3)
Parity	70.98^{NS} (8)	35.77^{NS} (7)	35.71^{NS} (7)	34.34^{NS} (7)	96.16^{NS} (6)	51.52^{NS} (6)	118.43^{NS} (8)
Error	83.43 (100)	26.18 (22)	36.43 (40)	29.81 (20)	51.31 (27)	25.36 (19)	100.46 (169)

Figures in parentheses indicate degree of freedom, ** <0.01; * <0.05; NS = Non-significant

Seasons of farrowing
Seasons of farrowing had significant influence on piglets mortality during 0-1, 1-2, 0-2 and 0-8 week of age, but it had non-significant influence during 2-8 weeks of age. The season should have in fact its effect on newly born piglets up to 2nd week of age as seen in the present study (Table 1). Since newly born piglets would be more susceptible to the vagaries of different season than older piglets as they would have completely adjusted to the environment. The significant effect of season of birth on piglet mortality was also reported by Mukhopadhyay (1989) [7], Kumar (1999) [2] and Khalkho (2004) [3].

Significantly highest mortality were recorded in rainy season which did not differ significantly from autumn. This was with the agreement of our hypothesis that incidence of disease was more during rainy season and most of the piglets suffered from different types of diseases *viz.*, enteritis, fever, wounds etc. Resulting in high mortality. The present finding is in good agreement with those of Kumar (1999) [2] and Khalkho (2004) [3] who also obtained significantly highest mortality in rainy season in different genetic groups.

Parity of farrowing
Parity had non-significant influence on pre-weaning mortality rate in present study and the present finding is in agreement with that of Kumar (1999) [2] and Khalkho (2004) [3] who also noticed non-significant effect of parity on pre-weaning mortality rate.

Conclusion
1. Genetic group had significant effect on the mortality particularly upto 1st two weeks of ages and non-significant thereafter up to 8th weeks of ages. Significantly highest mortality was observed in Landrance than LR x D and desi during first two weeks.
2. Seasons of farrowing had significant influence on piglets mortality during 0-1, 1-2, 0-2 and 0-8 week of age, but it had non-significant influence during 2-8 weeks of age. The season should have in fact its effect on newly born piglets up to 2nd week of age as seen in the present study.
3. Parity had non-significant influence on pre-weaning mortality rate in the present study.

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