

EFFECT OF GENETIC AND ENVIRONMENTAL FACTORS ON SEX RATIO IN CROSSBRED PIGS

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ABSTRACT: The study was initiated with an idea to investigate few genetic and environmental factors that affect sex ratio of Khasi local and their different crossbreds with Hampshire pigs. Individual data were collected of pure Khasi local and its crossbred with 50, 75 and 87.5 % Hampshire inheritance in different seasons like rainy (July to October), summer (March-June) and winter (Nov-Feb). The sex ratio for Khasi local crossbred with 50, 75 and 87.5 % Hampshire inheritance was 1.21 ± 0.16 , 1.32 ± 0.16 , 1.48 ± 0.16 and 1.32 ± 0.16 respectively with an overall mean sex ratio 1.38 ± 0.16 , whereas, the sex ratio for spring, rainy and winter season was 1.31 ± 0.17 , 1.29 ± 0.16 and 1.32 ± 0.15 , respectively. Similarly, the sex ratio for larger litters and smaller litters was 1.40 ± 0.13 and 1.45 ± 0.13 respectively. This study concludes that crossbreds at different levels of inheritance, season and litter size had no effect on sex ratio.

Key words: Sex ratio, Crossbred pigs, Season, Litter size.

INTRODUCTION

The sex ratio in domesticated animals has an especial importance for commercial aspect. Females are required for breeding and an excess of females per litter ensures rapid extension of the herd. It has been demonstrated that there is decrease in proportion of male offspring with increase in absolute age of parent, thus sex ratio may decrease with increasing parity. In another study, it was observed that the litter size has also significant effect on sex ration in guinea pig (Peaker and Taylor 1996). Nishida *et al.* (1981) observed

significant effect of boar, sow, parity, litter, season and parental age on sex ratio.

Hence, the present study was undertaken to investigate effect of the genetic group with different levels of genetic inheritance in local pig (genetic factor) and season and litter size (environmental factors) on sex ratio.

MATERIALS AND METHODS

The experiment was carried out in Pig Breeding Farm under Division of Animal Production, ICAR Research Complex for NEH Region, Barapani, Meghalaya, India which is

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located at humid sub tropical high rainfall region of Northeastern part of India and the environmental temperature varies from 3°C to 28°C. The study was carried out on data collected from Khasi local and different genetic groups of Hampshire and Khasi local crossbred pigs from 1998 to 2008 for a period of 10 years. The sows were maintained in the indoor pen system of housing and fed with balanced concentrate feed twice daily. The sows were subjected to estrus detection twice daily and natural mating was carried out on estrus sow.

Individual data were collected for Khasi local and its crossbred with 50, 75 and 87.5% inheritance in different season that is spring (March -June), rainy (July-October) and winter (November - February). Sex ratio was classified according to season of the birth.

Sex ratio is the number of males divided by the number of females in a litter. Litter size was the number of piglets furrowed, dead or alive, per farrowing. The litter size of eight and above was assumed as larger litter and the litter size of seven and below was classified as

Table 1: Effect of different genetic groups and season on sex ratio (mean \pm SE)

Season	Breeds and genetic level				Mean
	Khasi Local	Khasi Local X Hampshire			
		50%	75%	87.5%	
Spring	1234 \pm 0.15	1.387 \pm 0.16	1.431 \pm 0.16	1.212 \pm 0.15	1.314 \pm 0.17
Rainy	1342 \pm 0.16	1.274 \pm 0.16	1.421 \pm 0.16	1.257 \pm 0.15	1.292 \pm 0.16
Winter	1221 \pm 0.16	1.231 \pm 0.16	1.487 \pm 0.17	1.478 \pm 0.16	1.325 \pm 0.15
Overall mean	1216 \pm 0.16	1.323 \pm 0.16	1.481 \pm 0.16	1.320 \pm 0.17	1.384 \pm 0.16

Table 2: Effect of litter size on sex ratio (mean \pm SE)

Litter size	Sex ratio
Larger Litters (above 8)	1.403 \pm 0.13
Smaller Litter (below 8)	1.457 \pm 0.13

smaller litters. The data were analyzed by standard statistical methods (Snedecor and Cochran 1989)

RESULT AND DISCUSSION

The sex ratio of local and crossbred pigs for different seasons is presented in the Table 1. The sex ratio for Khasi local crossbred with 50, 57 and 87.5% Hampshire inheritance was 1.22 ± 0.16 , 1.32 ± 0.16 , 1.48 ± 0.16 and 1.32 ± 0.16 respectively. There is no significance difference among local and crossbred with different levels of Hampshire inheritance. The sex ratio recorded in the study was in agreement with Nkango and Egbunike (1988) in European pigs at Ibandan who recorded mean sex ratio of 1.36 and 1.28 respectively in large White and Landrace pigs with an overall mean sex ratio of 1.32 but the difference was not significant. However, the present study recorded slightly more males in crossbred with 87.5% Hampshire inheritance. This non-significance difference on sex ratio among genetic levels is in agreement with the results obtained by Gray and Katanbaf (1985) and Nkango and Egbunike (1988). Many studies have indicated that cross mating results in an increased sex ratio among the offsprings of both man and animals, which may be an expression of the increased vigour that accompanies hybridization which would account for the non-significantly higher sex ratio in cross bred pigs particularly with 75% Hampshire inheritance in present study.

The sex ratio for spring, rainy and winter season was 1.31 ± 0.17 , 1.29 ± 0.16 and 1.32 ± 0.15 respectively. No significant difference was observed on sex ratio among seasons. Similarly, there was no significant difference on sex ratio between larger litters and small litters. The

mean sex ratio was 1.403 ± 0.13 and 1.457 ± 0.13 respectively, for larger litters and small litters. The sex ratio recorded in the study for different season is in consensus with Nkango and Egbunike (1988) who recorded mean sex ratio of 1.23, 1.19, 1.49 and 1.27 respectively in late dry, early rainy, late rainy and early dry season. No significant effect of season and litter size on the sex ratio recorded in the present study is in agreement with Nkango and Egbunike (1988) who reported that season of birth and the litter size had no effect on sex ratio. Mullaniy and Cox (1969) also reported that while keeping all the other factors constant, there was non-significant effect of litter size on sex proportion. Parkes (1925) also found no evidence of any effect of litter size on sex proportion in sheep, men, rats and pigs. However, this result is in conflict with that of Jimenez (1984) and Nishida *et al.* (1981) who observed significant effect of boar, sow, parity, litter size, season and the parental age on sex ratio. Similarly Peaker and Taylor (1996) reported that a significant relationship between sex ratio and litter at birth was observed in guinea pigs.

The overall mean sex ratio of all animals and season was 1.38 ± 0.16 . The more number of males at birth irrespective of all sows at the different season recorded in the study are in agreement with Parkes (1925) and Nkango and Egbunike (1988). It is apparent deviation from a sex ratio at birth of 1:1. From these results it appears that the greater ratio of male piglets per litter is not affected by environmental conditions like season and litter size, but it is genetically predetermined at the time of fertilization.

From this study, it may be concluded that cross bred pigs at different levels of inheritance,

season and litter size had no significant effect on sex ratio. However, non-significantly higher sex ratio in crossbred pigs is a need for further investigation.

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