



SHORT COMMUNICATION

Heritability Estimates of Reproductive Traits in Crossbred Pigs

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ABSTRACT

Records on reproductive traits of pigs pertaining to 541 crossbreds, comprising 308 half-bred *inter se* ($\frac{1}{2}$ Hampshire \times $\frac{1}{2}$ Local) and 233 graded *inter se* ($\frac{3}{4}$ Hampshire \times $\frac{1}{4}$ Local), maintained at ICAR Mega Seed Project (MSP) and All India Coordinated Research Project (AICRP) on pigs, Assam Agricultural University, Khanapara for the period from 2002 to 2013 constituted the materials for the present investigation. The heritability estimates were obtained by paternal half-sib correlation method using sire component of variance. The heritability estimates of age at sexual maturity, age at first conception, age at first farrowing, litter size at birth and litter size at weaning, litter weight at birth and litter weight at weaning were 0.150 ± 0.301 , 0.274 ± 0.318 , 0.361 ± 0.329 , 0.224 ± 0.238 , 0.122 ± 0.297 , 0.270 ± 0.247 , 0.001 ± 0.278 and 0.891 ± 0.383 , respectively in half-bred *inter se* pigs and 0.671 ± 0.445 , 0.830 ± 0.468 , 0.848 ± 0.471 , 0.371 ± 0.185 , 0.367 ± 0.388 , 0.134 ± 0.268 , 0.148 ± 0.502 and 0.617 ± 0.522 in graded *inter se* pigs, respectively.

Keywords: Graded *inter se* pig, half-bred *inter se* pig, heritability, reproductive traits

Unlike other parts of the country, pig as a source of animal protein is having high demand in north eastern states of India. The indigenous pigs of the region are low producers, while the superior exotic pig breeds do have adaptability concern in the low input management adopted by farmers under the high humid environment of the regions. Crossbreds are thus gaining popularity. Realizing the necessity to stabilize and consolidate characters, *inter se* mating of crossbreds for generations was practiced in the population under study. For further genetic improvement of such population, it is imperative to estimate heritability of important traits of reproduction and growth. In a highly prolific animal like pig, importance of reproduction traits bears special significance. The present study was carried out to estimate the heritability of reproductive traits in halfbred and graded pigs mated *inter se* for several generations.

The data analyzed in the investigation were collected from the performance records of 308 halfbred *inter se* ($\frac{1}{2}$ Hampshire \times $\frac{1}{2}$ Indigenous); 233 graded *inter se* ($\frac{3}{4}$ Hampshire \times $\frac{1}{4}$ Indigenous) pigs maintained and bred at ICAR-MSP and AICRP on Pigs, Assam Agricultural University, Khanapara. The data were collected and compiled from progenies of 59 sires and 541 dams maintained over a period of 12 years ranging from 2002 to 2013. The heritability, of various reproductive traits was estimated by paternal half-sib correlation method as described by Becker (1975). The data on only those animals whose sires had three or more progeny were analyzed for these traits. The data were first corrected for significant effects of various factors, viz. genetic group, period of birth, parity and season of birth by using least squares constants obtained from Least Squares Analysis (Harvey, 1975). Standard errors of heritability were

estimated as per the method described by Swiger *et al.* (1964).

Details of estimates of heritability for reproductive traits obtained in the present study were as under.

The heritability estimates of age at sexual maturity for halfbred and graded *inter se* pigs in the present investigation were 0.150 ± 0.301 and 0.671 ± 0.445 , respectively that can be compared favourably with the reported estimates of Deka (2000) and Kumari and Rao (2010). On the other hand, comparatively higher estimates of heritability were observed by Ferdoci (2003). The higher estimates of heritability of graded *inter se* for age at sexual maturity in the present investigation revealed the presence of proportionately high additive genetic variance and thus better scope for genetic improvement in terms of reduction in age at sexual maturity in the present herd.

The heritability estimates of age at first conception for halfbred and graded *inter se* pigs were 0.274 ± 0.318 and 0.830 ± 0.468 respectively. In conformity with the present finding, comparable estimates of heritability were also reported by Deka (2000) and Ferdoci (2003). On the other hand, Kalita (1995) reported lower estimates of heritability for age at first conception. This discrepancy in heritability estimate of age at first conception in the present study may be due to differences in sample size.

The heritability estimates of age at first farrowing in halfbred and graded *inter se* pigs in the present investigation were 0.361 ± 0.329 and 0.848 ± 0.471 , respectively and could be compared fairly well with the reported estimates of Ferdoci (2003). However, in contrary to the present estimate, Deka (2000) reported comparatively lower estimates of heritability for age at first farrowing. High heritability estimate of age at first farrowing obtained in graded *inter se* pigs of the present investigation suggested that the trait could be improved through selection due to proportionately high additive genetic variance

The heritability estimate of gestation length was obtained as 0.224 ± 0.238 and 0.367 ± 0.383 for halfbred and graded *inter se* pigs, respectively in the present investigation. These estimates were found comparable to those reported by Kalita (1995) and Deka (2000). Higher heritability estimates was reported by Ferdoci (2003) and lower estimates was observed by Kumari and Rao (2010) in comparison with the present findings.

The heritability estimates of litter size at birth was found to be low for both the genetic groups, 0.122 ± 0.297 and 0.371 ± 0.185 for half bred and graded *inter se* pigs respectively. The present findings are comparable with the reported estimates of Pandey and Singh (2010), Rokde *et al.* (2013) and Phookan *et al.* (2013). However, relatively higher estimates were observed by Deka (2000) and Ferdoci (2003).

The heritability estimates of litter size at weaning for half bred and graded *inter se* pigs were 0.270 ± 0.247 and 0.134 ± 0.268 respectively. In conformity with the present finding, comparable estimates of heritability of litter size at weaning were reported by Pandey and Singh (2010), Phookan *et al.* (2013) and Rokde *et al.* (2013). Comparatively higher estimates were observed by Ferdoci (2003) and lower estimates by Deka (2000).

The heritability estimates of litter weight at birth for halfbred and graded *inter se* pigs were found to be low, being 0.001 ± 0.278 and 0.148 ± 0.502 respectively. The estimates of heritability reported by Pandey and Singh (2010) and Phookan *et al.* (2013) compared well with the present finding. On the other hand, higher heritability was observed for litter weight at birth by Ferdoci (2003).

The heritability estimates of litter weight at weaning for halfbred and graded *inter se* pigs were 0.891 ± 0.383 and 0.617 ± 0.552 , respectively. Comparable to the present findings, Mishra and Sharma (1990) reported higher heritability value for this trait. Some other workers (Ferdoci, 2003, Phookan *et al.*, 2013 and Rokde *et al.*, 2013), however reported lower estimates.

In the present investigation, barring few, most of the reproductive traits studied had reasonably high heritability values indicating substantial sire group variations and, thus, proportionately high additive genetic variance. Traits related to fitness are, in general, of low heritability (Falconer and Mackey, 1996). Reproductive traits are important fitness traits. Consolidation of characters due to generations of *inter se* mating and ensuring minimum inbreeding coupled with elimination of significant environmental effects by statistical method must have contributed to relatively high and realistic estimates of heritability values in the investigation under report.

In the present study, the estimates indicated that there is a possibility of improving the reproductive performance

in crossed pigs through selection. Particularly, age at sexual maturity, age at conception, age at farrowing and litter weight at weaning in graded *inter se*, and litter weight at weaning in halfbred *inter se* showed promise for application.

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