

Phenotypic morphometric parameters of indigenous pig of Nagaland

Z CHUSI¹, N SAVINO², A DHALI³ and P PERUMAL⁴

Nagaland University, Medziphema Campus, Nagaland 797 106 India

Received: 23 April 2015; Accepted: 26 May 2015

ABSTRACT

The present study was conducted to measure the phenotypic morphometric parameters of Naga indigenous pig in Kohima, Peren and Phek district of Nagaland at birth, weaning and adult stage in both male and female animals. These parameters were collected through measurement and field survey. The morphometric parameters such as body weight (g or kg), body length (cm), heart girth (cm) and height at wither (cm). The result revealed that there was a significant difference between the male and female in different districts and in different age groups for all the morphometric parameters except body weight at weaning and heart girth at weaning and adult. Similarly, the significant difference was observed among the different districts of Nagaland for all the parameters except that of heart girth at birth and adult and body length at adult. The phenotypic parameters were significantly higher in male than in female animal in three stages. Similarly, body weight at birth and weaning stage was significantly higher in Phek district, body length at weaning and adult, heart girth at birth, body weight and height at wither at adult were significantly higher in Peren district and height at wither at birth and weaning, body length at birth and heart girth at weaning and adult were significantly higher in Kohima district. These phenotypic morphometric parameters analyses may be useful in selection of breeding stock for future parents and select the place for breeding programme of local indigenous Naga pigs.

Key words: Local indigenous pigs, Nagaland, Phenotypic morphometric parameters

Naga local indigenous pigs are highly preferred by rural families to supplement protein intake and family income because of their less intensive management and feed requirements. In spite of high ample scope for swine development, no proper and systematic study was reported on the phenotypic morphometric attributes of these animals and the native types still represent a valuable component of genetic resources (Subalini *et al.* 2010). Therefore, the present investigation was designed to study/determine the growth performance of indigenous local Naga pigs.

MATERIALS AND METHODS

The present study was conducted in Kohima, Peren and Phek districts of Nagaland. To study growth performance of indigenous pigs, relevant information and data were collected from farmers of these districts through field survey after thorough and proper identification and markings of the animals of the respective farmers. Each unit consisted of 30 gilts at the age of 4–5 months were initially selected to form parental stock for the present study. Data pertaining to 630 progenies and 90 dams were utilized to study the

growth performances of indigenous pigs in Nagaland. The information was collected from 720 animals. The phenotypic morphometric parameters such as body weight at birth (g), body weight at weaning (kg; 60 days), body weight for adult (kg; 180 days) and body measurements such as body length (cm), heart girth and wither height at birth, weaning and adult (cm) were measured both in male and female pigs. The length and circumference measurements (cm) were effected using a tape rule while the width measurement was done using a calibrated wooden caliper. All the measurements were carried out by the same person to avoid between individual variations (Table 1). The experimental animals maintained in the backyard with no history of crossbreeding were considered for the study through field survey. The data were analyzed using the SPSS version 10.0 software package. The data are presented as mean $\pm$ SE. The variations in these morphometric parameters were analyzed by means of one-way ANOVA. The model included districts and sex as source of variations. The multiple pair-wise mean comparisons were performed by means of Duncan Multiple Range Test (DMRT), when the effect was found significant.

RESULTS AND DISCUSSION

This study revealed more live weight in male than in females and the population of pigs are generally kept by subsistence peasant farmers in rural areas. Generally, rural

Present address: ¹(zasechusi@yahoo.com), ²(neilhouvotso@yahoo.com), Livestock Production and Management. ³(dhali72@rediffmail.com), ICAR-National Institute of Animal Nutrition and Physiology, Adugodi, Bengaluru. ⁴(perumalponraj@gmail.com), Animal Reproduction Division.

Table 1. Phenotypic morphometric characteristics

Traits	Description
Body weight	In recording the weight of the crate or clean plastic sack-types were first recorded and then the weight of the animal along with the crate was recorded. The former weight was subsequently subtracted from the later weight to express the weight of the animal in grams or kilograms.
Body length	Body length was measured at the straight line distance from the occipital bone to the base of the tail. The body length was measured usually when the animal stood quietly on a plain surface with the head erect, or placed the animal on the plain surface lying down on the lateral recumbence position only. The body length was measured with a cloth/synthetic materials measuring tape and recorded in centimeter
Heart/Chest girth	The heart girth was taken as the circumference of the chest behind the elbow joint by placing the measuring tape around the animal at the point of the chest circumference. While measuring heart girth, the tape was tightened enough in order to keep the hair down to avoid any possible error and was expressed in centimeter
Height at wither	Height at wither measured in animals was the vertical distance from the top scapula bone to the ground of the parallel to the forelegs. It was taken with a wooden scale provided with a sliding bar preferably when the animal was standing squarely on all legs measurement was recorded in centimeter

farmers were creative breeders who naturally and traditionally know that a constant flock size essentially depends on a large number of reproductively active females that must be kept for long periods of time. Unlike descriptive traits, body measurements, which are quantitative characters, are influenced by both genotype and environment. Therefore, the variation in body measurements may be attributed partly to the variation in availability of feed resources in village situations. This was confirmed by Jones (1998), who reported that the limited feed resources available in villages for pigs reared under semi-intensive system.

Body weight: The birth weight estimated in the present study was comparatively lower than the findings of Singh *et al.* (1990) and Phookan (2002). The birth weight however, reported by Pandey *et al.* (1997) and Kalita *et al.* (2001) were comparatively higher than the present finding. The mean body weight at weaning was comparatively higher than the finding of Singh *et al.* (1990). The present findings were similar with the reports of Phookan (2002). Nevertheless, higher weaning weight was reported by Pandey *et al.* (1997). The estimated mean for adult weight in indigenous pigs of Nagaland was 17.15 ± 0.19 kg. The present investigation was slightly lower than the reports of Phookan (2002). The lower average body weight might be owing to the differences of genetic variation, growth hormones and system of management. The adult body weight in the present investigation was also weighed as early as 25 weeks of age as compared to 32 weeks of other workers. Sex had a significant effect ($P \leq 0.01$) on body weight. Males were heavier at birth and at adult as compared to females. Males having higher birth weight were also reported by Gaur *et al.* (1997) who reported significant effect of sex on body weight at different ages. Contrary, a nonsignificant effect of sex on body weight was observed by Bordoloi and Raina (1984), Guar *et al.* (1997) and Kalita *et al.* (2001). Significantly higher body weight at birth and adult in males might be attributed due to the influence of

different sex hormones during prenatal growth and genetic variation.

Analysis of variance revealed locality of Kohima, Peren and Phek districts of indigenous pigs were statistically significant to have effect on body weight at birth, weaning and adult ($P < 0.01$). Animals belonging to Phek had significantly higher body weight at birth, at weaning and Peren at adult. The difference in body weight of indigenous pigs belonged to Kohima, Peren and Phek districts indicating possibilities of existence of disparity in genetic combination and growth hormones between 3 groups of pigs.

Body length: The average body length at birth observed in the present investigation was in good agreement with Phookan (2002). However, the length at weaning and at adult was reported to be higher than the present observation. Bordoloi and Raina (1984) reported higher body length at weaning than the present finding. Rajamahendran *et al.* (1985) reported higher length than the present findings in the native pigs of Sri Lanka. Das and Mishra (1986) also reported higher adult length in local pigs of Odisha. Deka (1988) observed higher body length at birth, at weaning and adult in local pigs of Asom. The differences of body length might be attributed to the difference of genetic combination, influences of growth hormones and system of management. Analysis of variance revealed that sex of animals have significant ($P < 0.01$) effect on body length at birth, weaning and adult. The DMRT revealed males were significantly lengthier at birth, weaning and adult as compared to females. Between carcass length and body length there was a high and positive correlation. Phookan (2002) reported the carcass length has to be significantly longer in male than in female animals. Contrary, Deka (1988) reported that females were longer than males at low live weight. However, Bordoloi and Raina (1984) observed a nonsignificant effect of sex on body length. Longer body length in males as compared to females might be attributed to differences in the influence of the sex hormones.

Differences due to locality revealed significant effect for body length at birth ($P < 0.05$) and weaning ($P < 0.01$) in indigenous pigs of Nagaland among 3 districts. However, the statistical analysis for adult body length showed no significant effect. Animals of Kohima revealed significantly higher body length at birth and weaning and Phek had marginally higher body length at adult, although not significant. This might be due to the possibilities of existence of genetic variation between the groups of pigs.

Heart girth: The present observation for heart girth at birth, weaning and adult were 12.81 ± 0.10 ; 20.75 ± 0.30 and 64.91 ± 0.43 cm, respectively. Deka (1988) observed almost similar value for heart girth at birth and higher heart girth at weaning; however, lesser heart girth at adult as compared to the present finding was reported. Bordoloi and Raina (1984) reported higher heart girth at birth in Landrace pigs than the present finding. Simultaneously, Rajamahendran *et al.* (1985) also reported higher heart girth than present finding at adult. Das and Mishra (1986) reported similar heart girth in adult of Large White Yorkshire and LWY $\times$ Local pigs of Odisha. Phookan (2002) observed higher heart girth than the present studied values. The differences of heart girth at different ages may be due to disparity of growth hormone, inherent deviation and system of management. Differences associated with sex showed a significant ($P < 0.01$) effect on heart girth at birth. Nevertheless, the overall mean at weaning and adult showed insignificant difference between the sexes. Males had significantly higher heart girth at birth as compared to females. Phookan (2002) observed sex of animal to have significant effect on heart girth at different stages. Contrary, Bordoloi and Raina (1984) reported a nonsignificant effect of sex on heart girth. The statistical analysis for heart girth at birth and adult has revealed insignificant effect of locality among the different districts. However, the differences associated with locality exerted a significant effect ($p < 0.01$) on heart girth at weaning. DMRT observed that the pigs belonged to Kohima had significantly higher heart girth at weaning.

Height at wither: The average height at wither revealed at birth, weaning and adult in the present study was in good agreement with Phookan (2002) for height at wither at birth, however, higher values were observed for height at wither at weaning and adult. Bordoloi and Raina (1984) observed almost similar value for height at wither at birth, however, reported higher finding at weaning. Das and Mishra (1986) and Rajamahendran *et al.* (1985) observed higher height at wither for adult than the present observation. Deka (1988) reported higher values at all stages than the present study. The differences of height at wither with the reports of other workers might be due disparity in genetic variation, management and secretion of hormones. On statistical analysis, sex had significant ($P \leq 0.01$) effect on height at wither at birth, weaning and adult in indigenous pigs of Nagaland. Analysis of variance revealed males had significantly higher height at wither at birth, weaning and adult as compared to females. Bordoloi and Raina (1984)

reported a nonsignificant effect of sex on heart girth. However, Phookan (2002) observed sex of animal to have significant effect on height at wither at different stages of growth. Males being taller than the females might be due to the differences in the influence of sex hormones.

Height at wither at birth, weaning and adult as a source of variation was found to exert significant ($P \leq 0.01$) difference among different districts. The analysis revealed Kohima pigs had significantly highest height at wither at birth, weaning and adult while Phek district pigs exhibited the lowest height at wither among the districts. Height at wither differences in different localities might be due to their differences in inherent deviation. The low mean live weight and body measurements recorded in samples show that the Naga local indigenous pigs are generally smaller than imported commercial pigs and their crossbreds. Similar report was observed in Khoongroo pigs in India (Pan *et al.* 2005). These contrasting differences may be driven by environmental influences such as climate, nutrition and management. However, our study agreed with the findings of Holness (1991) that indigenous breeds are smaller with shorter legs than exotic types. Smaller size may yield a greater ability to survive under the harsh conditions than larger size, as an evolutionary adaptation to conditions of low-input production. The odd Naga local pig is similar to Mexican hairless pigs (Lemus *et al.* 2003), Kele indigenous pigs found in southwest China (Cheng 1984), Majorcan black pigs in Spain (Jaume and Alfonso 2000) and Khoongroo pigs in India (Pan *et al.* 2005).

Naga local pig has the potential to be developed to contribute significantly to the indigenous pig industry based on their positive qualities such as a valuable source of meat and secondary income to the rural household economy, the hardiness and adaptability to harsh management conditions. Phenotypic morphometric parameters analyses may be useful in selection of breeding stock and pork production in its home tract of Nagaland.

REFERENCES

- Bordoloi T and Raina B L. 1984. Effect of genetic group, season of birth and sex on growth traits in landrace, large white and crossbred pigs. *Indian Veterinary Journal* **61**:599–606.
- Cheng P. 1984. Livestock breeds of China. *Animal production and Health* 46.
- Das P and Mishra M. 1986. Performance of Large White Yorkshire and its crossbreds with indigenous pigs in Orissa. *Indian Journal of Animal Sciences* **56**:144–46.
- Deka A C. 1988. 'Performance of local, exotic and crossbred pigs under farm and village conditions.' M.V. Sc. Thesis submitted to Assam Agricultural University, Guwahati.
- Guar G K, Chhabra A K and Paul S. 1997. Growth intensity of indigenous pigs from birth to slaughter age. *Indian Journal of Animal Sciences* **76** (4):344–56.
- Holness D H. 1991. *The Tropical Agriculturist (Pigs)*. CTA, Wageningen, pp. 1–29.
- Jaume J and Alfonso L. 2000. The Majorcan black pig. *Animal Genetic Resources Information* **27**: 53–58.
- Jones G F. 1998. Genetic aspects of domestication, common breeds and their origin. *The Genetics of the Pig*. Ruvinsky A

- and Rothschild M F, Eds. pp. 17– 50. CAB Int. Oxon, UK.
- Kalita D, Das D and Goswami R N. 2001. Body weight of indigenous pigs of Asom and their crosses with Hampshire as affected by various factors. *Indian Veterinary Journal* **78**:1027.
- Lemus F C, Alonso M R, Alonso S M and Ramirez N R. 2003. Morphologic characteristics in Mexican Native Pigs. *Archives of Zootechnology* **52**:105–08.
- Pan S, Misra S K and Kundu M S. 2005. Ghoongroo pig: A new found animal genetic resource of sub-Himalayan West Bengal, India. *Animal Genetic Resources Information* **37**: 91–96.
- Pandey R N, Singh S K, Singh R L and Dubey C B. 1997. Genetic study of weight at different ages in exotic, desi and their half breed of pigs. *Indian Journal of Animal Sciences* **67** (12): 1086–90.
- Phookan A. 2002. 'Studies on certain growth, reproduction and biochemical traits in indigenous pigs of Assam.' M. V. Sc. Thesis submitted to Assam Agricultural University, Khanapara, Guwahati, India.
- Rajamahendran R, Ravindran V, Goomewardene L A, Sahaeyarubom P and Rajaguru A S B. 1985. The native pig of Sri Lanka. *Animal Genetic Resources Information* **4**: 9–12.
- Singh K L, Singh R L, Sharma B D and Dubey C B. 1990. Reproductive traits and mortality rate in pigs. *Indian Journal of Animal Sciences* **60** (7): 886–87.
- Subalini E, Silva G L L P and Dematawewa C M B. 2010. Phenotypic characterization and production performance of village pigs in Sri Lanka. *Tropical Agricultural Research*, **21** (2): 198–208.