

Phenotypic characteristics of native pigs in Bhutan

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A B S T R A C T

The study objectives were to characterize the phenotypic characters and understand the socio-cultural role of native breeds of pig in Zhemgang *dzongkhag* (district). A field survey was conducted in two villages in Bardho *gewog* (block) under Zhemgang *dzongkhag*. Stratified random sampling method was used for selecting households and semi- structured questionnaire was used for interviewing farmers. Data was collected from 35 households in villages of Digala and Langdurbe. Morphological traits and reproductive performance, both in males and females, were measured separately. Forty percent of the farmers reared village pigs in two villages. Over 46% of pigs had black coat color and over 25% had some skin pigmentations. The mean adult body weight was 47.83 ± 16.6 kg for males and 35.93 ± 16.1 kg for females. Over 80% of pigs had erect ears with upward or backward orientation. The mean litter size was 5.71 ± 1.04 . The mean age at first farrowing was 14.54 ± 0.76 years. There was no significant correlation between reproductive parameters except for the litter size at birth and weaning. Native pigs were reared predominantly under extensive management systems with occasional tethering. Farmers possessed limited knowledge on pig farming and improved management practices though pigs were reared for commercial purposes. Easy management, low cost of production, and disease tolerance were the main advantages of village pigs.

INTRODUCTION

Pig farming has traditionally been an integral part of the agricultural production system. Native Pigs have considerable contribution to household income, food security, quality food, energy, and assets of rural households. Pig production is one of the few ways to alleviate poverty in rural areas. Therefore, pig farming is a basic part of strategies for rural poverty reduction. The global plan of action for AnGr emphasizes that breed characterization is necessary to guide decision-making in livestock development and breeding programs.

Most of the domesticated native pigs in Asia are descendants of local wild boar (*Sus scrofa*). Since there is shortage of pig breeding resources, many countries have been looking at Chinese pigs due to their high rate of reproduction (Cheng 1985). On the other hand, the realities of native pig production in large areas of Southeast Asia are not well known. Native pigs have broad genetic diversity and are important genetic resources. Pigs have cultural and economic value to humanity in terms of direct and indirect influence on agricultural production.

In Bhutan, pigs are reared by resource poor households. Pigs are raised mostly in a free range or scavenging condition and very few are reared in a semi-intensive type of system. These pigs are mainly raised for household consumption and to meet monetary needs. Despite the availability of exotic breeds, farmers prefer to rear local pig breeds mainly because of their thriftiness and easy management under local conditions. Local pigs have the ability to live in the harsh and rough environment. It is known for its good resistance to many diseases and parasitic infections. However, native pig is currently threatened by the pig breeding policy that encourages the use of exotic

breeds for breeding and producing crossbred piglets. Native pigs are smaller in body size and have slow growth, which appears to prompt the government to promote cross breeding with exotic breeds. Native pigs are utilized for hybridization with exotic lines to upgrade its traits such as fertility and litter size, thus, threatening native breeds. Further, the rampant crossbreeding with exotic breeds is also a potential threat to native pig and reduces the availability of pure local breed. Currently, it is difficult to confirm the uniqueness of a local breed, which is one of the important criteria for justification for conserving a breed. Therefore, a clear government policy support and focused commodity development approach are needed to strengthen the pig industry in the country with emphasis on sustainable utilization and conservation of native breeds of pigs. However, there is little information on characterization of native pigs in Bhutan. Especially, there is lack of information on phenotypic characteristics, geographical distribution, production, and utilization of native pigs. This information is necessary to guide planning and management of pig breeding and conservation programs. It strongly indicates a need to characterize native pig breeds and their production performance in different regions. Therefore, a study was conducted with the objectives to characterize phenotypic characters and understand socio-cultural role of native pigs in Bhutan.

MATERIALS AND METHOD

Study area, sampling technique, and sample size

A multi-stage sampling was carried out for selecting the study sites. Zhemgang *dzongkhag* was chosen for the study since it is

one of the least developed *dzongkhags* in the country where pig farming practices are higher than other *dzongkhags*. Zhemgang *dzongkhag* is located in the east central region and has total area of 2126 sq. km. There are eight *gewogs* in the *dzongkhag* and only three *gewogs* are connected with roads. Within the *dzongkhag*, Bardho *gewog* was identified for the study since it has comparatively greater population of native pigs. The *gewog* lies in the eastern part of *dzongkhag* with an area of 210 sq. km. Two villages viz. Langdurbi and Digala under Bardho *gewog* were selected for data collection. The villages fall within altitudes ranging from 1050 to 1770 m above the sea level. Therefore, the study sites have subtropical climate.

Data collection

Data was collected on morphological and reproductive traits of native pigs. Information on management systems including breeding, rearing facilities, production parameters was collected using a semi-structured questionnaire. From the current local pig population of 57 (23 males and 34 females) 41 local pigs were sampled from two villages. The survey had to be limited to 41 local pigs due to the limited availability of pure local pigs. Using the stratified random sampling method, 35 households were selected and interviewed. Different traits measured are presented in Table 1. Measuring tape and scale were used for measuring the morphometric traits of native pigs. Altimeter was used for recording altitude of the study sites.

Data analysis

Microsoft Excel program was used to process the data. The data were further coded and analyzed with Statistical Package for Social Sciences (SPSS) version 16. The results were presented in graphical form, percentages and frequency table. Descriptive statistical analysis was carried out to explain the phenotypic characters of pigs.

Table 1 Morphological traits included in the study.

Descriptive traits	Coat colour, coat pattern, Head profile, Ear type, Hair type, snout, Ear orientation, Tail type, hoof colour, Tusk
Morphometric traits	Body weight, Number of teats, Girth size, head length, Height at withers, Body length, Ear length, Tail length

RESULTS AND DISCUSSION

Morphological traits

Coat characteristics

The types of coat color of native pigs in the study area are presented in Figure 1. The common coat color of village pigs was black (46.3%), followed by white (24.4%), dark red (19.5%), light red (4.9%), and grey (4.9%). Some of the village pigs in the study areas had skin pigmentation (34.2%). About 90% of pigs had smooth skin and about 10% had wrinkled skin. Over 50% of the pigs were found to have straight hairs, about 15% with short hairs, about 12% with curly hairs, another 12% with dense hairs, and about 10% with long hairs (Figure 2). Generally, the skin of the village pigs was fully covered with curly to dense hairs.

Head and ear characteristics

The shape of the head was straight in most of the native pigs (80.5%) and the rest had a shape classified as concave (Figure 3). The present study showed that village pigs had drooping ears (19.5%) while the majority (80.5%) had erect ears (Figure

4). The erect ears were upward (51.2%), forward (7.3%) and backward (41.5%) orientation (Figure 5). On the size of the ear, 30% of the pigs had ears measuring 12 cm and rest had varying sizes ranging from 7 to 15 cm.

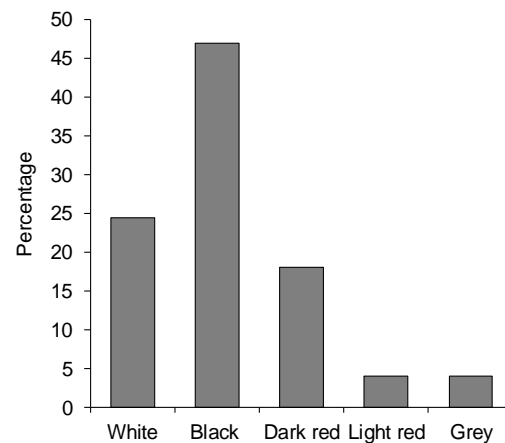


Figure 1 Proportions of pigs with different coat colors.

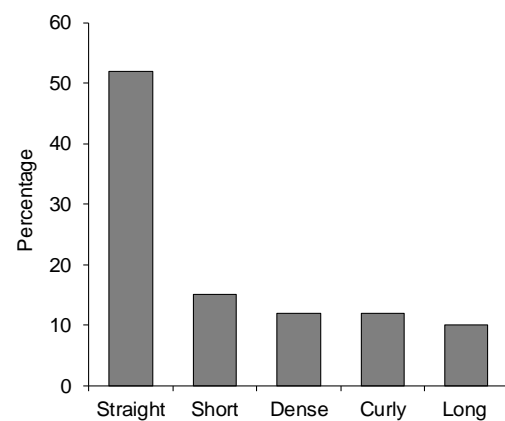


Figure 2 Proportions of pigs with different type of hairs.

Body measurements

Males had bigger body conformation than the females except for the body and head length (Table 2). The weight of adult pigs varied from 36 to 73kg. The average body weights were 47.8kg and 39.9kg for adult male and female pigs, respectively. The study found that the correlation among the variables was positively significant ($p \leq 0.05$). The correlation between body weight and wither height was also positively significant ($r = 0.75$, $p \leq 0.05$).

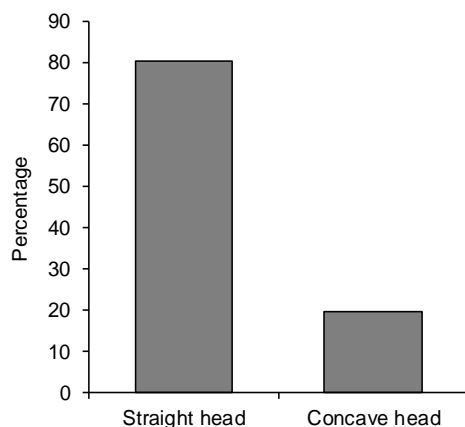
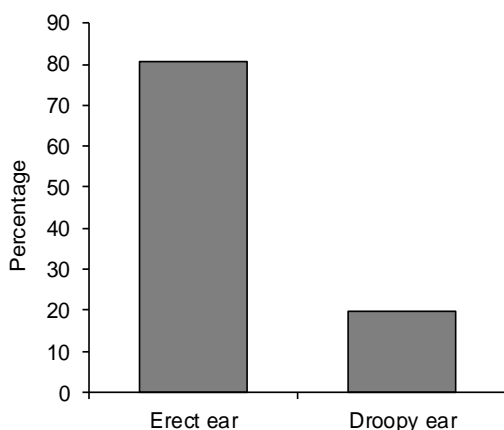
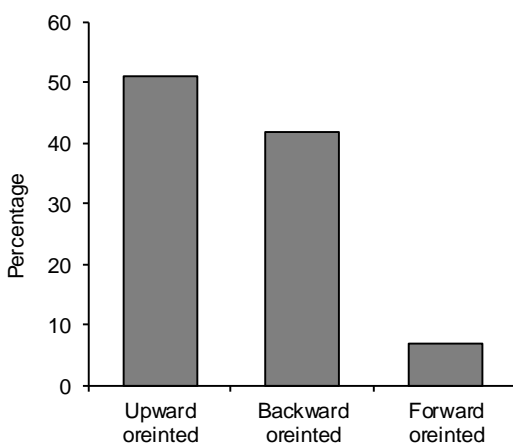
Reproductive performance

The average litter size of village pigs at birth was little less than 6.00 ± 1.04 number (Table 3). About 50% of pigs showed that the age at first service was 5-12 months with a mean of 6.97 ± 1.86 . The age at first farrowing ranged from 9-13 months with a mean of 9.12 ± 1.17 months.

There was only one farrowing in a year. There was no significant correlation among the reproduction parameters except for the litter size at birth and weaning ($r = 0.69$, $p \leq 0.05$). There was no systematic breeding though there were two local boars. Male pigs were castrated for fattening, thereby, losing breeding boars, which in turn disturbed the breeding pattern. About 75% of farmers used the boar from the neighbors for breeding.

Table 2 Linear body measurements of pigs (mean \pm se).

Body part	Male	Female
Body weight	47.8 \pm 16.6	35.9 \pm 16.2
Girth size (cm)	68.3 \pm 5.30	31.3 \pm 2.82
Body length (cm)	62.0 \pm 38.2	64.7 \pm 32.3
Head length (cm)	19.8 \pm 0.41	20.0 \pm 0.66
Pair of teats	-	4.80 \pm 0.52
Tail length (cm)	19.8 \pm 5.36	17.5 \pm 2.13
Ear length	1.33 \pm 1.36	1.30 \pm 1.31

**Figure 3** Head characteristics of native pigs.**Figure 4** Ear characteristics of native pigs.**Figure 5** Ear orientation of native pigs.**Table 3** Reproductive traits of native pigs.

Reproductive parameters	Mean \pm SE
Age at first service (months)	6.97 \pm 1.86
Live weight at first service (kg)	25.0 \pm 5.90
Age at first farrowing (months)	9.72 \pm 1.17
Litter size at birth (no)	5.71 \pm 1.04
Litter weight at birth (kg)	1.04 \pm 0.20
Litter size at weaning (no.)	5.53 \pm 0.76
Weaning weight (kg)	1.08 \pm 0.28
Weaning age (month)	2.04 \pm 0.55
Number of farrowing per year	1.00 \pm 0.00
Mothering ability	1.50 \pm 0.51

CONCLUSIONS

Local pigs are reared mainly under a resource-driven management system with an aim to generate household income and to meet the immediate monetary needs. Though the native pigs are of little value for commercial pork production, they remain as valuable sources of meat and secondary income to the rural households. The robustness and rigidity to harsh management and environmental conditions encourage farmers to rear native breed under the traditional management systems, thereby, compensating their low productivity.

It is apparent that there is potential to improve the village pigs genetically for sustainable utilization and conservation of native breeds. From the population size, native breeds are declining gradually which is a great concern. Thus, it is important to take conservative measures based on the phenotypic characters of the native breed as per the breeding policy and in line with the importance of the AnGr of the Country. Due to the decreasing population trends of native pig, rural people are confronted with the fast erosion of such native breeds. Efforts should be made to make efficient use of this genetic resource to develop suitable breed of pigs for Bhutan. Due to various advantages, many farmers rear local pigs. However, the existing native breeds are fed and managed in a traditional way.

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