

Phenotypic Variation in Village and Wild Pigs in Sri Lanka

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ABSTRACT. A study was carried out to evaluate and compare phenotypic characteristics of the two native pig populations in Sri Lanka as a part of a comprehensive study on characterization of native pigs, in order to assess the contribution of native populations in animal production. A total of 60 animals were randomly selected for phenotypic measurements of village pigs from Kalutara, Puttalam, Kurunegala and Chilaw, and the similar number of wild pigs was selected from Batticaloa, Polonaruwa, Anuradhapura, Kurunegala and Kandy areas according to their availability. Morphological characters were assessed to identify the phenotypic variation between village and wild pigs. The body shape, coat colour and presence of skin pigmentation of wild pigs differ from those characteristics observed in village pigs. Wild pigs predominantly showed an angular body shape and light brown coat colour without skin pigmentation. Both wild and village pigs showed similarities with respect to the length of hair, shape of the head and the size of the ear. The study further revealed that the village pigs were significantly different ($P < 0.05$) from wild pigs in their body weight, girth, height at withers and tail length while the body length and head dimensions of the two groups were not significantly different ($P < 0.05$). Female wild pigs were significantly different ($P < 0.05$) from female village pigs with respect to the body weight, girth size, body length and tail length. The mean number of teats that the female village pig and female wild pig possessed was 6.71 ± 0.46 and 5.40 ± 0.51 , respectively. The results of this study revealed that the wild pigs exhibit similarities to village pigs for most of the qualitative traits and some quantitative traits, indicating that the village pig population in Sri Lanka has a close relationship with wild pig population. However, some animals in wild pig population showed different morphometry from that of village pig confirming that the wild pigs possess some specific characteristics as they are a unique population.

Key words: Phenotypic variation, village pigs, wild pigs.

INTRODUCTION

Among meat producing animals, swine is considered as an animal of great importance with immense potential because of its high prolificacy and efficient feed conversion (Devendra and Thomas, 2002). Though social and religious restrictions exist among certain communities in Sri Lanka, there is a great potential in increasing the pork consumption level (Devendra *et al.*, 2000). At present, native pigs constitute about 60% of the total pig population as against 80% in 1972 (Devendra and Thomas, 2002). This decline is similar to that experienced elsewhere in the tropics (Devendra 1980 and Eusebio, 1980), where the need to maximize profits rather than to subsist has resulted in native types being replaced by

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exotic breeds. Despite decreasing trends in population size, the native pigs still represent a valuable component of local genetic resources. The village pig is the native pig which closely resembles the Sri Lankan wild pig and must have evolved as a result of gradual domestication of wild pigs (Rajamahendran *et al.*, 1978). Wild pig that abounds the jungles from ancient times has a special value as a unique species in rural areas (Ravindran *et al.*, 1984). Evaluating and assessing the phenotypic variation among native pig populations are important to identify the uniqueness of populations and the possible gene flow between wild and village pig populations. A recent study reported on genetic characterization of native pigs in Sri Lanka depicted that there is a close genetic relationship between the two populations (Thangarajah, 2009). Further, the phylogenetic evaluation suggested close genetic structure of subpopulation of both groups. This paper presents the comparison of some selected qualitative and quantitative characteristics between two populations of native pigs in order to establish the differences between two populations so as to identify conservation and utilization strategies.

METHODOLOGY

The complete study consisted of two phases; a field level investigation on morphological and reproductive traits of village pigs and wild pigs, and a set of laboratory investigations on molecular characterization of village pigs and wild pigs. This paper presents the methodology adopted for the field level investigations on morphological and reproductive parameters of village pigs and wild pigs at different locations in Sri Lanka. Based on the preliminary investigation, four locations (administrative districts) were included in the study, namely, *Kalutara*, *Kurunegala*, *Puttalam* and *Chilaw* to collect information on village pigs while five locations, namely, *Batticaloa*, *Polonnaruwa*, *Anuradhapura*, *Kurunegala* and *Kandy* were selected to collect information on wild pigs. Sixty unrelated village pig farms equally distributed in four locations were sampled while a similar number of wild pigs was also sampled among selected locations. The sample size had to be limited to sixty farms due to the limited availability of farms having pure village pigs and wild pigs. The types of morphological characters observed and measured are given in Table 1.

Table 1. Descriptive and morphometric traits recorded

Type	Trait
Descriptive	Coat colour, skin pigmentation, head shape, ear direction, ear size, ear orientation, tail shape, body shape
Morphometric	Hair length, tail length, number of teats, girth size, length of head, height at withers, body length, width of head

The data analyses were carried out using Excel spreadsheets (MS EXCEL-2007) and analyzed using Statistical Analysis software (SAS 9.1).

RESULTS AND DISCUSSION

Comparison of descriptive traits between village and wild pigs

Morphological characters were assessed to identify the phenotypic variation between village and wild pigs. The descriptive traits were useful in identifying population differences and

draw inferences on the distances between populations as those are predominantly controlled by few genes with major effect. The differences and similarities of descriptive traits in two populations are shown in Table 2.

Table 2. Descriptive traits of wild and village pigs

Traits	Village pigs¹	Wild pigs
Coat colour	Black	Light brown
Skin pigmentation	Present	Absent
Head shape	Long straight	Long straight
Ear size	Medium	Medium
Ear orientation	Horizontally erect	Horizontally erect
Body shape	Stocky body	Angular body
Tail shape	Straight tail	Straight tail

¹ According to Subalini *et al.* (2009)

According to the Table 2, the body shape and coat colour of wild pig, which has angular body and light brown coat colour varied from those of village pig. The angular body shape is a unique character in wild pigs, which is typical in describing the unimproved body shape; slim in loin area and bulk in shoulder area (Holness, 1991). The angular body shape was common across the wild population since the shape was constant in all wild pig samples which were from different geographical locations scattered in the island. However, when the body colour is considered, the horizontal stripes are present in newborn piglings of village and wild pigs proving the relationship of village pig with wild pig (Fisher and Devendra, 1963). Though it is not proved, if the village pigs are descendant of wild pig the change of body shape in these ancestral and descending populations could be attributed to directional selection of domestic population. Irrespective of the geographical separation of wild populations, wild pigs showed no skin pigmentation. This has not been recorded in earlier studies reported on Sri Lankan wild pigs (Sahayaruban *et al.*, 1984; Goonawardena *et al.*, 1984; Dematawewa *et al.*, 1999 and Silva *et al.*, 1999). However, 85% of the village pigs in the study areas had skin pigmentation. This observation suggests that village pigs have some genetic contribution from different genotypes, other than wild pigs during and after the process of domestication. Both village and wild pigs had a hair length of 1.5 to 2.0 cm. However, in wild pig population scant coat of coarse bristle-like dark brown hairs (more than 2 cm) were observed along the spine. The village and wild pigs showed similarities on the shape of the head, size and orientation of the ear. All wild pigs and 72% of village pigs had a straight tail. One fourth of the total tail length was tail switch in village pigs while in wild pigs the tail switch was comparatively shorter in length. However, when village pigs from different areas were considered, those found in Chilaw and Puttlam showed deviation in certain morphological characters such as body shape and ear orientation from those exhibited by wild pigs. Similarly, few village pigs in Puttalam and Kalutara showed difference in shape of head compared to wild pig (Table 3). Though these differences are not important from the view point of production, the tracing back of such differences will be useful in establishing the evolutionary events. These structural differences of the body may be due to several factors that contributed during and after domestication such as, directional selection and introgression. The phylogenetic analysis carried out as the second part of this study further confirmed the uniqueness of village pig population.

Table 3. Variations between village pigs and wild pigs in different locations

Traits	Wild pig	Village pig			
		<i>Puttalam</i>	<i>Kalutara</i>	<i>Kurunegala</i>	<i>Chilaw</i>
Coat colour	Light brown	Black	Black	Black	Black
Skin pigmentation	Absent	Present	Present	Present / Absent	Present
Hair length	Medium	Medium	Medium/ Long	Medium	Medium
Head shape	Long Straight	Long Straight/ Wide	Long Straight / Wide	Long Straight	Long Straight
Head (side-view)	Concave	Concave	Concave	Concave	Concave
Ear direction	Horizontally erect	Erect upward	Drooping	Drooping/ Erect upward	Erect upward
Ear size	Medium	Medium	Medium	Medium	Medium
Tail shape	Straight	Straight/ Curved	Straight	Straight	Straight
Body shape	Angular	Stocky	Stocky/ Angular	Stocky / Angular	Stocky

Comparison of morphometric traits between village and wild pigs.

Among the morphometric traits considered in the present study, body dimensions showed significant differences between wild and village pigs, whereas head dimensions showed no differences between two native populations (Table 4). Wild pigs showed significantly different ($P < 0.05$) body weight and girth size in both males and females. However, the height at withers was significantly high ($P < 0.05$) in male wild pig whereas the body length was significantly high ($P < 0.05$) in female wild pig compared to their village counterparts. These differences and similarities suggest that village pigs have comparatively compact body compared to that of wild pig. Sahaayaruban *et al.* (1983) and Holness (1991) also reported that in Sri Lanka and other tropical regions, wild pig showed unimproved and loose body dimensions. According to the present study, in general, wild pig carried a longer and heavier body with higher carrying capacity than that of village pigs. 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 wild and village situations. This was confirmed by Jones (1998), who reported that the feed resources in forest area has high energy content than the refuse available in villages for pigs reared under semi intensive system. Also, the directional force in selective breeding could be another factor that contributed in making a difference in body size. The measurements of head in both wild and village populations showed no difference while the wild pigs carried a shorter tail than village pigs. Similarities in head measurements and head shape among wild and village populations were reported also by Sahaayaruban *et al.* (1983), indicating that distinct features of the wild pig, such as tapering face and long snout could be observed also in village pigs.

Table 4. Linear body measurements of village pigs and wild pigs (Mean \pm S.E.)

Body measurements	Male		Female	
	Village pigs ¹	Wild pigs	Village pigs ¹	Wild pigs
Body weight (kg)	50.62 \pm 1.92 ^a	74.00 \pm 3.51 ^b	44.00 \pm 3.47 ^a	75.00 \pm 3.45 ^b
Girth size (cm)	75.14 \pm 2.43 ^c	63.25 \pm 3.52 ^d	73.66 \pm 3.17 ^c	64.15 \pm 4.44 ^d
Height at withers (cm)	48.59 \pm 3.88 ^e	58.04 \pm 3.27 ^f	50.77 \pm 4.01 ^a	58.10 \pm 2.76 ^a
Body length (cm)	75.10 \pm 1.87 ^a	80.10 \pm 1.10 ^a	69.95 \pm 2.43 ^e	80.00 \pm 1.33 ^f
Length of head (cm)	25.04 \pm 0.91 ^a	24.70 \pm 0.67 ^a	23.57 \pm 0.99 ^a	24.90 \pm 0.73 ^a
Width of head (cm)	12.54 \pm 0.53 ^a	11.25 \pm 0.67 ^a	12.14 \pm 0.61 ^a	11.75 \pm 0.82 ^a
Pair of teats	--	--	6.71 \pm 0.46 ^a	5.40 \pm 0.51 ^a
Tail length (cm)	28.47 \pm 4.03 ^g	17.00 \pm 1.05 ^h	27.94 \pm 4.74 ^g	14.00 \pm 1.41 ^h

Numbers followed by different letters in a row within one sex category are significantly different ($P < 0.05$)

¹According to Subalini *et al.* (2009)

Most of the similarities in body morphology and morphometry between wild and village pigs could be due to gene flow which still exists in rural extensive management system (Subalini *et al.*, 2009). This report agrees with the observation made by Nozawa, 1980, who suggested that the gene flow from wild animals to other indigenous type was possible due to breeding between these two types. Hence, the present study confirms that the morphological similarities reported here could be due to the existing gene flow between two populations.

CONCLUSIONS

The results of this study revealed that the village pigs show close relationship to wild pig populations in Sri Lanka. However, wild pigs showed some uniqueness in morphometry from the village pig populations.

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