

Status of Nili Ravi buffaloes in India

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Summary

Nili Ravi buffaloes are native to the Ferozepur, Amritsar and Gurdaspur districts of Punjab. A systematic survey was conducted in this area to study the socio-economic status of the farmers, and the demographic distribution and breed characteristics of Nili Ravi buffaloes. The majority of the farmers surveyed (84%) kept buffaloes. About 34 % of buffalo farmers were landless. Average land holdings were 1.50 hectares. Animals were provided with separate houses. The buffaloes were tied most of the time and fed chaffed fodder. Natural service was mainly practiced for the breeding of animals. Very few buffaloes had typical Nili Ravi characters (all extremities white). Most of the Nili Ravi type buffaloes now available have white markings on the forehead and hind legs only, and some have wall eyes i.e. eyes with a whitish iris. Average daily milk yield was 6.67 kg in a lactation period of 8-9 months. Nili Ravi type buffaloes constituted only 10.8 %, 8.7 % and 14 % of total buffaloes surveyed in Ferozepur, Amritsar and Gurdaspur districts, respectively. The estimated population of these buffaloes was about 0.2 million. The population of Nili Ravi is declining because of the non-availability of typical Nili Ravi bulls and non-marketability of Nili Ravi type (2-3 white extremities) animals.

Resumen

La raza de buffalo Nili Ravi es nativa del Ferozepur, en los distritos de Amritsar y Gurdaspur en la region de Punjab. Se llevó a cabo una encuesta sistemática en la zona para estudiar la situación socio-económica de los granjeros y la distribución demográfica y características de la raza Nili Ravi. La mayoría de los granjeros encuestados (84%) crían búfalos. Alrededor del 34% de estos granjeros no posee tierra. La media de tierra es de 1,5 hectarea. Los animales están atados y alimentados con paja y heno. Los apareamientos son naturales. Pocos animales poseen las características típicas de la raza Nili Ravi (todas las extremidades blancas). La mayoría de los búfalos de tipo Nili Ravi hoy en día poseen solo manchas blancas en la parte frontal y trasera de las patas, y algunos animales presentan ojos con el iris blanquecino. La media diaria de producción de leche es de 6,67 kg en un periodo de lactación de 8-9 meses. El buffalo tipo Nili Ravi representa solo el 10,8%, 8,7% y 14% del total de búfalos existentes en los distritos de Ferozepur, Amritsar y Gurdaspur, respectivamente. La población estimada es de alrededor de 0,2 millones. La población de Nili Ravi está en declino debido a la falta de disponibilidad de machos puros de esta raza y por la falta de mercado de animales del tipo Nili Ravi (2-3 extremidades blancas).

Key words: Socio-economic status, Management practices, Morphological characters, Milk production, Characteristics.

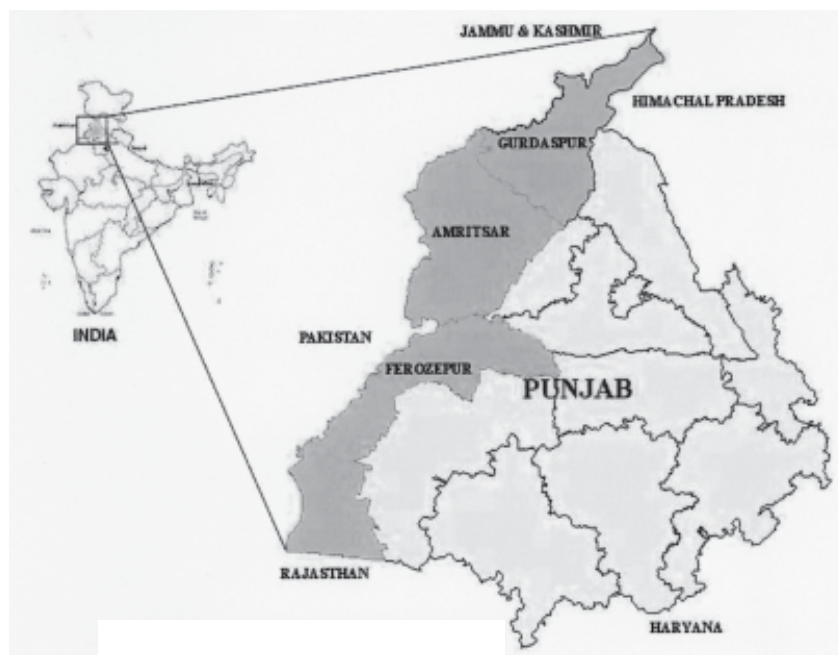


Figure 1. Breeding tract of Nili Ravi buffalo.

Introduction

Buffaloes on the Indian subcontinent play an important role as producers of milk, draught power, dung and other value added products. Nili Ravi is one of the best riverine breeds of buffaloes. Originally Nili and Ravi were two separate breeds but later became classified as one breed due to similarities in appearance. The home tract of this breed lies in Pakistan, but these buffaloes are also found in India in the Ferozpur, Amritsar and Gurdaspur districts of Punjab all along the Indo-Pak border (Figure 1). These buffaloes are best suited to the water logged conditions along the Sutlej, Ravi and Beas rivers of this region. The productivity of these buffaloes is comparable with the well-known dairy buffaloes, i.e. the Murrah. Nili Ravi buffaloes are different from Murrah in their morphology, for example their horn shape and five white markings (Figure 2 and 3). Punjab state is the second largest producer of milk in India with an annual production of about 8 million tonnes. About 72% of this milk comes from buffaloes. Nili Ravi is the

only recognized breed belonging to this area. Of late, the population of this breed has been declining. The breed characters have also been diluted as a result of mixing with other breeds especially Murrah. Hence, this study was undertaken to generate information on the present status of the breed in its breeding tract.

Materials and Methods

A survey was carried out in the breeding tract of Nili Ravi buffaloes, i.e. Ferozpur, Amritsar and Gurdaspur districts of Punjab. Sixteen clusters were identified randomly in the three districts for conducting the survey. Farmers were classified into six groups on the basis of land holding size viz. landless, marginal (0-1 ha), small (1-2 ha), lower medium (2-4 ha), upper medium (4-8 ha) and large (>8 ha). A total of 13 571 farmers were contacted through a door-to-door survey in order to record information on the socio-economic status of the farmers and the demographic distribution and breed

Table 1. Frequency of farmers in various categories (%).

Districts	Total farmers contacted	Landless	Marginal 10-1 ha	Small 1-2 ha	Medium		Large >8 ha
					Lower 2-4 ha	Upper 4-8 ha	
Ferozepur	4 639	44.5	9.2	17.5	16.4	8.2	4.2
Amritsar	5 560	34.7	14.1	26.0	18.3	5.9	0.9
Gurdaspur	3 372	48.2	20.3	19.2	8.6	3.0	0.7
<i>Buffalo keepers</i>							
Ferozepur	3 763	36.2	10.3	19.8	19.1	9.6	5.0
Amritsar	5 139	31.05	14.6	27.6	19.6	6.3	1.0
Gurdaspur	2 501	37.5	23.4	23.2	11.1	3.9	0.9

characters of Nili Ravi buffaloes. Test day milk yield was recorded at monthly interval starting from the first 15 days of calving. The population of Nili Ravi buffaloes in the three districts was estimated by superimposing the proportion obtained in this survey on the total buffalo population of these districts as per the livestock census (1997).

Results and Discussion

Socio-economic status

The greatest number of farmers in all the three districts were landless (41%) followed

by small (22%), lower medium (15.2%), marginal farmers (14%) and upper medium (6%) (Table 1). The percentage of large farmers was lowest (2%) in all the districts. Average land holdings varied from 0.94 to 1.99 hectares with an overall average of 1.50 hectares. About 81%, 92% and 74% of the farmers contacted in Ferozepur, Amritsar and Gurdaspur districts respectively, kept buffaloes. Among these buffalo farmers, 34.1% were landless, 15.1% marginal, 24% small, 17.6% lower medium, 6.9% upper medium and 2.3% large farmers. The landless farmers were dependent mostly on animal rearing and buffalo constituted one of the major components of their income. The



Figure 2. Nili Ravi bull.

Table 2. Average family status in the survey area.

District	Family members	Literacy (%)	Involved in animal rearing		Average land holding (hectares)
			Male	Female	
Ferozpur	5.35	37.2	0.96	1.11	1.99
Amritsar	5.39	18.7	0.62	0.30	1.44
Gurdaspur	6.32	35.4	0.56	0.12	0.94

distribution for buffalo farmers was almost comparable in the marginal and lower medium categories whereas it was minimal with regard to large farmers in the survey area.

The analysis revealed that the average family size was 5.35, 5.39 and 6.32 with average literate members being 1.99, 1.01 and 2.24 in Ferozpur, Amritsar and Gurdaspur districts respectively (Table 2). More male family members were involved in animal rearing than female members in Amritsar and Gurdaspur districts whereas in Ferozpur district more females were involved.

Management practices

Most of the farmers (98%) tied their buffaloes all the time. The animal houses, though separate, were located in the same premises as the residence of the farmer in most of the cases (86%). The animal houses were usually open (57%), made up of mud (49%) and bricks (46%), full walled (54%) and had mud floors (66%). These were well ventilated (91%) and clean (88%). Drainage was provided in 51% of the houses. Some of the farmers had even dug ponds in which buffaloes could wallow. Most of the farmers (73%) grew fodder for feeding to their animals and on an average a farmer had 0.50 ha of land under fodder production. Most of the farmers chaffed the fodder and fed the animals in groups. Natural service was mostly practiced (67%).

Morphological characters

The typical characteristics of Nili Ravi buffaloes as available in the literature include a black-brown hide colour, wall eyes and white markings on the forehead, face, muzzle, legs and tail. The breed is also known as '*Panch Kalyani*' due to the possession of these five white markings. The survey has revealed that their morphological characteristics have also undergone some changes. The true Nili Ravi animals with all five white extremities are rarely available. Most of the Nili-type buffaloes now available in the field have white marking on the forehead and hind legs and some also have wall eyes. Animals typically have a white moustache. These buffaloes are of a medium to large size. The head is elongated, bulging at the top and depressed between the eyes. Horns are small and tightly curled (slightly less than that of the Murrah). The tail is long, extending below the hocks and has a white switch. The udder is well shaped, capacious and extends well forward up to the naval flap.

Milk production

The average daily milk yield (Table 3) increased from 8.01 kg on the first test day (15 to 20 days from calving) to 8.24 kg on the second test day (45 to 50 days from calving) and then declined gradually to 3.23 kg on the ninth test day (approximately 8-9 months of lactation). The overall average daily milk yield was 6.67 kg. Estimated milk yield was about 1600 to 1800 kg in a lactation period of

about 8 to 9 months. Nivsarkar *et al.* (2000) reported total lactation yields in Nili Ravi buffaloes ranging from 1 586 kg to 1 929 kg with lactation length ranging from 263 to 316 days.

Population

The populations of buffaloes surveyed were largest in Amritsar followed by Ferozepur and Gurdaspur districts with average herd sizes of 5.2, 3.7 and 3.3, respectively (Table 4). Ferozepur district, which is otherwise considered as a breeding tract of

the Nili Ravi, had more than 50 % buffaloes of the Murrah type. Ferozepur and Amritsar districts had only 10.8 % and 8.7 % of Nili Ravi type buffaloes respectively. On the contrary, Gurdaspur district, not known earlier as major breeding area of Nili Ravi, had the highest proportion (14%) of Nili Ravi type buffaloes. The majority of buffaloes (61%) were of non-descript type (not confirming to any particular breed). The greatest number of non-descript buffaloes (73%) were found in Amritsar district and the least (36%) in Ferozepur district. The large proportion of non-descript animals shows that the breeding of buffaloes in these



Figure 3. Nili Ravi she buffalo.

Table 3. Test day milk yield (kg) of Nili-Ravi buffaloes.

Test day	Average	No. of records
1	8.01	492
2	8.24	504
3	7.92	513
4	7.40	486
5	6.78	478
6	6.00	446
7	4.86	359
8	3.69	287
9	3.23	199

Table 4. Breedwise proportion of buffaloes in survey area.

District	Total buffaloes surveyed	Percentage of			Estimated population of Nili Ravi
		Nili-Ravi	Murrah	Non-descript	
Ferozepur	1 4092 (3.7)	10.8 (1.7)	53.1 (2.9)	36.1	66 284
Amritsar	2 6806 (5.2)	8.7 (1.9)	18.7 (3.7)	72.6	65 527
Gurdaspur	8 221 (3.3)	14.2 (2.3)	17.1 (2.5)	68.7	63 236

() Numbers in brackets are household.



Figure 4. Nili ravi buffaloes bathing in a pond in the house of a farmer.

areas lacks proper planning. The estimated population of Nili Ravi type buffaloes in the three districts was around 0.2 million. The three districts had almost equal numbers of Nili Ravi buffaloes.

The interaction with the farmers has indicated a decline in the population of purebred Nili Ravi buffaloes. The primary reason for this decline is the higher market value placed on the black buffaloes. Earlier the true *Panch Kalayni* (with all extremities white) had very good physical appearance and was the first choice of the traders. Due to the lack of a planned breeding program,

the Nili Ravi buffalo could not retain its true characteristics and presently hardly any animal with all five extremities being white is seen. Buffaloes with 2-3 white extremities have a lower market price when compared to pure Nili Ravi or black buffaloes. Taking the benefit of market conditions, the breeders also started maintaining Murrah type bulls as very few Nili Ravi bulls are available. This has resulted in a farmer's preference for completely black buffaloes over the Nili type buffaloes. There is a definite market preference towards the Murrah type black animals while the population of pure Nili has declined considerably in spite of its milk yield

being not less than that of the Murrah. This trend needs to be checked to prevent the erosion of this gene pool in India. There is a need to provide semen of typical Nili Ravi bulls in its breeding tract so as to produce progeny true to its characteristics and propagate the breed.

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Phenotypic characterization and production performance of local pigs under village settings in the Southern Highland zone, Tanzania

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Summary

Indigenous pigs in Tanzania are descendants of earlier European introductions. However, a lack of systematic breeding plans, poor husbandry practices, genetic drift and possibly mutation have led to pigs of varied phenotypes. A study undertaken in Mbeya region showed that the predominant management system practised was free ranging and occasionally tethering. The average mature body weights for boars and sows were 57.4 kg and 54 kg, respectively. Coat colour varied, but the predominant colours were white (28%), black and white (24%), and solid black (19.8%). The majority (78%) of pigs had droopy ears and such pigs were found to be significantly ($P<0.01$) heavier with a longer trunk and increased body length when compared with those with erect ears. Other features included a long and straight face and a short curled tail. The overall mean birth weight was 0.9 kg while the mean weaning weight was 10.8 kg. The average litter size for local pigs was 6.6 piglets and litter size at weaning was 4.3 piglets. Locally raised pigs served a number of functions including among others, income, provision of meat, cooking fat and manure.

introducidas con anterioridad. Sin embargo, la falta de planificación sistemática en la reproducción, las escasas prácticas en la cría, así como las posibles mutaciones genéticas han llevado a una serie de cerdos con amplia variedad fenotípica. Un estudio llevado a cabo en la región de Mbeya muestra que el sistema mayormente utilizado es la cría al suelo con los animales ocasionalmente atados. La media del peso corporal de un macho y hembra adultos es de 57,4 kg y 54 kg, respectivamente. El color del manto varía pero es principalmente blanco (28%), blanco y negro (24%) y todo negro (19,8%). La mayoría de los cerdos (78%) poseen orejas caídas y resultaron ser significativamente ($P<0,01$) de mayor peso y con un tronco más largo en comparación con los animales con orejas erectas. Otros de los rasgos son la cabeza larga y estrecha y la cola corta y enroscada. La media del peso al nacimiento es de 0,9 kg, mientras que la media al destete es de 10,8 kg. La camada media al nacimiento es de 6,6 cochinitos y al momento del destete de 4,3. En la cría local los animales sirven para diversas funciones, incluidas, entre otras, el suministro de carne, la provisión de grasa para cocinar y de abono, además de ser una moneda de cambio.

Key words: Local pigs, Phenotypic characteristics, Production characteristics.

Resumen

Las razas indígenas porcinas existentes en Tanzania descienden de razas europeas

Introduction

Local pigs raised by the rural poor have received little attention, which could be attributed in part to the failure of agriculture development policies to accord importance to this genetic resource. In Tanzania past research has concentrated on exotic pigs, and mainly on the use of locally available agro-industrial by-products for inclusion in rations. Although reliable figures are hard to obtain, it is estimated that the pig population in Tanzania is about 500 000. The majority of these animals are of an unimproved type and are to be found mostly in three regions of the Southern Highland zone viz. Mbeya, Ruvuma and Iringa (MAFS, 2001).

Documented information has often disregarded the existence of indigenous pigs in Tanzania. According to Mason and Maule (1960) the Tanzanian indigenous pigs are believed to be descendants of earlier introductions by missionaries during the colonial period. More than 90% of these pigs are found under traditional systems and are an integral part of smallholder farming systems (Kimbi *et al.*, 2001; Lekule *et al.*, 1990). However, no concerted efforts have been made to study and describe these pigs despite their roles in rural peoples' livelihoods. In view of the global concern regarding the disappearance of indigenous/local animal genetic resources a

study was undertaken to describe the phenotypic and production attributes of local pigs found in the Southern Highlands of Tanzania.

Materials and Methods

Study sites

The study was conducted in the Mbeya region, located in southwestern corner of the Southern Highlands of Tanzania. The region lies between latitudes 7° and 9° South and between longitudes 32° and about 35° East (Figure 1). Mbeya region has an altitude ranging from 800 to 2 981 meters above sea level. Temperatures range between minus 6°C in the highlands and 25°C in the lowland areas. The region enjoys abundant and reliable rainfall. Annual total rainfall varies between 650 mm and 2 600 mm.

Four districts, namely, Mbozi, Rungwe, Mbeya rural and Ileje were purposely selected due to the abundance of local pigs found there. In this region 87% of pigs are of a local/indigenous type and account for 33.8% of the total indigenous pigs in Tanzania (MAFS, 2001). From these districts, a total of 10 villages were sampled for investigation based on the fact that they were relatively un-influenced by large-scale urbanization.



Figure 1. Mbeya region, located in southwestern corner of the Southern Highlands of Tanzania.

Data collection and analysis

Data were collected by surveying methods using a structured questionnaire, onsite observation and physical measurement of pigs. 75 farmers who keep pigs were selected at random and interviewed. For phenotypic characterization, a total of 480 mature pigs were randomly sampled for various body measurements. Simple descriptive statistics for various parameters and quantitative variables were analyzed using SPSS statistical package.

Results and Discussions

Management and role of pigs

Southern Highland is among the major agriculture zones in Tanzania and pig-raising is one of the diverse activities pursued by farmers there. The major role of pig keeping as revealed by the interviewed farmers was income generation (97.1%). Other roles included provision of meat (48.6%), manure (12.9%), provision of cooking fat (18.6%) and as an asset (7.1%). These findings are incongruent with observations made by Anderson *et al.*, (2000) and Moll and Heerink, (2003) where in the smallholder situations cited, providing for household needs is the prime objective in pig keeping rather than profit maximization *per se*. The majority of pig keepers were also crop producers and men owned most of the pigs. However, women were had greater responsibilities in pig management compared to men.

In the study villages, the average herd size of pigs in the household was 7.6 ± 4.4 pigs (inclusive of immature animals) and the majority of pig keepers tended to keep all categories/classes of pigs in a single herd. The average number of breeding sows was 1.9 ± 0.78 with a range of between 1 and 4 sows. A few farmers (4.3%) kept crossbred pigs, however local pigs were predominant (95.7%). The study further revealed that scavenging was the common method of feeding, especially during the off-farming season. Other methods such as tethering and total confinement were common. Mpofu (1999) made similar observations in Zambia. This system has the disadvantage of limiting animals to scavenging for a variety of food

materials to fulfill their requirements while supplementation is normally minimal or absent. Scavenging has also been associated with a higher risks of cystericosis (Lekule and Kyvsgaard, 2003; Ngowi *et al.*, 2002).

Housing was observed to be poor and piglets were often exposed to extremely cold weather conditions. Confinement and tethering were normally applied during the farming season to avoid crop destruction. About 73% of respondents had no disease control strategies in their herd leading to higher incidences of mortality among the piglets. Some pig keepers experienced pre-weaning mortalities of up to 100%. To counteract early death among the piglets, it has been necessary for farmers to extend the weaning period to between 3 and 4.5 months. The study also observed that less attention to feeding and disease control might have predisposed pigs to other problems such as poor growth, agalactia and general weakness of the animals.

Morphological traits

Results on live weights and linear body measurements for the local boars and sows are presented in Table 1. The weights of mature pigs were quite variable ranging from 30 kg to 64 kg. The overall mean weights for the adult local pigs were 57.4 ± 2.4 kg and 54.0 ± 1.3 kg for boars and sows, respectively. Adebambo (1982) reported similarly low mature live-weights ranging between 45 kg and 56 kg for Nigerian indigenous pigs. Local breeds of pigs tend to be smaller in size and are often mistakenly thought to be inferior to commercial breeds. For a resources

Table 1. The Least Squares Means (\pm S.E.) for body weight and linear measurements for local pigs in surveyed area by sex.

Sex	Body weight (kg)	Trunk length (cm)	Body length (cm)	Heart girth (cm)	Height at wither (cm)
Boars	57.4 ± 2.4	82.8 ± 1.4	97.3 ± 1.7	85.6 ± 1.4	59.7 ± 1.4
Sows	54.0 ± 1.3	78.8 ± 0.8	92.4 ± 0.9	86.6 ± 0.8	60.2 ± 0.8



Figure 2. A typical local boar standing on a wooden stall

poor farmer, small sized animals are cheaper to maintain than large commercial breeds. It appears that the ability to survive under the harsh conditions could be linked to evolutionary adaptation to a low-input production environment, hence the smaller size (Lekule and Kyvsgaard, 2003).

The result of linear body measurements showed that body length, heart girth and height at wither averaged 97.3 cm, 85.6 cm, 59.7 cm in boars and 92.4 cm, 86.6 cm and 60.2 cm in sows, respectively. Overall, boars were significantly ($P>0.05$) heavier and had

Table 2. Frequency of coat colours among local pigs (N=405).

Colour	Frequency	Percentage
White	114	28.1
Black	80	19.8
Brown	16	4.0
Reddish brown	8	2.0
Grayish	8	2.0
Black and white	97	24.0
Black and brown	14	3.5
Black + white patches	13	3.2
Black + brown spot	2	0.5
Black and brown + white patches	3	0.7
Black and brown + white spots	6	1.5
Black and white + brown spots	3	0.7
Reddish brown + black spots	3	0.7
Brown + black spots	16	4.0
Gray and white	1	0.2
White + black spots	14	3.5
White + brown spots	7	1.7

longer trunks as well as greater body length. Height at wither and heart girth did not differ significantly ($P<0.05$) between the sexes. Figures 2 and 3 give some typical features of local pigs found in Southern Highlands.

Table 2 shows the proportion of the various colours of pigs in the study areas. Great variation in terms of coat colour was observed. The majority of the pigs were white (28.1%), followed by a mixture of black and white (24%) and solid black (19.8%), the rest had mixed colour patterns. Association between coat colour and linear body measurements revealed that pigs with a white coat colour had significantly ($P<0.05$) longer (98.3 ± 1.4 cm) body length followed by black pigs (93.5 ± 1.7 cm), black and white pigs (92.6 ± 1.5 cm) and white pigs with black spots (88.6 ± 3.1 cm) with brown pigs having the shortest linear body measurements (81.1 ± 5.0 cm). The majority of pigs (96%) had long, straight faces and droopy ears. Pigs with droopy ears were found to be significantly ($P<0.01$) heavier when compared with those with erect ears. Also, in terms of linear body measurements, animals with droopy ears had significantly ($P<0.01$) longer body trunk length ($P<0.001$), body

length ($P<0.05$), heart girth ($P<0.001$), height at withers ($P<0.01$), snout length ($P<0.001$), tail length and ear length ($P<0.001$), compared to the pigs with erect ears.

Regarding tail shapes, curled tails were the most common type of tail (60.2%).

The number of teats (Table 3) among sows observed in this study ranged between four and seven pairs similar to observations made by Cheng (1984) on Kele indigenous pigs found in southwest China. Pigs with five pairs of teats were observed to be most common (61.5%), followed by those with six pairs (32.6%) of teats. No significant ($P>0.05$) differences were observed in body weight or height at withers for animals with four, five, six and seven pairs of teats. However, significant ($P<0.05$) differences in trunk length and body length were observed when pigs with five pairs of teats were compared with those having six or more pairs of teats. The droopy ears, white coat and longer body characteristic of white local pigs may suggest that crossing with exotic breeds like the Landrace at some stage cannot be ruled out. This supports the contention that these pigs are indeed descendants of European breeds (Lekule *et al.*, 1990).

Table 3. Body shapes and number of teats among local pigs.

	Frequency	Percentage
<i>Tail shape</i>		
Curled	154	60.2
Straight	102	39.8
<i>Ear shape</i>		
Droopy	196	78.4
Erect	54	21.6
<i>Face</i>		
Long and straight	192	95.5
Medium	9	4.5
<i>Pair of teat number</i>		
4	1	0.2
5	249	61.5
6	132	32.6
7	23	5.7

Table 4. Reproduction performance of local pigs in Mbeya region.

Trait	Mean
Age at first farrowing (months)	13.8±2.5
Farrowing intervals (months)	12.0±2.2
Litter size at birth	6.6±1.2
Number of lifetime farrowings per sow	6.4±0.7
Average litter size at weaning	4.3±0.9
Weaning age (months)	3.4±0.4

Reproductive characteristics

Table 4 shows the mean performances for different reproductive traits of the local pigs. The observed litter size is within the range reported by Els, (2000) and Adebambo (1982) in South Africa and Nigeria, but slightly lower than that of Kele pigs (7-8) (Cheng, 1984) and Mukota pigs in Zimbabwe whose litter size ranges from 7.3 to 7.9 piglets. Some farmers reported that often some sows lost almost all the piglets before weaning. The higher pre-weaning mortalities could be attributed to poor management and lack of veterinary and livestock support services, in addition to low input management. About 57% of the

interviewed farmers indicated that access to breeding boars was a problem. Pathiraja (1986) expressed a similar observation in small village populations of pigs in Nigeria.

A lack of organised breeding and poor access to improved boars largely contributes to the observed low productivity. An observed feature was greater age at first farrowing (13.9±2.5 months), late weaning and delayed age at mating. Cases of stillbirth, abortion and morphological deformities were also common. This could be explained in part by possible higher levels of inbreeding. Results from the Mashari research station in Namibia showed that with improved management, nutrition and weaning at 8 weeks of age, indigenous sows



Figure 2. A tethered sow close to the homestead during the cropping season.

could produce 2 litters per annum (Els, 2001). The practice of pig keepers to leave piglets to suckle without restriction until they wean themselves also contributes to delayed heat by sows after weaning and invariably causes the long farrowing intervals.

Population trend

About 40% of the farmers interviewed indicated that their herds have been increasing over time, while 28% and 27% indicated that their flocks were stable or decreasing, respectively. In contrast previous studies in the same region observed that in general, the population of local pigs was increasing (Kimbi *et al.*, 2001). In general, availability of a ready market was a limiting factor to herd expansion and farmers were compelled to keep only a few animals for trading between 'market and subsistence'.

The study found that only 4.3% of the households surveyed kept crosses. This was firstly due to remoteness of the villages surveyed, and secondly most farmers were poor and could not afford to purchase improved boars and additional inputs such as cereal by-products. A few farmers who kept crosses had better connections with the town markets. It appears that for the majority of farmers, the current system of raising local pigs will continue unchanged for the foreseeable future unless deliberate efforts are made to improve both the husbandry and breeding practices.

Conclusion

The local pigs found in the Southern Highlands of Tanzania have morphological features common to other indigenous pigs found under low-input traditional systems in Africa. They serve functions that are not reflected in simple economic balance. However, the lack of improved breeding boars and poor support services have led to the observed poor productivity. There is a

need for institutional support to these communities to allow for active and sustainable utilization of this genetic resource.

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