Phenotypic characterization and performance evaluation of Rayalaseema black pig

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Journal of Livestock Science (ISSN online 2277-6214) 17: 198-205
Received on 28/3/25; Accepted on 29/3/26; Published on 4/4/26
doi. 10.33259/JLivestSci.2026.198-205

Abstract

This study provides a comprehensive profile of the indigenous pigs of the Rayalaseema region, highlighting their physical characteristics and management practices. A demographic survey, along with biometric, morphological, and morphometric assessments, was conducted on 356 local black pigs from 105 villages randomly selected across 35 mandals in the Rayalaseema region of Andhra Pradesh. The predominant color pattern was black, with most pigs being medium to large in size. Common features included a straight backline, flat belly, erect ears, slightly concave snout, curved tail, and a stocky body. Sex had a significant effect on all body measurements and body weights, except at 0-1 month of age. The overall mean body weights recorded at different age groups were: 3.09 ± 0.12 kg (0–1 month, n = 111), 22.1 ± 0.46 kg (2-6 months, n=91), 48.26 ± 2.01 kg (7-9 months, n = 83), 69.72 ± 6.93 kg (10-12 months, n=46), and 78.31±1.61 kg (above one year, n=25).

Key words - Rayalaseema local black pigs; body measurements; body weights; correlation; regression.

Introduction

Indigenous pigs are well adapted to adverse agroclimatic conditions and can survive and reproduce even under low or zero-input production systems (Nachare et al., 2024). While their feed conversion efficiency and growth rates are lower than those of exotic or crossbred pigs, they possess unique traits such as disease resistance, heat tolerance, leaner meat production, and early sexual maturity (Behl et al., 2020). Additionally, indigenous pigs exhibit diverse and favorable productive and reproductive performances (Onwuachi-Iheagwara, 2022). Moreover, in certain regions of the country, they are highly preferred by consumers due to the superior quality and taste of their pork compared to exotic and crossbred pigs.

Indigenous pigs are distributed across Andhra Pradesh, exhibiting diverse morphometric traits and production parameters, with a predominant presence in the Rayalaseema region. However, they remain largely uncharacterized. Therefore, it is essential to document their phenotypic characteristics, including morphological, morphometric, productive, reproductive, and litter traits. This characterization will aid in recognizing their unique attributes and contribute to the conservation of these valuable genetic resources, aligning with the mission of the NBAGR Karnal's campaign to eliminate non-descript animal genetic resources.

Materials and methods

A multistage sample survey was conducted on indigenous (local black) pigs of the Rayalaseema region (Kadapa, Kurnool, Chittoor, and Anantapur districts; Figure 1; 14.6° N, 78.4° E) of Andhra Pradesh from March 2023 to August 2023 to document their morphological characteristics, as well as productive, reproductive, and litter traits, following the NBAGR breed descriptor. The study included pigs from 11 mandals in Kadapa and 8 mandals from the remaining districts, with three villages selected from each mandal. Morphological traits such as color, snout shape, ear type, tail type, belly type, body shape, hoof placement, top line, number of teats, and presence of wattles were recorded. Additionally, reproductive performance was documented. Data collection was conducted early in the morning before the animals were released for scavenging.

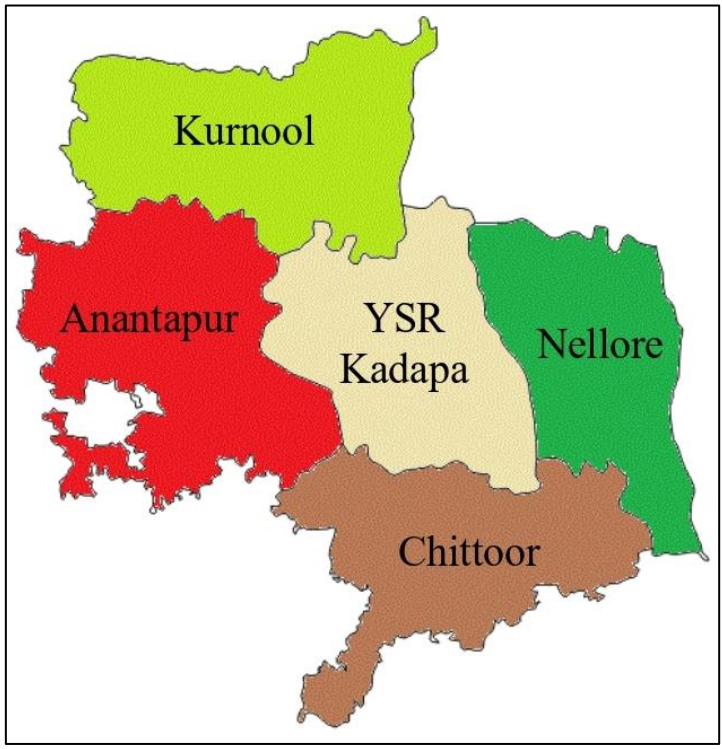

Fig. 1. Study area (Rayalaseema region) of Andhra Pradesh, India

The age of pigs was estimated through inquiries with farmers, supplemented by assessments based on the animal's size. Body weights and measurements, including body length (BL), height at withers (HW), chest girth (CG), paunch girth (PG), neck girth (NG), ear length (EL), snout length (SL), and tail length (TL), were recorded for various age groups viz. birth to 1 month, 2 to 6 months, 7 to 9 months, 10 to 12 months, and above 1 year on a total of 356 local pigs. Body weights were measured using a 100 kg circular spring balance with 500 g accuracy, while body measurements were taken using a one-meter measuring tape.

Reproductive performance data were collected from 108 local black pig droves, including parameters such as age at first mating in males, age at first estrus, age at first mating, age at first farrowing, farrowing interval,

and lifetime number of farrowings in females. Additionally, litter traits, including litter size at birth, litter size at weaning, litter weight at birth, and litter weight at weaning, were recorded from 53 farrowings of local black pigs.

Statistical analysis

The collected data were scrutinized, edited, collated, and grouped according to the age group, and sex. General linear model was used to interpret quantitative traits in Statistical Package for Social Sciences (SPSS Vs.23). The model used for least square mean analysis was:

$$Y_{ijkl} = \mu + D_i + S_j + A_k + e_{ijkl}$$ where,

Y_{ijkl} = The l^{th} observation of i^{th} district, j^{th} sex and k^{th} age group

D_i = Effect of i^{th} district (Kadapa, Kurnool, Chittoor and Anantapur)

S_j = Effect of j^{th} sex (female and male)

A_k = Effect of k^{th} age group (birth to 1 month, 2 to 6 months, 7 to 9 months, 10 to 12 months and above 1 year)

e_{ijkl} = Random error

Duncan's multiple range tests as modified by Kramer (1957) was employed to make pair wise comparisons of least-square mean.

Correlation and Regression analysis

Correlation between of body weight with biometrical measurements was estimated using Pearson correlation coefficient. stepwise multiple regressions were used to predict body weight from linear measurements having significant correlations with body weight. variables that best fitted the model were selected using R^2.

Results and Discussion

The pig is routinely called as "Naatu pandi" in its native tract. The demographic survey revealed that a total of 12,570 black coloured local pigs were distributed across the breeding tract of Rayalaseema region that account for about 13.66 per cent of total pig population of Andhra Pradesh and 0.13 per cent of total pig population of India (DAHD 2019).

Morphological characters

The local black sow and boar of Rayalaseema region are shown in Figure 2.A and 2.B, respectively. The present study revealed that the coat color of indigenous pigs in the Rayalaseema region varied, with black being the predominant pattern, followed by black with white patches and, occasionally, white. The presence of white patches is likely due to sporadic crossbreeding between local black pigs and Large White Yorkshire crossbred pigs, primarily introduced from ICAR-AICRP, Tirupati. Consequently, black appears to be the original coat color pattern of the local pigs in this region. This is further supported by observations in remote areas with limited access to crossbred boars, where the indigenous pig population exhibits an entirely black coat. The majority of pigs exhibited a straight topline (87.36%), while a smaller proportion (12.64%) had an arched topline. Most pigs had a flat belly (74.38%), whereas 25.62% displayed a pot-shaped belly. A predominant percentage (96.06%) had erect ears. The majority (95.28%) possessed medium-sized snouts with a slight concavity, while the rest had straight snouts. Hoof development was observed to be proper and complete.

Fig. 2. Local black pig of Rayalaseema region (A) local black sow and (B) local black boar

Most pigs (96.91%) had a stocky appearance, indicating a robust and muscular build. A distinct presence of long bristles was noted in the shoulder region. Female pigs typically had five to eight pairs of teats arranged asymmetrically along the ventral abdomen. The tail was generally medium in length, curved, and featured a tuft of hair at the tip in 97.19% of the pigs.

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Body measurements

Body measurements are useful for assessing the growth trend of a breed as they reflect the skeletal development of the animals. The least-squares means for BL, HW, CG, and PG at various age groups viz. birth, 3 months, 6 months, two-toothed, four-toothed, six-toothed, and full mouth were pooled over sex and district, showed an increasing trend. The least squares means of the different body measurements are presented in Tables 1 and 2.

The least squares means compared between sexes at different ages revealed a significant influence on four body measurements (BL, HW, CG, PG), with higher values ($P<0.01$) observed in males, except for the birth to one-month age group. Similar findings were reported for Wak Chambil pigs (Kadirvel et al., 2021), while females had higher body measurements than males in Doom pigs (Banik et al., 2022). The variation in measurements between males and females increased with age, likely due to differences in body weights, sex hormones, and sexual dimorphism. Districts did not show a significant effect on any of the body measurements.

Adult indigenous pigs from the Rayalaseema region had higher BL, HW, CG, PG, and neck girth (NG) compared to Doom pigs (Banik et al., 2022) and Tenyi Vo pigs (Rutsa and Rutsa, 2019). They also had longer snouts than Mali pigs and longer ears than Doom pigs (Banik et al., 2022). The overall least square means for neck girth at birth to 1 month, 2 to 6 months, 7 to 9 months, 10 to 12 months, and above 1 year of age, pooled over sex and district, were 27.25±0.52, 61.96±0.69, 75.92±0.62, 88.36±1.14, and 119.87±4.22 cm, respectively. The corresponding snout lengths were 4.09±0.05, 6.39±0.13, 7.51±0.14, 9.28±0.26, and 10.52±0.53 cm.

Table.1 Least square means (±SE) of body length (cm) and Height at withers of local black pig of Rayalaseema region

Effects	Birth to one month	Two to six months	Seven to nine months	10 to 12 months	Above one year
Body length (cm)					
Over all	28.76±0.68 **(111)**	47.48±0.39 **(91)**	85.47±2.09 **(83)**	93.76±4.46 **(46)**	100.46±4.41 **(25)**
Sex	**NS**	**	**	**	**
Female	28.54±0.94 **(56)**	44.33±0.83 [a] **(50)**	83.77±1.69 [a] **(68)**	89.87±3.14 [a] **(41)**	99.73±2.73 [a] **(23)**
Male	28.99±0.96 **(55)**	50.63±0.53 [b] **(41)**	89.18±3.71 [b] **(15)**	98.66±8.16 [b] **(5)**	108.18±8.48 [b] **(2)**
District	**NS**	**NS**	**NS**	**NS**	*
Kadapa	28.12±1.16 **(35)**	47.82±0.63 **(35)**	83.51±2.55 **(31)**	93.35±5.06 **(19)**	89.24±5.52[a] **(8)**
Kurnool	28.67±1.26 **(29)**	46.52±0.69 **(25)**	84.71±3.05 **(24)**	91.23±6.34 **(11)**	106.01±5.79[b] **(7)**
Chittoor	29.38±1.46 **(25)**	47.46±0.78 **(20)**	87.72±3.91 **(16)**	97.63±7.68 **(10)**	100.74±7.04[ab] **(5)**
Anantapur	28.88±1.53 **(22)**	48.13±0.98 **(11)**	85.92±4.16 **(12)**	92.89±8.11**(6)**	105.84±6.98[b] **(5)**
Height at withers (cm)					
Over all	14.31±0.46 **(111)**	29.62±0.32 **(91)**	45.39±0.51 **(83)**	53.21±0.59 **(46)**	77.96±2.37 **(25)**
Sex	**NS**	**	**	**	**
Female	13.97±0.63 **(56)**	26.63±0.64 [a] **(50)**	41.78±0.42 [a] **(68)**	50.55±0.41 [a] **(41)**	75.21±1.45 [a] **(23)**
Male	14.66±0.65 **(55)**	34.62±0.44 [b] **(41)**	49.02±0.89 [b] **(15)**	55.85±1.07 [b] **(5)**	82.71±4.52 [b] **(2)**
District	**NS**	**NS**	**NS**	**NS**	**NS**
Kadapa	13.28±0.79 **(35)**	29.03±0.51 **(35)**	44.84±0.61 **(31)**	52.92±0.66 **(19)**	74.29±2.93 **(8)**
Kurnool	13.62±0.85 **(29)**	29.07±0.58 **(25)**	45.07±0.73 **(24)**	52.81±0.83 **(11)**	79.39±3.08 **(7)**
Chittoor	15.96±0.98 **(25)**	29.54±0.65 **(20)**	46.77±0.93 **(16)**	53.46±1.01 **(10)**	76.34±3.75 **(5)**
Anantapur	14.39±1.03 **(22)**	30.87±0.82 **(11)**	44.89±0.98 **(12)**	53.66±1.07 **(6)**	71.82±3.72 **(5)**

NS - Not significant * Significant ($P\leq0.05$) **Highly significant ($P\leq0.01$); Figures in parentheses are number of observations. Means with similar superscript within each column under each effect do not differ significantly ($P>0.05$)

Table 2. Least square means (±SE) of Chest girth (cm) and Paunch girth of local black pig of Rayalaseema region

Effects	Birth to one month	Two to six months	Seven to nine months	10 to 12 months	Above one year
Chest girth (cm)					
Over all	36.87±0.42 **(111)**	69.32±0.64 **(91)**	93.06±0.91 **(83)**	104.38±0.91 **(46)**	132.47±3.67 **(25)**
Sex	**NS**	**	**	**	**
Female	36.61±0.58 **(56)**	66.33±0.98 [a] **(50)**	87.57±0.74 [a] **(68)**	100.04±0.64 [a] **(41)**	129.13±2.25 [a] **(23)**
Male	37.13±0.62 **(55)**	75.32±0.41 [b] **(41)**	96.54±1.62 [b] **(15)**	109.71±1.68 [b] **(5)**	137.81±7.02 [b] **(2)**
District	**NS**	**NS**	**NS**	**NS**	**NS**
Kadapa	36.32±0.72 **(35)**	70.23±0.99 **(35)**	92.97±1.12 **(31)**	103.92±1.04 **(19)**	133.26±4.53 **(8)**
Kurnool	36.62±0.78 **(29)**	67.61±1.14 **(25)**	91.63±1.33 **(24)**	103.94±1.31 **(11)**	132.09±4.78 **(7)**
Chittoor	37.92±0.91 **(25)**	69.21±1.29 **(20)**	94.73±1.71 **(16)**	104.52±1.58 **(10)**	136.84±5.81 **(5)**
Anantapur	36.63±0.95 **(22)**	70.26±1.62 **(11)**	92.89±1.79 **(12)**	105.12±1.67 **(6)**	127.68±5.76 **(5)**
Paunch girth (cm)					
Over all	39.18±0.48 **(111)**	77.94±0.82 **(91)**	102.88±1.14 **(83)**	107.82±0.91 **(46)**	145.86±5.25 **(25)**
Sex	**NS**	**	**	**	**
Female	38.39±0.66 **(56)**	76.81±1.13 [a] **(50)**	99.58±0.92 [a] **(68)**	105.17±0.64 [a] **(41)**	142.83±3.22 [a] **(23)**
Male	39.96±0.68 **(55)**	79.07±1.12 [b] **(41)**	106.17±2.03 [b] **(15)**	110.53±1.67 [b] **(5)**	148.89±10.09 [b] **(2)**
District	**NS**	**NS**	**NS**	**NS**	**NS**
Kadapa	39.82±0.82 **(35)**	79.19±1.27 **(35)**	104.07±1.39 **(31)**	107.51±1.03 **(19)**	146.51±6.48 **(8)**
Kurnool	38.27±0.89 **(29)**	75.92±1.46 **(25)**	101.17±1.66 **(24)**	107.43±1.29 **(11)**	146.92±6.82 **(7)**
Chittoor	39.52±1.03 **(25)**	77.54±1.65 **(20)**	102.76±2.13 **(16)**	108.19±1.57 **(10)**	148.36±8.37 **(5)**
Anantapur	39.16±1.08 **(22)**	79.13±2.07 **(11)**	103.59±2.24 **(12)**	108.14±1.66 **(6)**	140.66±8.23 **(5)**

NS - Not significant * Significant (P≤0.05) **Highly significant (P≤0.01); Figures in parentheses are number of observations. Means with similar superscript within each column under each effect do not differ significantly (P>0.05)

Table 3. Least square mean (±SE) body weights of local black pig of Rayalaseema region

Effects	Birth to one month	Two to six months	Seven to nine months	10 to 12 months	Above one year
Body weight (kg)					
Over all	3.09±0.12 **(111)**	22.14±0.46 **(91)**	48.26±2.01 **(83)**	69.72±6.93 **(46)**	78.31±1.61 **(25)**
Sex	**NS**	**	**	**	**
Female	2.96±0.16 **(56)**	20.58±0.64[a] **(50)**	46.72±1.63[a] **(68)**	67.13±4.87[a] **(41)**	77.65±0.98[a] **(23)**
Male	3.22±0.17 **(55)**	23.63±0.64[b] **(41)**	49.79±3.57[b] **(15)**	72.27±12.65 [b] **(5)**	83.56±3.05 [b] **(2)**
District	**NS**	**NS**	**NS**	**NS**	**NS**
Kadapa	2.81±0.21 **(35)**	22.92±0.72 **(35)**	48.63±2.46 **(31)**	70.38±7.84 **(19)**	77.74±1.97 **(8)**
Kurnool	2.78±0.22 **(29)**	21.02±0.83 **(25)**	47.25±2.93 **(24)**	69.74±9.83 **(11)**	78.23±2.08 **(7)**
Chittoor	3.44±0.26 **(25)**	21.98±0.94 **(20)**	49.01±3.76 **(16)**	69.71±11.91 **(10)**	78.28±2.53 **(5)**
Anantapur	3.32±0.27 **(22)**	22.52±1.17 **(11)**	49.13±3.94 **(12)**	68.96±12.58 **(6)**	77.97±2.51 **(5)**

The pooled least square means for ear length at birth to 1 month, 2 to 6 months, 7 to 9 months, 10 to 12 months, and above 1 year of age, pooled over sex and district, were 5.66±0.11, 7.81±0.17, 8.73±0.28, 9.56±0.61, and 10.11±1.83 cm, respectively. While district had no significant effect on body measurements, sex had a significant effect (P<0.01) on snout length, ear length, and tail length at ages 7 to 9 months and above 1 year. Further, the adult indigenous pigs in the Rayalaseema region recorded a higher neck girth and ear lengths compared to Doom (Banik *et al.,* 2022) and Tenyi Vo pigs (Rutsa and Rutsa, 2019) and longer snouts than Mali pigs (Dandapat *et al.,* 2010).

Body weights

The least-squares means for body weights pooled over sex of the animals and district showed an increasing trend as presented in Table 3. The overall least square mean for body weight at 0 to 1 month, 2 to 6

months, 7 to 9 months, 10 to 12 months and above one year of age pooled over sex of the animal and district are 3.09±0.12, 22.14±0.46, 48.26±2.01, 69.7±6.93 and 78.31±1.61 kg, respectively. The body weights of indigenous pigs of Rayalaseema region were having higher body weights than Niang Megha (Khargharia *et al.*, 2014), Banda (NBAGR, 2022), Mali (Dandapat *et al*., 2010), Doom (Rahman *et al*., 2020; Banik *et al*., 2022) and Nicobari (Kundu *et al.,* 2019).

Among sexes, males recorded significantly higher body weights (P≤0.01) than females at all ages studied except at birth to one month age group and this effect of sex might be due to muscular and skeletal growth along with formation of reproductive organs as the age advances. The difference in body weight between males and females at two to six months, seven to nine months, 10 to 12 months and above one year age group were 3.05, 3.07, 5.14 and 5.91 kg respectively. Similar effect of sex on body weights also reported by Kadirvel *et al.* (2021) in Wak Chambil pigs, Kundu *et al*. (2019) in Nicobari pigs under in intensive conditions but in contrary, the female Doom pigs have significantly higher body weights at weaning and in adults compared to males except at birth (Rahman *et al.,* 2020).

Reproductive performance

Reproductive performance has major influence on production efficiency of pig farming. The influence of district on reproductive performance of these pigs was not significant (P > 0.0.5). The pooled least square means of reproductive performance of local black pigs of Rayalaseema over the districts are presented in Table 6.

The least squares means of all reproductive traits in the present study were comparable and notably lower than the reports of previous studies of Banik *et al.* (2022) in Doom, Kadirvel *et al.* (2021) in Wak Chambil, Boro *et al.* (2021) in Gunghroo pigs, Gokuldas *et al*. (2015) in Niang Megha pigs, Kundu *et al*. (2019) in Nicobari pigs maintained in field level, Paul *et al.* (2020) in Mali pigs, Zosangpuii *et al.* (2020) in Zovawk pigs and higher Age at first mating in males and farrowing interval(FI) reported in the present study than previous reports.

Litter traits

The overall mean for litter size at birth and weaning, litter weight at birth and weaning 7.16±0.13 and 4.35±0.14, 7.87±0.14 and 19.14±0.89 kg (n=53) respectively (Table no.6). Litter traits reported in the presented study were higher than reports of Banik *et al.* (2022) in Doom pigs, Kadirvel *et al.* (2021) in Wak Chambil, Singh *et al.* (2020) in Niang Megha pigs, Losou *et al.* (2022) in TenyiVo, Paul *et al.* (2020) in Mali pigs.

Table 4. Correlation coefficients among body measurements and body weight of local black pig of Rayalaseema region

	BL	HW	CG	PG	NG	SL	EL	TL	BW
BL	1								
HW	0.883**	1							
CG	0.881**	0.951**	1						
PG	0.859**	0.912**	0.982**	1					
NG	0.825**	0.938**	0.983**	0.985**	1				
SL	0.842**	0.962**	0.956**	0.924**	0.940**	1			
EL	0.554**	0.668**	0.693**	0.672**	0.703**	0.708**	1		
TL	0.832**	0.951**	0.972**	0.953**	0.961**	0.962**	0.692**	1	
BW	0.933**	0.925**	0.933**	0.854**	0.823**	0.863**	0.568**	0.634**	1

Table 5. Multiple linear regression analysis of body weight on different body measurements in local black pig of Rayalaseema region

Model	Intercept	b1	b2	b3	b4	b5	b6	b7	b8	R^2
BL	-30.125	1.139								0.882
HW	-20.462	1.615								0.863
CG	-37.903	1.017								0.891
BL+HW	-30.313	0.823	0.526							0.872
BL+HW+CG	-31.312	0.814	0.455	0.052						0.916
BL+HW+CG+PG	-31.042	0.822	0.484	-0.053	0.082					0.916
BL+HW+CG+PG+NG	-33.949	0.687	0.573	0.547	0.197	-0.684				0.916
BL+HW+CG+PG+NG+SL	-36.492	0.699	0.349	0.478	0.239	-0.749	1.238			0.916
BL+HW+CG+PG+NG+SL+ER	-36.623	0.694	0.335	0.486	0.226	-0.723	1.313	-0.082		0.916
BL+HW+CG+PG+NG+SL+ER+TL	-37.92	0.656	0.447	0.624	0.243	-0.724	1.664	-0.077	-0.768	0.916

Table 6. Least square means (±SE) of Reproductive performance and Litter traits of local black pigs of Rayalaseema region

Effects	n	AFE (Days)	AFM (male) (Days)	AFM (female) (Days)	AFF (Days)	FI (Days)	LTNF	n	LSB	LSW	LWB (kg)	LWW (kg)
Over all	108	157.51± 2.56	272.85± 3.02	183.28± 3.06	302.65± 3.07	252.45± 3.03	5.43± 0.12	53	7.16± 0.13	4.35± 0.14	7.87± 0.14	19.14± 0.89
District		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**		**NS**	**NS**	**NS**	**NS**
Kadapa	29	158.23± 4.62	273.34± 4.86	183.79± 4.98	303.03± 4.96	253.06± 4.92	5.34± 0.23	19	7.21± 0.49	4.37± 0.32	7.92± 0.81	19.47± 0.98
Kurnool	29	159.34± 4.92	274.93± 5.81	185.41± 5.88	304.82± 5.76	254.62± 5.82	5.17± 0.89	12	7.24± 0.25	4.48± 0.28	7.96± 0.27	19.64± 1.72
Chittoor	27	158.55± 5.12	274.59± 6.01	185.03± 6.09	304.33± 5.97	254.14± 6.03	5.29± 0.24	9	6.85± 0.26	3.96± 0.29	7.53± 0.29	15.99± 1.79
Anantapur	23	154.13±5. 53	268.56± 6.51	178.91± 6.62	298.43± 6.47	248.92± 6.53	5.91± 0.26	13	7.34± 0.28	4.65± 0.32	8.08± 0.31	19.36± 1.94

Correlation between body weights and linear body measurements

The phenotypic correlation between body weight and linear body measurements pooled over various ages and sexes is presented in Table 4. The correlation between body weight and linear body measurements is positive, robust and statistically significant. It was observed that body length (r=0.93), chest girth (r=0.93) and height at withers (r=0.92) exhibited significantly stronger correlation with body weight compared to other measurements. Report produced by Banik *et al.* (2012) in Ghoongroo pigs was in accordance to the present study.

Regression analysis

Regression analysis is commonly used in animal research to describe the quantitative relationships between a dependent variable and one or more independent variables, such as body weight and linear body measurements (e.g., body length, chest girth, height at withers), especially in situations where weighing equipment is unavailable (Cankaya, 2008). The results of the regression analysis, pooled across all ages and sexes, are shown in Table 5. The analysis revealed that chest girth (CG) alone had the highest R^2 value (0.891) compared to other body measurements. The stronger correlation between body weight and chest girth can be attributed to the significant contribution of chest girth, which includes bones, muscles, and viscera, to overall body weight. The combination of body length, height at withers, and chest girth yielded an R^2 of 0.92. This suggests that, given the challenges of restraining animals in field conditions, the optimal combination for predicting body weight involves considering body length along with height at withers and chest girth. Similar findings were reported by Murillo and Valdez (2004) and Walugembe et al. (2014).

Conclusion

Rayalaseema local black pigs showed good growth, reproductive performance, adaptability, disease resistance, and survivability under low-input Indian field conditions, with chest girth alone or combined with height at withers and body length serving as the best predictors of body weight. However, the estimated population size and low breedable male-to-female ratio indicate an urgent need for conservation, more breeding boars, selective breeding, and improved management practices.

References

1) Banik, S., Naskar, S., Pankaj, P. K., Sahoo, N. R., Tamuli, M. K. and Das, A. (2012). Effect of different body measurements on body weight in Ghungroo pigs. Indian Journal of Animal Sciences, **82(9):** 1094-1097. Doi: 10.56093/ijans.v82i9.23679
2) Behl, R., Vij, P. K., Niranjan, S. K., Behl, J. and Vijh, R. (2020). Indigenous pig genetic resources of India: Distribution, types and their characteristics. Indian Journal of Animal Sciences, **90 (2):** 127-133. Doi: 10.56093/ijans.v90i2.98760
3) Cankaya, S. 2008. A comparative study of some estimation methods for parameters and effects of outliers in simple regression model for research on small ruminants *Ondokuz Mayis University, Biometry and Genetics Unit,* Kurupelit / Samsun, Turkey.
4) Kramer, C. Y. (1957). Extension of multiple range test to group correlated adjusted means. Biometrics., 13: 13-18.
5) Kundu, M. S., Perumal, P., Ravi, S. K., Sawhney, S., Bhattacharya, D., Kundu, A., Sundar, J., Muniswamy, K. and De, A. K. (2019). Evaluation of reproductive and production performance of Nicobari pig under humid tropical island ecosystem. Indian Journal of Animal Sciences, **89(3):** 73-78. Doi: 10.56093/ijans.v90i7.106680
6) Kadirvel, G., Kumar, R., Borah, S., Singh, N.S., Devi, Y.S., Jamitia, K. and Deori, S. (2021). Phenotypic characterization and performance evaluation of Wak Chambil: A unique indigenous pig of northeast region of India. Indian Journal of Hill Farming, **34:** 75-81.

7) Khargharia, G., Zaman, G., Laskar, S., Das, B., Aziz, A., Roychoudhury, R. and Roy, T. C. (2014). Phenotypic characterization and performance studies of Niang Megha and Doom pigs of Northeastern India. Asian Academic Research Journal of Multidisciplinary, **1(27):** 2319-2801.
8) Losou, L., Rutsa, M. C., Zuyie, R. and Singh, R. (2022). Productive and reproductive performance of female Tenyivo pig under field condition. Journal of Agriculture and Veterinary Science, **15(9):** 34-38. Doi: 10.9790/2380-1509023438
9) Murillo, M. C. K. M., and Valdez, C. A. (2004). Body weight measurement in triple weight estimation cross pigs (Large white-landrace-duroc) using external body measurements. Philippine Journal of Veterinary Medicine, **41:** 32-39.
10) Nachare, V.V. Sonawane, G.S., Jadhav, S.N., Doiphode, A.Y., Shende, T.C., Shelar, R.R., Nimbalkar, V.G., S.M. Bhokre 2024. Oxidative stress and NRF2 gene expression in blood of indigenous pigs. Journal of Livestock Science 15: 111-119 doi. 10.33259/JLivestSci.2024.111-119
11) Onwuachi-Iheagwara, P.N. 2022. Feeding indigenous black pigs with Chlorella sp supplements. Journal of Livestock Science 13: 288-295 doi. 10.33259/JLivestSci.2022.288-295
12) Rahman, M., Phookan, A., Zaman, G. U., Das, A., Akhtar, F., Hussain, J. and Choudhury, H. (2020). Growth and reproductive performances of doom pigs under field condition. Veterinary Research International, **8(2):** 73-77.
13) Rutsa, M. C. and Rutsa, V. (2019). Characterization of population and production system of Tenyi-vo pig of Nagaland (India). Journal of Livestock Biodiversity, **9(1):** 5-8.
14) NBAGR. (2022). ICAR-NBAGR, Karnal Annual Report 2021-22.
15) DAHD (2019). http://dahd.nic.in/dahd/statistics.aspx
16) Dandapat, A., Choudhury, K. B. D., Debbarma, C. and Das, M. K. (2010). Phenotypic characterization of Mali pig in Tripura, India. Livestock Research for Rural Development, 22(4).
17) Paul, A., Das, S., De, A., Debbarma, S., Roy, J., Sarkar, B. K. and Nandi, S. (2020). Physical and reproductive features of Mali: An indigenous pig breed of Tripura with special emphasis to impact of weaning on haemato-biochemical parameters. Journal of Entomology and Zoology studies, **8(5):** 1531-1536.
18) Singh, M., Mollier, R. T. and Sharma, R. (2020). Reproductive attributes of Hampshire, Gunghroo, Large Black and Tenyi Vo (local Naga Pig) under intensive management system in subtropical condition of Nagaland. Indian Journal of Animal Sciences, **90(6):** 934-936. Doi: 10.56093/ijans.v90i6.105008
19) Walugembe, M., Nadiope, G., Stock, J. D., Stalder, K. J. and Rothschild, M. F. (2014). Prediction of live body weight using various body measurements in Ugandan village pigs. Development, **26(5).**
20) Zosangpuii, J. B., Lalliankimi, H., Hmar, L., Singh, N. S. and Leihang, E. L. (2020). Phenotypic characterization of local pigs (Zovawk) in Mizoram. Journal of Entomology and Zoology studies, **8(5):** 336-338.