Original Research

Study on Various Morphometric and Bristle Traits of Doom Pigs of Assam under the Existing Management System

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Abstract

The present work was designed to study various morphometric and bristle traits of Doom pigs under field condition covering the breeding tracts viz. Dhubri, Kokrajhar, Goalpara, Bongaigaon and South Salmara Mankachar districts of Assam. Data pertaining to 247 and 40 animals were utilized for the study of various morphometric and bristle traits respectively. The average body length, height at withers, heart girth, neck girth, head length, head width, ear length and tail length were 16.83±0.90, 12.77±0.17, 22.75±0.27, 16.35±0.25, 5.96±0.09, 4.41±0.07, 3.42±0.07 and 5.38±0.09 cm at birth, 42.06±0.32, 34.50±0.24, 40.32±0.37, 36.05±0.24, 12.38±0.13, 9.67±0.10, 6.60±0.07 and 12.50±0.20 cm at weaning and 71.01±0.59, 58.67±0.39, 73.16±0.46, 62.25±0.49, 22.28±0.23, 13.97±0.14, 9.81±0.13 and 20.22±0.26 cm at adult age respectively. Sex was found to have significant effect on head width and tail length at birth; body length, height at withers, heart girth and neck girth at weaning and heart girth and head length at adult. Females were found to have higher averages for different body measurements as compared to males. The average bristle length and bristle diameter were 10.87±0.17 cm and 368.30±6.50 micron respectively. Significant effect of sex on bristle length and diameter were observed. The values were higher in males as compared to females. Location of bristle on body revealed non-significant effect on bristle length where as significant effect on bristle diameter. Bristle diameter was highest in bristles from withers region of males and neck region of females.

Key words: Bristle, Doom Pig, Morphometry, Migratory Scavenging System

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Introduction

Pig husbandry plays an important role in socio economic development and livelihood of the rural people in North-East India, which accommodates 38.38% of country's pig population (Livestock Census, 2012).

Among the four registered pig breed of North East India, Assam possess only one pig breed known as Doom pig. This unique germplasm is characterized by medium body size, short ears, black coat colour with thick line of hair (bristle) on the crest extending up to lumber region. They are mainly reared for meat and bristle under migratory scavenging system with minimum input from the farmer's end and possess some valuable traits such as resistance to diseases and adaptability to low input management system. However, till to date no field level post registration work has been done on Doom pig. This valuable and important germplasm, therefore, needs to be studied in their native tract under the prevailing management system so as to gather information on different body measurements and bristle traits, which can be further utilized for planning suitable breeding strategies their genetic improvement as the body measurements traits can be used to predict body weight at different stages because they are said to have a positive correlation (Bordoloi *et al.*, 1978; Morenikeji *et al.*, 2013 and Oluwole *et al.*, 2014). Therefore, the present study was designed to record the morphometric and bristle traits of Doom pigs under field conditions.

Materials and Methods

Data pertaining to 247 animals (115 males and 132 females) at different age (birth, weaning and adult) and 40 randomly chosen adult animals (20 males and 20 females) were utilized for the study of morphometric traits and bristle traits respectively covering the breeding tracts of Doom pigs, *viz*. Dhubri, Kokrajhar, Goalpara, Bongaigaon and South Salmara Mankachar districts of Assam. The morphometric trait under study were recorded using calibrated measuring tape. The bristle length were recorded using measuring scale and the bristle diameter were measured using projection microscope (samples were send to Wool Research Association, Thane, Maharashtra for bristle fiber diameter analysis).

Table 1: Description of morphometric and bristle traits under study

S. No.	Traits	Description
1	Body length (cm)	Measured as a straight line from the occipital bone (midpoint between ears) to the base of the tail.
2	Height at withers(cm)	Measured as the vertical distance from the top of the scapula bone to the ground parallel to the fore legs.
3	Heart girth (cm)	Measured as the circumference of the chest behind the elbow join.
4	Neck girth (cm)	Measured as the circumference of the neck region.
5	Head length (cm)	Measured as the distance from the tip of snout to forehead.
6	Head width (cm)	Measured as the distance between two eyes.
7	Ear length (cm)	Measured as the distance between the base and the tip of the pinna.
8	Tail length (cm)	Measured as a distance from the base to the tip of the tail.
9	Bristle length (cm)	Measured as distance between the base and tip of the bristle.
10	Bristle diameter (micron)	The diameter of bristle is the circumference of the bristle and measured using projection microscope.

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The morphometric trait and bristle length were expressed in centimeter and bristle diameter was expressed in micron. All the morphometric and bristle traits were recorded by same person to avoid individual variation (Table 1) and the data were classified according to the sex of the animals for morphometric traits and for bristle traits. The data were classified according to sex of animals and location of bristle on the body and the statistical analysis was carried out as per the methods described by Snedecor and Cochran (1994).

Results and Discussion

Morphometric Traits

The various morphometric traits of Doom pigs at birth, weaning and adult are presented in Table 2.

Body Length

The average body length of Doom pigs in the present study were 16.83±0.90, 42.06±0.32 and 71.01± 0.59 cm respectively at birth, weaning and adult age. Body length at birth were comparable to the findings reported by Khargharia *et al*. (2014) in Niang Megha pigs and Doom pigs. Kalita *et al.* (2018) also revealed comparable body length in Mizo local pigs at weaning and Subalini *et al*. (2010) in adult Sri Lankan local pig. In contrary, a lower body length at birth, weaning and adult as compared to present finding were reported by Savino *et al.* (2016) in Naga local pigs and Zaman *et al.* (2017) in Suwo pigs . However, Banik *et al.* (2016) revealed higher body length in adult Doom pigs as compared to present findings. The effect of sex on body length found to be non-significant at all the ages except at weaning where female animals exhibited significantly higher (P< 0.01) body length as compared to male. Non-significant effect of sex at birth and adult were also revealed by Banik *et al*. (2012) and Kalita *et al.* (2018) in Ghungroo and Mizo local pigs respectively. In contrary, Phookan (2002) reported significantly longer body length for males as compared to females at all ages in indigenous pigs of Assam.

Height at Withers

The average height at withers of Doom pigs were 12.77±0.17, 34.50±0.24 and 58.67±0.39 cm respectively at birth, weaning and adult age. The observed height at withers at birth was in accordance with the findings of Phookan (2002), Khargharia *et al.* (2014), Savino *et al.* (2016) and Zaman *et al.* (2017) in indigenous pigs of Assam, Niang Megha, Naga local pig and Suwo pig respectively. However, they revealed lower averages for the trait at weaning and adult. Comparable height at withers at weaning in indigenous pigs of Assam and at adult in Doom pig were reported by Deka (1988) and Khargharia *et al.*(2014) respectively. However, higher averages for the trait at birth in Bareilly local pigs and at adult in Mali pigs were reported by Chauhan *et al.* (1992) and Dandapat *et al.* (2010) respectively. The effect of sex on height at withers was found to be significant (P< 0.01) at weaning only. Female animal revealed significantly higher height at withers than male in the present study. However, Banik *et al.* (2016) and Zaman *et al*. (2017)

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observed significantly higher height at withers in adult female Doom and Suwo pigs compared to male. Though significant effect of sex on height at withers was reported by Phookan (2002) in indigenous pigs of Assam at birth, weaning and adult which was contradictory to the present findings.

Heart Girth

The average heart girth of Doom pigs in the present findings were 22.75±0.27, 40.32±0.37 and 73.16±0.46 cm respectively at birth, weaning and adult age. Phookan (2002) reported comparable heart girth at birth and weaning in indigenous pigs of Assam. In contrast to this, lower heart girth at birth, weaning and adult were reported by Khargharia *et al.* (2014), Savino *et al.* (2016) and Zaman *et al.* (2017) in Niang Megha, Naga local pig and Suwo pigs respectively. However, higher averages for the trait at adult were reported by Razmaite *et al.* (2009) in Lithuanian indigenous pigs and Dandapat *et al.* (2010) in Mali pigs. The present study revealed significant effect of sex on heart girth at all the ages except at birth. Female revealed significantly higher heart girth than male at weaning ($P< 0.01$) and adult ($P< 0.05$). These findings were supported by Banik *et al.* (2016) and Zaman *et al*. (2017) in adult Doom pigs and Naga local pigs. Phookan (2002) also reported significant effect of sex on heart girth at all the age where male were found to be significantly heavier than female that is contradictory to present finding. However, non-significant effect of sex on heart girth at different ages were reported by Banik *et al*. (2012), Borkotoky *et al.* (2014) and Kalita *et al.* (2018) in Ghungroo, Naga local and Mizo local pigs respectively.

Neck Girth

The average neck girth of Doom pigs were 16.35±0.25, 36.05±0.24 and 62.25±0.49 cm respectively at birth, weaning and adult age. Neck girth at birth and adult age in the present study were comparable to the findings of Khargharia *et al.* (2014) in Doom pigs. However, in accordance to the present findings, Khargharia *et al.* (2014) and Zaman *et al.* (2017) revealed lower average of neck girth at birth, weaning and adult in Niang Megha and Suwo pigs respectively. The effect of sex on neck girth in present finding was found to be not significant at birth and adult, but at weaning, female pigs revealed significantly higher ($P< 0.01$) neck girth than male. Non-significant effect of sex on neck girth at birth was also reported by Zaman *et al*. (2017) and Kalita *et al*. (2018) in Suwo and Mizo local pigs respectively. However, Banik *et al*. (2016) and Zaman *et al*. (2017) reported significantly higher neck girth in adult female Doom and Suwo pigs respectively.

Head Length

The average head length of Doom pigs at birth, weaning and adult age were 5.96±0.09, 12.38±0.13 and 22.28±0.23 cm respectively. The present findings were comparable with the observations of Dandapat *et al*. (2010) and Ritchil *et al.* (2012) in Mali pigs of Tripura and indigenous pigs of Bangladesh at adult

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respectively. However, McManus *et al.* (2010) and Subalini *et al.* (2010) reported higher head length in adult pigs of Brazil and local pigs of Sri Lanka respectively. In the present findings, sex was found to have significant effect on head length at adult pig only, where female showed significantly higher (P< 0.05) values than male. On the contrary, McManus *et al.* (2010) reported significantly higher head length in adult male than female Brazilian pig.

Head Width

The average head width of Doom pigs were 4.41±0.07, 9.67±0.10 and 13.97±0.14 cm respectively at birth, weaning and adult age. The present finding was in good agreement with the findings of Ritchil *et al.* (2012) in adult indigenous pigs of Bangladesh. However, shorter averages for head width as compared to the present findings was recorded by Subalini *et al.* (2010) in adult local pigs of Sri Lanka. Effect of sexhas no influence on head width at different age except at birth, where female exhibited significantly higher (P< 0.05) values as compared to male in present observation. The non-significant effect of sex was also observed by Subalini *et al.* (2010) in adult Sri Lankan indigenous pigs.

Ear Length

The average ear length of Doom pigs were 3.42± 0.07, 6.60±0.07 and 9.81±0.13 cm respectively at birth, weaning and adult age. Comparable values with the present findings at adult age were reported by Ritchil (2012) in indigenous pigs of Bangladesh and Banik *et al.* (2016) in Doom pigs. However, compared to the present findings; longer average value was reported by McManus *et al*. (2010) in adult indigenous pigs of Brazil and shorter averages value was reported by Borkotoky *et al.* (2014) in adult Naga local pigs. The average ear length between the sexes did not differed significantly at different ages under study. Similar findings were also reported by Borkotoky *et al.* (2014) in adult Naga local pigs. However, McManus *et al.* (2010) revealed significantly longer ear length in male indigenous pigs of Brazil as compared to females.

Tail Length

The averages for tail length of Doom pigs at birth, weaning and adult age were 5.35±0.09, 12.50±0.20 and 20.22± 0.26 cm respectively. Similar to the present findings were also reported by McManus *et al.* (2010) in adult indigenous pigs of Brazil and Banik *et al.* (2016) in adult Doom pigs. However, longer averages for the trait at adult were reported by Dandapat *et al.* (2010) and Subalini *et al.* (2010) in Mali pigs and local pigs of Sri Lanka respectively. On the contrary to present finding, Borkotoky *et al.* (2014) revealed shorter tail length in adult indigenous pigs of Nagaland. There is no significant effect of sex on tail length for different age except at birth, where female revealed significantly longer (P< 0.05) tail length as compared to male pigs. Non-significant effect of sex on tail length was also reported by Borkotoky *et al*.

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(2014) in adult Naga local pigs. Contrary to present finding, Subalini *et al*. (2010) observed significantly longer tail length in male than the female adult Sri Lankan pigs.

Table 2: Mean along with standard errors for body length(BL), height at withers(HAW), heart girth(HG), neck girth (NG), head length(HL), head width (HW), ear length (EL) and tail length(TL) of Doom pig at birth, weaning and adult

Traits (cm)	Age Group								
	Birth			Weaning			Adult		
	Male (46)	Female (53)	Pooled (99)	Male (39)	Female (44)	Pooled (83)	Male (30)	Female (35)	Pooled (65)
BL	16.69 ±0.30	16.95± 0.24	16.83± 0.90	41.12±0.43	42.89**±0.43	42.06±0.32	70.17±0.89	71.73±0.79	71.01±0.59
HAW	12.39±0.30	13.1±0.23	12.77±0.19	33.77±0.29	35.12**±0.35	34.5±0.24	58.05±0.71	59.21±0.39	58.67±0.39
HG	22.28±0.39	23.16±0.37	22.75±0.27	39.24±0.50	41.29**±0.49	40.32±0.37	72.03±0.59	74.13*±0.65	73.16±0.46
NG	16.18±0.39	16.51±0.34	16.35±0.25	35.07±0.32	36.93**±0.31	36.05±0.24	61.26±0.52	63.09±0.77	62.25±0.49
HL	5.81±0.13	6.1±0.12	5.96±0.09	12.24±0.19	12.5±0.17	12.38±0.13	21.73±0.28	22.75*±0.33	22.28±0.23
HW	4.23±0.10	4.57*±0.10	4.41±0.07	9.54±0.16	9.79±0.13	9.67±0.10	13.89±0.17	14.04±0.22	13.97±0.14
EL	3.37±0.09	3.47±0.10	3.42±0.07	6.57±0.11	6.61±0.10	6.6±0.07	9.72±0.18	9.89±0.18	9.81±0.13
TL	5.15±0.13	5.52*±0.12	5.35±0.09	12.38±0.20	12.6±0.33	12.5±0.20	19.95±0.33	20.44±0.39	20.22±0.26

*Within parentheses are the number of observations; *: (P <0.05); **: (P<0.01)*

Bristle Traits

The mean values along with standard errors for Bristle length (BL) and Bristle diameter (BD) of Doom pigs from different areas of the body are presented in Table 3.

Bristle Length

The bristle length of Doom pigs in the present study was comparable with Ghungroo pigs reported by Mohan *et al.* (2014). The present findings were also supported by Banik *et al.* (2016). However, a lower values were reported by Mohan *et al.* (2014) in Niang Megha, Hampshire and Duroc pigs and Mohan *et al.* (2015) in crossbred (Hampshire X Ghungroo) pigs. Statistical analysis revealed significant (P<0.01) effect of sex on bristle length and non-significant effect of location on bristle length. Male was found to have significantly higher bristle length than females. This finding was in consonance to the finding in Doom pig revealed by Banik *et al.* (2016).

Bristle Diameter

The average bristle diameter was found to be 368.30±6.50 micron in Doom pigs. The present finding was found to be in good agreement with the report of Banik *et al.* (2016) in Doom pigs of Assam. However, a lower value of bristle fibre diameter was reported by Mohan *et al.* (2014) in Ghungroo, Niang Megha, Hampshire and Duroc pigs and Mohan *et al.* (2015) in crossbred (Hampshire X Ghungroo) pigs. There is a significant effect (P<0.01) of sex and location on bristle diameter. Males were found to have significantly higher diameter than females. Location wise variation revealed significantly highest diameter in the bristle from withers region of males and neck region of females respectively.

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Table 3: Mean along with standard errors for bristle length (BL) and bristle diameter (BD) of Doom pigs

Traits	Sex	Neck	Withers	Back	Pooled
BL (cm)	Male(20)	$12.36^{a} \pm 0.31$	$12.48^{a} \pm 0.31$	$11.82^{a} \pm 0.28$	$12.22^{a} \pm 0.17$
	Female(20)	$9.76^{b} \pm 0.26$	$9.58^{b} \pm 0.25$	$9.25^{b} \pm 0.24$	$9.53^{b} \pm 0.15$
	Pooled(40)	11.06 ± 0.29	11.03 ± 0.30	10.53 ± 0.27	10.87 ± 0.17
BD (micron)	Male(20)	$427.95^{Aa} \pm 2.85$	$442.93^{Ba} \pm 3.66$	$437.41^{Ba} \pm 3.05$	$436.09^{a} \pm 1.99$
	Female(20)	$330.65^{Ab} \pm 2.82$	$280.96^{Cb} \pm 2.96$	$289.93^{Bb} \pm 2.94$	$300.51^{b} \pm 3.26$
	Pooled(40)	$379.30^{A} \pm 8.04$	$361.94^{B} \pm 13.17$	$363.67^{B} \pm 11.99$	368.30 ± 6.50

Means with different superscript within a row (upper case) and within a column (lower case) differ significantly. Within parentheses are the numbers of observations

Conclusion

The various morphometric traits of Doom pig reported in the study may serve as baseline information for designing suitable conservation strategies for this native breed. The population of Doom pigs is declining; therefore scientific breeding strategies may be designed for proliferating their population. Study of bristle traits suggested that the bristle of Doom pigs are having unique characteristics in terms of length and diameter as compared to other breeds of pigs. Bristles can be very well utilized in commercial production of combs, brushes, brooms etc. Thus, these animals may be explored for bristle production to substantiate the income of poor farmers.

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