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Morphometric traits of different Deoni cattle strains

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Abstract
A study was carried out to record the morphometric traits of different strains of Deoni cattle i.e. Balankya, Shevera and Wannera, an indigenous dual-purpose cattle breed native to Bidar district of Karnataka and adjacent regions. Data on 297 Deoni cows in 13 villages and Livestock Research & Information Centre (Deoni), Hallikhed (B) in Bidar district of Karnataka state was collected as part of the Field Performance Recording Project. Significant differences among the three strains (with overall means given in parenthesis) with respect to horn length (18.2 ± 0.443 cm), chest girth (160.78 ± 0.467 cm) and abdominal girth (166.42 ± 0.516 cm) were noticed. For all other traits like ear length (24.09 ± 0.145 cm), distance between horn bases (14.66 ± 0.111 cm), face length (48.06 ± 0.202 cm), height at withers (126.16 ± 0.338 cm), body length (129.7 ± 0.405 cm), height at hip (129.12 ± 0.388 cm), tail length (88.97 ± 0.415 cm) and body weight (286.17 ± 1.637 kg), no significant differences were recorded. It was concluded that the three strains of Deoni cattle were closely related to each other with respect to morphometric traits.

Keywords: Deoni cattle, strain, Balankya, Wannera, Shevera, morphometric traits

1. Introduction
The dairy sector has played a prominent socio-economic role in India. The total cattle population of India is 190.9 million, comprising 151.1 million indigenous cattle and 53 descript cattle breeds (NBAGR, 2023) [7]. Deoni is a registered breed of Indian cattle declared by NBAGR having accession number INDIA_CATTLE_1108_DEONI_03005. The population of Deoni cattle in India was 1.51 lakhs which comprises 0.23 per cent of the total indigenous breeds. It is an important indigenous dual-purpose cattle breed seen in south-eastern part of Maharashtra and northern part of Karnataka. Deoni cattle are one of the most important cattle breeds found in most drought prone region of the country (Bukya *et al*., 2019; Dongre, 2019) [1, 3]. Joshi and Phillips (1953) [4] reported that genetically, the Deoni breed was evolved through the crossbreeding of the Gir cattle of the Kathiawar region of Gujarat with the Dangi breeds of Marathwada and local desi cattle of Nizam state from Bidar and Osmanabad. Deoni cows are moderate producers with 868.24 ± 49.56 kg (range 638 to 1229 kg) lactation milk yield (NBAGR, 2008).
Singh *et al.* (2002) [12] reported three coat colour variations in both the sexes of Deoni cattle *viz.* Wannera was clear white with black colour at the sides of the face, Balankya was clear white with black spots on the lower side of the body and Shevera was white body with irregular black spots. Many of the morphometric traits in cattle are correlated with their lactation. An evaluation of different phenotypic characters of dairy cattle plays a crucial role in judging the animal for specialized purpose. Generally, for animals with unknown pedigree or devoid of any reliable data in field conditions, observation of overall phenotypic characters can aid in predicting the probable value of the animal.

Materials and Methods
The present study was carried out under the project "Field Performance Recording (FPR) of Deoni cattle in Bidar District". Under the project 13 villages from 2 talukas (Bhalki and Aurad) of Bidar district were selected. The data of total 297 adult female Deoni cattle (Wannera 82, Balankya 49 and Shevera 166) were recorded for morphometric traits during 2018-19.

Physical and morphometric characteristics of different strains of Deoni cattle were recorded considering the general procedure of cattle breed descriptors with suitable modifications (FAO, 1986) and breed descriptors developed by NBAGR. The body measurements were taken on each animal and were corrected if necessary to the nearest centimeter. The measurements were taken with the animal standing squarely, comfortably and evenly on its feet over the hard plain surface. The body weights of Deoni cattle were estimated by using prediction equation for female Deoni cattle more than 1 year as formulated by Siddashree (2017) [11] i.e. Body Weight = -276.7689 + 3.5013 (Heart Girth).

Statistical methods

The data collected was analyzed by using SAS software version 9.3 (2010) using General Linear Model (GLM) procedure.

Results and Discussion

The comparison of the morphometric traits of different Deoni cattle strains are given in Table 1.

Ear length: The overall mean for ear length of Deoni cattle was found to be 24.09 ± 0.145 cm. Highest ear length was observed in Shevera strain (24.14 ± 0.194 cm) and lowest in Wannera strain (24.02 ± 0.277 cm), though differences between the strains were not significant. Higher ear length was reported by Pawar (2008) [9] (25.82 ± 0.2 and 26.74 ± 0.13 cm at Udgir and Parbhani farms, respectively) and Singh *et al*. (2002) [12] (26.18 ± 0.52 cm) in Latur district in Deoni cows.

Horn length: The overall mean for horn length of Deoni cattle was found to be 18.20 ± 0.443 cm. As per the least squares analysis of variance (LSA) strain had significant effect on the horn length. Highest horn length was observed in Balankya strain (21.97 ± 1.065 cm) whereas lowest (16.76 ± 0.823 cm) in Wannera strain, differences being significant (p<0.05). Similar findings of 22.40 ± 2.29, 16.87 ± 0.68 and 16.04 ± 0.80 cm were reported by Kuralkar *et al*. (2014) [6] for Balankya, Shevera and Wannera strains, respectively. Higher horn length was reported by Pawar (2008) [9] (20.04 ± 0.36 and 20.55 ± 0.24 cm at Udgir and Parbhani farms, respectively). However, lower horn length was reported by Singh *et al*. (2002) [12] (17.61 ± 0.74 cm) in Deoni cows.

Distance between horn bases: The overall mean for distance between horn bases of Deoni cattle was observed to be 14.66 ± 0.111 cm. As per the least squares analysis of variance (LSA), there was no significant effect of strain on distance between horn bases. Lower values of distance between horn bases were reported by Pawar (2008) [9] (7.44 ± 0.17 and 6.69 ± 0.1 cm at Udgir and Parbhani farms, respectively) in Deoni cows.

Face length: The overall mean for face length of Deoni cattle was found to be 48.06 ± 0.202 cm. As per the least squares analysis of variance (LSA), there was no significant effect of strain on face length. Face length was highest in Balankya strain (48.42 ± 0.495 cm) while lowest was observed in Wannera strain (47.43 ± 0.383 cm), though no significant difference between the strains was observed. Similar findings of 49.87 ± 1.09, 47.76 ± 0.35 and 48.24 ± 0.51 cm were reported by Kuralkar *et al*. (2014) [6] for Balankya, Shevera and Wannera strains, respectively. Lower face length was reported by Pawar (2008) [9] (42.82 ± 0.24 and 43.14 ± 0.17 cm at Udgir and Parbhani farms, respectively). Slightly higher face length was reported by Singh *et al*. (2002) [12] (49.82 ± 0.91 cm) in Deoni cows.

Chest girth: The overall mean for chest girth of Deoni cattle was observed to be 160.78 ± 0.467 cm. As per the least squares analysis of variance (LSA), strain had significant effect on the chest girth. Highest chest girth was observed in Shevera strain (162.12 ± 0.615 cm) whereas lowest in Wannera strain (158.58 ± 0.875 cm), differences being significant (p<0.05). Similar findings of 159.00 ± 1.34, 158.89 ± 1.48 and 159.91 ± 1.50 cm were reported by Kuralkar *et al*. (2014) [6] for Balankya, Shevera and Wannera strains, respectively. Lower chest girth was reported by Pawar (2008) [9] (154.64 ± 0.38 cm at Udgir farm), Rotte *et al*. (1987) 10[] (152 to 157 cm), Singh *et al*. (2002) [12] (151.82 ± 1.92 cm) and Siddashree (2017) [11] (140.00 ± 2.555 cm) in Deoni cows. Slightly higher values reported by Deshpande and Singh (1978) [2] (168.3 cm), Pawar (2008) [9] (161.75 ± 0.26 cm at Parbhani farm), Yadav (2008) [13] (161.50 ± 2.35 cm) and Kadam (2018) [5] (163.88 ± 0.51 cm) in Deoni cows.

Height at withers: The overall mean for height at withers of Deoni cattle was observed to be 126.16 ± 0.338 cm. As per the least squares analysis of variance (LSA), there was no significant effect of strain on the height at withers of cattle under this study. Height at withers was highest in Wannera strain (126.57 ± 0.645 cm) while it was lowest in Shevera strain (125.99 ± 0.453 cm). Lower values of 121.20 ± 1.57, 121.01 ± 0.66 and 123.59 ± 1.00 cm were reported by Kuralkar *et al*. (2014) [6] for Balankya, Shevera and Wannera strains, respectively. Lower height at withers was reported by Pawar (2008) [9] (121.12 ± 0.24 and 121.52 ± 0.17 cm at Udgir and Parbhani farms, respectively), Singh *et al*. (2002) [12] (122.22 ± 1.23 cm), Siddashree (2017) [11] (118.16 ± 1.461 cm), Yadav (2008) [13] (124.54 ± 0.85 cm) and Kadam (2018) [5] (122.10 ± 3.05 cm) in Deoni cows.

Abdominal girth: The overall mean for abdominal girth of Deoni cattle was found to be 166.42 ± 0.516 cm. As per the least squares analysis of variance (LSA), strain had significant effect on the abdominal girth. Highest abdominal girth was observed in Shevera strain (168.25 ± 0.669 cm) whereas lowest in Wannera strain (163.06 ± 0.952 cm), differences being significant (p<0.05). Lower abdominal girth was reported by Siddashree (2017) [11] (144.10 ± 2.725 cm) and higher values were reported by Pawar (2008) [9] (188.38 ± 0.49 and 193.26 ± 0.31 cm at Udgir and Parbhani farms, respectively) in Deoni cows.

Body length: The overall mean for body length of Deoni cattle was found to be 129.70 ± 0.405 cm. As per the least squares analysis of variance (LSA), there was no significant effect of strain on the body length. Body length was highest in Shevera strain (130.14 ± 0.541 cm) while it was lowest in Balankya strain (128.95 ± 0.996 cm). Lower values of 120.67 ± 2.25, 120.99 ± 0.75 and 122.97 ± 1.08 cm were reported by Kuralkar *et al*. (2014) [6] for Balankya, Shevera and Wannera strains, respectively. Lower body length was reported by Pawar (2008) [9] (125.04 ± 0.26 and 128.26 ± 0.17 cm at Udgir and Parbhani farms, respectively), Singh *et al*. (2002) [12] (120.11 ± 2.16 cm), Siddashree (2017) [11] (122.23 ± 2.003 cm), Yadav (2008) [13] (120.49 ± 0.87 cm) and Kadam (2018) [5] (104.44 ± 0.30 cm) in Deoni cows. Higher body length

reported by Deshpande and Singh (1978) [2] (132.2 cm) and Rotte *et al*. 1987 [10] (127 to 139 cm) in Deoni cows.

Height at hip: The overall mean for height at hip of Deoni cattle was observed to be 129.12 ± 0.338 cm. Highest height at hip was observed in Wannera strain (129.28 ± 0.739 cm) whereas lowest in Balankya strain (128.57 ± 0.956 cm), though the differences between the strains were not significant. Lower values were reported by Pawar (2008) [9] (127.05 ± 0.24 and 126.89 ± 0.18 cm at Udgir and Parbhani farms, respectively) in Deoni cows.

Tail length: The overall mean for tail length of Deoni cattle was found to be 88.97 ± 0.415 cm. As per the least squares analysis of variance (LSA), there was no significant effect of strain on tail length. However, village had significant effect on the tail length. Highest tail length was observed in Wannera strain (90.07 ± 0.786 cm) whereas lowest in Balankya strain (87.57 ± 1.017 cm). Higher values were reported by Pawar (2008) [9] (97.87 ± 0.25 and 98.52 ± 0.18 cm at Udgir and Parbhani farms, respectively) in Deoni cows.

Body weight: The overall mean for body weight of Deoni cattle was found to be 286.17 ± 1.637 kg. As per the least squares analysis of variance (LSA), strain had significant effect on the body weight. Highest body weight was observed in Shevera strain (290.86 ± 2.154 kg) while lowest in Wannera strain (278.48 ± 3.065 kg). Higher values were reported by Yadav (2008) [13] (313.01 ± 9.72 kg) and Kadam (2018) [5] (309.84 ± 1.45 kg) in Deoni cows. Lower values were reported by Siddashree (2017) [11] (213.42 ± 8.878 kg) in Deoni cows.

Plate 1: Measuring chest girth

Plate 2: Measuring ear length

Table 1: Morphometric traits of different Deoni cattle strains

Parameter	Balankya (n=49)	Shevera (n=166)	Wannera (n=82)	Overall (n=297)
Ear length (cm)	24.04 ± 0.358	24.14 ± 0.194	24.02 ± 0.277	24.09 ± 0.145
Horn length (cm)	21.97^{a} ± 1.065	17.79^{b} ± 0.579	16.76^{b} ± 0.823	18.2 ± 0.443
Distance between horn bases (cm)	14.85 ± 0.273	14.69 ± 0.148	14.48 ± 0.211	14.66 ± 0.111
Face length (cm)	48.42 ± 0.495	48.25 ± 0.269	47.43 ± 0.383	48.06 ± 0.202
Chest girth (cm)	159.91^{ab} ± 1.132	162.12^{a} ± 0.615	158.58^{b} ± 0.875	160.78 ± 0.467
Height at withers (cm)	126.04 ± 0.835	125.99 ± 0.453	126.57 ± 0.645	126.16 ± 0.338
Abdominal girth (cm)	165.83^{ab} ± 1.232	168.25^{a} ± 0.669	163.06^{b} ± 0.952	166.42 ± 0.516
Body length (cm)	128.95 ± 0.996	130.14 ± 0.541	129.25 ± 0.77	129.7 ± 0.405
Height at hip (cm)	128.57 ± 0.956	129.19 ± 0.519	129.28 ± 0.739	129.12 ± 0.388
Tail length (cm)	87.57 ± 1.017	88.83 ± 0.552	90.07 ± 0.786	88.97 ± 0.415
Body weight (kg)	283.15 ± 3.965	290.86 ± 2.154	278.48 ± 3.065	286.17 ± 1.637

Note: Means within a row having different superscripts differ significantly ($p<0.05$)

Conclusion

The three strains of Deoni cattle i.e. Balankya, Shevera and Wannera differ in various morphometric traits, and these can have implications in their draught and milch performance. The Balankya strain had higher horn length, face length and distance between horn bases. The Shevera strain had higher chest girth, abdominal girth, body length, body weight and ear length. The Wannera strain had greater height at withers, height at hip and tail length. However, significant differences were observed between the strains only in horn length, chest girth, abdominal girth and body weight.

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