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Studies on morphological characteristics of Kathani cattle in Bhandara tahsil of Bhandara district

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Abstract
The study titled "Studies on morphological characteristics of Kathani cattle in Bhandara tahsil of Bhandara district," conducted during the 2022-2023 period, meticulously examined 400 number of kathani cattle representing various age groups, including those up to 1 year, 1 to 2 years, 2 to 3 years and above 3 years, sourced from ten villages in Bhandara tahsil within the Bhandara district. Predominantly, these Kathani cattle exhibited a white coat color, complemented by striking black muzzle colour. Majority of cattle shows black hooves and tail switch. The eyelids of most of the cattle are predominately black in colour. The horns, on the other hand, displayed a distinctive grey hue and took on a small to medium size with an outward curve. Cattle typically possessed horizontally oriented ears and were characterized by medium sized humps and dewlaps. Notably, most individuals featured small naval flaps and penis sheath flaps, alongside a straight forehead. In the context of udder morphology, cattle predominantly boasted bowl shaped, small sized udders with cylindrical teats and rounded tips. The milk vein was observed to be relatively not prominent.

Keywords: Kathani, udder morphology, penis sheath flap, phenotypic characteristics

Introduction
India is the seventh largest country in the world and is a mega biodiversity centre. Over 70% of its population is engaged in occupations connected with agriculture and animal husbandry. Indian farmers are mostly dependent on animal power for farm operations. This trend is likely to continue because of small and fragmented holdings of the large number of small and marginal farmers and increasing cost of mechanization. If cattle wealth is properly used we can save a lot of capital needed for agricultural machines, besides the agricultural sector possesses implements and devices such as wooden ploughs, carts etc. which over centuries have been designed and adapted to animal power. Thus, the draught animals will be in demand not only for breeding purpose, but also for draught purpose in rural area. (Savalia *et al.*, 2019) [18].
India has rich and diverse genetic resources, with some of the best cattle breeds of dairy, draught and dual-purpose. Despite the large number of good breeds of cattle, more than 80% of cattle population belongs to the non-descript category. About 20-25% of total livestock population in our country can be classified as descript and recognized breeds. Various livestock breeds in our country evolving over centuries are endowed with desirable attributes like disease resistance, tolerance to heat stress, adaptability to environmental fluctuations and extremities, ability to utilize coarse fibres and crop residues (Gandhi and Sharma, 2016) [8].
Kathani cattle are found in large number in the rural areas of vidarbha region. Cow rearing is one of the traditional occupations in this localities, where this or other cattle forms as integral part in socio- economic structure of farming community. The phenotypic and performance evaluation of Kathani cattle in this native environment is very scanty. Even though Kathani breed has been recognized a distinct breed of cattle of vidarbha region by all workers but very little information based on scientific observation is available. (Rannaware *et al.*, 2016) [16].

Materials and Methods
Source of data
The data on the morphological characteristics of Kathani cattle were used for present

investigation from 10 villages *viz.* Ambadi, Bhilewada, Borgaon, Dawadipar, Garada, Manegaon, Pahela, Palgaon, Shrinagar and Silli of Bhandara tahsil of Bhandara district of Maharashtra state. From each village 40 cattle were selected. Total 400 cattle were selected out of which 200 are males and females each.

Collection of data

The data comprised of different observations relevant to the objectives of the study were collected from different villages.

1. **Colour pattern**
   Body coat, muzzle, eyelids, horn, tail switch and hoofs were observed in qualitative term i.e., white, black, brown and grey.

2. **Shape and orientation of horn**
   The presence or absence of horns were observed. Shape of horn was observed in terms of straight or curved, horn orientation was observed i.e., outward or upward.

3. **Orientation of ear**
   The orientation of the ear includes, horizontal and drooping ears.

4. **Shape of forehead**
   The shape of forehead was observed in terms of convex, concave and straight like shapes.

5. **Body characteristics**
   The shape of the body was observed in terms of hump, dewlap and naval sheath flap as large, medium and small type.

6. **Udder characteristics**

A. **Shape of udder:** Udder shape was observed as bowl, round, trough and pendulous type.
B. **Size of udder:** Udder size was observed as Large, medium and small.
C. **Shape of teat:** Shape of teat was observed as cylindrical, funnel and pear type of teat shape.
D. **Shape of teat tip:** Shape of teat tip was observed as pointed, round and flap.
E. **Type of milk vein:** Type of milk vein were observed as prominent and non-prominent.

Statistical method

A. The data collected in respect of all the parameters were tabulated and subjected to statistical evaluation by adopting the standard technique prescribed by Snedecor and Cochran (1967) [20].
B. **Chi-square test:** Testing of homogeneity for various morphological characteristics was tested by r × c contingency as per Amble (1975) [2]

The chi-square values for each observation was calculated as per following formula.

$$\chi^2 = \sum \frac{(\text{Observed value} - \text{Expected value})^2}{\text{Expected value}}$$

Results and Discussion

Morphological characteristics

A. Colour

The colour variations in Kathani cattle were observed and recorded for coat, muzzle, hoof, eyelids, tail switch and horn in percent and presented in Table 1.

Table 1: Colour pattern of different morphological characteristics along with χ^2 values

Sr. No.	Characters	No. of observations	Percentage %	Chi-square (χ^2)	D.F.	Significance
1	**Coat colour**					
	White	352	88	231.04	1	*
	Brownish	48	12			
2	**Muzzle colour**					
	Black	372	93	295.84	1	*
	Reddish	28	7			
3	**Hoof colour**					
	Black	388	97	353.44	1	*
	Brown	12	3			
4	**Eyelid colour**					
	Black	376	94	309.76	1	*
	White	24	6			
5	**Tail switch colour**					
	Black	366	91.5	275.56	1	*
	Brown	34	8.5			
6	**Horn colour**					
	Grey	68	68	12.96	1	*
	Blackish	32	32			

1. Coat colour

The colour pattern observed in Kathani cattle in Bhandara tahsil of Bhandara district exhibited white body colour, while remaining cattles were found to be brown in colour. Out of 400 Kathani cattles, 352 cattles (88%) were having white coat colour and 48 cattles (12%) were found to be with brownish coat colour. The chi-square value found to be 231.04, which is statistically significant, indicating variation among coat colour of animal, similar results were found by Badole *et al.* (2023) [4] he observed that coat colour of kathani cattle were white (89.5%). Similar results were found by Ruchi Yadav *et al.* (2021) [17] she observed that the coat colour of Kathani cattle were white (87%). Chavhan *et al.* (2022) [5] he observed that the coat colour of Kathani cattle were white (85%). Ashwini Kunghadkar (2017) [3] observed the coat colour of Kathani cattle as white (89.5%). Rannaware (2016) [16] observed that the coat colour of Kathani cattle were mostly white colour (91.5).

2. Muzzle colour

From Table 1 it is revealed that, black and reddish colour of muzzle were found in total 400 Kathani breed. Mostly the

muzzle colour were found to be black in 372 (93%) and remaining 28 (7%) cattles were having reddish muzzle colour. The chi-square test was applied and the chi-square value was found to be 295.84 which was statistically significant and indicates variation in muzzle colour. Badole *et al*. (2023) [4] observed that the muzzle colour was black in almost all the animals of Kathani cattle (95%). Ruchi Yadav *et al.* (2021) [17] observed that the muzzle colour was black in almost all the animals of Kathani cattle (94%). Chavhan *et al.* (2022) [5] observed that the muzzle colour was black in almost all the animals of Kathani cattle (94%). Ashwini Kunghadkar (2017) [3] observed the muzzle colour as black (92.2%) in Kathani cattle. Rannaware (2016) [16] observed that colour of muzzle were mostly black (94.5%) in Kathani cattle. Singh *et al.* (2015) [19] observed that the muzzle colour was black (96.03%) in unexplored Sanchori cattle.

3. Hoof colour

The hoof colour in 400 Kathani cattles were found to be black and brown. Hoof colour were mostly found to be black in 388 (97%) cattles and the remaining cattles were having brown hoof colour 12 (3%). The chi-square values were found to be 353.44 which was statistically significant and indicates variation in hoof colour. Badole *et al*. (2023) [4] observed that the hoof colour was found to be black (94%). Ruchi Yadav *et al.* (2021) [17] observed that the hoof colour was found to be black (96%). Chavhan *et al.* (2022) [5] observed that the hoof colour was found to be black (92.5%). Ashwini Kunghadkar (2017) [3] observed the black hoof colour (95.5%) in Kathani cattle. Rannaware (2016) [16] observed that the hoof colour in Kathani cattle were black in colour (93.5%).

4. Eyelid colour

From the present study, it is seen from the Table 1 that out of 400 cattles most of the cattle having black eyelid colour and the remaining cattles were found with the white eyelid colour. It is observed that 376 (94%) cattles were having the black colour eyelid and 24 (6%) of the cattles were having white colour of eyelid. The chi-square test was applied and the chi-square value was found to be 309.76, which was statistically significant and indicates variation in the eyelid colour. Badole *et al*. (2023) [4] observed that the eyelid colour of Kathani cattle was mostly found to be black (95.5%). Ruchi Yadav *et al.* (2021) [17] observed that the eyelid colour of Kathani cattle was mostly found to be black (96%). Chavhan *et al.* (2022) [5] observed that the eyelid colour of Kathani cattle was mostly found to be black (93.0%). Ashwini Kunghadkar (2017) [3] has observed that the eyelid colour of Kathani cattle was black (96.50%). Rannaware (2016) [16] observed that the eyelid colour was mostly black (94.50%) in Kathani cattle. Khirari *et al.* (2014) [11] observed black eyelid colour (87.22%) in non-descript cattle of Ratnagiri district of Maharashtra.

5. Tail switch colour

The result presented in Table 1 indicate that from 400 cattles most of the Kathani cattles were having black tail switch colour 366 (91.5%) and the remaining cattles were having brown tail switch 34 (8.5%). The chi-square test was applied and the chi-square value was found to be 275.56, which was statistically significant and indicates variation in tail colour. Badole *et al*. (2023) [4] observed that the tail switch colour was found to be black (92.5%). Meera Gonge *et al.* (2024) [14] reported that tail switch colour of Red Kandhari cattles were black (88%). Ruchi Yadav *et al.* (2021) [17] observed that the tail switch colour was found to be black (91.5%). Chavhan *et al.* (2022) [5] observed that the tail switch colour was found to be black (91.5%). Ashwini Kunghadkar (2017) [3] observed that tail switch colour (90.5%) were mostly black in Kathani cattle. Rannaware (2016) [16] observed that tail switch colour (94%) was mostly black in Kathani cattle.

6. Horn colour

From the Table 1 it is indicated that the majority of the Kathani cattles in above 3 years age groups were found to have grey coloured horn 68 (68%) and the remaining were found with the black coloured horn 32 (32%). The chi-square test was applied and the chi-square value was 12.96, which is statistically significant and indicates the variation in horn colour. Badole *et al*. (2023) [4] observed that the horn colour of Kathani cattle was grey (76%). Ruchi Yadav *et al*. (2021) [17] observed that the horn colour of Kathani cattle was grey (74%). Chavhan *et al.* (2022) [5] observed that the horn colour of Kathani cattle was grey (76%). Ashwini Kunghadkar (2017) [3] observed the colour of horn was generally grey (70%) and blackish (30%) in Kathani cattle. Rannaware (2016) [16] observed horn colour was grey (66%) in Kathani cattle. Kulkarni *et al.* (2013) [21] observed the colour of horn was generally grey and blackish in Kathani cattle.

Shape and orientation of horn, ear and forehead

The observations pertaining to the orientation of horn, ear and forehead were recorded and their percent values were calculated along with chi-square values and presented in Table 2.

Table 2: Shape and orientation of horn, ear and forehead characteristics along with χ^2 values

Sr. No.	Characters	No. of observations	Percentage %	Chi-square (χ^2)	D.F.	Significance
A	**Horn shape**					
	Curve	66	66	10.24	1	*
	Straight	34	34			
B	**Horn orientation**					
	Outward	78	78	91.32	1	*
	Upward	16	16			
	Backward	6	6			
C	**Ear orientation**					
	Horizontal	364	91	268.96	1	*
	Drooping	36	9			
D	**Forehead shape**					
	Straight	360	90	578.98	2	*
	Concave	28	7			
	Convex	12	3			

1. Horn shape

The horn shape was observed in 100 cattles which includes the age group of above 3 years. The two types of horn shape were observed that curve and straight in Kathani cattle. Most of the Kathani cattles were having curve shape of horns. The data in the Table 2 indicated that most of the cattle 66 (66%) had curve shape horns, while 34 (34%) cattles had straight horns. The chi-square was applied and the chi-square value was found to be 10.24, which was found to be statistically significant, indicating variation between different shape of horn in Kathani cattle. Badole *et al*. (2023) [4] observed that the horn shape was curve in Kathani cattle (70%). Ruchi Yadav *et al.* (2021) [17] observed curve shaped horn in Kathani cattle (66%). Gupta *et al.* (2020) [9] observed that the horn shape was curve in Rathi cattle. Jain *et al.* (2018) [10] also observed the curve horn shape in Kosali breed of cattle. Chavhan *et al.* (2022) [5] observed curve shaped horn in Kathani cattle (70%). Ashwini Kunghadkar (2017) [3] observed that curved shape of horn (76%) in Kathani cattle. Rannaware (2016) [16] observed that curved shape of horn (82%) in Kathani cattle.

2. Horn orientation

The orientation of horn was observed in 100 cattle which includes age group of above 3 years of Kathani cattle. The three types of horn orientations were observed in Kathani cattle i.e. outwards, upwards and backwards. The data presented in Table 2 indicate that the majority of cattles were found to be with outward orientation of horn 78 (78%), while the upward orientation of horns is 16 (16%) and the backward orientation of horn is 6 (6%).The chi-square test was applied and the chi-square value was found to be 91.32, which was statistically significant which indicated the variation in the orientation of horns in Kathani cattle. Badole *et al*. (2023) [4] observed the outward horn orientation (78%) in Kathani cattle. Ruchi Yadav *et al.* (2021) [17] observed the outward horn orientation (86%) in Kathani cattle. Chavhan *et al.* (2022) [5] observed the outward horn orientation (78%) in Kathani cattle. Ashwini Kunghadkar (2017) [3] also observed that orientation of horn was outward (84%) and upward (16%) in Kathani cattle. Rannaware (2016) [16] also observed that orientation of horn was outward (74%) and upward (26%) in Kathani cattle.

3. Ear orientation

From Table 2 it is revealed that out of 400 kathani cattles 364 (91%) cattle exhibited horizontal ear orientation while 36 (9%) cattles were found with drooping ears. The chi-square was applied and the chi-square value was found to be 268.96, which is statistically significant and indicates the variation in the orientation of ears in Kathani cattles. Badole *et al*. (2023) [4] observed that 186 (93%) cattle exhibited horizontal ear orientation while 14 (7%) cattles were found with drooping ears. Ruchi Yadav *et al.* (2021) [17] she was found the horizontal orientation of ear was highest 182 (91%) and drooping orientation was low 18 (9%) in Kathani cattle. Jain. *et al.* (2018) [10] observed that the ear orientation was horizontal in Kaosali breed of cattle. Chavhan *et al.* (2018) also found the horizontal orientation of ear was highest 188 (94%) and drooping orientation was low 12(6%) in Kathani cattle. Ashwini Kunghadkar (2017) [3] observed horizontal orientation of ear (93%) and drooping ear (7%) in Kathani cattle. Rannaware (2016) [16] recorded horizontal orientation of ear (94.50%) and drooping ear (5.5%) in Kathani cattle.

4. Forehead shape

Forehead shape was observed in 400 Kathani cattle of all age groups. Shape of forehead was observed as straight, concave and convex in Kathani cattle. The values calculated for straight forehead was 360 (90%), concave 28 (7%) and convex 12 (3%) respectively. The chi-square test was applied and the chi-square value was found to be 578.98, which was statistically significant indicating the variations in the shape of forehead in Kathani cattle. Similarly, Badole *et al.* (2023) [4] observed that the per cent values for straight forehead was 93 per cent, concave 4 per cent and convex 3 per cent respectively. Ruchi Yadav *et al.* (2021) [17] observed the shape of forehead as straight, concave and convex and the percentage were 90, 7 and 3 per cent respectively in Kathani cattle. Chavhan *et al.* (2022) [5] observed the shape of forehead as straight, concave and convex and the percentage were 85.5, 12.5 and 2 percent respectively in Kathani cattle. Ashwini Kunghadkar (2017) [3] observed 87.5 percent straight forehead shape in Kathani cattle. Rannaware (2016) [16] recorded 94.5 percent straight forehead shape in Kathani cattle.

B. Body characteristics of hump, dewlap, naval flap and Penis sheath flap

The observations on body characteristics pertaining to shape of hump, dewlap, naval flap and Penis sheath flap were recorded in age group 2-3 years and above 3 years and their percent values were calculated along with the chi-square values and presented in Table 3.

Table 3: Observations on body characteristics of hump, dewlap, naval flap and penis sheath flap along with χ^2 values

Sr. No.	Characters	No. of observations	Percentage %	Chi-square (χ^2)	D.F.	Significance
A	**Hump**					
	Large	15	7.5	133.57	2	*
	Medium	142	71			
	Small	43	21.5			
B	**Dewlap**					
	Large	16	8	151.85	2	*
	Medium	148	74			
	Small	36	18			
C	**Naval flap**					
	Large	8	4	152.45	2	*
	Medium	46	23			
	Small	146	73			
D	**Penis sheath flap**					
	Large	5	7	40.08	2	*
	Medium	19	26			
	Small	48	67			

1. Hump

On the basis of data collected the hump of Kathani cattle was found as large, medium and small in 200 cattles belonging to age groups of 2 to 3 and above 3 years. Table 3 indicates that the percentage value was highest for medium sized hump 71% (142) followed by small sized hump 43(21.5%) and large sized hump 15 (7.5%). The chi-square test was applied and the chi-square value was found to be 133.57, which was statistically significant indicating variation between the different hump of Kathani cattle. Badole *et al*. (2023) [4] observed medium sized hump (74%), followed by small type hump (22%) and large size hump (4%) in Kathani cattle. Ruchi Yadav *et al.* (2021) [17] observed medium sized hump (72%), followed by small type hump (22%) and large size hump (6%) in Kathani cattle. Chavhan *et al.* (2022) [5] observed medium sized hump (76%), followed by small type hump (20%) and large size hump (4%) in Kathani cattle. Ashwini Kunghadkar (2017) [3] observed the hump as medium in size (75%) in Kathani cattle. Rannaware (2016) [16] recorded that medium hump sized animal were highest 73 (73%) in numbers of Kathani cattle. Singh *et al.* (2015) [19] observed the hump of cow was medium in size in majority of cases (79.47%) in unexplored Sanchori cattle.

2. Dewlap

The dewlap of Kathani cattle was observed in total 200 cattles of age groups of 2 to 3 years and above 3 years as large, medium and small. The perusal of Table 3 indicates that the percentage value was found highest for medium type dewlap148 (74%), followed by small sized dewlap36 (18%) and large sized dewlap16 (8%). The chi-square test was applied and the chi-square value was found to be 151.85, which is statistically significant and indicates the variation in the size of dewlap of Kathani cattle. Similar results were found by Badole *et al*. (2023) observed (77%) medium type of dewlap, (22%) small and (6%) large sized dewlap. Ruchi Yadav *et al.* (2021) [17] who observed (74%) medium type of dewlap and (18%) small sized dewlap. Chavhan *et al.* (2018) who observed (74%) medium type of dewlap and (22%) small sized dewlap. Ashwini Kunghadkar (2017) [3] observed the (73%) medium type dewlap and (23%) small type dewlap. Rannaware (2016) [16] who observed the (75%) medium type dewlap and (21%) small type dewlap. Kulkarni *et al.* (2013) [21] who observed the dewlap was small to medium in size in Kathani cattle and Singh *et al.* (2015) [19] who observed the medium size dewlap (13.5%) in unexplored Sanchori cattle.

3. Naval flap

The observations on the naval flap of the Kathani cattle were found in 200 cattle to be of different sizes i.e. large, medium and small. The values were found to be highest for small sized naval flap 146 (73%) followed by medium sized naval flap 46 (23%) and large size naval flap 8 (4%) in Kathani cattle. The chi-square test was applied and the chi-square value was found to be 152.45, which was statistically significant and indicates the variation in the size of naval flap. Badole *et al*. (2023) [4] observed small sized naval flap (82%), followed by medium sized naval flap (16%). Ruchi Yadav *et al.* (2021) [17] observed small sized naval flap (74%), followed by medium sized naval flap (24%). Chavhan *et al.* (2022) [5] observed small sized naval flap (77%), followed by medium sized naval flap (21%). Ashwini Kunghadkar (2017) [3] observed the naval flap was small (74%) in Kathani cattle. Rannaware (2016) [16] observed the navel flap was small (78%) in Kathani cattle.

4. Penis sheath flap

The observation of the kathani cattle for the Penis sheath flap was observed in 72 Male cattle which includes age group of 2-3 years and above 3 years of Kathani cattle. The observations on the penis sheath flap of the Kathani cattle were found to be of different sizes i.e large, medium and small. The percentage values were found to be highest for small sized penis sheath flap 48 (67%) followed by medium sized19 (26%) and large sized penis sheath flap 5 (7%) in Kathani cattle. The chi-square test was applied and the chi-square value was found to be 40.08, which was statistically significant and indicates the variation in the size of penis sheath flap. Pundir *et al.* (2014) [15] observed small sized and tucked up with body penis sheath flap in indigenous cattle of Manipur.

C. Udder characteristics

The investigation on the udder characteristics pertaining to udder shape, teat shape and milk vein were recorded in 60 cattle which include age group of females above 3 years along with lactating as well as dry Kathani cows and their percent values were calculated along with chi-square and presented in Table 4.

Table 4: Observations on Shape of udder, size of udder, teat shape, teat tip and milk vein characteristics along with χ^2 values of female cattle (above 3 years)

Sr. No.	Characters	No. of Observation	Percentage %	Chi-square (χ^2)	D.F.	Significance
A	**Udder shape**					
	Bowl	46	76	52.3	2	*
	Trough	11	18			
	Pendulous	3	6			
B	**Udder Size**					
	Large	2	4	64.3	2	*
	Medium	9	14			
	Small	49	82			
C	**Teat shape**					
	Cylindrical	38	64	24.4	2	*
	Funnel	12	20			
	Pear	10	16			
D	**Teat Tip**					
	Pointed	10	16	55.9	2	*
	Round	47	78			
	Flap	3	6			
E	**Milk vein**					
	Prominent	19	32	8.06	1	*
	Not prominent	41	68			

1. Udder shape

The characteristics of udder were observed in 60 cattle which include age group of above 3 years. Table 4 indicates the bowl-shaped udder was found to be highest 46 (76%) followed by trough shaped udder 11 (18%) and pendulous shaped udder 3 (6%) in Kathani cattle. The chi-square test was applied and the chi-square value was found to be 52.3, which was statistically significant, indicating the variations in different udder shapes of cattle. Similar result was recorded by Badole *et al*. (2023) [4] observed bowl shaped udder (84%), round shaped udder (8%), trough shaped udder (2%) and pendulous shaped udder (6%). Ruchi Yadav *et al.* (2021) [17] observed that bowl shaped udder (74%), round shaped udder (14%), trough shaped udder (4%) and pendulous shaped udder (8%). Chavhan *et al.* (2022) [5] observed that bowl shaped udder (76%), round shaped udder (14%), trough shaped udder (6%) and pendulous shaped udder (4%). Ashwini Kunghadkar (2017) [3] observed that bowl shape udder (82%), round shape udder (10%), trough shape udder (4%) and pendulous shape udder (4%) in Kathani cattle. Rannaware (2016) [16] observed that bowl shape udder (72%), round shape udder (14%), trough shape udder (8%) and pendulous shape udder (6%) in Kathani cattle. Kulkarni *et al.* (2013) [21] observed that bowl shaped udder (34.85%), round shape udder (27.87%), trough shape udder (28.22%) and pendulous shape udder (9.06%) respectively.

2. Udder size

The observation on udder size were recorded in the 60 female kathani cattle which is in the age group above 3 years and it was found to be small, medium and large. Values in Table 4 indicate the number of cattle and percentage value of different size of udder among which small size found to be highest 49 (82%), followed by medium sized udder 9 (14%) and the large sized udder 2 (4%) in kathani cattle female in age group above 3 years. The chi-square test was applied and the chi-square value was found to be 64.3, which was statistically significant and indicates the variation in the size of udder of kathani cattle. Dar (2022) [7] reported that the fore and hind quarters of udder were small and medium sized, respectively.

3. Teat shape

The observations on the teat shape were found 60 female cattles of age group of above 3 years to be cylindrical, funnel and pear. Values in Table 4 indicates the number of cattle and the percentage value of different shapes of teat among which the cylindrical shape of teats was found to be highest 38 (64%), followed by funnel shaped teats 12 (20%) and pear-shaped teat 10 (16%) in Kathani cattle. The chi-square test was applied and the chi-square value was found to be 24.4, which was statistically significant and indicates the variation in the shape of teat. Badole *et al*. (2023) [4] observed the cylindrical shape udder (74%) followed by funnel shape udder (14%) and pear shape udder (12%). Ruchi Yadav *et al.* (2021) [17] have observed the cylindrical shape udder (70%) followed by funnel shape udder (16%) and pear shape udder (14%). Chavhan *et al*. (2022) [5] observed the cylindrical shape udder (74%) followed by funnel shape udder (14%) and pear shape udder (12%). Ashwini Kunghadkar (2017) [3] observed the teat shaped as cylindrical (78%) in Kathani cattle. The present findings are in agreement with Singh *et al.* (2015) [19] who reported the cylindrical teat shaped (90.91%) in unexplored Sanchori cattle. However, present research is not in agreement with Kulkarni *et al.* (2013) [21] as they reported that teat shaped as cylindrical in (44.6%) Kathani cattle.

4. Teat tip

The observations on the teat tip were recorded in 60 female cattles of age group of above 3 years and found to be Pointed, Round and Flap. The values in Table 4 indicates the number of cattle and the percentage value of different shapes of teat tip among which the round shape of teat tip was found to be highest 47 (78%), followed by Pointed shaped teat tip 10 (16%) and flap teat tip 3 (6%) in Kathani cattle. The chi-square test was applied and the chi-square value was found to be 55.9, which was statistically significant and indicates the variation in the shape of teat tip. The present study is in agreement with the teat tip shape recorded by Kumare *et al.* (2020) [12] which was round teat tip was observed in dry cow (49.5%) and in milch cow (42.9%) in Gaolao cattle. Adgale *et al*. (2017) [1] were recorded as round teat tips 57.45% and pointed 42.55% in khillar cattle.

5. Milk vein

The inspection on the milk vein were made in the Table 4 which were found to be prominent and not-prominent in 60 female cattle of age group above 3 years. Not prominent vein was found to be highest 68% (41) and prominent was found to be 32% (19) in Kathani cattle. The chi-square test was applied and the chi-square value was 8.06, which was statistically significant and indicates the variation in the size of milk vein. Dar (2022) [7] observed the milk vein was not prominent as Badri cattle is low yielder of milk. Badole *et al*. (2023) [4] observed the small milk vein (64%), medium milk vein (32%) and large milk vein (4%) in Kathani cattle. Ruchi Yadav *et al.* (2021) [17] observed the small milk vein (68%), medium milk vein (26%) and large milk vein (6%) in Kathani cattle. Chavhan *et al.* (2022) [5] observed the small milk vein (76%), medium milk vein (16%) and large milk vein (8%) in Kathani cattle. Similar result was reported by Ashwini Kunghadkar (2017) [3] who observed Kathani cows with small (16%) to medium (80%) milk vein. Chandran *et al.* (2014) [6] who reported that the milk vein is not prominent in Bachaur cattle.

Conclusion

The present survey indicated that, in Bhandara tahsil of Bhandara district found the variations in morphological characters of Kathani cattle. Kathani cattle body characteristics are variation in their body coat colour pattern, mostly white followed by brownish colour and the hoof and muzzle colour were mostly black colour. The colour of eyelid and tail switch were also in black colour and horn colour was grey. The horn were small in size and curved shaped with outward orientation. Hump and dewlap were small to medium and fairly developed in adult. Naval flap was small in size. Ear was comparatively horizontal and forehead is straight. The udder is mostly bowl in shape, teat are cylindrical shapeand milk vein mostly in small size.

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