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## Gangatiri cattle: A lifeline for sustainable livelihood

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**Abstract**

Gangatiri cattle is an important dual-purpose breed of Indian cattle found in the Duaba belt of India chiefly in the adjoining regions of Uttar Pradesh, Bihar and some parts of Jharkhand states. It has a distinct feature of being productive in harsh climatic conditions, low input and it serves millions of marginal and rural community of India. It is considered to be as an inevitable part of livelihood tradition of Duaba belt people community of India. It has attracted many farmers and scientists, now days, due to its valuable characteristics. It produces considerable amount of milk and helps in agriculture with its drought power. Present review aims at enlightening the important features of Gangatiri cows which may be very well suit to the harsh climatic conditions and can be well utilized for sustainable animal production.

**Keywords:** Gangatiri, dual- purpose breed, harsh climate, low inputs

**Introduction**

In India, farmers are mostly marginal and small holders of land. Livestock enterprise is an indispensable part of their farming. Livestock practice not only secures and enhances their livelihood but also increases market participation opportunity of poor farmers (ILRI, 2007) <sup>[1]</sup>. A total of 190.9 million cattle is in India (2012 Livestock Census) <sup>[3]</sup> which is more than 13% of world's total cattle population, comprising 151.17 millions indigenous cattle (BAHS, 2016) <sup>[4]</sup>. This pool of cattle genetic resource contributes to 165.4 million tonnes of milk production making India the largest producer of milk. Though, it produces considerable amount of milk but most of the milk produced is utilized for home consumption and surplus is sold in market. Gangatiri cow is remarkably an important breed of cattle for small and marginal farmers, mostly found in small herds (Singh PK *et al.*, 2018) <sup>[5]</sup>, specially found near Gangetic plains of India. Gangatiri cattle rearing are a part of traditional practice which passes from generation to generation for livelihood sustainability. Population percentage of Gangatiri cattle is merely 0.188% (Livestock census, 2007) <sup>[2]</sup> of total cattle present in India but it helps many fold number of human population to secure their well being. Gangatiri cattle husbandry has been acknowledged as not just cattle rearing practice but also a tradition that passes from generation to generation (Singh PK *et al.*, 2018) <sup>[5]</sup>.

**Estimated population of Gangatiri cattle**

**Table 1:** Estimated number of Gangatiri cattle

Breed	Total (no.)	Percentage of total cattle population
Gangatiri	3, 75, 154	0.188 %

*Source:* Livestock census, 2007 <sup>[2]</sup>.

**Origin and distribution**

ICAR has registered Gangatiri as INDIA\_CATTLE\_2003\_GANGATIRI\_03039 in 2015 (NBAGR). Origin of Gangatiri cattle pertains to Varanasi, Ghazipur, Ballia, and Chandauli, districts of eastern Uttar Pradesh (Cattle Genetic Resources of India). Large herds are maintained in the Diyara, the area near the river Ganga and the herd size varies from 2 to 150 animals. Gangatiri cattle are distributed mainly near river Ganga and Ghaghara Rivers. They are found in eastern Uttar Pradesh, Chandauli, Ghazipur and Ballia districts and in Bihar, Bhabhua (Kaimoor), Buxar, Arrah and Chhapra districts. Their breeding tract includes chiefly Ballia and Ghazipur districts of Uttar Pradesh and Shahabad and Rohtas districts of Bihar (Uttar Pradesh State Biodiversity Board).

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It closely resembles to Haryana cattle. It is also known as Eastern Haryana or Shahabadi. This breeds can be found in organized dairy farms namely at Livestock Unit, SHUATS, Allahabad, State Livestock Cum Agricultural Farm, Arajiline, Varanasi, *Surbhi Shodh Sansthan (Geeta Goshala)*, Dagmaipur, Mirzapur. of Uttar Pradesh state of India.

**Morphological characteristics**

Gangatiri cattle are characterized as completely white colored cattle that give very close resemblance to Haryana cattle (Om Prakash *et al.*, 2008) <sup>[11]</sup>. They have medium sized and compact body. Forehead is prominent, broad and straight having a little groove in middle. Muzzle, eyelids, hooves and switch of tail are generally found to be black. Horns are found to emerge from side of poll behind and above the eye

position. Horns are curved upwards and inwards with pointed ends.

Following are some typical morphological characteristics of Gangatiri cattle discussed below:

**Body measurements of typical Gangatiri animals**

**Table 2:** Body measures of Gangatiri animals

Parameters	Male (cm)	Female (cm)
Height	141.81	123.52
Body Length	119.37	110.12
Heart Girth	175.64	152.05
Weight	340	235
Birth Weight	21	20.5

*Source:* ICAR- National Bureau of Animal Genetic Resources

**Table 3:** Physical measures of Gangatiri cattle

Traits	Min. (cm)	Max. (cm)
Ischium width of rump	20.22	21.36
Ilium width of rump	34.69	36.61
top line (TPL)	142.97	146.31
tail length (TL)	78.57	81.19
hair length (HL)	0.21	1.61
Udder length	24.96	27.38
udder width	29.43	34.11
udder diameter	9.63	12.43
udder circumference	64.95	72.73
teat length	5.31	5.93
distance between fore to fore teat	5.53	6.53
distance between rear to rear teat	4.72	5.14

*Source:* Bhinchhar *et al.*, 2016 <sup>[13]</sup>.

**Breed development programs**

Government and other active organizations have shown keen interest for development and conservation of this breed. Various programs like Rashtriya Gokul Mission, Establishment of frozen semen station are run for this cause. In order to upgrade and improve Gangatiri cattle, many organizations like Uttar Pradesh Council for Agricultural Research, Frozen semen station at Purnea district of Bihar which will maintain frozen semen of Indigenous breeds such as Gangatiri, Red Sindhi, Bachaur, and Sahiwal. Proposal of Gangatiri Cow Conservation and Development Centre in Varanasi has been sanctioned under Rashtriya Gokul Mission (Economic times).

**Distinct features**

Reports suggest that Gangatiri is the only indigenous cow breed that gives a milk yield of 8-10 ltrs/ day in summer when others fail (Times of India) this suggests that they are high heat tolerant cattle breed. Gangatiri bullocks are found to be good for agricultural works. The farmers can earn considerable income through selling of milk and milk

products, their progeny, dung manure and dung cakes; thereby securing their livelihood (Singh *et al.*, 2017) <sup>[6]</sup>. It is well tolerant against many productive, reproductive ailments as well resistant to endo and ecto- parasites (Anonymous, 2006) <sup>[9]</sup>. It is an important dual- purpose cattle breed of India which significantly contributes to the sustainable livelihood due to its good draft and lactation ability (Shukla *et al.*, 2019) <sup>[8]</sup>. They are robust and resilient breed; navel flap is prominent in this breed. Long and curvy dewlap can be clearly observed in this breed. In these ways they have body modifications like larger body surface area to combat high heat during summer as compared to cross breed animals. Animal agriculture is going to face a lot of hardship in coming decades in terms of loss in production, deterioration of animal products and animal health in coming decades (Nardone *et al.*, 2010) <sup>[21]</sup>. Under such circumstances, Gangatiri cows may perform well due to their distinct capability to withstand harsh climatic conditions.

**Reproductive characteristics**

**Table 4:** Reproductive parameters of Gangatiri cattle

Reproductive parameters	Min. Value	Max. Value	References
Calving interval (days)	349.34	395.46	Singh <i>et al.</i> , 2017 <sup>[6]</sup> .
Age at First Calving (months)	42.99	44.74	Prakash <i>et al.</i> , 2008 <sup>[11]</sup> .
Service Period (days)	102	107	Prakash <i>et al.</i> , 2008 <sup>[11]</sup> .
Conception rate %	68.50	76.31	Prakash <i>et al.</i> , 2008 <sup>[11]</sup> .

**Dry period and Service period trends of Gangatiri cows (Shukla *et al.*, 2019) <sup>[8]</sup>.**

(Shukla *et al.*, 2019) <sup>[8]</sup> have investigated changing trend of

service periods and dry period of Gangatiri cows which may be as result of difference in management practices at different places. It is shown below-

## Dry period trends of Gangatiri cows

**Table 5:** Dry period pattern of Gangatiri cows

Parameters	Mean values	Standard Deviation
Second Dry period	174.15	77.80
Third Dry period	148.625	53.89
Fourth Calving interval	157.675	72.53

## Service period trends of Gangatiri cows

**Table 6:** Service period pattern of Gangatiri cows

Parameters	Mean values	Standard Deviation
First Service period	188.25	94.17
Second Service period	120.325	76.77
Third Service period	137.825	89.35

## Productive characteristics

Gangatiri is considered as an important dual- purpose breed of cattle. There are very less data available for Gangatiri breed. Some of the important researches done suggest the production performance of Gangatiri cows as given below-

**Table 7:** Production characteristics of Gangatiri cows

Production parameters	Min. Value	Max. Value
Avg. Milk yield (kg/ day)	4.02	4.2
Avg. Peak milk yield (kg/ day)	5.22	5.98
Avg. Days to Peak milk yield (days)	45	60
Avg. Lactation Length (days)	200	201
Avg. Lactation Yield(kg)	975.56	977.72
Avg. Dry Period (days)	162	163
Avg. Fat %	3.54	4.2
Avg. SNF %	8.662	8.718

Source: Om Prakash *et al.*, 2008 [11].

Whereas, (Singh *et al.*, 2017) [6] reported that under field condition, Gangatiri cows produced milk 2.44 to 3.42 ltr/ day whereas, (Jaiswal *et al.*, 2015) [16] reported that first lactation milk yield to be (Min. 907.55 kg/ day and Max. 985.59 kg/ day) with coefficient of variation of 29.11%; peak yield (Min. 4.62 kg/day and Max. 4.92 kg/day) with coefficient of variation of 26.27%; first lactation length (Min. 240 days and Max. 254 days) with coefficient of variation of 23.39%; first dry period yield (Min. 204 days and Max. 218 days) with coefficient of variation of 46.28%. Reason may be the result of different nutritional status of cows maintained at different locations. It is a known fact that animals which calved in rainy season were the best producers, whereas the autumn calver's are found as poor producers.

It is well known that milk composition is significantly affected by seasonal variation of production (Heck *et al.*, 2009) [22]. There is considerable seasonal variation of milk composition also. (Verma and Singh, 2018) [14] Reported seasonal variation of milk composition of Gangatiri cows provided below-

**Table 8:** The milk and winter summer rainy

Milk parameters	Winter (Nov-Feb)	Summer (March-June)	Rainy (July-Oct)
Fat %	5.06	5.0	5.04
S.N.F %	9.26	8.88	9.13
T.S. %	14.33	13.88	14.17
Water %	85.66	86.11	85.82
Sp. gr.	1.030	1.028	1.029
Acidity %	0.14	0.145	0.154

(Maurya and Sarashwat, 2008) [15] have worked on Jersey crossbred Gangatiri cows for different productive and reproductive performance. Crossbreeding of Gangatiri cows had shown that such progeny has appreciable potential for improved lactation milk yield, milk yield/ day, peak yield/ day, age at puberty, and service period.

## Performance of Jersey X Gangatiri crossbred cows (Maurya and Sarashwat, 2008) [15]

**Table 9:** Performance trends of Gangatiri crossbred cattle

Parameters	Min. Value	Max. Value
Age at puberty (months)	29.17	30.83
Age at calving (months)	39.54	95.20
Service Period (days)	116.19	146.61
Gestation Period (days)	281	284.80
Calving Interval (days)	365.14	441.55
Lactation Length (days)	265	318
Lactation yield (kg)	1599.82	2032.60
Avg. milk yield (kg)	6.04	6.40
Peak Yield (kg)	9.45	12.68

The above table reveals that Gangatiri cattle has got great potential for improved productive and reproductive performance after being cross bred with suitable exotic dairy animals.

## Conclusions

Gangatiri cows have always proved to be a livelihood supporting cattle for poor and marginal farmers in rural areas. Even though they are quite less in number but they support a large number of human population. They perform well under harsh climates. This breed can be well utilized in crossbreeding with suitable exotic cattle breeds, also, for better productive and reproductive performance. In present scenario of global warming it may be very good option for sustainable development of rural and marginal farmers. In true sense, Gangatiri cattle may be called as a lifeline for sustainable development of rural community of Dauba belt of India.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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