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Study on correlation between reproductive trait (Calving interval) with productive trait (Dry period) in Gangatiri breeds

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Abstract
The present study was conducted on correlation between reproductive traits (calving interval) with productive traits (dry period) in Gangatiri breeds. The data for study were collected from history sheet maintained at livestock cum agricultural farm, Arajiline, Varanasi -221305 (Uttar Pradesh) for period 2000-2017. The reproductive trait selected from history was first, second and third lactation calving intervals with the productive traits were second, third and fourth lactation dry period. The mean for first, second and third calving interval were 468.2, 404.175 and 397.625 days respectively. The mean value of productive traits such as second, third and fourth lactation dry period is 174.15, 148.63 and 157.67 respectively. Data were respectively were analyzed statistically to determine the correlation between reproductive with productive traits. The correlation between first calving interval with second dry period were positively significant (0.057), second calving interval with third dry period were negatively non-significant (-0.057) and third calving interval with fourth dry period were positively significant (0.366).

Keywords: gangatiri breed, reproductive trait, service period, productive trait, dry period

Introduction
India has a distinguished livestock heritage and a place of pride in the history of livestock development in the world. It has shared its livestock resources with many countries all over the world, thus contributing immensely to livestock development on a global scale. It ranks first in cattle and buffalo population with 15% and 52% respectively and together making up 28% of the large ruminant population of the world. Likewise, India ranks first in goat population (19%) and fifth in sheep population (45%), the two together making up (26%) of small ruminant population of the world.

It is worthwhile to mention that the per capita availability of milk to the lacto vegetarian Indians is estimated at 214 grams per day. It has been the only source of sufficient energy, minerals, vitamins and animal proteins. A 60% of the total milk production enters into the market in the form of curd, butter, ghee, khoa and shrikhand. Besides this the conventional dairy products including milk powder, ice cream and cheese are also manufactured. During last 20 years the supply of milk has been possible in sufficient quantities through the pasteurization plants and chilling units.

India ranks first according to the data of May 28, 2017, the total production of milk in 2015-16 reached 156 million tones which is 6.28% annual growth rate. The milk production during 2014-17 has increased by 16.9% when compared to the year 2011-14. Per capita availability of milk in India is 337gms/day while World average is only 299 gms/day. This has been the achievement of 70 million dairy farmers and also through the striated efforts of the animal husbandry practices, cattle cross breeding projects and cooperative dairy farming.

Animal husbandry practices have varied widely across cultures and time periods. Originally, livestock were not confined by fences or enclosures, but these practices have largely shifted to intensive animal farming, sometimes referred to as "factory farming". Now, over 99% of livestock are raised on factory farms. These practices increase yield of the various commercial outputs, but have also led to negative impacts on animal welfare and the environment. Livestock production continues to play a major economic and cultural role in numerous rural communities. NASS (2012) and USDA (2017).

The cattle and buffalo account for more than two third of the total output value of the livestock sector. Various indigenous breed of cattle in the country are the result of

thousands of years of selection, evolution and development of the wild species in the process of domestication to the local agro climatic conditions. These breed are now losing ground due to intense competition from other breed and risk of economic viability under the present system of management.

There are 33 well-defined breed of cattle apart from several non-descript types and some lesser-known breed (Chand, 2011) [1].

Gangatiri is an important dual-purpose cattle breed of Uttar Pradesh state of India. The breed is significantly contributing to the livelihood of the people due to its good draft ability and lactation milk yield. Average daily lactation milk yield of Gangatiri breed ranged between 4-6 litters/day with a lactation length of 150-250 days. The inter calving period varies between 14-24 months. The average fat is 4.33% (range 3.1-6.0%) and snf content 8.2% (range 7.87-8.42%). The average body length, height at withers and chest girth is 110, 124, 153 cm in breed and 121, 142, 146 cm in bullocks under field conditions, respectively.

1. This breed has acquired by natural selection following adaptation traits:
2. High degree of heat tolerance.
3. Resistant to certain diseases.
4. Ability to survive on low feed and fodder resources.

Gangatiri is a dual purpose breed well known for average milk and draft ability. The habitat of Gangatiri breed is Balia, Ghazipur of eastern Uttar Pradesh, which is well adapted to eastern U.P. agro climatic conditions.

Statistical analysis

Correlation is a statistical technique that can show whether and how strongly pairs of variables are related. For Analysis of phenotypic correlation among the two traits X and Y mostly the Karl Person's (1896) correlation formula used. The following is Karl Pearson's correlation formula.

Simple correlation

$$\text{rxy} = \frac{cov\ xy}{vx.vy}$$

$$= \frac{\sum xy = \frac{(\sum x-)}{N}\sum y}{\sqrt{\{\sum x^2 - \frac{(\sum x)}{N}\}\{\sum x^2 - \frac{(\sum x)}{N}\}}}$$

Where

rxy = correlation coefficient between characters x and y.

Covxy = co-variation between characters x and y.

Vx = variance for x character.

Vy = variance for y character.

Measurements of the traits

The data pertaining to parameters viz. First, second and third, Calving Interval with second, third and fourth Dry Period were collected, tabulated and analyzed for study.

The raw data were entered and sorted into MS Excel sheet then transferred to the analytical Web Based Agricultural Statistics Software Package (WASP-2.0) for descriptive result.

All data were expressed as mean ± SD ± correlation.

Result and discussion

The present study on correlation between reproductive trait with productive trait in Gangatiri breed was carried out of the data.

The following observation was made.

Table 1: Mean values of calving interval in first, second and third lactations were 468.2, 404.1 and 397.625 days, contained in

Parameter	Mean	S.D.
First calving interval	468.2	92.26
Second calving interval	404.175	75.23
Third calving interval	397.625	72.53

Irrespective of lactations calving interval and dry periods ranged from 311 to 641 (days) and 48 to 472 (days) respectively. Lactations calving interval in Gangatiri breed of three lactations (1st, 2nd and 3rd) were 365-641, 311-603 and 325-554 days while dry periods (2nd, 3rd and 4th) 48-472, 65-298 and 83-415 days respectively.

Table 2: Data regarding first, second and third calving interval (days) with second, third and fourth dry periods (days) are presented and following observation were made:

S. No.	CI 1	DP 2	CI 2	DP 3	CI 3	DP 4
1	377	308	439	154	347	127
2	419	155	364	112	393	139
3	365	149	360	259	401	114
4	445	129	315	224	457	192
5	561	190	356	144	351	86
6	370	168	324	113	357	120
7	366	286	352	108	345	121
8	440	178	472	152	456	185
9	412	173	395	15	378	412
10	581	230	514	221	490	195
11	571	182	483	94	488	97
12	366	113	382	162	367	182
13	532	130	477	73	393	166
14	504	117	387	298	438	94
15	427	139	364	114	409	133
16	418	174	361	158	320	131
17	533	151	471	86	394	83
18	391	122	320	147	325	119
19	370	48	350	124	344	109

20	621	272	374	184	329	139
21	431	140	312	242	348	90
22	402	143	370	130	384	175
23	593	115	455	134	391	167
24	376	168	324	113	357	120
25	416	103	422	144	411	141
26	475	150	382	153	325	235
27	439	122	360	129	422	252
28	439	151	435	136	427	167
29	565	197	437	141	383	129
30	416	103	422	144	411	141
31	460	145	603	144	451	137
32	485	149	311	65	388	98
33	346	67	335	93	327	110
34	456	284	468	126	435	176
35	532	222	455	148	515	415
36	641	294	446	128	401	165
37	752	472	605	128	554	168
38	484	151	335	190	359	164
39	560	254	510	225	509	230
40	391	122	320	147	325	83
TOTAL	18728	6966	16167	5945	15905	6307
MEAN	468.2	174.15	404.175	148.625	397.625	157.675
STAN.DEV.	92.26361	77.80203	75.22816	49.61632	58.44335	72.52847
CORRELATION	0.578088		-0.0578		0.365543	

First and third lactation calving interval had positively significant with second and fourth dry period whereas second lactation calving interval had negatively non-significant with third lactation dry period. Kumar (2012) [3] reported negative genetic correlations of SP with DP, LL, LMY, and MYPD were -0.034±0.32, -0.03±0.25, -0.02±0.37, -0.15±0.5, -0.20±0.32, respectively in Rathi cattle.

The data on for first, second and third lactations calving interval in breed of three lactations contained in (Table no. 2) it was noted that in general first, second and third lactations calving interval and second, third and fourth dry period ranged from 311 to 641 days and 48 to 472 days respectively. Whereas second, third and fourth dry periods 174.15, 148.625 and 157.675 days respectively. The following observations were made.

Table 3: The mean value of Dry Periods of Gangatiri was 174.15, 145.05, 157.675 days, respectively contained in table no.3

Parameter	Mean	S.D.
Second Dry Period	174.15	77.80
Third Dry Period	145.05	53.89
Fourth Dry Period	157.675	72.53

The highest lactations calving interval (641 days) was recorded in the breed belonging first lactations followed by 603 and 554 in second and third lactations, respectively, whereas highest dry periods (472) in second lactations followed by 298 and 415 days in third and fourth lactations respectively, and the correlation in these values were found negative and non-significant. (Table no.2). Nathpartha *et.al.* (1970) [5] reported the average lengths of calving interval (407.2 ± 77.5 days) and dry period (151.1 ± 55.8 days) are reported in Italian buffaloes. The correlation (r = 0.991) between calving interval was highly significant (P < 0.01). The coefficient of correlation between dry period and subsequent was positive and not significant.

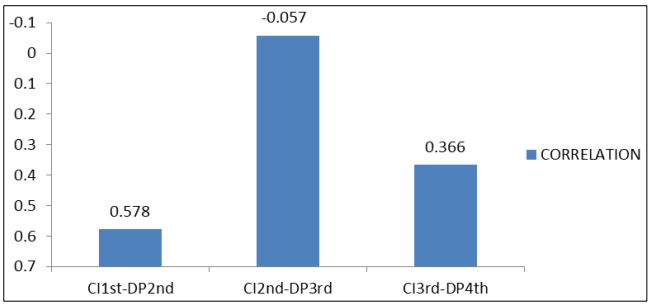

Fig 1: Correlation between first, second and third lactations calving interval (days) on second, third and fourth lactations dry periods (days)

Conclusion

Reproductive traits have the significant correlation with the productive traits should be considered in selection of dairy animals.

Traits having non-significant correlation may be taken into account for selection, since they also play an important role in breed improvement.

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