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RELATIONSHIP BETWEEN GESTATION LENGTH, BIRTH WEIGT OF CALVES, MILK YEILD, LACTATION LENGTH AND AGE AT FIRST SERVICE IN JERSINDH CROSSES

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ABSTRACT
This experiment was conducted at the Department of Animal Genetics and Breeding, Sunderasun School of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology and Science, India. The data were collected from the history sheets record maintained in the Department of Animal Genetics and Breeding, Sunderasun School of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology and Science, from 1940 to 1970. Animals were managed by skilled persons under similar feeding and management condition and the following traits were studied; Gestation length (GL), Birth weight (BW), Lactation Length (LL) and Milk Yield (MY) as influence by age at first service (AFS). The data for the traits of Jersey× Red Sindhi crosses was tabulated and analyzed to determine the relationship between the above mention traits. The GL and LL were measured in days while BW and MY were also measured in kilograms (kg). Completely randomized design and Correlation were used. The animals were grouped into three groups according to AFS G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month). The mean GL in male and female calves ranged from 268 to 348 days and 263 to 405 days respectively. The mean MY of male and female calves ranged from 919.32 kg to 6867.3 kg and 1178 kg to 4573 kg respectively. The LL of male and female calves ranged from 202 to 513 and 213 to 613 days. The mean BW of male and female calves ranged from 11.3 to 28.1 kg and 11.3 to 23.5 kg respectively. It was concluded that there was no significant effect of age at first service on gestation length, lactation length and milk yield (p>0.05), but a significant effect of age at first service was observed on birth weight of females calves born, while male calves birth weight has no effect of age at first service. The gestation length and birth weight were found positively correlated. Therefore, this can give a basis for selection of animals based on their age groups.

Keywords: Gestation Length (GL), Birth Weight (BW), Lactation Length (LL), Milk Yield (MY) and Age at First Service (AFS)

INTRODUCTION
Livestock production has always been an integral part of the rural livelihood system in India. Around 80 percent of marginal and small farmers along with landless folk in the state of India. However, cattle take predominance in the preference list of farm animals. Farming in India is characterized by very large number of animals with low productivity. According to recent estimate India has the 221.9 million cattle (16.24% of the total world cattle population) and 107.8 million buffaloes (56.9% of the world buffalo population) (Bhasin, 2004).

Indigenous dairy breed does not have adequate potential for improvement within reasonable length of time to a level of efficient economical profitable dairy animals. Breeding, management as well as the nutritional practices are needed.

Cross breeding was use as a tool for better production, shorter calving interval, shorter dry period of normal lactation length and early maturity in crossbreds. Since 1934 the programs of cross breeding for dairy cattle was started at the AAI. The impact of the cross breeding of cattle was to increase the economic performances of the indigenous breed or zebu cattle. Now India rank first in milk production in the world (140.6MT) and milk output accounts for 9.8 percent of GDP in India. Indigenous breeds viz.

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Kankrej, Gir, Hariana, Sahiwal and Red Sindhi were crossed to Holstein Friesian, Brown Swiss, Jersey and Guernsey at AAI. The information in this content on Jersind crossbred was undertaken in present study.

Red Sindhi cattle are the most popular of all Zebu dairy breeds. The breed originated in the Sindh province of Pakistan, they are widely kept for milk production across Pakistan, India, Bangladesh, Sri Lanka, and other countries. They have been used for crossbreeding with temperate (European) origin dairy breeds in many countries to combine their tropical adaptations (heat tolerance, tick resistance, disease resistance, fertility at higher temperatures, etc.) with the higher milk production found in temperate regions.

It has been crossed with Jerseys in many places, including India, the United States, Australia, Sri Lanka, etc. It has been crossed with Holstein-Friesian, Brown Swiss and Danish Red. It has also been used to improve beef and dual purpose cattle in many tropical countries, as it is sufficiently meaty to produce good beef calves in such crosses and the high milk production helps give a fast-growing calf which is ready for market at one year. The idea was to increase the economic potentials of the indigenous breeds. The results of cross breeding suggested that Red Sindhi ×Jersey crosses had the most desirable traits for Indian condition.

This includes small body size, better adaptability and high fat percentage. The Jersey crossbred between 3/8 and 5/8 have been interbred and named Jersind. Jersind crosses gave milk yield between 1557 and 1861 kg in first lactation. Due to its high productive performance and its adaptability to Indian condition we feel it is important to study the relationship between Gestation length, birth weight of calves, milk yield, lactation length and age at first service on this breed, so that we can evaluate the relationship that exist between gestation length, birth weight of calves, milk yield, lactation length and Age at first service in Jersind crosses.

MATERIALS AND METHODS

Experimental Location

This experiment was conducted at the Department of Animal Genetics and Breeding, Sunderasan school of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology and Science-Deemed-University, Allahabad-21107(U.P), India.

Source of Data

The data were collected from the history sheets record maintained in the Department of Animal Genetics and Breeding, Sunderasan school of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology and Science- Deemed-University, Allahabad-21107 (U.P), Dairy Farm from 1940 to 1970.

Animals were managed by skilled persons under similar feeding and management condition and the following traits were studied.

Traits

Gestation Length (GL), Birth Weight (BW), Milk Yield (ML), Lactation Length (LL), Age at first Service (AFS).

The data for the traits of Jersey× Red Sindhi crosses were tabulated and analyzed to determine the relationship between the above mention traits. The gestation length and Lactation Length were measured in days while the Birth weight and Milk Yield were also measured in kilograms (kg). The animals were grouped into three "3" groups according to Age at first service, the groups were as follows Group1- 25-28 month, Group2- 29-32 month and Group3- 33-36 month.

Statistical Analysis

Completely randomized design and Correlation using SPSS software were used.

Completely Randomized Design

$CF = (GT)^2/rt$, Raw SS $= \sum^t\sum^r Xij^2$, Total SS = Raw SS – CF, Sum of Square due to Treatment (SSA) $= \sum^t Ti^2/r - CF$

Error Sum of Square (ESS) = TSS – SSA

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Skeleton of ANOVA Table for Completely Randomized Design

Source of Variation	D.F	SS	MSS	FCAL	F(tab) at 5%
Treatment	t-1	SST	SST/t-1	MTSS/MESS	(t-1) (r-1)
Error	t(r-1)	ESS	ESS/(r-1) (t-1)		
Total	rt_1	TSS	TSS/rt-1		

Where

D.F = Degree of freedom, **SS** = Sum of square, **MSS** = Mean sum of Square, **S.td**= $\sqrt{2EMSS}$/t, **CD** at 5% = S.Ed (b) x t error d.f at 5% level of significance. The F value will be compare with table value for testing the significance of factor. Critical differences will be determined if calculated value of F will be more then table value at 5% level of significance to determine the significant difference between groups/season.

RESULTS AND DISCUSSION
Indigenous dairy breed does not have adequate potential for improvement within reasonable length of time to a level of efficient economical profitable dairy animals. Breeding, management as well as the nutritional practices are needed. Cross breeding was used as a tool for better production, shorter calving interval, shorter dry period of normal lactation length and early maturity in crossbreds. The information in this content on Jersind crossbred was undertaken in present study. The result obtained with regards to influence of Age at first service on gestation length, birth weight of calves, lactation length and milk yield has been presented for discussion in this chapter. The animals were grouped into three "3" groups according to Age at first service, the groups were as followed; Group 1- 25-28 month, Group 2- 29-32 month and Group 3- 33-36 month.

Influence of Age at First Service on Gestation Length at Birth of Male Calves
Irrespective of age groups gestation length ranged from 268 to 348 days. In general the gestation length observed were 251-303, 272-296 and 273-348 days in G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month) groups, respectively. The mean gestation lengths of male calves were 285.2, 282.8 and 291.3 days in G1, G2 and G3 groups, respectively. The differences in gestation length at birth of male calves' length due to group of age at first service were non-significant.

Influence of Age at First Service on Gestation Length at Birth of Female Calves
Irrespective of age groups gestation length ranged from 263 to 405 days respectively. In general the gestation length observed were 271-294, 263-405 and 276-286 days in G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month) groups, respectively. The mean gestation lengths were 284.9, 286.7 and 281days in G1, G2 and G3 groups, respectively. The differences in gestation length at birth of female calves due to age at first service were non-significant.

The Influence of Age at First Service on Birth Weight of Male Calves
Irrespective of age groups the birth weight ranged from 11.3 to 28.1 kg. In general the birth weight observed were 11.3-24.9, 11.3-27.2 and 11.7-28.1 days in G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month) groups, respectively. The mean birth weights were 19.45, 18.52 and 18.48kg in G1 G2 and G3 groups, respectively. The differences in birth weight of male calves due to group of age at first service were non-significant.

Influence of Age at First Service on Birth Weight of Female Calves
Irrespective of age groups the birth weights of female calve ranged from 11.3 to 23.5 kg. In general the birth weight of the calves born observed were 12.2-23.5, 11.3-21.3 and 14.5-18.1 days in G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month) groups, respectively. The mean birth weights of the calves born were 18.21, 16.4 and 16.13 kg in G1, G2 and G3 groups, respectively. The differences in birth weight of female calves due to group of age at first service were significant and the analysis of variance was given in table 1, and figure 1.
The Anova table reveals that the calculated value of birth weight of female calves, due to groups of age at first service was greater than the table value on the degree of freedom 2 and 75 at 5% probability level, so the null hypothesis will be rejected. Therefore, it can be concluded from the above tabulated data, that

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there is significance difference between the three (3) groups of age at first service as regard to the birth weight of female calves.

Based on the results obtained from the above test of significance differences after comparing the means of the three Groups (G1-18.21373, G2-16.39583 and G3-16.13333) with CD values at 5% level of significance, it shows that there is significant difference only in G1G2 which means Group 1 (25-28) according to age at first service, is the best among the three groups due its highest mean value. Group G1 and G2 found at par and showed a non significant difference between them. Hence, cows with age group G1, (25-28) gave birth to heavier calves then those in other group.

Influence of Age at First Service on Milk Yield at Birth of Male Calves

Irrespective of age groups the milk yield ranged from 919.32 kg to 6867.3 kg. In general the milk yield observed were 773.46-6867.3, 919.65-5249.22 and 4069.18-2553.22 kg in G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month) groups, respectively. The mean milk yields were 2360.46, 2176.05 and 2671.32 kg in G1, G2 and G3 groups, respectively. The differences in milk yield at birth of male calves due to group of age at first service were non-significant.

Influence of Age at First Service on Milk Yield at Birth of Female Calves

Irrespective of age groups the milk yield ranged from 1178 kg to 4573 kg respectively. In general the milk yield observed were 718.89-2735.2, 891.53-4064.18 and 1864-.3113.5kg in G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month) groups, respectively. The mean milk yields were 1941.91, 2153.49 and 2214.31 kg in G1, G2 and G3 groups respectively. The differences in milk yield at birth of female calves due to group of age at first service were non-significant.

Influence of Age at First Service on Lactation Length at Birth of Male Calves

Irrespective of age groups the lactation length ranged from 202 to 513 days. In general the lactation length observed were 257-592, 257-583 and 281-459 in G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month) groups, respectively. The mean lactation lengths were 366.8, 376.5 and 345 days in G1, G2 and G3 groups, respectively. The differences in lactation length at birth of male calves due to age at first service were non-significant.

Influence of Age at First Service on Lactation Length at Birth of Female Calves

Irrespective of age the lactation length ranged from 213 to 613 days. In general the lactation length observed were 213-560, 213-613 and 320-533 days in G1 (25-28 month), G2 (29-32 month) and G3 (33-36 month) groups, respectively. The mean lactation lengths were 378.4, 386.3 and 446 days in G1, G2 and G3 groups, respectively. The differences in lactation length at birth of female calves born due to group of age at first service were non-significant.

Table 1: ANOVA for the Data on Birth Weight of Female Calves as Influence by Age at First Service

Source of Variation	SS	df	MS	F	P-Value	F Crit
Between Groups	60.41208	2	30.20604	4.283842	0.017312	3.118642
Within Groups	528.8366	75	7.051155			
Total	589.2487	77				

Age Groups: G1 (25-28 month)   G2 (29-32 month)   G3 (33-36 month)
Mean birth weight (kg):   **18.2**   **16.4**   **16.1**

From above table, a significant different (SD) was observed in gestation length according to age at service for female caves. Therefore the table below was used to test the label of significant.

Critical Difference

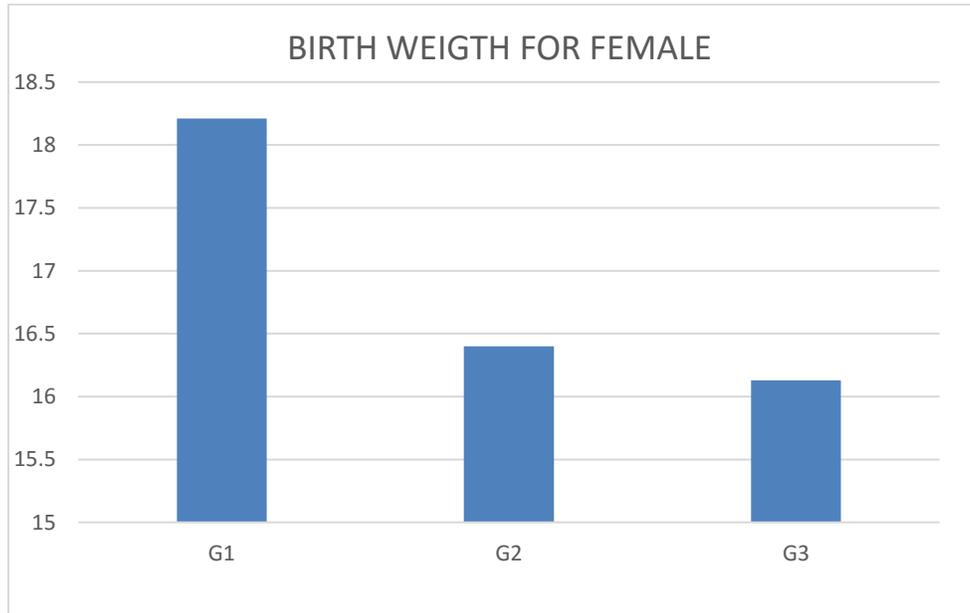| S/N	Between the Groups	CD	Differences	Remarks
1	GIG2	1.098	1.8179	S
2	G1G3	2.636	2.0804	NS
3	G2G3	2.717	0.2625	NS

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Figure 1: Chart Showing Birth Weight of Female Calves as Influence by Age at First Service

Table 2: Correlation between birth weight of calves and gestation length
Descriptive Statistics

	Mean	**Std. Deviation**	**N**
Gestation Length (GL)	2.8508E2	13.62708	156
Birth Weight (BW)	18.2558	3.49573	156

Correlations		**Gestation Length (GL)**	**Birth Weight (BW)**
Gestation Length	Pearson Correlation	1	.153[*]
	Sig. (1-tailed)		.028
	Sum of Squares and Cross-products	28783.077	1129.831
	Covariance	185.697	7.289
	N	156	156
Birth Weight	Pearson Correlation	.153[*]	1
	Sig. (1-tailed)	.028	
	Sum of Squares and Cross-products	1129.831	1894.125
	Covariance	7.289	12.220
	N	156	156

Correlation is significant at the 0.05 level (1-tailed).

The Birth Weight (BW) was found to be positively correlated with the gestation length (GL) of the calves. This correlation was significant at ($P<0.05$) in the case of both male and female calves. Farbes (1967) and Kaushish and Arora (1972) also observed significant correlation between gestation length (GL) and birth weight (BW).

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Conclusion

It was concluded that there was no significant effect of age at first service on gestation length, lactation length and milk yield, but a significant effect of age at first service was observed on birth weight of females calves born, while male calves' birth weight has no effect of age at service. The gestation length and birth weight were found positively correlated. Therefore, this can give a basis for selection or culling of animals based on their age groups.

REFERENCES

Bhasin NR (2014). Presidential address by President IDA. *Indian Dairy Man* **66** 40.

Birthal PS and Taneja VK (2006). Livestock sector in India: opportunities and challenges for Smallholders. Paper presented in the *International Workshop on Smallholders Livestock Production in India: Opportunities and Challenges,* Indian Council of Agricultural Research, International Livestock Research Institute and National Centre for Agricultural Economics and Policy Research, New Delhi, India.

Feote WD, Tyler WJ and Casida LE (1959). Effect of some genetic and maternal environmental variations on birth weight and gestation length in Holstein cattle. *Journal of Dairy Science* **42** 305.

Forbes J (1967). Relationship between gestation length and birth weight. *Journal of Agricultural Science* **66** 191.

Martin TG, Jacobson NL, Mc. Gillard LD and Homeyer PG (1962). Factors related to weight gain of dairy calves. *Journal of Dairy Science* **45** 886-892.