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Study of Interrelationship among Economically Important Production Traits and Season of Calving on Milk Production in Jersindh Crosses

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Study was conducted on productive traits in Jersindh crosses. The data were collected from the records of history sheets maintained in Department of Animal Husbandry and Dairying, SHUATS for the period from 1924 to 1973. The productive traits selected from history sheets were first, second and third lactation milk yield and lactation length and dry period. The mean of 1/4J X3/4RS crosses for 1st ,2nd and 3rd LMY (Kg) were 2259.95, 1963.59 and 1832.74 and for lactation length (days) 378.71, 357.78 and 352 and for Dry period (days) 65.94, 98.23 and 98.26, respectively. The mean of 1/2J X 1/2RS crosses for 1st ,2nd and 3rd LMY (Kg) were 1892.14, 1680.14 and 1789.25 and for

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lactation length (days) 366.06, 338.75 and 359.43 for Dry period (days) 76.81,61 and 59.93 respectively. The mean of 3/8J X 5/8RS crosses for 1st ,2nd and 3rd LMY (Kg) were 1754, 1843.39 and 3682.36 and for lactation length (days) 320.1, 357.15 and 3 and for Dry period (days) 71.2, 70.7 and 72.35 respectively. The mean of 1/8J X 7/8RS crosses for 1st ,2nd and 3rd LMY (Kg) were 1966.35, 1906.51 and 1837.68 and for lactation length (days) 425.6, 371.75 and 446.4, and for Dry period (days) 71.35, 58.75 and 111.2 respectively. Significant effects of season of calving were observed on 3rd LMY of 1/2J X 1/2RS crosses as well as 3/8J X 5/8RS and 2nd LMY of1/4J X 3/4RS crosses , Second and third lactation length of 1/8 X 7/8 crosses has significant influence on lactation milk yield. Second and third lactation length of 1/4 X 3/4 crosses has significant correlation with lactation milk yield and also the regression of milk yield on lactation length was recorded. Third lactation length of 3/8 X 5/8 crosses has significant correlation with lactation milk yield and also the regression of milk yield on lactation length was recorded. Second lactation length of 1/8 X 7/8 crosses has significant correlation with lactation milk yield and also the regression of milk yield on lactation length was recorded. Out of these crosses (1/4Jx3/4RS,1/2JX1/2RS,3/8 JX5/8RS,1/8JX7/8RS) 3/8JX5/8RS has highest lactation length 652.76 and lactation milk yield is 3682.36.

Keywords: Productive traits; jersindh crosses; lactation milk yield; lactation length and regression.

1. INTRODUCTION

Animal husbandry is a science or area of agriculture that focuses on the management and care of animals, including feeding, breeding, housing, and medical care in order to maximize advantages. The term "livestock" refers to farm animals (domesticated creatures like cows, buffaloes, sheep, goats, pigs, and poultry, among others) kept by people for practical commercial and domestic purposes Nardone et. al. [1]. In the context of animal husbandry, the term "animal" refers exclusively to domesticated animals that are raised primarily for commercial or recreational purposes, such as cattle, buffalo, sheep, goats, camels, pigs, and horses. The management of home affairs is referred to as "husbandry," and it also encompasses fisheries and poultry farming. The phrase "animal husbandry" refers to the care and feeding of animals as well as their breeding, housing, and other needs Boyazoglu et. al. [2]. Animals and vegetation both are required to support human life. We breed animals for their fibre, wool, and other products in addition to rearing them for their meat, milk, and eggs. The area of agriculture known as animal husbandry deals with the daily care, selective breeding, and subsequent rearing of livestock (of various domestic animals Constable et. al. [3]).

Animal care, breeding, administration, etc. are all explicitly under the control of the department of animal husbandry. Animal husbandry is a big business. The animals are produced, taken care of, grown, and housed in a farm or area that is specifically made for them. Aquaculture, dairy farms, bee farms, chicken farms, and milk farms are a few examples of animal husbandry Broom et. al., [4].

Agriculture and animal husbandry are closely related in India. This industry offers potential for exporting milk, wool, hides, skin, hooves, bones, and hair in addition to providing food security through meat, eggs, and dairy products. Livestock accounts for 26% of the agricultural GDP and 9.1% of the overall GDP in India, agriculture accounts for 27% of GDP. India only makes up 3% of the total land area of the planet, but it is home to 55% of the world's buffaloes, 16% of its cattle, 20% of its goats, 5.4% of its sheep, and 1% of its swine population FAO [5]. Our nation has roughly 205 million cattle, 80 million buffaloes, 46 million sheep, and 111 million goats and 11 million pigs according to the 1992 livestock census, and Only 18% of total stock of cattle and buffaloes are of well -defined breeds and rest 82% are classified as non-descript animals.

The influences of genotype and environmental factors combined produce the yields of farm animals. Enhancing the animals' genetic makeup and optimizing the environmental conditions are both required to raise the yield level. Understanding the variables influencing a dairy animal's milk output is essential for increasing productivity. Age, year, season, frequency of milking, etc. are examples of measurable environmental influences. Environmental factors with immeasurable impacts include everything else (infectious diseases, parasitic infestations, etc.). It is possible to identify the observable effects and use them to manage the farm Kiplagat et. al. [6].

1.1 Jersey Cattle

Over 200 years ago, on the Island of Jersey, the Jersey cattle breed was developed. The English Channel's southernmost island, Jersey, is located off the French coast. According to sources from as early as 1771, these cattle were the main export from the Island, making the Jersey breed one of the oldest dairy breeds. As early as 1763, restrictions were passed prohibiting the entrance of livestock and related goods onto the Island of Jersey. These prohibitions were then followed by a succession of regulations over the following two centuries, fully isolating these cattle and starting the development of the Jersey breed. By the early 1800's, the Jersey cow was "celebrated not only for its beauty, but for the richness in milk and excellence in butter." **–** Huson et. al., [7].

Red Sindhi: Also Known By: *Malir (Baluchistan), Red Karachi, Sindhi*

This breed is recognized for its capacity to produce effectively in tropical environments. Cows are primarily domesticated to improve the dairy industry; this is largely dependent on the number of lactations and productive life. This breed of animals are heavy and can tolerate heat well. These cows have equivalent milk potential to Sahiwal breed and are heavy milkers. More than 20 countries, including the United States, Australia, the Philippines, Brazil, and Sri Lanka, among others, exported the Red Sindhi breed. Due to the availability of these animals in field conditions, the breed is considered to have an endangered population status in India. Breed needs immediate care for conservation as it is endangered in the nation Madalena et. al. [8].

2. MATERIALS AND METHODS

The data for the study were collected from history sheets maintained in the Department of Animal Husbandry and Dairying, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj -211007 (UP), Dairy Farm Allahabad for the period from 1924 to 1973.

2.1 Management Practices

The animals were reared, fed and managed under similar condition of housing management and environment.

Following were parameters of this study:

Genetic groups: 1/4 Jersey x 3/4 Red Sindhi, 1/2 Jersey x 1/2 Red Sindhi, 3/8 Jersey x 5/8 Red Sindhi, 1/8 Jersey x 7/8 Red Sindhi

Productive traits: Lactation milk yield**,** Lactation length**,** Dry period

Seasons: Winter (Nov-Feb)**,** Summer (Mar-Jun)**,** Rainy (July-Oct)

3. STATISTICAL ANALYSIS

I had used Snedecor and Cochran (1956) statistical method that can show whether the data is significant or non-significant.

For analysis of correlation between traits mostly the Karl Pearson's (1896) correlation formula is used. The following is Karl Pearson's correlation formula:

Simple correlation:

$$\boldsymbol{ryx} = \frac{\boldsymbol{Covyx}}{\sqrt{\mathbf{Vx}.\mathbf{Vy}}}$$

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

Where:
rxy = correlation coefficient between character x and y. cov.xy = covariation between character x and y
Vx = variance for x character.
Vy = variance for y character.
To calculate the regression between two characters x and y we use simple regression formula given below will be used [9]

Regression Formula:

$$b_{yx} = \frac{Cov(x.y)}{Vx}$$

$$= \frac{\sigma_{xy}}{\sigma^2}$$

$$= \frac{\Sigma XY - \frac{(\Sigma X \Sigma Y)}{N}}{\Sigma X^2 - \frac{(\Sigma X)^2}{N}}$$

Where,
bxy = regression coefficient between character x and y.
Cov.xy = covariation between character x and y.
Vx= variance for x character.

4. RESULTS AND DISCUSSION

4.1 Productive Traits of Jersindh Crosses

The data regarding mean lactation (days), lactation yield (kg), Dry period (days) in three lactations of Jersindh crosses are:

1. The mean of first, second and third lactation length of (1/4 J X 3/4RS crosses was 378.71, 357.78 and 352 days, respectively. The mean of first, second and third lactation yield of (1/4 J X 3/4RS crosses was 2259.95,1963.59 and 1832.74 kg, respectively. The mean of first, second and third Dry period of (1/4 J X 3/4RS crosses was 65.94,98.23 and 98.26 days, respectively.
2. The mean of first, second and third lactation length of (1/2 J X1/2RS crosses was 366.06, 338.06 and 359.43days, respectively. The mean of first, second and third lactation yield of (1/2 J X1/2RS crosses was 1892.14,1680.07 and 1789.25 kg, respectively. The mean of first, second and third Dry period of (1/2 J X1/2RS crosses was 76.81,61 and 59.93 days, respectively.
3. The mean of first, second and third lactation length of (3/8 J X 5/3RS crosses was 320.1, 357.15 and 342.7 days, respectively. The mean of first, second and third lactation yield of (3/8 J X 5/3RS crosses was 1754.48,1843.39 and 3682.36 kg, respectively. The mean of first, second and third Dry period of (3/8 J X 5/3RS crosses was 71.2,70.7 and 72.35 days, respectively.
4. The mean of first, second and third lactation length of (1/8 J X 7/8RS crosses was 425.6, 371.75 and 446.4 days, respectively. The mean of first, second and third lactation length of (1/8 J X 7/8RS crosses was 425.6,371.75 and 446.4 days, respectively. The mean of first, second and third Dry period of (1/8 J X 7/8RS crosses was 71.35,58.75 and 111.2 days, respectively.

Table 1. The mean and standard deviations of productive traits of 1/4J X3/4RS crosses

1/4J X3/4RS CROSSES		
Parameters	**Mean**	**SD**
Lactation yield (kg)		
1st Lactation yield	2259.95	991.85
2nd Lactation yield	1963.59	628.23
3rd Lactation yield	1832.74	641.30
Lactation length(days)		
1st Lactation length	378.71	111.80
2nd Lactation length	357.78	78.45
3rd Lactation length	352	121.92
Dry period(days)		
1st dry period	65.94	22.54
2nd dry period	98.23	123.14
3rd dry period	98.26	86.30

Table 2. The mean and standard deviations of productive traits of 1/2J X 1/2RS crosses+

1/2J X 1/2RS CROSSES		
Parameters	**Mean**	**SD**
Lactation yield (kg)		
1st Lactation yield	1892.14	624.83
2nd Lactation yield	1680.14	1001.49
3rd Lactation yield	1789.25	726.09
Lactation length(days)		
1st Lactation length	366.06	74.43
2nd Lactation length	338.75	40.25
3rd Lactation length	359.43	92.48
Dry period(days)		
1st dry period	76.81	48.84
2nd dry period	61	7.26
3rd dry period	59.93	17.56

Table 3. The mean and standard deviations of productive traits of 3/8J X 5/3RS crosses

3/8J X 5/3 RS CROSSES		
Parameters	**Mean**	**SD**
Lactation yield (kg)		
1st Lactation yield	1754	358.36
2nd Lactation yield	1843.39	649.57
3rd Lactation yield	3682.36	7257.44
Lactation length(days)		
1st Lactation length	320.1	34.37
2nd Lactation length	357.15	86.28
3rd Lactation length	342.7	79.59
Dry period(days)		
1st dry period	71.2	21.03
2nd dry period	70.7	26.63
3rd dry period	72.35	26.28

Table 4. The mean and standard deviations of productive traits of 1/8J X 7/8RS crosses

1/8J X 7/8 RS CROSSES		
Parameters	**Mean**	**SD**
Lactation yield (kg)		
1st Lactation yield	1966.35	515.94
2nd Lactation yield	1906.51	465.55
3rd Lactation yield	1837.68	426.91
Lactation length(days)		
1st Lactation length	425.6	164.24
2nd Lactation length	371.75	89.03
3rd Lactation length	446.4	223.24
Dry period(days)		
1st dry period	71.35	13.85
2nd dry period	58.75	32.42
3rd dry period	111.2	64.82

5. CONCLUSIONS

- Summer season had significant influence on milk yield in 2nd lactation of 1/4JX3/4RS crosses whereas winter and rainy season had a significant effect on milk yield in 1/2J X 1/2RS and 3/8J X 5/8RS crosses, respectively.
- Second and third lactation length of 1/8J X 7/8RS crosses had significant influence on lactation milk yield.
- Second lactation of 1/4J X 3/4RS, 1/8J X 7/8RS crosses and third lactation of 1/4J X 3/4RS, 3/8J 5/8RS crosses had recorded a significant positive correlation on milk yield and also the positive regression of milk yield on lactation length.
- Out of (1/4Jx3/4RS,1/2JX1/2RS,3/8JX5/8RS,1/8JX7/8RS) crosses, 3/8J X 5/8RS had the highest lactation length 652.76 days and lactation milk yield is 3682.36kg and was found best.

6. RECOMMENDATION

Animals having 3/8J X 5/8RS exotic inheritance can be selected and may be a helping key for selection/purchase of animals for dairy farm/breeding farm.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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