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INCIDENCE OF DISEASES AND EXPENDITURE ON HEALTH CARE AMONG DIFFERENT STRAINS OF FRIESIAN CROSSES

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ABSTRACT

Data on 123 female halfbred Friesian × Tharparkar animals, using Friesian sires from four sources—Indian, American, New Zealand and British were analysed to compare the incidence of different diseases and expenditure on different aspects of health care among these four strains of halfbred animals. Three traits of mastitis—no. of incidence(s), no. of quarter(s) affected and days affected per lactation showed no significant difference due to strains. But parity order affected the no. of incidence(s) per lactation ($P<0.05$) and that incidence was lowest in first lactation which increased subsequently according to parity order. Significant differences among four strains were observed in the incidence of retention of placenta ($P<0.10$), tuberculosis ($P<0.10$), pyrexia ($P<0.10$) and gastro-enteritis ($P<0.05$). But in cases of FMD, ephemeral fever, metritis, eye trouble, hoof trouble, lameness, joint ill/naval ill and pneumonia the differences were not significant.

The expenditure on health care upto age at first calving did not differ significantly with minimum in British strain (Rs. 43.44 ± 0.45). In lactating cow minimum expenditure was revealed in Indian strain both due to mastitis (Rs. 20.45 ± 2.72) and other diseases (Rs. 15.63 ± 1.79) per lactation. The effect of strain ($P<0.05$) and parity order ($P<0.01$) on the later case was found to be significant.

INTRODUCTION

Performance of any livestock is greatly hindered by diseases. This is more serious in case of a particular breed of animal in an environment not adaptable. Naturally high morbidity rate in zebu × taurus crossbred animal under the conventional management resulting in losses due to decreased production, heavy expenditure on veterinary aid and high cost of raising replacement stocks are the main constraints in initiating crossbreeding programme on a national scale. Use of more resistant breed or strain in crossbreeding programme is the obvious corollary.

Though experiments have been started in European countries to detect the best strain of Friesian, yet no complete reports are available particularly for tropical condition. The following investigation was undertaken to find, if any particular strain of Friesian is more adaptable to Indian condition.

MATERIALS AND METHODS

A crossbreeding experiment was started at National Dairy Research Institute, Karnal in 1971 with the objective of evaluating the performance of crossbreds

obtained by inseminating Tharparkar cows (T) with semen of Friesian (F), Brown Swiss and Jersey bulls. Data in the present study were from the halfbred (1/2F 1/2T) female animals born of bulls from four Friesian strains, *viz.*, Indian, American, New Zealand and British. Details of number of animals in each strain available for the investigation and those with completed lactations parity wise have been shown in Table 1.

Table 1. Number of animals available for study

Strains	No. of animals	Lactations							Total lact. studied
		1st	2nd	3rd	4th	5th	6th	7th	
Indian	40	36	35	27	22	19	14	9	162
American	59	56	54	44	40	31	17	3	245
New Zealand	17	15	15	11	7	—	—	—	48
British	7	7	6	6	2	—	—	—	21
Total	123	114	110	88	71	50	31	12	476

Once an animal had suffered from a disease at any time during the study, it was considered to be susceptable to that disease.

Expenditure on health care included the cost of medicine, antiparasitic drug and vaccine.

Analysis of variance for the data on mastitis and expenditure on health care was conducted by using the following hierarchical model :

$$Y_{ijk}=u+S_i+L_{ij}+e_{ijk}$$

where Y_{ijk} = No. of incidence(s)/quarter(s) affected/days affected by mastitis/ Expenditure on mastitis treatment/Other diseases for k_{th} animal of i_{th} strain of j_{th} laciation.

u = Overall mean common to all effects.

S_i = effect of i_{th} strain ($i=1$ to 4).

L_{ij} = effect of j_{th} lactation of i_{th} strain ($j=1$ to 7).

e_{ijk} = random error.

The independence of incidence of rest of the diseases between strain groups was tested by 2×4 chi-square test.

RESULTS AND DISCUSSION

Incidence of different diseases

Clinical mastitis :— Three traits of clinical mastitis were studied, *viz.*, number of incidence(s), number of quarter(s) affected and number of days affected per cow per lactation. A separate incidence was defined as one in which at least ten days had elapsed since any previous treatment in the same quarter. Number of days affected in a single incidence included all the days the animal was under treatment till it was declared cured.

From the record it has been found that high percentage of the animals (89.72%) had at least one episode of clinical mastitis in its life. This is quite high in comparison to other reported data on cattle (Miller *et al.*, 1973 and Kapur and Singh, 1978).

The average number of incidence(s), quarter(s) affected and days affected by mastitis per lactation in four strains has been summerised in Table 2. The lowest number of incidence (0.64 ± 0.06) and quarter affected (0.85 ± 0.09) was observed in Indian strain, whereas British strain ranked lowest in case of number of days affected per lactation (6.58 ± 1.94).

Table 2. Incidence of clinical mastitis (Mean±S.E.)

Traits	Strains	Lactations 1st	2nd	3rd	4th	5th	6th	7th	Overall
No. of incidence/lactation/cow	Indian	0.47 (0.12)	0.54 (0.12)	0.37 (0.12)	0.68 (0.19)	0.95 (0.23)	1.14 (0.25)	0.44 (0.34)	0.64 (0.06)
	Amer.	0.38 (0.08)	0.62 (0.11)	0.89 (0.14)	0.58 (0.11)	0.77 (0.18)	0.59 (0.22)	1.00 (1.00)	0.68 (0.65)
	N.Z.	0.60 (0.19)	0.67 (0.15)	0.73 (0.30)	1.28 (0.47)	—	—	—	0.82 (0.12)
	Brit.	0.57 (0.20)	0.83 (0.48)	1.00 (0.45)	1.00 (1.00)	—	—	—	0.86 (0.22)
No. of quarters affected/ lactation/ cow	Indian	0.69 (0.21)	0.69 (0.18)	0.48 (0.17)	0.82 (0.25)	1.16 (0.30)	1.57 (0.37)	0.67 (0.55)	0.85 (0.09)
	Amer.	0.46 (0.11)	0.83 (0.17)	1.20 (0.25)	0.80 (0.18)	1.19 (0.39)	0.82 (0.35)	2.00 (2.00)	1.04 (0.09)
	N.Z.	0.73 (0.28)	1.00 (0.29)	1.09 (0.49)	1.71 (0.64)	—	—	—	1.10 (0.19)
	Brit.	0.57 (0.20)	0.83 (0.48)	2.50 (1.91)	1.00 (1.00)	—	—	—	1.26 (0.56)
No. of days affected/ lactation/ cow	Indian	4.28 (1.64)	8.11 (2.59)	5.56 (1.92)	6.86 (2.26)	8.89 (2.71)	11.43 (3.28)	4.22 (3.98)	7.01 (0.93)
	Amer.	5.01 (1.70)	7.03 (1.98)	7.11 (1.48)	11.35 (6.72)	8.94 (4.32)	5.35 (2.53)	5.33 (5.33)	7.19 (1.39)
	N.Z.	5.00 (1.69)	5.33 (1.77)	6.36 (2.81)	10.00 (4.16)	—	—	—	6.67 (1.22)
	Brit.	4.29 (2.16)	6.33 (3.21)	10.00 (5.46)	5.5 (5 5)	—	—	—	6.58 (1.94)

Analysis of variance (Table 3) showed no significant difference due to strain or parity order in any of these traits except the number of incidence(s), which differed significantly among parity orders ($P<0.05$). From the data presented, it can be seen that the incidence was lowest in first lactation and it increased consistently in later lactations.

Table 3. Analysis of variance for mastitis traits and expenditure components

Source	d.f.	M.S.S.				
		Incidence/ Lact.	Quarter affected/ Lact.	Days suffered/Lact.	Exp. on mastitis/ Lact.	Exp. on other diseases/ Lact.
Strain	3	0.77678	2.53666	27.69666	992.73	1898.69*
Lactation	18	1.28188*	3.16611	126.27778	2328.91	2950.33**
Error	454	0.73283	2.83788	506.2817	2152.96	635.477

*P<0 05, **P<0.01

The present findings are somewhat higher as compared to those reported by Miller *et al.* (1973), Batra *et al.* (1977) and Batra (1979) in purebred Holstein cattle, reflecting the managemental efficiency of the herd studied. An increase in incidence of mastitis in later lactations, was also reported by the above authors.

Genetic difference in susceptability to mastitis was reported by Nagarcenkar and Bhaskar (1971), and Grootenhuis *et al.* (1979). But in the present study no significant effect of strain on different mastitis traits was observed. A very high coefficient of variation (ranging from 119–172%) in these mastitis traits was also seen. However, limited number of observations and no information beyond fourth lactation in New Zealand and British strain was a major constraint in the herd investigated.

Abortion and Retention of placenta :— Lowest number of aborting cows were detected in the British strain (Nil). In terms of percentage of abortions among total gestations, naturally British strain was least affected (Table 4). Pooled data over strains showed that 22.81 per cent were affected with 6.72 per cent of total gestation being terminated by abortion. The difference among strains in percentage of cows aborting and gestations terminated were not statistically significant.

Table 4. Incidence of retention of placenta and abortion

Strains	Percentage of cows affected						Percentage of gestations affected	
	Once		Twice or more		Overall			
	Ret. of placenta	Abort.	Ret. of placenta	Abort.	Ret. of placenta	Abort.	Ret. of placenta	Abort.
Indian	36.11	22.22	8.33	5.56	44.44	27.78	14.20	7.41
American	37.50	17.86	17.86	7.14	55.36	25.00	18.78	7.35
New Zealand	53.33	13.33	13.33	Nil	66.67	13.33	25.00	4.17
British	Nil	Nil	14.29	Nil	14.29	Nil	9.52	Nil
Total	36.84	17.54	14 03	5.26	50.88	22.81	17.44	6.72
Chi-square value	5.85	2.22	1.65	1.63	6.29†	3.49	4.31	2.29

† P< 0.10

Table 5. Incidence of diseases in different Friesian strains (percentage)

Strains	Tuberculosis		FMD	Ephe-meral fever	Metri-tis	Eye trouble	Hoof trouble	Lame-ness	Pyre-xia	Joint ill/naval ill	Pneu-monia	Gastro-enteri-tis
	+ve	doubtful										
Indian	10.26	5.13	20.51	15.38	22.22	5.13	33.33	30.77	30.77	2.56	5.13	30.77
	(39)	(39)	(39)	(39)	(36)	(39)	(39)	(39)	(39)	(39)	(39)	(39)
American	20.69	5.17	22.41	25.86	21.43	3.45	39.66	37.93	29.31	5.17	Nil	12.07
	(58)	(58)	(58)	(58)	(56)	(58)	(58)	(58)	(58)	(58)	(58)	(58)
New Zealand	5.88	5.88	5.88	35.29	33.37	11.76	11.76	17.65	58.82	11.76	5.88	5.88
	(17)	(17)	(17)	(17)	(15)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
British	42.86	Nil	28.57	28.57	14.29	Nil	28.57	42.86	14.29	Nil	Nil	Nil
	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
Overall	16.53	4.96	19.83	23.97	22.81	4.96	33.06	33.06	33.06	4.96	2.48	16.53
	(121)	(121)	(121)	(121)	(114)	(121)	(121)	(121)	(121)	(121)	(121)	(121)
Chi-square value	6.753†	0.403	2.671	4.266	1.300	2.319	4.688	2.842	6.674*	2.516	3.598	9.351*

† $P<0.10$, * $P<0.05$

Figures in parenthesis indicate the number of animals exposed to risk.

No report is available on this trait comparing different strains of Friesian. However, the incidence of abortion as found in the present investigation was higher compared to other reported data in different breeds (Amble and Jain, 1967; Prabhu and Chatterjee, 1970; Murty and Nagarcenkar, 1978 and Singh, 1979).

In case of retention of placenta, a significant ($P<0.10$) difference among strains in number of affected cows was found. The lowest number of affected animals were in British strain (14.29%) (Table-4). The overall incidence was much higher compared to the reports by Kaikani *et al.* (1976) and Sinha *et al.* (1978) in zebu and zebu×taurus crossbred animals.

Other diseases : Significant ($P<0.10$) difference in the incidence of tuberculosis among strains was detected in case of 'positive reactors' but not in case of 'doubtful test' (Table 5). New Zealand strain crossbred Friesian cows had lowest positive reactors (5.88%). The overall incidence was found to be 16.53 per cent and was somewhat higher than the published reports in different breeds of cattle in Indian condition (Singh and Prasad, 1971; Nagaraja *et al.*, 1973 and Joshi *et al.*, 1976).

Two outbreaks of Foot and Mouth disease had been recorded in the herd though the animals were vaccinated regularly. However there was no mortality due to these outbreaks. Lowest morbidity rate was noticed in New Zealand strain (5.88%). The difference among strains was non significant (Table 5).

The overall incidence observed (19.83%) in the present investigation was low compared to those reported by Ahuja and Rai (1977), Sethi and Balaine (1978) and Rai and Ahuja (1978) but high as compared to that reported by Singh (1979). These outbreaks may be due to break in immunity or due to a strain not incorporated in the polyvalent vaccine.

Significant differences were observed in the incidences of pyrexia ($P<0.10$) and gastro-enteritis ($P<0.05$) among the four strains with lowest number of susceptable animals in British strain (14.29% and nil respectively). The overall incidence of gastro-enteritis (16.53%) in this herd was low compared to those reported by Hollon and Branton (1975). Incidence of morbidity due to ephemeral fever, metritis, eye trouble, hoof trouble, lameness, joint ill/naval ill and pneumonia in different strains have also been summarised in Table 5. None of these diseases revealed significant difference among the four strains studied.

Expenditure on health care

Expenditure upto age at first calving : The expenditure on health care upto age at first calving in each strain under study revealed that the progeny of New Zealand strain Friesian bulls required highest expenditure (Rs. 47.48 ± 3.58) followed by Indian (Rs. 46.73 ± 1.23), American (Rs. 44.22 ± 0.54) and British strain progeny (Rs. 43.44 ± 0.45).

The analysis of variance did not reveal significant difference for the effect of strain on expenditure.

Expenditure per lactation : The data on expenditure on mastitis and other diseases per lactation has been summarised in Table 6. The expenditures were found lowest in case of Indian strain for both the causes with Rs. 20.45±2.72 and Rs. 15.63±1.79 per lactation respectively. The data were analysed for studying the differences, if any, for expenditure on treatment among the strains and parity orders (Table 3). No significant variation due to these two sources was found in case of mastitis treatment but expenditure on other diseases varied significantly among strains ($P<0.05$) and parity order ($P<0.01$).

Table 6. Expenditure on treatment of mastitis (a) and other diseases (b)/lactation/cow (Mean±S.E.) (Rs.)

Strains		Lactations							Overall
		1st	2nd	3rd	4th	5th	6th	7th	
Indian	a	12.82	14.65	16.35	24.58	21.94	44.35	22.43	20.45
		(4.80)	(4.39)	(7.18)	(8.19)	(6.38)	(13.69)	(14.35)	(2.72)
	b	12.31	15.16	13.76	10.94	31.04	11.99	17.43	15.63
		(1.05)	(2.28)	(2.04)	(1.14)	(13.46)	(3.10)	(6.13)	(1.79)
Amer.	a	13.26	23.43	18.66	33.86	31.87	16.85	25.27	22.97
		(4.53)	(5.98)	(3.55)	(14.90)	(12.81)	(7.91)	(25.27)	(3.48)
	b	11.13	18.89	11.38	23.88	31.51	22.06	31.44	20.44
		(0 96)	(2.72)	(0.91)	(4.03)	(7.72)	(5.30)	(15.23)	(1.46)
New Zealand	a	24.42	24.21	26.95	43.51	—	—	—	28.35
		(8.64)	(6.47)	(14.00)	(17.76)				(5.22)
	b	19.05	18.04	12.94	44.73	—	—	—	24.58
		(7.89)	(3.95)	(3.20)	(41.48)				(7.47)
British	a	12.21	19.44	44.13	16.73	—	—	--	22.74
		(5.28)	(8.04)	(28.69)	(16.73)				(8.64)
	b	12.36	15.18	18.57	23.65	—	—	—	16.96
		(2.95)	(3.42)	(8.81)	(23.65)				(3.22)

Pooled data over strains showed that the expenditure on other diseases was lowest in first lactation (Rs. 13.65±1.20) then it showed an increasing trend and it was highest in fifth lactation (Rs. 31.28±6.91). In lactations, subsequent to fifth, the trend was decreasing again may be due to vigorous culling and due to non availability of data in New Zealand and British strain crossbred cows in lactations subsequent to fourth.

A very wide range of variation in these expenditure components from animal to animal was noticed specially in case of mastitis treatment (c.v. ranging from 95-162%). This may be due to the fact that severity of different diseases varied widely from animal to animal which required different forms of treatment for

different duration of time for complete recovery from certain disease. Comparatively fewer number of observations in certain strains and no observation in New Zealand and British strain in later lactations may also be the cause for the wide range of variation observed.

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