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Incidence of Mastitis in Kankrej Cows*

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ABSTRACT

Incidence of subclinical mastitis was studied on 146 quarter's milk samples drawn from 38 milking Kankrej cows, on cow basis and quarter basis with Direct-microscopic Leucocyte count as the standard method. Incidence of 76·32% on cow basis and 42·26% on quarter basis was observed.

Studies were also conducted to know whether there was any influence of lactational number and position of quarters on occurrence of mastitis which showed non-significant results with X^2 test. All these non-significant results were thought to be due to high overall incidence of mastitis in the herd.

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INTRODUCTION

MASTITIS MAY BE regarded as the state of inflammation of udder, without the consideration of Oetiological factors. The resultant effect of mastitis is deviation in milk secretion which may vary from slightest change in composition to secretion of blood or slight drop in milk yield to complete cessation of milk secretion depending upon the severity of the infection. Mastitis presents two important problems (i) Public health and (ii) Economic losses.

(i) *Public health:* Mastitis is caused by several micro-organisms many of which are pathogenic to humanbeings. Particular importance can be cited with the mastitis caused by *Staphylococcus aureus*, *Streptococcus pyogenes*, *Corynebacterium pyogenes*, *Mycobactcrium tuberculosis*, *Brucella abortus* and *Br. melitonsis*.

Staphylococcus aureus produces the heat stable toxin that causes gastroenteritis in humanbeings. Particularly in India, the incidence of *Staphylococci* mastitis is more as observed by Kalra and Dhanda (1964). Similar problem was revealed by Davis (1968) in Britain because of development of antibiotic resistant strains. *Streptococcus pyogenes* is known to cause septic sore throat and scarlet fever, when raw milk with these organisms was consumed. *Corynebacterium pyogenes* is noted all over the world, to cause mastitis and is the causative organism of dyphtheria in humanbeings, specially in children.

The danger to the public health from *Mycobacterium tuberculosis* by consumption of milk could rarely be overlooked. This organism is known to cause mastitis in cattle and is excreted in milk. Incidence of *Brucellosis* is very high in Indian cattle. *Brucellae* cause undulent fever in man.

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(ii)(a) *Economic losses:* Changes in composition of milk create difficulties in manufacture of dairy products like cheese, sweetened condensed milk, evaporated milk, dried milks and fermented milks as observed by Little and Plastridge (1946), Davis (1965), Fegan *et al* (1966).

(b) *Losses in milk yield:* Several workers have shown the variation in the reduction of the milk yield depending upon variation in the severity of inflammation and stage at which estimates were made. Gray and Sehalm (1962) have stated the loss of milk yield ranging from 5 to 24%. Forster *et al* (1967) at Washington State University have given the average decrease in milk production from 9 to 43%. Elaborate study of mastitis by King (1967) showed that the reduction in the yield due to mastitis not only results in current lactation but also has the reduced yield in subsequent lactation.

(c) *Loss of animals:* Though the culling on the basis of mastitis is not followed in India, the extent of losses in other countries gives us the idea about economic losses in this respect. Blackburn (1958) estimated loss of 19 million pounds in Great Britain, while Guthrie and Guest (1964) estimated 435 million dollars in U.S.A. Under Indian conditions Dhanda and Sathi (1962) have estimated the total loss due to mastitis to be equal to Rs. 52.9 crores per year.

MATERIALS AND METHODS

Samples were collected randomly from all forty four cows in milk during the period of study. Every time 2 cows were milked for sampling. At the end of the experimental period six cows were ommitted from the consideration because of late lactational stage or old age. 146 samples from 146 quarters of 38 cows were finally taken for analysis. Six teats were blind. Cows were milked twice at the milking shed at 9 A.M. & 4 P.M. No weaning was followed hence calves were allowed to suckle prior to milking and after milking.

Procedure followed for sample collection:

(1) Udder was washed with tap water, carbolic soap was rubbed till good lather developed. Then it was washed with warm water to remove the foam and dirt.

(2) Udder and teats were rinsed with the solution of about 200 ppm available chlorine and were dried with sterilized (autoclaved) cotton towel.

(3) Prior to collecting the milk sample, 95% alcohol was applied to the tip of the teats by cotton swab.

About 30 ml of foremilk sample was collected in sterilized test tubes which were initially marked to identify the individual quarter of the cows milked on that day.

Following tests were conducted for each sample as per standard procedure laid down by AOAC method (1967). (i) Hotis test, (ii) Leucocyte test, (Breed's method), (iii) Direct Microscopic (Leucocyte) count.

RESULTS AND DISCUSSION

Incidence of Mastitis

Diagnosis of subclinical cases of mastitis is very difficult. White Blood

Corpuscles (W.B.Cs.) count in the milk by Breed's method has been considered as reliable test. On account of body defence mechanism even milk infections cause rise in the W.B.Cs. in milk. The standard criterion to identify the sub-clinical cases is the W.B.C. count above 500,000 cells per ml. of the milk as stated by Hucker (1933), Narayanan and Iya (1953), Bakshi (1963), Brazis *et al* (1967). In the present study the results of incidence of mastitis are reported on (1) cow basis and (2) on quarter basis.

TABLE 1

Incidence of mastitis in kankrej herd "on cow basis".

		Cows tested for mastitis	Cows +Ve* to D.M.L.C. No. of quarters involved in each cow 1	2	3	4	Total	Cows —Ve@ to D.M.L.C
IN-CI-DEN-CE	Number of cows	38	9	7	6	7	29	9
	% of total cows tested	—	23·68	18·42	15·79	18·42	76·32	23·68
	% of cows found infected		31·02	24·15	20·68	24·15	100·00	—

* Leucocytes by direct microscopic leucocyte count above 500,000/ml.
@ Leucocytes by direct microscopic leucocyte count below 500,000/ml.

On Cow Basis

From Table 1 it can be seen that 29 cows out of 38 were positive for mastitis with either one, two, three or all four quarters infected, amounting to 76·32%, while nine cows i.e. 23·68% were completely free from mastitis. Number of cows suffered with the infection of one quarter were nine i.e. 23·68% on cow basis. Similarly cows suffered from 2, 3 or 4 quarters were 7, 6 and 7 in number, which worked out as 18·42%, 15·79% and 18·42% of incidence respectively.

Out of 29 cows found affected with mastitis the percentage of infected with one, two, three or all the four quarters was 31·03, 24·15, 20·68 and 24·15 respectively.

Table 2 has been prepared to study the effect of number of lactation in relation to incidence of mastitis. The results were analysed by X^2 test which showed $4{\cdot}82 X^2$ value, which was non-significant, indicating that there was no relation between the occurrence of mastitis and the number of lactations. That is occurrence of mastitis was a random event. These results are in contradiction to the findings of Narayanan and Iya (1953), Oliver *et al* (1956), Pendse (1966) and Smith (1966).

TABLE 2

Lactationwise distribution of cows and incidence of mastitis.

Lactation No.	No. of cows studied	Cows + ve	% + ve	Cows — ve	% — ve
1	15	12	80·00	3	20·00
2	12	7	58·33	5	41·67
3	5	4	80·00	1	20·00
4 and above	6	6	100·00	0	0·00

Regarding the incidence of causative organisms no detailed cultural examination was undertaken. But Hotis test was

performed to get the general idea about *Streptococcus agalactiae* shreded in the milk. Out of 38 cows studied 27 cows were showing at least one quarter positive for Hotis Test. This indicated that 71.05% of the total cows were shedding *Str. agalactiae* in their milk. Hotis test was considered a reliable test to detect the infection of *Str. agalactiae* as observed by Hotis and Miller (1936), Cone and Grant (1940), Narayanan and Iya (1953). Microscopic examination of Hotis positive test smears confirmed the long chains of *Streptococci*.

On Quarter Basis

Samples from 146 quarters were examined by D.M.L.C. (Direct Microscopic Leucocyte Count) and the results were tabulated in Table 3. Out of 146 quarters studied it was observed that 69 quarters were positive for mastitis which account for 47·26% incidence on quarter basis. The distribution of mastitis incidence according to individual quarter is given in the Table 3.

Left forequarters showed minimum infection i.e. 39·47% while right fore quarters showed maximum i.e. 55·55% infections. This was subjected to X^2 test and value of 2·176 was obtained, which proved nonsignificant, showing that there was no frequent involvement of any of the quarter with mastitis infection. The observation is in agreement with Narayanan and Iya (1953). Similarly the records of the present investigation related to fore and hind quarters were put to chi-square test and X^2 value in this respect also was nonsignificant ($X^2 = 0·0245$) which disproves the common belief that hind quarters are more prone to get infection though Kalra and Dhanda (1964) and Swarbrick (1968) noticed higher incidence in hind quarters.

Braund and Schultz (1963) observed that the incidence of mastitis was more

TABLE 3

Incidence of mastitis "on quarter basis".

Quarter position	*No. Examined*	*No. +ve* to D.M.L.C.*	*% +ve*	*No. —ve @ to D.M.L.C.*	*% —ve*
Right Side	72	36	50·00	36	50·00
Fore	36	20	55·55	16	44·45
Hind	36	16	44·45	20	55·55
Left side	74	33	44·59	41	55·41
Fore	38	15	39·47	23	60·53
Hind	36	18	50·00	18	50·00
Hind Quarters	72	34	46·22	38	53·78
Fore Quarters	74	35	47·03	39	52·97
TOTAL	146	69	47·26	77	52·74

* Leucocyte count above 500,000/ml. of milk.
@ Leucocyte count below 500,000/ml. of milk.

in the right side quarters of the udder. But in present study out of 72 right side quarters (including fore and hind) 33 were positive, though it appears that right side quarters had more incidence (50%) than the left side quarters (44·59%), statistically this difference was not significant, X^2 value of 0·238 was obtained using $R \times 2$ table. Present results were not in agreement with the findings of Braund and Schultz, (1963).

The presence of *Str. agalactiae* in milk samples from 146 quarter samples was studied with Hotis test in which 45 samples gave positive test accounting to 30·82% quarters shedding *Str. agalactiae* in the fore milk.

The incidence of mastitis reported in the present study appears high when compared to incidence of sub-clinical mastitis of 43·6% in cows reported by Sethi (1956-58), it is also more when compared to breed wise incidence e.g. Sindhi, Gir, Thari and Crossbred cows as reported by Narayanan and Iya (1953). In comparison of incidence reported by Bhatnagar and Malhotra (1969) in Hariyana, Rathi and Gir cows, the present incidence appears to be three times more than what they observed. However, noticeable difference is not found in the present study than those observed by Kalra and Dhanda (1964) in Punjab, and Pendse (1966) at Karnal.

In foreign countries *Str. agalactiae* has been regarded as the chief organism involved in subclinical cases as reported by Murphy (1956), Elipovic Marija (1956) and Smith (1966). But under Indian conditions *Staphylococci* are reported to be the main causative agents of mastitis according to findings of Kalra and Dhanda (1964), Bhatnagar and Malhotra (1969). In the present study the incidence of *Str. agalactiae* was shown to be high (71·05%) as detected by Hotis test.

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