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FACTORS AFFECTING THE INCIDENCE OF CLINICAL MASTITIS IN FRIESIAN COWS AND BUFFALOES UNDER THE PREVAILING FARM CONDITIONS IN U.A.R.

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An investigation on the incidence of clinical mastitis was undertaken in two herds of Friesians and buffaloes belonging to the Ministry of Agriculture. they included 1747 and 1691 lactation records of Friesian cows and buffaloes respectively and covered the period from 1960 to 1965. Records of another 465 paternal sisters belonging to 17 Friesian sires and another 387 buffaloes progeny of 19 sires were used to study the difference between daughter groups for susceptibility to clinical mastitis.

It was found that the incidence of mastitis increased with the advance in age. The percentage of mastitis friesian cows at the first lactation was 11.2 compared to 16 at the fourth. In the case of buffaloes the corresponding figures were 4.7% and 8.5%. Animals that had suffered from clinical mastitis were more liable to be infected again in the subsequent lactations and the percentage of re-infected animals increased with advancing order of lactation.

It was also found that 52% of the total cases of clinical mastitis occurred among Friesian cows during the first month after parturition corresponding to 54% fo the buffaloes. The data also showed that buffaloes are less susceptible to clinical mastitis than the Friesians. Differences between the two breeds were significant.

The percentage of mastitits cows vary widely between the daughter groups of different sires, ranging between zero to 28.2% for the Friesians and between zero to 20% for the buffaloes.

The mastitis animals showed a slight decrease in average milk yield than the normal ones though the differences were not significant.

Methods of controlling mastitis were discussed in details in the text.

Mastitis or udder inflamation is one of the major disease problems facing dairy industry today. Dairymen are well aware of the losses inflicted by mastitis such as reduction of milk yield, selling the mstitis cows at lower prices and the costs of treatment, prevention and replacements. Authorities in the United Kingdom have estimated the total losses inflicted by mastitis at a cost of £ 10-19 million per annum,(1) whereas the American dairy industry estimated the losses at 325 million a year(2).

(1) Leaflet No. 295 issued by the Ministry of Agriculture, Fisheries and Food, London (1964).

(2) Issued by Auburn University Extension Service, Auburn, Alabama, Circular No. 584.

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The present study investigates the incidence of clinical mastitis in the Friesian cows and buffaloes and whether there is a difference between the two breeds for susceptibility to mastitis. Moreover it investigates to what extent the daughter groups of different sires vary from each other in their resistance to clinical mastitis, It also deals with some fundamental causes which may contribute in incresing the degree of incidence of clinical mastitis such as age, stage of lactation and milk production.

Materials and Methods

The data used in this investigation were obtained from the records of two herds of Friesian cows and buffaloes belonging to the Ministry of Agriculture. The Friesian herd is stationed at the Sakha Experimental Farm whereas the buffalo herd is kept at Mehallet Mousa Farm. Both farms are located in the northern part of the Delta.

The data comprised 1747 lactation records of imported and locally born pure Friesian cows 'covering the period from 1960 to 1965, and 1961 lactation records of buffaloes during the same period. The two herds were kept under nearly similar conditions of management and feeding. All animals were hand milked twice daily. Cases of clinical matitis were recorded by the veterinarian and were recognized by the swollen or tender udder or the milk contained clots or discolored, also if the udder or the milk showed any other abnormalities.

In order to study the differences between sire daughter groups the records of another 465 paternal sisters group belonging to 17 Friesian sires and 387 buffaloes, progeny of 19 sires were used. These records covered the period from 1962 to 1967.

Results and Discussion

Effect of age

The effect of age, in terms of lactations, on the incidence of clinical mastitis among the Friesians and buffaloes is shown in Table 1. In case of the Friesians, it can be seen that the incidence of mastitis increased wih the advance in

TABLE 1.—INCIDENCE OF CLINICAL MASTITIS AMONG FRIESIAN COWS AND BUFFALOES AS AFFECTED BY LACTATION ORDER (1960-1965).

Order of Lactation	Friesian cows			Buffaloes		
	No. of cows	No. of Mastit. cows	%	No. of Buffaloes	No. of Mastitis Buffaloes	%
1st lactation . . .	773	87	11.25	782	37	4.73
2nd ,, ...	537	94	17.50	583	35	6.00
3rd ,, ...	263	36	13.69	279	16	5.73
4th ,, ...	125	20	16.00	47	4	8.51
5th ,, ...	49	7	14.28	—	—	—
Average			13.97			5.43

age. The heifers showed the lowest percentage of cows susceptible to mastitis (11.3%) which increased to 17.5, 13.7, 16.0 and 14.3% from the second to the fifth lactation respectively. The buffaloes showed the same trend as the percentage increased from 4.7 for heifers to 8.5 at the fourth lactaion.

It could be also seen that the older animals are more liable to infection than the younger ones. Probably this is because, with advancing age, the udder became more pendulous thus increasing the risk of injuring the udder and consequently the incidence of mastitis. Young et al (1960) reported that differences between cows in susceptibility to mastitis are associated with differences in udder height, the more susceptible cows are being those with more pendulous udder.

Inspection of Table 2 shows that the higher percentage of mastitis among older animals may be also due to the former infection. Mastitis being one of those diseases that do not result in a state of immunity but give srisk to a state of susceptibility. The cows that suffered from mastitis are more liable to be infected again, actually 22% of the infected number of cows which were infected in the previous lactation were reinfected again.

TABLE 2.—PERCENTAGE OF RE-INFECTED MASTITIS COWS DURING SUBSEQUENT LACTATIONS

Order of Lactation	No. of Mastitis cows	* No. of re-infected mast cows	%
1st lactation . .	87	—	—
2nd ,, . . .	94	21	22.34
3rd ,, . . .	36	13	36.11
4th ,, . . .	20	9	45.00
5th ,, . . .	7	4	57.1

Friesian cows during the second lactation were suffering from mastitis in the first, whereas 36% of cows contracted mastitis in the third lactation were previously infected during the first and second lactations. It is also obvious from the results presented in Table 2 that the percentage of re-infected cows increased with the advance in age.

Effect of Stage of Lactation

The incidence of clinical mastitis among the Friesians and buffaloes as affected by the stage of lactation is shown in Table 3. In both Friesians and buffaloes the highest percentage of the cases occurred during the first month after calving, whereas near the end of the lactation period the percentage dropped

TABLE 3.—INCIDENCE OF MASTITIS AMONG FRIESIAN COWS AND BUFFALOES AS AFFECTED BY STAGE OF LACTATION

Order of Lact.	Months of stage of lactation												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Friesian													
1st lactation ..	30	8	7	7	3	9	7	4	5	2	2	3	87
2nd „ ..	56	10	6	4	5	—	3	3	3	—	2	2	94
3rd „ ..	26	1	—	—	—	2	4	1	—	1	—	1	36
4th „ ..	11	1	—	3	2	2	—	—	—	—	—	1	20
5th „ ..	5	1	—	—	—	—	—	—	—	1	—	—	—
Total ..	128	21	13	14	10	13	14	8	8	4	4	7	244
Percentage %	52.46	8.61	50.33	5·74	4.10	5.33	5.74	3 28	3.28	1.64	1.64	2.87	
Buffalo													
1st lactation ..	18	6	2	1	1	3	—	3	2	—	1	—	37
2nd „ ..	20	5	1	3	3	—	1	—	—	1	—	1	35
3rd „ ..	11	—	3	—	—	—	—	—	1	—	—	1	16
4th „ ..	1	—	—	1	1	—	1	—	—	—	—	—	4
Total ..	50	11	6	5	5	3	2	3	3	1	1	2	92
Percentage %	54.34	11.95	6.52	5·43	5.43	3 26	2.17	3.26	3 26	1.08	1 08	2.17	

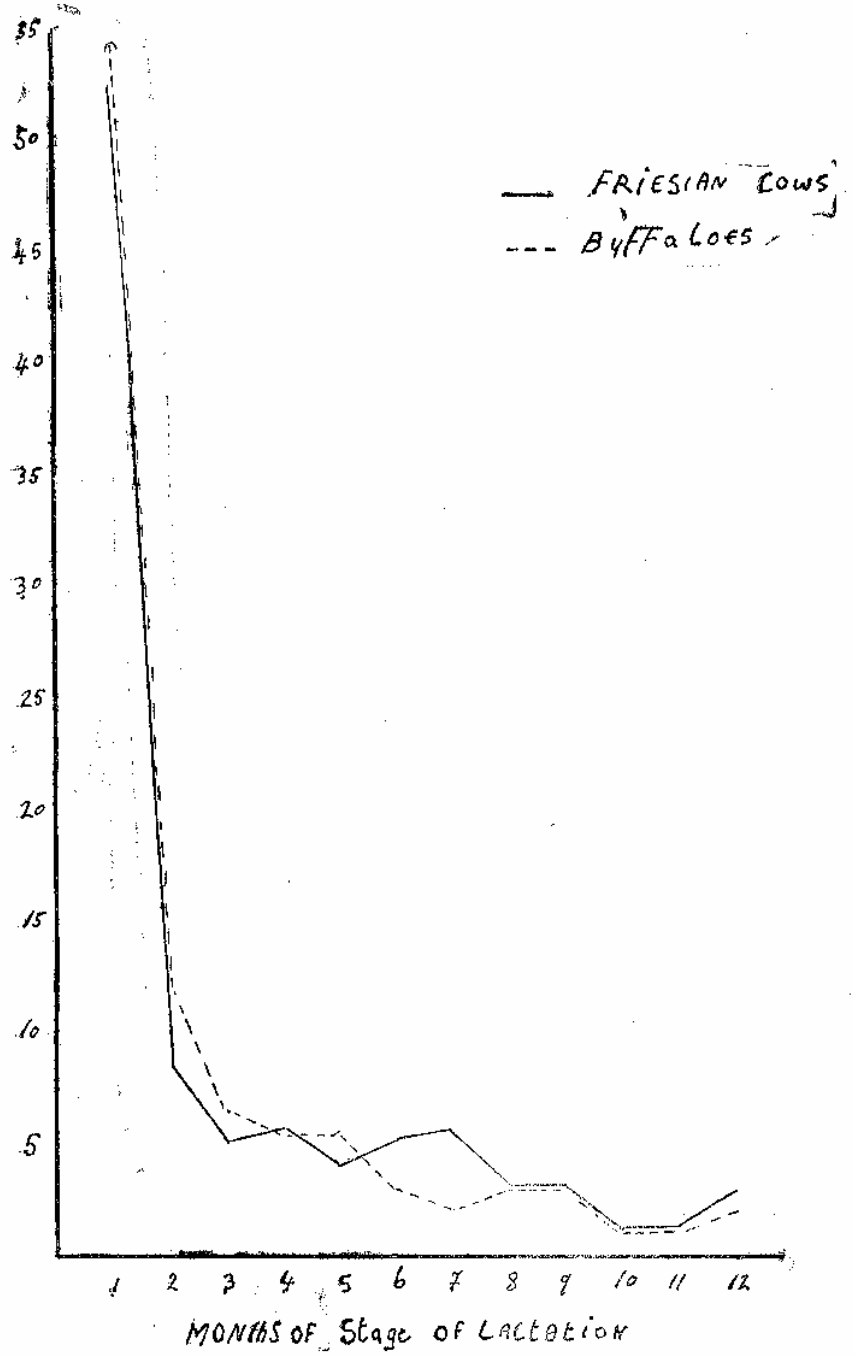
to the minimum. However, the decrease was sharp at the begining of the second month but remained fairly constant throughout most of the lactation period and then dropped again to minimum during the last three or four months. This becomes clear when the data is illustrated in Fig. 1. In the case of the Friesians, 52% of the cases occurred during the first month after parturition corresponding to a percentage of 54 for the buffaloes. In the second month the cases dropped to 8.6% and 11.9% for the Friesians and buffaloes respectively. By the end of lactation period the percentages fell to the lowest values.

The foregoing results agree with those of Ragab (1963) who found that 31.1% of the cases of mastitis took place during the first month of lactation, while the percentage dropped to 1.8 at the 12 the month. He stated that the heavy impulse of milk secretion during the first month of lactation may aid the infection to heighten at this period.

The effect of the previous dry period may partly offer another explanation for the observed higher incidence of mastitis during the early stage of lactation. Although mastitis could be developed during the dry period it passes unobserved because the infected cows are not milked, but at calving and commencement of milking these cows could be easily detected. This interpretation is supported by the present results showsn in Table 4. First, it can be noticed that the percentage of mastitis cases were relatively high at the first week of lactation as it was 40% and 25% of all cases in the Friesians and buffaloes respectively. This indicates that most of the cases were infected during the dry period. Secondly, since heifers do not have dry periods, it is expected that they relatively show a lower percentage of infection than the older cows at the first week after parturition. Examination of Table 4 explains this clearly and shows the sudden increase in the rate of infection at the second and following lactations. The Friesians display the phenomanon more pronounced than the buffaloes. The explantion of the effect of the dry period on the infections is also supported by the findings of Neave et al (1950) who reported that large numbers of infections occurred during the dry period and about half of them produced clinical symptoms within the first two weeks after calving.

TABLE 4.—PERCENTAGE OF FRIESIAN COWS AND BUFFALOES CAUGHTED MASTITIS DURING THE FIRST WEEK AFTER PARTURITION

Order of Lactation	Friesians			Buffaloes		
	No. of mastitis cows	No. of cows infected during the 1st Wk.	%	No. of Mastitis buffaloes	No. of buf. infect. during 1st, Wk,	%
1st lactation .	87	22	25.28	37	7	18.82
2nd ,, . .	94	43	45.74	35	8	22.86
3rd ,, . .	36	20	55.55	16	7	43.75
4th ,, . .	20	10	50.00	4	1	25.00
5th ,, . .	7	3	42.85	—	—	—
Total&Average	244	98	40.16	92	23	25.00



(FIG. 1) Percentage of cases of Mastitis for Friesian Cows and Buffaloes through the stage of lactation.

However the higher rate of mastitis at an early stage of lactation which is reported in the present study was not in agreement with the findings of Braund and Schultz (1963) who stated that seventy percent of quarters examined showed positive reactions to California mastitis test at the end of lactation. This controdiction may be attributed to the difference in system of milking. In the present study hand milking was used while in the other machine milking was practiced. It may be also due to the difference in management followed in the farm such as disinfecting in teast after the final milking which was not practiced in the present study. This may provide a good medium to bacteria to develop in the teat canal during the dry period.

Milk Production in Relation to Mastitis

The results presented in Table 5 show the differences in milk yield between the healthy and mastitis animals. Incomplete records and animals milking less than 200 days were excluded. It can be seen that the mastitis Friesian cows showed a slight decrease in average milk production below the normal ones. The difference between the two groups was more pronounced with advanced order of lactation as it was 136 lbs. in the first lactation and continued to increase progressively until it came to 336 lbs. in the fourth lactation. Nevertheless the difference between the two groups was not significant (t = 0399). The buffaloes which were infected nearly gave a similar result during the first and second lactations. The average milk production of mastitis buffaloes was 375 and 376 lbs less than the production of normal buffaloes in the first and second lactation respectively. However, in the third and fourth lactations the infected buffaloes showed a slight increase. The difference between the two groups was statistically insignificant (t = 0.5679) The present results agree with the findings of Ragab (1963), Afifi (1967) and Joan *et al.* (1950). Moreover, Rothe *et al.* (1964) concluded that mastitis caused a decrease in milk and fat production and stated that they were negatively correlated with bacterial counts. The possible interpretation of the results obtained is that clinical mastitis will some what depress the milk yield. Also it is quite possible that the susceptible animals had the greater milk production and may have been reduced because of irritation brought about by mastitis.

TABLE 5.—EFFECT OF MASTITIS ON TOTAL MILK YIELD OF FRIESIAN COWS AND BUFFALOES

Lactation Number	Friesian Cows					Buffaloes				
	Healthy		Mastitis		Diff.	Healthy		Mastitis		Diff.
	No. of cows	Aver. Milk yield l bs	No. of cows	Aver. Kilk yield l bs		No. of buff.	Aver. milk yield l bs	No. of buff.	Aver. milk yield l bs	
Lst lact. l. .	689	3254	84	3091	—163	570	2418	30	2043	—375
2nd lat. l. .	447	3754	90	3557	—197	473	2688	24	2312	—376
3rd lact. . .	232	4321	31	4119	—202	279	2792	7	2839	+ 47
4th lact. . .	107	5071	18	4735	—336	38	2523	3	2759	+236

Differences between Friesian cows and Buffaloes in susceptibility to mastitis.

From the preceeding results (Table 1) it appears that the buffaloes were less susceptible to clinical mastitis than the Friesians. A marked difference is noticeable between the two animals since the overall average percent of the mastitis Friesians was 13.97 compared to 5.13 for the buffaloes. Furthermore, the difference between the two breeds for the incidence of clinical mastitis during the first four lactations was significant ($t = 5.26$).

It seems that one of the major factors affecting the difference between the two breeds is heredity which has a great influence on the structure of the udder. Ease of milking which is controlled to an appreciable extent by genetic factors may influence the susceptiblity to mastitis between the two breeds. The Friesian cow is an easy milking animal compared to the buffalo. Abdel-Rahman (1964) found that the average milking rates for the Egyptian buffaloes and Friesian cows were 1.15 and 2.10 lb/min. He stated that the difference bet ween the two breeds is due to difference in the structure of the teat's sphincter. Since many investigators indicated that there was a positive relation between ease of milking and mastitis (Murphy, 1944, McEwen and Cooper, 1947; and Dodd and Neave, 1951), it is therefore expected to find a higher frequency of mastitis among Friesian cows than buffaloes.

Differences between daughter groups for clinical mastitis

The present study is extended to investigate whether variation existed between sires' daughter groups for susceptibility to clinical mastitis. From the results presented in table 6 and illustrated in Fig. 2 and 3 it is clear that the percentage of the mastitis Friesians vary widely between the different daughter groups of different sires and ranged between zero to 28.2%. The incidence of mastitis among the buffalo daughter groups also showed similar results for it ranged from zero to 20% (Table 6). This agrees with the findings of Reid (1954) who concluded that among 18 Jersey heifers from one sire the incidence of mastitis was 55% whereas among 15 heifers from another sire its frequency was less than 14%. Thus, it seems that sires vary in the degree of genetic resistance to clinical mastitis they transmit to their daughters. For instance, the daughter groups may differ from each other for udder structure which is controlled to a considerable extend by genetic influence. Daughters with loose, pendulous udders are exposed to the risk of being injured which is mostly followed by mastitis. Also daughters with large teat sphincter diameter are fast milking cows but are more susceptible to mastitis because it facilitates bacterial infection.

Since treatment alone with antibiotics will not control mastitis, carefull management must be continually emphasized. From the present study it appears that cows which have had mastitis are more likely to contract it again and consequently the role of the milker towards these cows could not be overlooked. An appreciable number of infections occured during the dry period, therefore more attention must be paid to the method of drying off the cows. Wayne and Macy (1933) and Neave et al (1950) concluded that intermittent

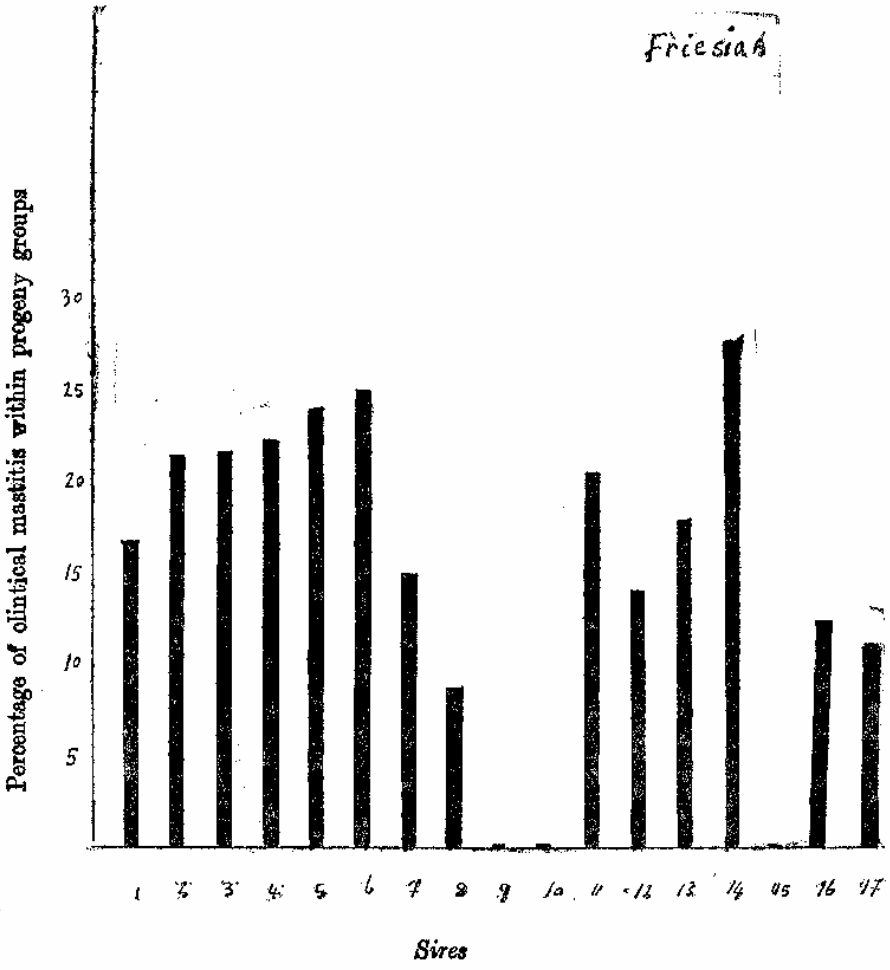
TABLE 6.—PERCENTAGE OF CLINICAL MASTITIS COWS AND BUFFALOES DURING THE FIRST THREE LACTATION PERIODS WITHIN PROGENY GROUPS

Friesian Cows				Buffaloes			
Sire	No. of daughters	No.of Mastitis daughter	%	Sire	No, of daughters	No. of Mastitis daughters	%
1	24	4	16.7	1	24	1	4.2
2	51	11	21.5	2	79	10	12.7
3	23	5	21.7	3	54	5	9.2
4	18	4	22.2	4	34	1	2.9
5	29	7	24.1	5	28	2	7.1
6	56	14	25.0	6	22	1	4.5
7	13	2	15.4	7	27	—	0
8	23	2	8.7	8	15	1	6.7
9	10	0	0	9	20	1	5.0
10	7	0	0	10	13	2	15.4
11	34	7	20.6	11	10	1	10.0
12	28	4	14.1	12	13	1	7.7
13	11	2	18.2	13	11	—	0
14	39	11	28.2	14	5	1	20.0
15	11	0	0	15	6	1	16.7
16	16	2	12.5	16	8	—	0
17	71	8	11.6	17	5	—	0
				18	6	1	16.7
				19	7	1	

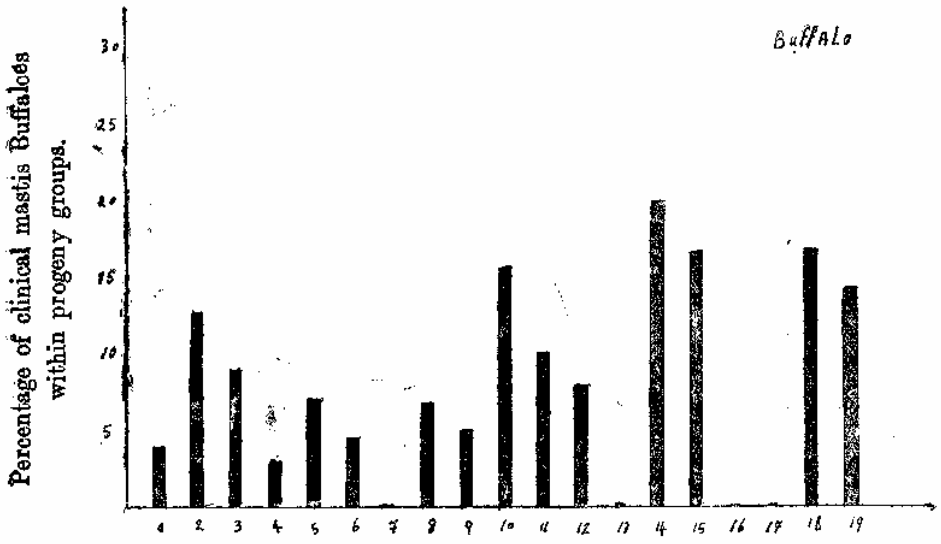
and incomplete milking usually resulted in somewhat higher bacterial counts in milk, whereas complete cessation of milking appeared to give the most satisfactory results. Disinfecting the teat after the last milking seems to be an important process to prevent the growth of bacteria in the teat canal duing the dry period. It may also have some influence in reducing the severity of incidence of clinical mastitis at the early stage of the following lactation.

The most obvious factors associated with mastitis is injuring the tip of the teat. This can be reduced by providing an adequate stall width in cowsheds and providing the floor with a clean suitable bedding.

The present study showed that progeny groups of different sires vary from each other in their susceptibility to clinical mastitis. Therefore, selection against sires whose progeny show relatively high incidenc of mastitis could partly play a role in reducing the spread of the disease. On the other hand, the



(FIG. 2.) Percentage of clinical of mastitis cows during the first three lactation periods within progeny groups.



(FIG. 3.) Percentage of clinical Mastitis Buffaloes during the first three Lactation periods within progeny groups.

values for heritability of mastitis obtained by various authors (Table7) are low and fluctuate between 0.05 - 0.38. Consequently, it seems that depending only on mass selection against clinical mastitis will lead to a very slow genetic improvement per generation. Herd management therefore, is the most effective way to control the disease and to prevent the spread of organisms from cow to cow. Selecting against cows severely affected in and favor of sires whose dams and daughters demonstrated resistance to mastitis, may contribute to the control of the disease.

TABLE 7.—SOME ESTIMATES OF THE HERITABILITY OF MASTITIS

Heritability	Reference
—12	Afifi (1968).
—10	Schmidt *et al* (1964).
—13	Gaunya (1962).
—05	O'Bleness *et al* (1960).
—23	Young *et al* (1960).
—27	Legotes *et al* (1952).
—38	Lush (1950).

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العوامل التى تؤثر على حدوث مرض التهاب الضرع في الأبقار والجاموس تحت ظروف الرعاية السائدة فى الجمهورية العربية المتحدة

الملخص

البيانات التى استخدمت فى هذه الدراسة حصل عليها من سجلات اللبن الخاصة بمحطتى البحوث التابعة لوزارة الزراعة بسخا ومحلة موسى. وقد تتبع حدوث مرض التهاب الضرع خلال ١٧٤٧ موسم حليب للأبقار الفريزيان ، ١٦٩١ موسم حليب للجاموس وذلك فى الفترة ما بين ١٩٦٠ — ١٩٦٥ هذا بالاضافة بأنه قد استخدمت سجلات أخرى خاصة بـ ٤٦٥ بقرة فريزيان يمثلون بنات ١٧ ثور فريزيان وسجلات ٣٨٧ جاموسة يمثلون ١٩ فحل جاموس خلال الفترة من ١٩٦٢—١٩٦٧ وذلك لدراسة الفرق بين مجاميع بنات الثيران المختلفة من حيث قابليتها للاصابة بمرض التهاب الضرع . وقد شخصت حالات الاصابة بواسطة الطبيب البيطرى المشرف على كل محطة وفيما يلى النتائج التى حصل عليها .

١ — تزداد الاصابة بالالتهاب الضرع بتقدم الحيوان فى العمر فقد كانت نسبة عدد الأبقار الفريزيان المصابة خلال موسم الحليب الأول ٢ر١١٪ بينما بلغت هذه النسبة ١٦٪ خلال موسم الحليب الرابع . أما فيما يختص بالجاموس فقد بلغت نسبة الحيوانات المصابة ٧ر٤٪ ، ٥ر٨٪ خلال موسم الحليب الأول والرابع على التوالى .

٢ — الأبقار التى تصاب بمرض التهاب الضرع لها قابلية الاصابة مرة اخرى خلال مواسم الحليب التالية وتزداد نسبة الأبقار التى يتكرر اصابتها بتقدم العمر .

٣ — أعلى نسبة من حالات الاصابة بالتهاب الضرع تحدث خلال الشهر الأول عقب الولادة فبلغت نسبة حدوث الاصابة خلال هذه الفترة ٥٢٪ ، ٥٤٪ من مجموع حالات الاصابة بالتهاب الضرع للبقر والجاموس على التوالى .

٤ ــ الجاموس أقل قابلية للاصابة بمرض التهاب الضرع من الأبقار الفريزيان كما انه يوجد فرق معنوى بينهم من حيث الاصابة بالمرض .

٥ ــ نسبة الأبقار الفريزيان المصابة تختلف اختلافا كبيرا بين مجاميع بنات الثيران المختلفة فقد تراوحت هذه النسبة بين صفر الى ٢د٢٨٪ بينما تراوحت من صفر الى ــ٢٠٪ بين مجاميع بنات فحول الجاموس المختلفة .

٦ ــ الأبقار المصابة بالتهاب الضرع انخفض انتاج لبنها انخفاضا طفيفا عن الأبقار السليمة الا أن الجاموس المصاب خلال موسم الحليب الثالث والرابع زاد انتاج لبنه زيادة طفيفة عن انتاج الجاموس السليم خلال هذه المواسم . الا أن هذه الاختلافات فى انتاج اللبن بين مجموعتى الحيوانات المصابة والسليمة بكل من الأبقار والجاموس لم تكن معنوية .