

The incidence of coliform mastitis caused by *E.coli*

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Summary

Dairy project of private sector was selected to find out the incidence of mastitis due to *E.coli* or other pathogen .This dairy project was under bad managemental feeding, housing and health practices. This dairy project was included 80 cows ,thirty two cows were at milking period while the other 48 were dry .Milk samples from the teats of each milking cow was collected to find out the infected quarters or udder with mastitis either by *E.coli* or other microorganism using nutrient agar ,eosin methylene blue agar and MacConky agar then using the biochemical test as completed tests .The result revealed that twenty six cows out of thirty two were shown positive result with mastitis .*E.coli* infection was highly designated (65.38 %).Single infected quarters showed high infection rate .Anterior right and posterior left quarters recorded higher infection rate than other quarters. Single infection of the anterior right quarter manifested among other single infected quarters .*E.coli* was not specialized in any quarter.

مدى انتشار التهاب الضرع بعصيات *E.coli* في قطاع خاص لابقار الحليب

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الخلاصة

تم اختيار مشروع ابقار حليب لقطاع خاص ذو ادراة غير جيدة لمعرفة مدى الاصابة بالتهاب الضرع ا ب *E. coli* او غيرها من لجراثيم . ضم هذا المشروع 80 بقرة منها 32 بقرة كانت في مرحلة الحلب و الباقي (48 بقرة) كانت جافة . تم اخذ عينات من الحليب من جميع الحلمات لكافة الابقار التي كانت في مرحلة الحلب لمعرفة مدى الاصابة للارباع بالتهاب الضرع .اظهرت النتائج ان 26 بقرة من اصل 32 كانت مصابة بالتهاب الضرع وان الاصابة بالـ *E. coli* كانت مرتفعة جدا (65.38%) . سجلت الاصابة ربع واحد النسبة الاكبر من حيث نسب الاصابة ,في حين عند الاصابة بربعين كانت النسبة الاكبر للاصابة بالربعين الامامي الايمن والخلفي الايسر

Introduction

Mastitis is an inflammation of the udder and is common in dairy herds causing important economic losses (1) .It cannot be eradicated, but can be reduced to low levels by good management of dairy cattle. It remains a major cause of financial loss to the dairy industry and is considered to be the most economically

important disease of dairy cattle, accounting for 38% of the total direct cost of all common production disease of United Kingdom (2). Of the several causes of mastitis only microbial infection is important. The most common pathogens are (*Staphylococcus aureus*, *Streptococcus agalactia*, *Streptococcus dysgalactia*, *Streptococcus uberis* and *Escherichia coli*, though other pathogens can cause occasional herd outbreak (3). In many herd, 25 -60 % of clinical mastitis is caused by coliform pathogens, primarily *E.coli* (4). *E.coli* lives in manure, or dirty, wet and muddy areas, polluted water, dirty milking equipment, udder infection can occur between milking, but also caused by poor milking practices and probably can penetrate the teat canal during milking causing infection (5). However, *E.coli* is recognized as a highly adaptive organism existing, both as a commensal and as pathogenic organism (6). (7) Found that only 6% of Coliform Clinical mastitis cases has been found during lactation occurred in quarters sub-clinically infected at calving in five united kingdom herds.

(5) reported that cows in low somatic cell count (below 200,000 -300,000) herds are most susceptible to environmental Streptococci and coliform infection after drying off a just prior to calving but which appear in early lactation. Therefore, In Netherlands (8) found that in 20,478 cows from 274 herds with somatic cell count below 400,000 (The regulatory limit in Europe); 28.5 % of the cows had clinical mastitis during a year and a half period (41 cases per 100 cows per year); of these 42 % were caused by environmental pathogens which include the other Streptococci and coliforms. In USA, (9) have been reported that in 4,957 cows from 67 herds in 14 states of environmental pathogen infection by Streptococci; 11.5 % of cows and 3.9 % of quarters coliform 5.0% of cows and 1.3 of quarters, *S.aureus* 11.5 % of cows and 4.0 % of quarters and streptococcus *agalactiae*, 6.5% of cows and 4.3 quarters. However, (10) reported that 35% of clinical cases were due *E.coli* and 24% of *E.coli* mastitis was due to recurrent clinical episodes in same quarter.

There for, the aim of this study was to monitor sub-clinical *E.coli* mastitis on a field of private sector of dairy project in Sulaimani province in order to assess the importance of this case on production rate and milk yield.

Materials and Methods

Herd selection

The herd was selected on the basis of owner complained from a reduction in milk yield, and as a pre cautionary for presence of sub-clinical mastitis in Sulaimani Province.

Herd History

In spring, 2005, there was 150 cows were reared in private sector of Dairying Project which recently brought them from south of Iraq . Their age was ranged between 5-7 years, but no more details were known about them.

In summer , 2005, 60 cows were died caused by acute Theileriasis and 10 cows were sold .At that time the owner complained from a significant gradual decrease in milk yield and reached up to 0.5 kg / day after they produced 5-10 kg / day each .However ,the herd composed 80 cows of Friesian breed , 32 cows were only in lactated period . The herd was reared in a small closed restricted field, where there was no grazing pasture for cows was offered for grazing. Therefore, the movement of the cows was restricted inside the building. All cows were fed as a group on concentrate diet and roughages.

Milk samplings

All udders, quarters and teats were washed and disinfected by disinfectant (diluted detol) and wiped.

The first few drops of milk of each teat obtained were discarded .Then the samples had been collected in a sterile test tubes , in which were numbered by the cow number and each four tubes labeled by AR (anterior right) , PR (posterior right) , AL (anterior left) and PL (posterior left).

All samples had been collected with in two hours after that they kept in a cool box up to get the laboratory for bacteriological test.

Bacteriological test:

The samples were submitted to the Sulaimani University , college of Veterinary Medicine, Food Hygiene laboratory , where the samples cultured and the results recorded.

The samples firstly cultured on Nutrient agar for enhancement of growth at 37 c for 4 hr then it recultures on:

1. EMB (Eosine methylene blue) agar (a selective and differentiated media for *E.coli*) on which it produce Greenish metallic sheen.
2. MacConkey agar (other selective media for Coliform bacteria) on which it ferment lactose producing dark Pink a colored colony. The positive results were confirmed by Gram stain and under microscope they Appear pink, stumpy and non - sporulated.
3. Then to differentiate the *E.coli* microorganism from the other Enterobacteriaceae microorganisms ,and as completed biochemical test ,which give appositve result in Indole and Methyle red tests ,while give negative results for Vocus percouse test and Simon citrate test.

Results

The total number of Dairy cattle of this Dairy project was 80 cows. Thirty two cows were at lactated period (40%), while the other 48 cows were at dry period (60%). This decline in the number of the lactating cows could be due to the bad manage mental, feeding and health's practices at that field.

However, twenty six cows (81.75%) of the lactated cows showed positive infection with mastitis with different pathogens and only six cases (18.75%) showed negative ones by using different media of cultures (Table , 1) .

In the mean time, 17 animals out of 26 positive infected cases (65.38%) were infected by *E.coli* , where as the remaining nine cases (34.61%) were due to other microorganisms . This indicate that the sub – clinical mastitis in this Diary project caused by *E.coli* and is about twice times of other pathogens (Table 1) Out of the total infected cases , 13 cases (50%) were only infected single quarter ; seven cases (53.9%) were infected with *E.coli* while the other six cases (46.1%) were due to other microorganisms, however, five cases showed two infected quarters, viz. ; four cases with *E.coli* and one case with other microorganisms(Table,2).

In the mean time four cases showed three infected quarters, two of them were due to *E.coli* and the other two cases were due to the other microorganism, however, four cases showed that all quarters were only infected with *E.coli*(Table 2)

The total infected quarters with pathogen environmental mastitis was 51 out of 104 quarters of the only infected cows (48.07%).The posterior left (15) and anterior right (13) recorded mathematically ,higher values than the anterior left and posterior right (12,11 quarters respectively).The posterior left quarters showed the highest infection(12 cases) with *E.coli* while the anterior right quarters recorded the highest infection by other microorganisms(Table,3).

The infected single quarter designated in the anterior right which showed seven cases out of 13 infected single quarter, Three cases were due to *E.coli* and four cases due to other microorganisms (Table , 4 and5), then followed the posterior left which showed four infected single quarter(three cases by *E.coli* and one case by other microorganisms, However, the infected double quarters (10 cases) was designated in the posterior left which showed five cases), three were due to *E.coli* and two cases due to other microorganisms , while the anterior left quarters showed four cases , in which two cases for both pathogens studied infection.

In the mean time, the infected three quarters were distributed for all quarters, but *E.coli* pathogen designated the highest infection (75%).

Table (1): The infected quarters and cows with E.coli and other Microorganisms

No. of cow (sample)	The infected quarter	Nutrient	EMB	Mac	Results
1.	-	--	--	--	Nil
2.	-	--	--	--	Nil
3.	All quarters	+	+	+	E.coli
4.	-	--	--	--	Nil
5.	-	--	--	--	Nil
6.	AL,PL	+	+	+	E.coli
7.	PR,PL	+	+	+	E.coli
8.	-	--	--	--	Nil
9.	AR,PR,AL	+	+	+	E.coli
10.	PL	+	--	--	Other M. O
11.	PR	+	--	--	Other M. O
12.	AL,PL	+	+	+	E.coli
13.	All quarters	+	+	+	E.coli
14.	AR	+	+	+	E.coli
15.	AL,PL	+	--	--	Other M. O
16.	AL,PL	+	--	--	Other M. O
17.	AR,PR,AL	+	--	--	Other M. O
18.	AR	+	--	--	Other M. O
19.	AR	+	--	--	Other M. O
20.	PL	+	+	+	E.coli
21.	AR	+	+	+	E.coli
22.	AR	+	--	--	Other M. O
23.	PR,AL,PL	+	+	+	E.coli
24.	AR	+	+	+	E.coli
25.	AR	+	--	--	Other M. O
26.	PL	+	+	+	E.coli
27.	-	--	--	--	Nil
28.	PR	+	+	+	E.coli
29.	PL	+	+	+	E.coli
30.	All quarters	+	+	+	E.coli
31.	All quarters	+	+	+	E.coli
32.	PL,PR,AL	+	+	+	E.coli

Note AL Anterior left
 PL posterior left
 AR Anterior right
 PR posterior right
 M.O Microorganism

Table (2): Different numbers of cow quarters infected with *E.coli* And / or other microorganisms and their ratios

No. of quarter infected	Total No.	<i>E.coli</i>		other microorganisms	
		No.of cases	%of total	No.of cases	%of total
Single quarter	13	7	53.9	6	46.1
Two quarters	5	4	80.0	1	20.0
Three quarters	4	2	50.0	2	50.0.
All quarters	4	4	100.0	0	0
Total	26	17	65.39	9	34.61

Table (3): Different quarters infected of the total quarters infected with *E.coli* and / or other microorganisms and their ratios

Infected Quarters	Total No.	<i>E.coli</i>		other microorganisms	
		No. cases	%of total	No. cases	%of total
Anterior left	12	4	75.0	3	25.0
Posterior left	15	12	80.0	3	20.0
Anterior right	13	8	61.5	5	38.5
Posterior right	11	9	81.8	2	18.2
Total	51	38	74.5	13	25.5

Table (4):- Different infected numbers single, two, three, all infected Quarter and their ratios with *E.coli* and other microorganisms

Quarter Infected	Single infection		Two quarters infection		Three quarters infection		All quarters infection	
	No.	%	No.	%	No.	%	No.	%
Anterior left	0	0	4	40	4	33.3	4	25
Posterior left	4	30.8	5	50	2	16.7	4	25
Anterior right	7	53.9	0	0	2	16.7	4	25
Posterior right	2	15.3	1	10	4	33.3	4	25
Total	13	100	10	100	12	100	16	100

**Table (5): Different infected numbers of quarters, single, two, and three
And all quarters either with *E.coli* or other microorganisms**

Infected Quarter	Single		Two quarters		Three		All quarter	
	<i>E .coli</i>	<i>Other micro</i>	<i>E .coli</i>	<i>Othe r micro</i>	<i>E .coli</i>	<i>Other micro</i>	<i>E.coli</i>	<i>Other micro</i>
Anterior left	0	0	2	2	3	1	4	0
Posterior left	3	1	3	2	2	0	4	0
Anterior right	3	4	0	0	1	1	4	0
Posterior right	1	1	1	0	3	1	4	0
Total	7	6	6	4	9	3	16	0

Discussion

One major problem confronting all studies of this type of disease is the reliance on herd to identify and led a reduction in milk yield. The gradual decrease should be monitored and watched carefully, and owners should be trained and motivated to a ware when they first observe these changes (10) .Sub – clinical coliform mastitis can occur via two different ways; Either as a result of infection from the environmental pool or as a result of persistence of organisms with the mammary gland (11)

The high incidental rate (81.25%) of sub-clinical infection is of interest. It could be argued that this is suggestive of cow susceptibility and that these cases were occurring in particularly susceptible cows(11).(12) reported that contagious infections are caused by pathogens and are usually spread from infected to non – infected cows during milking , in addition , milker` s hand, wash clothes , flies ,manure or dirty wet and muddy areas ,polluted water are ways in which the infection can spread from cow to cow in which these problem were designated in this Dairy project .However , (9 &13)found much lower infection rate (34.5 and 50.4% respectively).

The most frequently (65.38%) isolated pathogens is *E.coli* which was in agreement with the findings by (13), while (14) found lower infection rate by *E.coli* (30-40%)

Single infected quarters showed the highest infection rate (50%) out of two , three of all infected quarters , this mean that by time the other quarters were infected later because of the pathogens are usually spread from infected to non-infected quarters of cows during milking practices(5)

The infected quarters out the total quarters of infected cows was high (48.07%) composed with those found by (9),this high infection rate could be due to bad managerial hand milking and precaution practices .*E.coli* pathogens

designated the highest infection rate (74.5%), while (9) showed that *E.coli* was the lowest cause of mastitis compared with other pathogens.

However, the high infected quarters of the anterior right (13 cases) and posterior left (15 cases) could be as a result of hand milking which always has been done firstly from the right position of the cow, mean that the anterior right and posterior left be milked firstly together by hand milking followed the other two quarters which is a result of unwashed hands of the milker which was really noticed, and is documented from the results observed in table(4) that the anterior right and posterior left were designated in their infection due to single quarter infection.

No special attention be noticed in different quarters infection by *E.coli* or other microorganism because of lack observation.

Therefore, it could be concluded that high mastitis infection rate was noticed, *E.coli* was designated pathogens in causing mastitis High quarters infection was recorded and the anterior right and posterior left quarters were more infected them the other quarters and single quarter showed the highest infection rate.

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