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## Effect of mastitis on milk Lactose, Chloride and Koestler's Number

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**Abstract:** Two farms were examined for the presence of mastitis. The incidence of the disease was 20.1 per cent for the 1st farm and 36.4 per cent for the 2nd one. Chemical analysis for lactose and chloride contents and calculation of Koestler's number revealed their alteration compared to normal cases. Generally speaking, the effectiveness of milk-borne organisms of the 2nd farm on milk lactose content was more potent than that of the 1st farm. The reverse effect was observed concerning the chloride content. The result proved that the decrease in milk lactose content and/or the increase in milk chloride content can be used as an index for suspecting the presence of subclinical mastitis.

**Key Words:** Milk lactose content, milk chloride content, Koestler's number and sub clinical mastitis

### Introduction

Mastitis is a disease having different causes, different degrees of intensity and variations in duration and residual effects. The severity of the disease may be classified clinically as acute, sub acute or chronic. The most important phase in the disease is the sub-clinical phase which can not be detected without bacteriological and chemical analysis. The former type of analysis showed that microorganisms associated with the disease varied greatly, but in all cases, *Staphylococcus* spp., *Straptoicoccus* spp. and *E. coli* were the major groups (Harrop *et al.*, 1977; Egan, 1982; Alshwabkeh and Abdul Aziz, 1987; Tarigan *et al.*, 1988; and Ahl *et al.*, 1989).

Several factors controlled the incidence of mastitis such as age and type of the animal (Zjalic, 1976; Batra, 1979; Belyaev, 1992), hygiene management of the farm (Yosai *et al.*, 1980) and increase in the number of lactation (Al Shawabkeh and Abdul Aziz, 1987).

In this work, lactose and chloride contents as well as Koestler's on were analyzed in mastitic milk samples collected from two different farms. The occurrence of the disease was due to the presence of *Staphylococci*, *Streptococci* and *E. coli* (Mahmoud, 1993). These organisms were present either singly or in mixed cultures. These above mentioned parameters were analysed since their concentration were altered due to the presence of disease and this alteration was considered as a sign for suspecting the presence of the disease (Horvarth *et al.*, 1980; Kuzmina, 1981; Majewski, 1982; Schulz *et al.*, 1988; Casadocimiana and Garcia Alvarez, 1989).

### Materials and Methods

Mastitic milk samples were collected from two farms, 66 milk samples from the 1st farm and 36 samples from the 2nd one. Ten non mastitic milk samples from both farms were collected all under aseptic conditions and kept in a ice box until analysis (Mahmoud, 1993).

Analysis of milk chloride content was done according to the method of Ling (1963).

Milk lactose content was calculated after the method adopted by Barnet and Tawab (1957).

All milk samples-mastitis or non mastitic-were statistically analyzed using F-test method.

### Results and Discussion

In the 1st farm, bacteriological analysis revealed that the infection was due to *Streptococci* and *Staphylococci* present singly in the collected milk samples. But in the 2nd farm, the presence of mastitis was due to *Staphylococci*, *Streptococci* and *E. coli* either in a mixed cultures or present singly in the mil samples (Mahmoud, 1993). The effect upon milk lactose and chloride contents as well as Koesther's number was presented in Tables 1 and 2 after subjecting to statistical analysis. For simplicity of the tables, only the higher and lower significant results of each test milk samples were recorded.

**Effect on milk lactose content:** In the 1st farm, the effect of *Streptococci* was higher than that of *Staphylococci* (Table 1). The prominent effect was observed by *Streptococcus agalactiae* which caused a decrease in lactose content by a value varying from 7.2 - 14.7 per cent

Organisms isolated from the 2nd farm were effective upon milk lactose content when present in mixed cultures than that single one (Table 2) as shown by the different representatives, the highest effect was shown by culture containing *S. aureus*, *S. saprophyticus* and *Enterococcus faecalis* causing a decrease varying between 15.2-27.6 per cent .

**Effect of milk chloride content:** The results of the 1st farm showed that *Streptococci* had an effect on chloride content causing its increase. The highest effect was shown by *Enterococcus faecalis* causing a value varying between 10.8 and 51.7 per cent (Table 1). In case of the 2nd farm, the significant effect of the isolated organisms was restricted to some of the samples and not all of them (Table

Morsi *et al.*: Mastitis on Milk

Table 1: Effect of different organisms present in mastitic milk samples isolated from the 1st farm on milk lactose and chloride contents and Koestler's No.

Milk-borne samples	Lactose content		Chloride content		Koestler's No.	
	Mean	% D	Mean	% I	Mean	% I
	C 4.850		C 0.147		C 3.027	
<i>Staphylococcus epidermidis</i>						
TS = 5	T 4.60	5.10	-	-	3.500	15.6
*S S = 5 <sup>a</sup> , 0 <sup>b</sup> , 4 <sup>c</sup>	4.46	7.90			3.400	12.3
LSD at 5 % = 0.125 <sup>a</sup> , 0.357 <sup>c</sup>						
<i>S. saprophyticus</i>						
TS = 5	T4.600	5.10	0.17	15.60	3.68	21.8
S S = 5 <sup>ac</sup> , 1 <sup>b</sup>	4.533	6.50			3.30	9.12
LSD at 5 % = 0.125 <sup>a</sup> , 0.014 <sup>b</sup> , 0.309 <sup>c</sup>						
<i>S. aureus</i>						
TS = 11	T4.600	5.10	0.19	29.25	4.60	51.97
S S = 11 <sup>ac</sup> , 3 <sup>b</sup>	4.400	9.28	0.18	22.45	4.40	45.36
LSD at 5 % = 0.103 <sup>ac</sup> , 0.017 <sup>b</sup>						
<i>Streptococcus agalactiae</i>						
TS = 36	T4.500	7.22	0.22	49.60	5.23	72.88
S S = 36 <sup>ac</sup> , 34 <sup>b</sup>	4.130	14.78	0.17	15.65	3.54	17.18
LSD at 5 % = 0.155 <sup>a</sup> , 0.016 <sup>b</sup> , 0.421 <sup>c</sup>						
<i>Enterococcus faecalis</i>						
TS = 96	T4.500	7.22	0.223	51.7	5.23	73.01
S S = 9 <sup>ac</sup> , 6 <sup>b</sup>	4.260	12.02	0.163	10.8	3.48	14.97
LSD at 5 % = 0.131 <sup>a</sup> , 0.014 <sup>b</sup> , 0.360 <sup>c</sup>						

C = Control D = decrease in relation to control a = refers to lactose sample T = Test sample  
 I = Increase in relation to control b = Refers to chloride sample TS = TS = No. of test sample SS = No. of significant sample  
 = refers to Koestler's No.

Table 2: Effect of different organisms present in mastitic milk samples isolated from the 2nd farm on milk lactose and chloride contents and Koestler's no.

Milk-borne samples	Lactose content		Chloride content		Koestler's No.	
	Mean	% D	Mean	% I	Mean	% I
	C 4.840		C 0.166		C 3.420	
<i>Staphylococcus epidermidis</i>						
TS = 4	T4.200	13.20	-	-	-	-
*S S = 4 <sup>a</sup> , 0 <sup>bc</sup>	4.400	9.09				
LSD at 5 % = 0.161 <sup>a</sup>						
<i>S. saprophyticus</i>						
TS = 1	T4.600	4.96	-	-	-	-
S S = 1 <sup>a</sup> , 0 <sup>bc</sup>						
LSD at 5 % = 0.237 <sup>a</sup>						
<i>S. aureus</i>						
TS = 14	T3.700	23.5	0.200	20.48	4.877	42.77
S S = 14 <sup>a</sup> , 8 <sup>b</sup> , 14 <sup>c</sup>	4.300	11.16	0.190	14.46	3.967	15.89
LSD at 5 % = 0.152 <sup>a</sup> , 0.017 <sup>b</sup> , 0.443 <sup>c</sup>						
<i>S. aureus</i> + <i>Enterococcus faecalis</i>						
TS = 4	T3.700	23.55	-	-	4.610	34.68
S S = 4 <sup>a</sup> , 0 <sup>1c</sup>	4.000	17.36				
LSD at 5 % = 0.188 <sup>a</sup> , 0.722 <sup>c</sup>						
<i>S. aureus</i> + <i>S. epidermidis</i> + <i>Strep. agalactiae</i>						
TS = 5	T3.500	27.69	0.183	10.24	4.953	44.70
S S = 7 <sup>ac</sup> , 1 <sup>b</sup>	4.100	15.29			4.200	22.70
LSD at 5 % = 0.184 <sup>a</sup> , 0.012 <sup>b</sup> , 0.442 <sup>c</sup>						
<i>S. aureus</i> + <i>S. epidermidis</i> + <i>Strep. agalactiae</i>						
TS = 5	T3.800	21.49	0.183	10.24	4.820	40.90
S S = 5 <sup>ac</sup> , 1 <sup>b</sup>	4.000	17.36			4.000	16.86
LSD at 5 % = 0.162 <sup>a</sup> , 0.015 <sup>b</sup> , 0.509 <sup>c</sup>						
<i>S. aureus</i> + <i>S. epidermidis</i> + <i>S. saprophyticus</i> + <i>E. coli</i>						
TS = 1	T4.200	13.20	-	-	4.120	20.45
S S = 1 <sup>ac</sup> , 0 <sup>b</sup>						
LSD at 5 % = 0.224 <sup>a</sup> , 0.460 <sup>c</sup>						

C = Control D = decrease in relation to control a = refers to lactose sample T = Test sample  
 I = increase in relation to control b = refers to chloride sample TS = No. of test sample  
 SS = No. of significant sample c = refers to Koestler's no sample