

## SOME MICROBIOLOGICAL PARAMETERS OF COLOSTRUM OBTAINED FROM SIMMENTAL COWS

Özlem ERTEKİN<sup>1</sup> and Murat ÇİMEN<sup>2\*</sup>

<sup>1</sup>Department of Nutrition and Dietetics, Faculty of Health Sciences,  
Munzur University, Tunceli, Turkey

<sup>2</sup>Department of Plant and Animal Production, Vocational School of Tunceli,  
Munzur University, Tunceli, Turkey

E-mail: mcimen19@gmail.com (\*Corresponding Author)

**Abstract:** The aim of the research was to evaluate the microbiological composition of colostrum samples collected from Simmental cows raised in a special dairy farm. For this purpose, ten Simmental cows were selected from a commercial dairy herd. Mean of the total bacteria counts (15309, CFU/mL) of the colostrum obtained from the Simmental cows in our study is quite appropriate for milk hygiene. Yeast/mold could not be detected in colostrum samples. In the samples investigated, the mean numbers of *Micrococcus/Staphylococcus* and coliform bacteria were determined as 1660 CFU/mL and 13565 CFU/mL. Since, our study is performed on Simmental cows, new studies on the microbiological parameters of other dairy cow breeds should be done.

**Keywords:** Colostrum, Total bacteria, Coliform, *Micrococcus/Staphylococcus*, Yeast/mold.

### Introduction

Dairy calves are less susceptible to diseases during the first days of life due to the use of colostrum with a higher nutritional and microbiological quality (DeNise et al., 1989). Newborns have problems due to the lack of hygienic care related to colostrums manipulation. Negative factors such as microorganisms on in terms of hygiene of colostrums can increase in the duration of the post-parturition, and herewith mortality may increase in newborns (Faber et al., 2005; Godden, 2008). These microorganisms may occur from the mammary gland or contaminate the colostrum during milking, manipulation, and storage (Stewart et al., 2005). It is also possible that colostrum can be contaminated with feces containing bacteria or that teats can be contaminated with bacteria, and a calf may then ingest bacteria at colostrum feeding without bacteria actually being excreted in the colostrum (Sweeney, 1996). In the literature search, we did not find any basic research showing microbiological characteristics of the colostrum obtained from Simmental cows. However, colostrum is so important for offspring life. There is a need for studies to determine the microbiological structure of colostrum for each dairy cow breed. It is necessary to investigate the information on colostrum in order to maintain the desired rate of offspring affecting the profitability

especially for dairy farms. The objective of this study was to evaluate the microbiological composition of colostrum samples collected from Simmental cows raised in a special dairy farm.

### **Material and Methods**

*Animals:* With an aim of evaluate the microbiological composition of colostrum samples, total 10 Simmental cows were selected from a commercial dairy herd.

*Milk samples and laboratory analysis:* At least 100 ml of colostrum was obtained from individual cows in the first day of postpartum period. For microbiological analyzes, 10 mL of milk samples were taken and homogenized by adding 90 mL of sterile peptone water. Thus, a  $10^{-1}$  (1/10) dilution of the sample was prepared. Dilutions up to  $10^{-5}$  were made from this dilution. Plate Count Agar medium was used for counting of total microorganisms. The plates were incubated at 30 °C for 72 hours and colonies formed were counted (ICMSF, 1986). Violet Red Bile (VRB) Agar medium was used for coliform microorganism. Typical colonies resulting from 24 hour incubation at 30°C were counted (ICMSF, 1982). *Staphylococcus-Micrococcus* Count: Baird Parker Agar Base was used to count these microorganisms. Incubate for 24-48 hours at 37 °C. Black, bright convex colonies were evaluated after incubation (Halkman and Sağdaş, 2010). Yeast-Mold count colonies were counted after 5 days of incubation at 25 °C (Mislivec et al., 1992).

*Statistical analysis:* With an aim of learning the component values of colostrum, descriptive statistics were used (Cimen, 2015). Besides, spearman correlation was used to research the relationships between parameters (Box et al., 2005). All statistical analyses were performed using the statistical software SPSS 18.0 for Windows.

### **Result and Discussion**

Microbiological data were summarized by basic descriptive statistics and grouped in tables while aiming to support a better understanding, comparison, and discussion of findings. Table 1 shows the results of descriptive statistics for the microbiological parameters of colostrum samples obtained from Simmental cows. The narrowest variations in data set can be seen in the data of *Micrococcus/Staphylococcus*. Yeast/mold could not be detected in colostrum samples. The maximum and minimum values of total bacteria and coliform bacteria counts were similar.

**Table 1.** Descriptive Statistics for microbiological parameters of colostrum

	Total bacteria (CFU/mL)	<i>Micrococcus/Staphylococcus</i> (CFU/mL)	Coliform (CFU/mL)	Yeast/mold (CFU/mL)
N				
Valid	10	10	10	0
Missing	0	0	0	10
Mean	15309,0000	1660,0000	13565,0000	--
Std. Error of Mean	6051,40873	365,20922	5548,38340	--
Median	950,0000	1300,0000	475,0000	--
Mode	800,00	1000,00	,00 <sup>a</sup>	--
Std. Deviation	19136,23465	1154,89297	17545,52887	--
Minimum	100,00	,00	,00	--
Maximum	45000,00	4000,00	43000,00	--

Colostrum should have adequate microbiological quality, determined as a function of low total bacterial contamination (<100.000 CFU/mL), to be considered as acceptable for newborn calves (Godden, 2008). According to the information in this literature, mean of the total bacteria counts (15309 CFU/mL) of the colostrum obtained from the Simmental cows in our study is quite appropriate. Total bacterial count should not exceed 100.000 colony forming units CFU/mL (McGuirk and Collins, 2004). In practice, these aims can be reached by means of hygienic milking, avoidance of bacterial contamination, as well as immediate cooling or freezing of surplus colostrums. The values of the mentioned two parameters in our study were found to be suitable to the announced thresholds for desired colostrum levels. According to McGee et al., (2006), the quality of colostrum in beef breeds is generally better than in dairy breeds. However, we can say that the results were not negative, although the Simmental dairy breed was used in our study. When we look at the frequency table for total bacteria counts (Fig.1), it is noteworthy that there are large variations in the total bacterial data set. As shown the fig.1, values between 100 and 45.000 were observed.

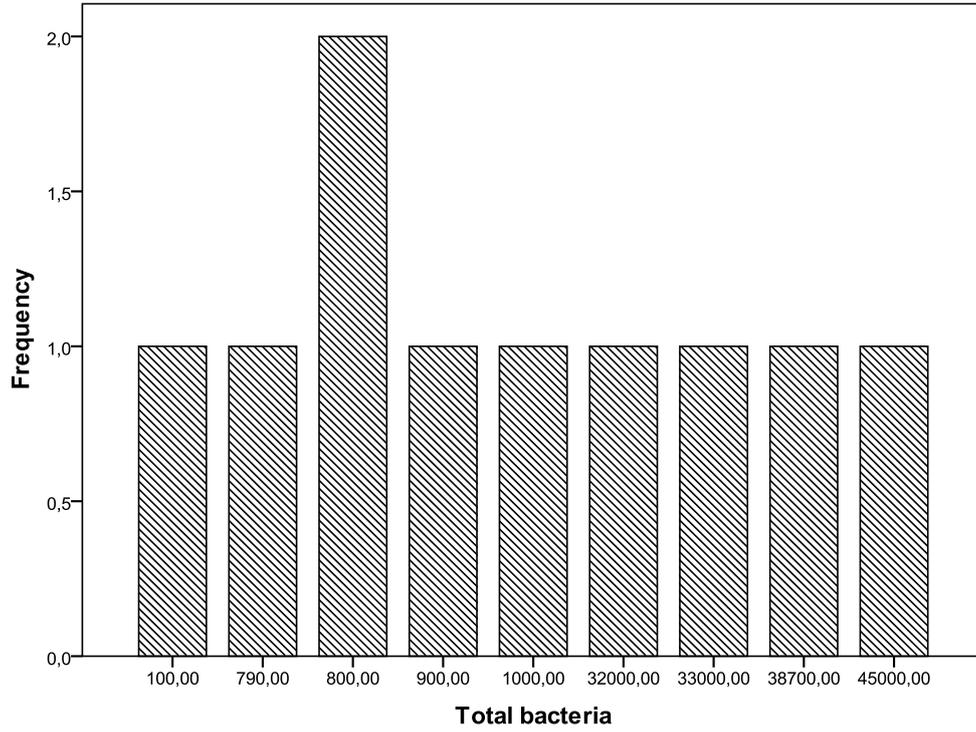


Fig. 1. Frequency table for total bacteria counts

For *Micrococcus /Staphylococcus* values, the most observed frequency (frequency 4) was determined for the value of 1000 (Fig.2).

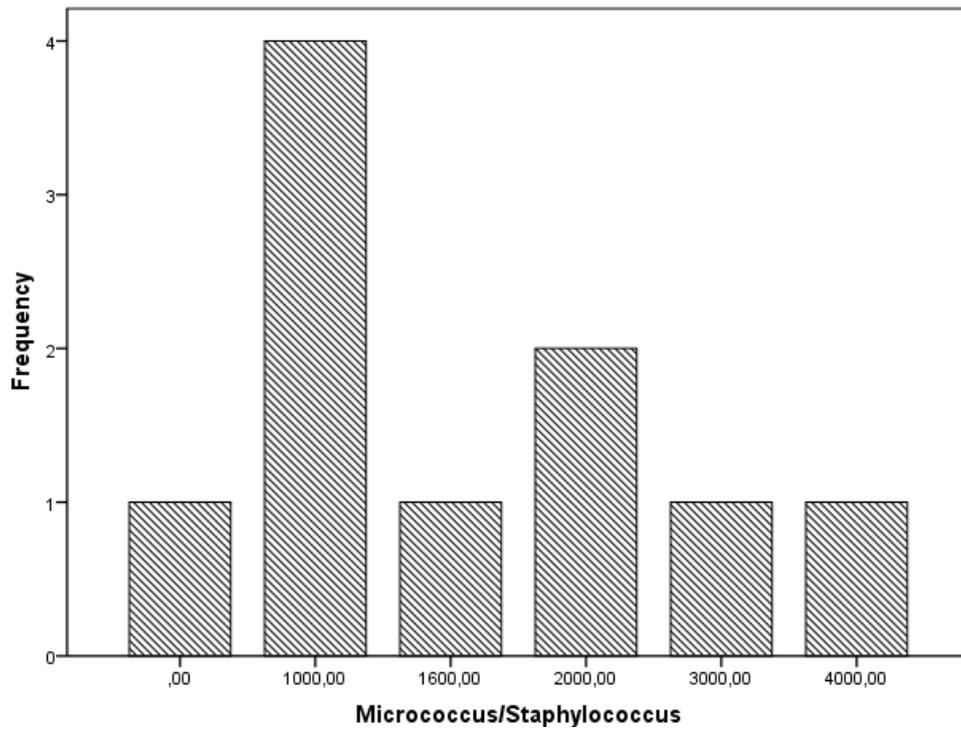


Fig. 2. Frequency table *Micrococcus/Staphylococcus*

For coliform bacteria counts between 0 and 43,000 were observed. It is noteworthy that variations in observation values are large. (Fig.3)

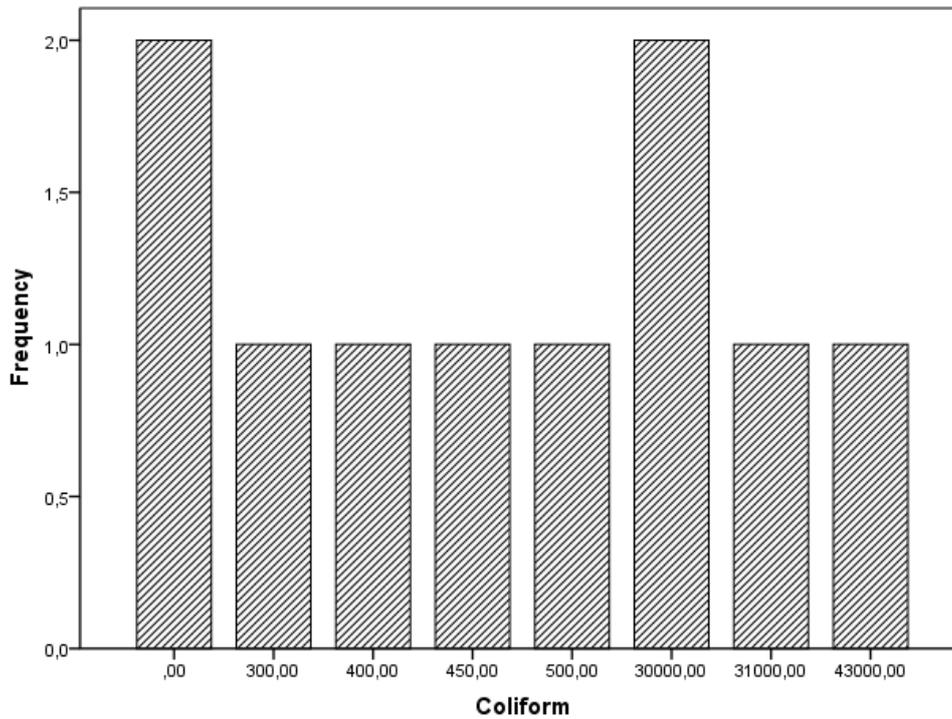


Fig. 3. Frequency table for coliform bacteria counts

The highest spearman correlation was observed between total bacteria and coliform ( $r=0.896$ ;  $p<0.001$ ). Correlations between other microbiological parameters were insignificant.

**Table 2.** Correlations between microbiological parameters of colostrum

		Total Bacteria	<i>Micrococcus/Staphylococcus</i>	Coliform	Yeast/mold
Spearman's rho	Total bacteria	Correlation Coefficient	1,000	-,267	,896**
		Sig.(2-tailed)	.	,455	,000.
		N	10	10	10
<i>Micrococcus/Staphylococcus</i>		Correlation Coefficient	-,267	1,000	-,347.
		Sig.(2-tailed)	,455.		,326.
		N	10	10	10
Coliform		Correlation Coefficient	,896**	-,347	1,000.
		Sig.(2-tailed)	,000	,326.	.
		N	10	10	10
Yeast/mold		Correlation Coefficient	.	.	.
		Sig.(2-tailed)	.	.	.
		N	10	10	10

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Since milk is a good nutritional environment, many microorganisms can live and multiply in milk. Coliform bacteria were found in the study. The most important characteristic of these bacteria is that they adapt to the nutrient medium and divide and build up very quickly. These bacteria, which are effective in the udder of cow, increase the count of somatic cells rapidly. In our study, the count of bacteria in the coliform group was determined to be at least 0 CFU/mL, at most  $4.30 \times 10^4$  CFU/mL. The contamination of coliform bacteria to raw milk is due to the fact that milking and milk collection are performed under inadequate hygiene and sanitation conditions. The presence and number of coliform bacteria in raw milk is more important in terms of reflecting the presence of inadequate hygienic conditions during milking, transport, storage and processing, rather than indicating faecal contamination or the presence of enteric pathogens (Ünlütürk and Turantaş, 1999). Coliform group microorganisms are not desired to be present in milk because they affect the flavor quality by causing gas development derived from lactose in milk (Keskin et al., 2011). The very high total microorganisms count probably indicates that this milk is spoiled or that the animal from which the milk was obtained has mastitis. Total mesophilic aerobic microorganisms were found to be between  $10^2$ - $4.5 \times 10^4$  CFU/mL in colostrum. Therefore, it can be said that this value is quite low when compared with raw milk quality. It is seen that the post-partum colostrum contains immunity to feed the offspring and the number of microorganisms is quite low. It can be said that the present values comply with the Turkish Food Codex, Communiqué on Raw Milk and Heat Treated Drinking Milk (2000/6) (Anonymous, 2000).

*Micrococcus* are found in the dust, soil, water, skin of humans and animals and play an important role in degradation (Banwart, 1989, Gökten, 1990). In this study, the number of *Staphylococcus/Micrococcus* microorganisms was found to be at least  $<0$  CFU/mL and at most  $4 \times 10^3$  CFU/mL. Milk obtained from a healthy animal contains very little bacteria before it exits the animal's udder. However, after milking, intensive contamination occurs. These sources of contamination are factors such as animal skin, barn air, milking machine, hands of milkman, milk buckets, milk jugs, etc. (Göncü, 1998). Although the high number of Micrococci-Staphylococci is an indication that the hygienic milking conditions of the milk sample are not taken into consideration, some strains of *Staphylococcus* species cause food poisoning, especially the control of toxin-forming staphylococci is important in terms of public health (Bostan et al. 1992, Ergün et al., 1992).

The chemical composition of colostrum is different from that of normal milk and is influenced by breed of cow, individual cows within a breed, length of lactation period and feed intake etc. (Crowley, 1973). It should be noted that the results obtained from this study are valid for the Simmental breed. Based on the results of the microbiological parameters in colostrum of the Simmental breed used in this study, reaching general judgments cannot be valid with a single study. Our findings in terms of colostrum obtained from Simmental cow breed should be supported with new studies using the present breed. Since the current study is performed on simmental cows, new studies on the microbiological parameters of other dairy cow breeds should be done.

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