Determination of Suitability to Cheese Standards of Somatic Cell Counts in Milk obtained from Dairy Cows having Different Body Condition Scores

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ABSTRACT

In the study, milk samples were gathered from 30 Brown Swiss cows were grown at the special dairy farm and analyses were done at the same farm's lab. In the research, cows having three different body condition score (2, 3, 4) was compared for determination of differences in terms of somatic cell count in milk. There are three different condition groups as Condition 2(weak), Condition 3 (normal) and Condition 4 (Fatty) in the study. The SCC of milk was compared with the desired standards for cheese production (max. 500×10^3 cell/mL) by using one-sample statistical t test. According to the study results, somatic cell counts of all condition scores (2, 3 and 4) for Brown Swiss cattle were compatible with reference values of quality cheese making. We can say that BCS 2 (100×10^3 per mL), BCS 3 (80×10^3 per mL), and BCS 4 (104×10^3 per mL) for Brown Swiss cattle were suitable for quality cheese production.

KEY WORDS: Somatic Cell, Milk, Cow, Cheese Standard

INTRODUCTION

Somatic cells are an important component in raw milk, and SCC is used as an indicator of raw milk quality. Recently, there has been increasing interest on milk SCC [1]. Milk SCC can greatly impact profit of milk products because higher SCC rates leads to lower cheese yield [2]. SCC is therefore called economic parameter. Suitable hygiene will ensure high quality milk products obtained from raw milk. The somatic cell level in conventional milks is due to hygiene of raw milk [3] as affected by a lot of factors such as lactation stage and feeding practices and environmental conditions. It is known that cow factor affects dairy product processing in terms of their having different SCC. However, it is not known which body condition score is more suitable for desired cheese production. It is necessary to determination and classification of conventional raw milk in terms of SCC basis for desirable cheese composition and quality [4].

The variations of somatic cell counts in raw cow milk from different animal material can offer different opportunities for the made of cheese varieties [5]. Milk SCC significantly affected firmness and flavor of dairy products such as cheese [6]. It must be known that which raw cow milk should be preferred according to SCC for the producing of cheese varieties. The aim of this paper is to investigate the suitability of milk from cows having three different body condition score for the production of different cheese varieties.

MATERIALS AND METHODS

Animal

In the research, Brown Swiss cows (10 cows per group) having three different body condition score (2, 3, 4) was compared for determination of differences in terms of somatic cell count in milk. There are three different condition groups as BCS 2(weak), BCS 3 (normal) and BCS 4 (Fatty) in the study.

Season and study area

In the study, the daily milk samples were obtained during summer season from special dairy farm in Bursa Province of Turkey.

Milk analysis

The milk samples were put into vessels and stored 4°C for analyzing procedure. The somatic cell counts within taken milk samples were determined by the standard analysis (Microscopic count) method.

Statistical analysis

The SCC of raw cow milk was compared with the standard (max. 500×10^3 cell/mL) of cheese production [7] by using one-sample t-test [8] by SPSS 18.0 package program [9].

RESULTS

The statistical control analysis (one sample t test results) for the SCC level of raw milk obtained from different body condition scores were given in Table 1, 2 and 3. It is also possible to see the results of descriptive statistics such as mean, std. deviation and std. error from the table.

BCS 2 and suitability test

The SCC of milk obtained from BCS 2 was compared with the cheese standards in Table 1.

Table 1. The suitability test of BCS 2 for cheese production standard

Mean	SD	Std. Error Mean		
100.333	21.197	12.238		
One Sample Test				
Reference value = 500.000				
df	P	Mean Difference	Confidence Interval of the Difference	
			Lower	Upper
9	,001	3.99	-452324	-347009

Obtained somatic cell count (100×10^3 per mL) for BCS 2 was statistically lower ($p < 0.01$) than announced reference value (max. 500×10^3 cell/mL) for quality cheese production. According to research findings, quality cheese can be produced from milk of cows having body condition score 2. From the results, we can say that the leanness is not risky and also it has advantages for quality cheese production. If quality cheese making is desired, BCS 2 is suitable score.

BCS 3 and suitability test

As shown the Table 2, SCC (80×10^3) for BCS 3 was compatible with the standards (max. 500×10^3 cell/mL). From the results of study, desired cheese quality according to standard can be obtained from milk of cows having BCS 3. There is no need to extra manipulation of the raw milk for quality cheese production. The milk samples for this score are very suitable for cheese standards.

Table 2. The suitability test of BCS 3 for cheese production standard

Mean	SD	Std. Error Mean		
80.666	87.36	50.44		
One Sample Test				
Reference value = 500.000				
df	P	Mean Difference	Confidence Interval of the Difference	
			Lower	Upper
9	.001	4.19	-441036	-397629

BCS 4 and suitability test

Table 3 shows the results of statistical control for cows having BCS 4. Determined somatic cell level (104×10^3 per mL) for BCS 4 was statistically lower ($p < 0.01$) than critical threshold (max. 500×10^3 cell/mL) for quality cheese making. According to research data, quality cheese can be produced from milk of cows having condition score 4. In light of the obtained findings, we can say that BCS 4 is suitable score for quality cheese making. From the results, we can say that the adiposity is not risky and quality milk has low SCC for cheese making may obtain from fatty animals.

Table 3. The suitability test of BCS 4 for cheese production standard

Mean	SD	Std. Error Mean		
104.333	12.50	7.2		
One Sample Test				
Reference value = 500.000				
df	P	Mean Difference	Confidence Interval of the Difference	
			Lower	Upper
9	,001	3.95	-42672	-36460

DISCUSSION

In this paper, statistical control on SCC rates of milk obtained from cows having different body condition scores was applied for determination of suitability to quality cheese production. We thought that if there is discrepancy between data obtained from different body condition scores, there will be an opportunity to get interesting interpretations.

High SCC (greater than 200,000 cells/ml) is not favorable for consumer and human consumption [10]. If the SCC exceeds announced threshold, it is considered unhealthy for consumers and this high critical threshold is not suitable for their demands. For human health, SCC levels should be at a minimum threshold. The obtained mean value was also in line with European Union (max. 400,000 cells/ml), Canada (max. 500,000 cells/ml) and USA (max. 750,000 cells/ml) standards [11]. Although there are studies on the somatic cells, there are no studies on the compatibility of somatic cells with reference values of cheese and product quality standards.

It was seen that the condition score did not change the somatic cell counts related to cheese making. The differences in body fat tissue ratios of the dams have not made a significant negative impact on SCC. According to Işgın and Cimen [12], ratios of body fat depots do not change somatic cell levels. In the study, it was aimed to determine which body condition score is more suitable for quality cheese making. In the light of this information, it is understood that different body condition scores caused from different fat tissue ratios do not have a negative effect on somatic cell levels of raw milk obtained from dairy cows.

According to findings obtained from study, similarly to the low body condition score (2), the normal (3) and fatty (4) scores also are characterized by their advantageous properties associated with low SCC. The fact that differences in body condition scores do not have a negative effect on milk quality caused from somatic cell counts is an advantage in terms of milk sector. Milk producers thinking to their profits in terms of risk from high somatic cell levels do not need to pay attention to differences in body condition scores. Since cheese production is important for dairy sector, all animal and environmental factors on milk quality should be investigated. New and striking findings obtained from statistical control are needed for cheese making sector.

CONCLUSION

According to findings from the research, it can be said that all body condition scores (2, 3 and 4) for Brown Swiss cattle were suitable for reference values of quality cheese making. To sum up, quality cheese can be produce from raw milk obtained from Brown Swiss cows having different body condition scores.

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