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Milk Components from Machine Milking Cows in Winter and Spring Periods

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Abstract: The aim of this study is to research the biochemical components in milks of machine milked cows for spring and winter season in different regions of Turkey. In study, all data were investigated for winter (December, January and February) and spring (March, April and May) periods in 2006. The milk fat levels were the highest in the winter season in Kayseri, Malya, Sahilköy, Turhal and Pazar regions. The milk total solid levels were the lowest in the spring season for Kayseri Province. The milk sH values were the lower in the spring than winter season in Malya region. Whereas, there were no significant differences among regions for pH values in different periods. Low fat levels in total milk for spring period can cause to economical loss since the milk price depends on milk fat levels. Further studies are needed to investigate on milk components in different climatic conditions.

Key words: Milk, component, machine milking, winter, spring

INTRODUCTION

Comprehensive information concerning the detailed analyses of the major constituents in cow milk in the different season is limited. As known, the milk biochemical parameters impact product quality and international trade (Colemann, 2004). The total solids, pH and fat are most important parameters of milk because these parameters lead to higher cheese yields (Pierre *et al*., 1999) . Breeding of dairy cows has resulted in animals that are highly adapted to the requirements of dairy farming including machine milking. With suitable structures and adequate equipment of milking machines, it is possible to produced high quality milk. These machines cause no injury to the udder of animals, if proper hygienic and mechanical procedures are adopted. The milking by machine in certain high milk producing areas will become efficient and economic in dairy farm conditions (Reinemann *et al*., 2003). However, not enough studies have been done on biochemical parameters in milk of machine milked cows in different seasons. The objective of this study is to determine the biochemical components in milk of machine milked cows in winter and spring periods.

MATERIALS AND METHODS

The present study was conducted on the collected data from DIMES Company for winter (December, January and February) and spring season (March, April and May) in 2006. The milk samples were obtained from 7 different regions (Kayseri, Yildizeli, Malya, Bala, Sahilkoy, Turhal and Pazar) in Turkey. The samples were collected directly from bulk milk at analyzed local points and put in to the 200 mL sterile plastic container stored at 4°C. Milk acidity was determined using a Xerolyt electrode (model HA 405; Ingold Electrode, Wilmington, MA). The milk fat was analyzed by Roese-Gottlieb Method (Hundrieser *et al*., 1984). Total solids were determined by drying a known mass of milk at 102±1°C. The all data are showed as mean±SEM. Comparisons were done by using t-test with help of the SPSS (Norusis, 1993).

RESULTS AND DISCUSSION

Table 1-4 gives means of data from chemical analysis of milk parameters and statistical analyses in Winter (WN) and Spring (SP) season. Milk biochemical paremeters in this research are in agreement of reported levels for cows by Kaneko *et al*. (1997).

Climatic conditions and seasonal changes have influences on the milk composition. When temperature is increased the milk fat begins to decrease. Probably due to the fact that increased feeding frequency of low fiber, high grain diets increase milk fat levels during the winter period and the herbage was not available in this period. Alderson and Pollak (1980) have reported that percentage

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Table 1: Total solid levels of milk for different regions

	Total solids (%)	
Regions	WN	SP
Kayseri	10.1±0.10*	9.6±0.12
Yildizeli	10.1±0.17	10.3±0.05
Malya	9.6±0.09	9.4±0.10
Bala	9.7±0.07	9.8±0.04
Sahilköy	9.5±0.05	9.6±0.05
Turhal	9.5±0.05	9.6±0.10
Pazar	9.6±0.05	9.5±0.10

*(p<0.05)

Table 2: The milk fat levels for different regions

	Total fat (%)	
Regions	WN	SP
Kayseri	3.6±0.03*	3.5±0.02
Yildizeli	3.4±0.09	3.5±0.10
Malya	3.3±0.05*	3.1±0.03
Bala	3.4±0.10	3.3±0.04
Sahilköy	3.3±0.05*	3.1±0.03
Turhal	3.2±0.02*	3.1±0.04
Pazar	3.4±0.06*	3.2±0.02

*(p<0.05)

Table 3: The milk acidity (sH) values for different regions

	sH	
Regions	WN	SP
Kayseri	5.9±0.05	6.0±0.08
Yildizeli	6.0±0.05	6.0±0.06
Malya	5.8±0.04**	5.5±0.02
Bala	5.8±0.06	5.7±0.05
Sahilköy	5.7±0.03	5.7±0.06
Turhal	5.7±0.04	5.6±0.08
Pazar	5.7±0.04	5.7±0.06

**(p<0.01)

Table 4: The milk acidity (pH) values for different regions

	pH	
Regions	WN	SP
Kayseri	6.7±0.05	6.6±0.07
Yildizeli	6.7±0.04	6.7±0.01
Malya	6.7±0.06	6.7±0.02
Bala	6.6±0.08	6.7±0.04
Sahilköy	6.7±0.02	6.7±0.01
Turhal	6.7±0.02	6.7±0.04
Pazar	6.7±0.04	6.6±0.08

of fat has been influenced by the seasonal variations. Sevi *et al.* (2001) found high temperatures to negatively the milk yield and the cheese-quality. The cold weather can also induce marked changes in milk production and composition (Sevi *et al.*, 2004).

The milk total solid levels were the highest in the SP season for Kayseri region. But total solids were similar for both periods in other regions (Table 1).

The milk fat levels were the highest in the WN season in Kayseri, Malya, Sahilkoy, Turhal and Pazar regions. But the milk fat levels were similar for both periods in Yildizeli and Bala regions (Table 2). The milk fat rates in SP season for Malya, Sahilkoy and Turhal regions were low for economic cheese production because, milk must contain a fat percentage at least 3.2% for economic cheese (Outlaw *et al.*, 1993).

There were significant differences in sH values between the periods for Malya (p<0.01) region. The milk sH values were the highest for WN season in this region (Table 3). Acidity changes as a result of the variations in the amount of fat. It is well known that the fat contribute to the natural acidity of milk. The sH values was not significantly varied in different season for other regions and its fluctuation pattern was not clear. Average sH value in cows' milk samples of this study was not higher than the values reported by Kaneko *et al.* (1997).

The high or low acidity in milk is not favorable. It has been showed in The Turkish Food Regulation that the acidity of cows' milk is not more than 8 sH (0.18%) (Kurt *et al.*, 1993). Table 3 gives means of data for acidity (sH) values that is similar with normal value in standards. There were no significant differences in pH values between the periods for all regions (Table 4).

CONCLUSION

Milk fat furnishes energy and is important in taste and palatability considerations of dairy foods. Low fat levels in total milk for SP period can lead to economical loss since the milk price depends on milk fat percentage. The important results were obtained in this research and seasonal variation on milk fat has been found significant for different regions in Turkey. Whereas, there were no significant differences among regions for total solids and pH values in different periods. There is a lack of information on standard biochemical values of milk from machine milking in Turkey conditions in literature. Therefore, further research is needed to investigate for obtained standard values on biochemical components of milk from machine milking in all season for different regions of Turkey and other countries.

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REFERENCES

Alderson, A. and E.J. Pollak, 1980. Age-season adjustment factors for milk and fat of dairy goats. J. Dairy Sci., 63: 148-151.

Colemann, J., 2004. Conditions of Competition for Milk Protein Products in the U.S. Market. USITC Publication, Washington DC, pp: 20-300.

Hundrieser, K.E., R.M. Clark, R.G. Jensen and A.M. Ferris, 1984. A comparison of methods for determination of total lipids in human milk. Nutr. Res., 4: 21-26.

Kaneko, J.J., J.W. Harvey and M.L. Bruss, 1997. Clinical Biochemistry of Domestic Animals. 5th Edn., Academic Press, New York, pp: 39-386.

Kurt, A., S. Cakmakci and S. Caglar, 1993. Guide of Inspection and Analysis Methods in Milk and Milk Products. Agricultural Faculty Press, Erzurum, pp: 284-290.

Norusis, M.J., 1993. SPSS for Windows: Base System User's Guide. 1st Edn., SPSS Inc., Chicago, ISBN-10: 0131788566, pp: 710-800.

Outlaw, J., R. Knutson and B. Schwart, 1993. Minimum solids-not-fat standards for fluid milk. Dairy Markets and Policy, pp: 1-6. http://www.cpdmp.cornell.edu/CPDMP/Pages/Publications/Pubs/P13.pdf.

Pierre, A., F. Michel, Y.L. Graet and J. Berrier, 1999. Soft goat cheeses at different ripening stages: Cheese structure, composition and non solvent water. Lait, 79: 489-501.

Reinemann, D.J., G.A. Mein and M.D. Johnson, 2003. Milking machine research: Past, present and future. University of Wisconsin milking research and instruction lab, Madison WI Paper Presented at the 42nd Annual Meeting of the National Mastitis Council, Jan. 26-29, Fort Worth Texas, USA., pp: 1-4.

Sevi, A., G. Annicchiarico, M. Albenzio, L. Taibi, A. Muscio and S. Dellaquila, 2001. Effects of solar radiation and feeding time on behavior, immune response and production of lactating ewes under high ambient temperature. J. Dairy Sci., 84: 629-640.

Sevi, A., M. Albenzio, R. Marino, A. Santillo and A. Muscio, 2004. Effects of lambing season and stage of lactation on ewe milk quality. Small Rum. Res., 51: 251-259.