THE BIOCHEMICAL PARAMETERS HAVING ECONOMIC IMPORTANCE IN MILK OBTAINED FROM DIFFERENT BREED COWS

Ali Rıza Şahin[1*], Duygu Ulaş[1] and Yeliz Yılmaz[2]
[1] Provincial Directorate of Food, Agricultural and Livestock, Tunceli
[2]Department of Food Engineering, Faculty of Engineering, Munzur University, Tunceli
E-mail: alirizas6262@gmail.com (*Corresponding Author)

Abstract: In the research, milk samples were gathered totally from 27 dairy cows are grown at the plants under the name of Gespa Dairy Product and Food Industry in Bursa and analyses were done at the same Company's lab. In the research three different cow breeds (Black Holstein, Red Holstein and Brown Swiss) were compared for total fat and non fat solid in milk. To do this, one way variance analyses was applied to data. While it was found significant effect of cow breed to the total fat, the non fat solid was found similar at all groups. Fat rates of milk obtained from Holstein (Red and Black) cows were lower than that of Brown Swiss cattle. It is required to be done new researches to investigate the effect of breed on milk parameters having economic importance by generating different breeds. Beneficial breed of cattle should be preferred for enhance the raw milk quality and parameters having economic importance such as fat and NFS.
Keywords: Milk, non fat solid, fat, cow, breed.

Introduction

The farmers must produce quality raw milk from healthy and highly productive animals, because the dairy sector requires quality raw milk for the production of favorable products. Milk components are affected by animal (Yıldırım *et al.,* 2009) and environmental factor, such as milking methods (Cetin *et al.*, 2007), season (Ceylan *et al.,* 2013) and lactation (Cetin *et al.,* 2010; Yılmaz *et al.,* 2017). Breed affects the yield and composition of raw cow milk (Young *et al.,* 1986). In the European Union, the quality standards of raw milk from dairy animals are defined by regulation (Goemann, 1999). Insufficient level of parameters in milk generates a serious risk for producers because raw milk may be a reason of insufficient quality for dairy products (Barbano *et al.,* 2006; Zeng *et al.,* 2008). To enhance the quality of milk offered through direct sale centers, it is necessary to increase compliance with feeding practices and to provide suitable training to farm workman responsible for milking and animal welfare (Pantoja *et al.,* 2009). The effects of breed on milk parameters such as fat and non fat solid are well studied by researchers. However, we did not find that three cow breed

(Black Holstein, Red Holstein, Brown Swiss) were together for compare the parameters having economic importance. The goal of this study is to present comparison among cow breed that influence total fat and non fat solid in raw milk.

Material and Methods

In the study, totally 27 cows (9 Black 9 Holstein, 9 Red Holstein and Brown Swiss) that are grown at the plants under the name of Gespo Dairy Product and Food Industry Trade Company in Bursa were used as animal material. In the research, milk samples were gathered totally from 27 animals. The samples collected aseptically in sterile containers and transported to the laboratory. The analyses of milk samples were done at the same company's laboratory. The analysis of fat and non fat solid was carried out by means of Farm Milk Analyser (Milkana) device. It was aimed to compare three different cow breeds (Black Holstein, Red Holstein and Brown Swiss) for parameters having economic importance such as fat and non fat solid (NFS) in milk in the research. For statistical analyses, one way Anova test for variance analyses and Duncan test were applied to data (Leech *et al.,* 2005; Çimen, 2015). The data were presented as mean ± standard error. Comparisons were done with help of the SPSS 18.0 statistical program (Box *et al.,* 2005).

Results and Discussion

Table 1 gives means and standard errors for total fat and non fat solid in milk obtained from different cow breeds. Means for total fat and non fat solid in the same line with similar letters are not significantly different. There were no significant differences between cow breeds with respect to non fat solid (NFS) rates. Therefore, we cannot say that any one group is better than the other for above mentioned parameter. Significant variations in NFS among cow breeds were noted by Carrol *et al.* (2006). According to mentioned authors, NFS rates in milk obtained from Holstein cows were higher than that of Brown Swiss, whereas we couldn't find any difference between genotype and NFS rates.

Table 1. Total fat and non fat solid (NFS) rates in milk obtained from different breeds

	Cow Breeds		
Biochemical parameters	Black Holstein	Red Holstein	Brown Swiss
Non fat solid (NFS), %	8.42±0.24 a	8.43±0.30 a	8.41±0.26 a
Total fat, %	3.55±0.42 a	3.61±0.39 a	4.22±0.35 b

Values in the same line with different letters are significantly different (p<0.05)

The findings in Table 1 show that the milk fat rates differed significantly between different cow breed. According to Carrol *et al.* (2006) fat level of milk obtained from Holstein cows

were lower than that of Brown Swiss. The results of Carrol *et al.* (2006) on milk fat were compatible with our results. The Holstein cow has significant advantages in milk production; however, it unfortunately also has some disadvantages, especially regarding its low milk fat rates. In our study, Brown Swiss cows produced more milk fat than Holstein cows.

While it was found significant effects of cow breed to the total fat, the non fat solid was found similar at all breed group. These findings need to be further studied on fat and non fat solid in raw milk obtained from different cow breeds. Most of the raw milk obtained from different animal material is of poor quality. So, the governmental authorities should enforce all the regulations needed for producing and purchasing raw milk with acceptable product quality. However, milk production in disadvantaged regions for mentioned quality parameters should be carefully arranged by the producers. It is clear that the dairy industry is moving towards producing a more profitable cow. In our country, dairy industries first focused on overall milk production and then had to put more focus on milk parameters having economic importance. For this purpose, favorable cow breed should be preferred for enhance the raw milk quality and parameters having economic importance such as fat and NFS.

References

[1] Barbano, D.M., Ma, Y., Santos, M.V., (2006). Influence of Raw Milk Quality on Fluid Milk Shelf Life. *J. Dairy Sci.* **89**(E. Suppl.):E15–E19.

[2] Box, G.E.P., Hunter, J.S., Hunter, W.G., (2005). Statistics for Experimenters. Design, innovation, and Discovery. Second Edition. Wiley interscience. A John Wiley & Sons, Inc., Publication. ISBN-13 978-0471-71813-0.

[3] Carrol, S.M., Depeters, E.J., Taylor, S.J., Rosenberg, M., Perez-Monti, H., Caaps, V.A., (2006). Milk composition of Holstein, Jersey, and Brown Swiss cows in response to increasing levels of dietary fat. *Animal Feed Science and Technology*, **131**:451–473.

[4] Cetin, M., Cimen, M., Dilmac, M., Ozgoz, E., Karaalp, M., (2007). Studies of biochemical parameters of milk of sheep milked by machine early lactation period. *Asian Journal of Chemistry,* **19**(3), 2135-2140

[5] Ceylan, B., Çimen, M., Bakır, K., Oduncu, İ., (2013). Farklı mevsimlerden elde edilen inek sütlerinde pH seviyelerinin peynir standartlarına uygunluklarının belirlenmesi. *Bilim ve Gençlik Dergisi,* **1**(1), 7-12.

[6] Cetin, M., Cimen, M., Goksoy, E.O., Kirkan, S., Yildirim, S., (2010). Machine milked and suckled goats differ in some biochemical components of their milk in 1st and 2nd weeks of lactation. *International Journal of Agriculture and Biology,* **12** (5), 799-800.

[7] Çimen, M., (2015). Fen ve Sağlık Bilimleri Alanlarında Spss Uygulamalı Veri Analizi. Palme Yayıncılık, Yayın No: 905, ISBN: 978-605-355-366-3. Sıhhıye, Ankara.

[8] Goemann, D., (1999). Milk Quality Requirements in the European Union–Trends and Reasons. Proceedings of an International Workshop. Food and Agriculture Organization of the United Nations. 24-25 January, 1999. Pp. 1-17.

[9] Leech, N.L., Barrett, K.C., Morgan, G.A., (2005). SPSS for intermediate statistics: Use and preparation. Second ed. Lawrence Erlbaum Associates, Inc. ISBN: 0-8058-4790-1.

[10] Pantoja, J.C.F., Reinemann, D.J., Ruegg, P.L., (2009). Associations among milk quality indicators in raw bulk milk. *J. Dairy Sci.* **92** (10): 4978- 4987.

[11] Yılmaz, Y., Çimen, M., Şahin, A., (2017). Milk total fat and ph curves of Simmental cows in early and late lactation period. *The International Journal of Engineering and Science.* **6**(6), 94-96.

[12] Yildirim, S., Cimen, M., Cetin, M., Dilmac, M., (2009). The effect of live weight and age of dam on milk biochemistry of machine milked cows. *Australian Journal of Basic and Applied Sciences* **3**(2), 477-479.

[13] Young, C.W., Hillers, J.K. and Freeman A.E., (1986). Production, consumption and pricing of milk and its components. *J. Dairy Sci.* **69**:272.

[14] Zeng, S.S., Zhang, L., Wiggans, G.R., Clay, J., La Croix, R., Wang, J.Z., Gipson, T., (2008). Current status of composition and somatic cell count in milk of goats enrolled in Dairy Herd Improvement Program in the United States. In: New Research on Livestock Science and Dairy Farming. Nova Science Publishers, Inc., Hauppauge, NY, US, Pp. 129–144.