Asian Journal of Chemistry Vol. 21, No. 3 (2009), 2482-2484

NOTE

Acidity and Fatness in Milks from Machine Milking

S. YILDIRIM*, M. CIMEN† and T. BAYRIL‡
Department of Agricultural Machinery, Faculty of Agriculture
Adnan Menderes University, Aydin, Turkey
E-mail: ylsado@hotmail.com; adcicek@gmail.com

The objective of this research is to investigate the acidity and fatness in milk of machine milked cows. The data were obtained from 53 machine milked Holstein cows in early and late lactation period. The cows were fed with a total mixed ratio. The milk fat level of early lactation group was significantly lower compared to the late lactation group. The total solids and pH levels of cows did not differ between early lactation and late lactation groups. Milk components of cows were not affected by different lactation number (1 and 2).

Key Words: Milk, Acidity, Fatness, Machine milking.

In many advanced countries milking machine playing an important role, as manual labour is not easily available and the cost of labour is very high. Under dairy farm conditions, manual labour will be a future problem and milking by machine in certain high milk producing areas will become efficient and economic. Changes in the composition of milk components can also influence the quality and yield of milk[1]. But studies on the use of machine milking in dairy farm conditions are limited and sporadic[2-4]. Chemical studies reflect a need for data to support investigations of a nutritional, breeding or processing nature. It was reported that milk composition was affected by milking methods in breeds because they have different autocrine control of milk secretion[5]. However, less studies have been done on acidity and fatness in milk of machine milked cows during early and late lactation months. The aim of this study is to investigate the acidity and fatness in milk of machine milked cows.

The experiment was conducted at DIMES Kazova Animal Farm. The data collected from 53 machine milked Holstein cows in early and late lactation period. Lactation number (LN) was obtained from first (F) and second (S) lactation. Lactation number was used as the standard measure of age in this study because the potential existed for the dairy farmer to assume a birth date for grade cows enrolled for first lactation. The cows were fed with a total mixed ratio (TMR). To determine milk composition,

†Department of Animal Science, Faculty of Agriculture, Gaziosmanpasa University, Tokat, Turkey.
‡DIMES Kazova Tarim Isletmesi, Veteriner Hekim, Tokat, Turkey.

samples were obtained on observation days in late lactation and early lactation periods by hand-milking from different lactation number. The samples were collected into plastic vials preserved with micro tabs, stored at 4 ºC until analyzed for determination of total fat, total solids and pH. The milk fat was determined by Roese-Gottlieb Method[6]. Milk pH was determined using a Xerolyt electrode (model HA 405; Ingold Electrode, Wilmington, MA). Total solids were determined by drying a known mass of milk at 102 ± 1°C. Independent Samples t-test was performed on data using SPSS.

The milk fat level of late lactation cows was significantly lower ($p < 0.05$) compared to the early lactation group (Table-1). This indicates that the milk fat production is not constant from lactation to lactation. The total solids and pH levels of cows did not differ between early lactation and late lactation groups.

TABLE-1
MEANS AND STANDARD ERRORS FOR MILK BIOCHEMICAL PARAMETERS IN DIFFERENT LACTATION STAGES

Parameters	Lactation stages	
	Early lactation	Late lactation
Total fat (%)	3.50 ± 0.13*	3.11 ± 0.06
Total solid (%)	11.14 ± 0.19	10.84 ± 0.16
pH	6.06 ± 0.10	6.23 ± 0.11

*($p < 0.05$).

The stage of lactation has been reported to have an effect on milk composition. In dairy cows, in general the fat is high in early lactation, increase in mid lactation (peak milk yield) and decrease during mid- to late-lactation[4,7,8]. Breeds differ for average milk composition in different lactation stages and between individual cows within the breed there is even greater variation. However, in some studies, it has been reported that lactation stages had no significant effect on milk constituent percentages[9,10]. In cattle, milk fat percentage was found to be highest in early lactation[11,12]. Morgan[13] reported the lowest values for milk fat percentage during the peak milk yield (first months of lactation) for Hereford cows. The reason for this differential response is not readily apparent in this breed. However, it is known that normal milk secretion is under a complex endocrine control and undoubtedly differences in endocrine function are an important source of differences in yield and composition of milk of different individual cows. There is no doubt that breed factors govern an important amount of the variation in milk composition.

In this study, milk components of cows were not affected by different lactation number. In cattle has been found that lactation number had no effect on milk composition[14,15]. However, influence of lactation number on total fat, total solids and pH of milk values was not apparently discussed by the authors. The most striking conclusion in present study was that the means of biochemical parameters in milk from machine milking were differ than some reported results for milked by machine in early lactation

TABLE-2
MEANS AND STANDARD ERRORS FOR MILK BIOCHEMICAL PARAMETERS IN DIFFERENT LACTATION NUMBER

Parameters	Lactation number	
	First	Second
Total fat (%)	3.60 ± 0.18	3.30 ± 0.12
Total solid (%)	11.25 ± 0.37	11.30 ± 0.32
pH	6.14 ± 0.19	6.31 ± 0.16

and late lactation period, whereas the low and high points of milk biochemical parameters in early lactation and late lactation period were coincide with the parameter points of machine milked cows in literature[7,8,12].

From the results, the stages of lactation have significant influence on the milk fat level. When definite goals become more clearly established, certain breeds or herds may find it most desirable to select for increased total milk yield and biochemical milk parameters. The physiological regulation of milk ejection and milk removal needs to be considered for milking machine equipment and milking routine in order to meet the requirements of the animal and to optimize the interaction between cow and technology. Therefore, further research is needed to investigate on basic milk parameters such as acidity and fatness of milks from machine milking.

REFERENCES

1. J.M. Lynch, D.M. Barbano, D.E. Bauman, G.F. Hartnell and M.A. Nemeth, *J. Dairy Sci.*, **75**, 1794 (1992).
2. M. Cetin, M. Cimen, M. Dilmac, E. Ozgoz and M. Karaalp, *Asian J. Chem.*, **19**, 2135 (2007).
3. M. Cimen, M. Cetin, M. Karaalp and S. Sahin, *Ind. Vet. J.*, (2008) (In press).
4. A.P. Chaudhary, O.S. Parmar and K.P. Singh, *Proc. 6th Wld. Cong. Genet. Appl. Livest. Prod.*, **25**, 11 (1998)
5. R. Bencini, The Sheep as a Dairy Animal: Lactation, Production of Milk and its Suitability for Cheese Making, Ph.D. thesis, The University of Western Australia (1993).
6. K.E. Hundrieser, R.M. Clark, R.G. Jensen and A.M. Ferris, *Nutr. Res.*, **4**, 21 (1984).
7. R.C. Dash, B.P. Singh and B.S. Misra, *Indian Vet. Med. J.*, **2**, 141 (1978).
8. S.B.S. Yadav and J.S. Sharma, *Asian J. Dairy Res.*, **3**, 51 (1984).
9. M.A. Sharaby, *J. Dairy Res.*, **55**, 171 (1988).
10. J.A. Ibeawuchi and A.J. Dangut, *Disc. Inn.*, **8**, 249 (1996).
11. K. Yanagita, T. Oyamada, Y. Nakanishi, H. Tojo and K. Ogawa, *Bull. Fac. Agric.*, **28**, 19 (1978).
12. D.R. Daley, A. McCuskey and C.M. Bailey, Caracterization of Milk Constituents of Bos taurus and Bos indicus x Bos taurus breed types, *Proc. 3rd World Cong. Genet. Appl. Livest. Prod.*, pp. 308-313 (1986).
13. J.H.L. Morgan, *Wld. Rev. Anim. Prod.*, **26**, 59 (1991).
14. I. Mondragon, J.W. Wilton, O.B. Allen and H. Sang, *Can. J. Anim. Sci.*, **63**, 751 (1983).
15. A. Meregalli, D'.Aiutolo, A. Montaghi and A. Acciaioli, *Rivista di Zootecnia e Veterinaria*, **11**, 380 (1983).

(*Received*: 17 June 2008; *Accepted*: 15 December 2008) AJC-7085