

Estimation of Milk Yield and Financial Losses Related to Somatic Cell Count in Holstein Cows Raised in Turkey

Savas Atasever and Huseyin Erdem

Department of Animal Science, Faculty of Agriculture, University of Ondokuz Mayıs,
55139, Samsun, Turkey

Abstract: The objective of this study was to estimate the milk yield losses related to milk Somatic Cell Count (SCC) in Holstein cows of Turkey. Data included 17 study results conducted in Turkey between 1999 and 2009. Average SCC was determined as 705.419 cells mL⁻¹ and thus, daily Milk Yield (dMY), Lactational Milk Yield (LMY) and 305 daily milk yield losses were estimated as 14.56-17.44, 11.62 and 12.84-15.38%, respectively. Annual financial loss due to high SCC was estimated as \$217.8 per milking cow. Therefore, reducing SCC in Holstein cows is seen an obligation for dairy sector of Turkey.

Key words: Somatic cell count, milk yield losses, Holstein, Turkey

INTRODUCTION

In parallel to the world dairy sector, cattle husbandry plays a special importance for Turkey. Such that 91% of the total milk production is ensured from cows and also, culture and crossbred cows have 3 quarter portion in the total amount (Anonymous, 2009). Because of well adaptation characteristic of Holstein to temperate climatic conditions and its high production level, this breed is the mainly demanded one among culture cows in the country. However, Akbulut *et al.* (2007) clearly indicated that milk production levels of this breed are highly lower than those raised in the US or EU countries. In spite of many factors may be effective on this case, inadequate managerial applications can clearly be pointed out (Uzmay *et al.*, 2001). Such as, improper bedding usage, unsuitable milking and feeding, or lacking observation on cow's health status may result a failure in immunity system. In this situation, marked compositional changes in milk, or dramatic reduction in milk production may be detected as the 1st signs. Because of a high correlation between Somatic Cell Count (SCC) and bacteriological status of milk (Schutz *et al.*, 1994), practically, an elevation of SCC or number of the white blood cells in raw milk is considered as abnormal and thus, measured SCC levels are accepted as a reflector for milk quality (Norman *et al.*, 2000). Although, numerous studies (Erdem *et al.*, 2007a; Duru and Tuncel, 2002 and Ulutas *et al.*, 2004) have been published on milk yield characteristics or SCC levels of Holstein cows in Turkey, there is no detailed report on the relationship between milk production and SCC.

The goals of the present study were to evaluate studies conducted on milk yield and SCC of Holsteins raised in Turkey conditions, to determine mean SCC value of these cows and to estimate milk yield and financial losses related to SCC.

MATERIALS AND METHODS

The data were occurred from 17 previously investigations that had been conducted on SCC of milk in Holstein cows raised in Turkey. In the present study, only investigations included from 1999-2009 were considered. To calculate milk yield losses, Lactational Milk Yield (LMY), 305 daily Milk Yield (305 dMY) and daily Milk Yield (dMY) values of Holstein cows in Turkey reported by Akman and Kumlu (1999) and Akbulut *et al.* (2007) were used. In order to estimate, these losses related to SCC levels, a chart was utilized (Table 1).

Table 1: Milk production losses related to SCC (Kaya *et al.*, 2001)

SHS (cells mL ⁻¹) (×1000)	Predicted loss	
	kg day ⁻¹	kg lactation ⁻¹
0-17	0.0	0
18-34	0.0	0
35-70	0.0	0
71-140	0.7	182
141-282	1.4	363
283-565	2.0	545
566-1130	2.7	726
1131-2262	3.4	908
2263-4525	4.1	1090
>4526	4.8	1271

Corresponding Author: Savas Atasever, Department of Animal Science, Faculty of Agriculture, University of Ondokuz Mayıs, 55139, Samsun, Turkey

Table 2: Research results conducted on SCC of Holstein cows in Turkey

References	SCC (cells mL ⁻¹)
Goncu and Ozkutuk (1999)	679,000
Kesenkas (1999)	896,000
Goncu (2000)	1,287,680
Koker (2000)	420,899
Yalcin <i>et al.</i> (2000)	178,000
Kaya <i>et al.</i> (2001)	933,190
Risvanli and Kalkan (2000)*	746,355
Kucuk and Alacam (2003)*	1,306,615
Koc (2004)	534,688
Eyduran <i>et al.</i> (2005)*	1,022,285
Koc (2006)*	404,506
Erdem <i>et al.</i> (2007b)	572,607
Koc (2007)	218,524
Onal and Ozder (2007)*	304,418
Koc (2008)*	456,54
Atasever (2008)	1,071,557
Atasever and Erdem (2009)	959,644
Overall mean (±SE)	705,419 (±86742)

When different SCC vales were reported in an investigation (for instance, different seasonal values in the same study), average of these values was recorded and used as the SCC value. These were coded with (*) sign in Table 2.

RESULTS AND DISCUSSION

Table 2 shows that the range among references has a variable trend. In this study, overall mean of the data (705,419 cells mL⁻¹) was found as higher than the 400,000 cells mL⁻¹, which is the legal limit of raw milk in the EU countries (Norman *et al.*, 2000). Besides, this mean was higher than the numbers obtained in some researches (Kul, 2006; Koc, 2007) conducted with other culture breeds in Turkey. This case could be explained by the close association between high milk production trait and SCC in dairy cattle. And also, Table 2 apparently indicates that some studies conducted by same researchers in the same region at different years (1 and 3; 9, 11, 13 and 15 and 12, 16 and 17) have alternating SCC values. In an earlier study, Uzmay *et al.* (2001) emphasized that managerial practices in dairy farms have significantly impression on subclinical mastitis risk. Thus, this alternation in the present study can be explained by the effect of the different managerial applications in the farms.

When the data were evaluated into four different SCC groups (Table 3), considerably low amount of references (17.65%) presented in normal (400,000 cells mL⁻¹) level. This finding is fairly dramatic, because, when compared with the SCC groups, the group with normal SCC threshold assumed in the EU countries was approximately 4 fold lower than the groups with elevated ones.

In an earlier study, Akman and Kumlu (1999) considered only Holstein cows enrolled to Cattle Breeders Association of Turkey (CBA) and LMY, 305 dMY and

Table 3: SCC (cells mL⁻¹) frequencies of the results

SCC (×1000) range	n	Rate (%)
0-400	3	17.65
401-750	7	41.18
751-1000	3	17.65
1000<	4	25.53

Table 4: Milk yield losses by two different references

Considered references	Predicted milk yield losses (%)		
	dMY	LMY	305 dMY
Akman and Kumlu (1999)*	14.56	11.62	12.84
Akbulut <i>et al.</i> (2007)	17.44	-	15.38

*Only cows enrolled to CBA were assessed by the authors

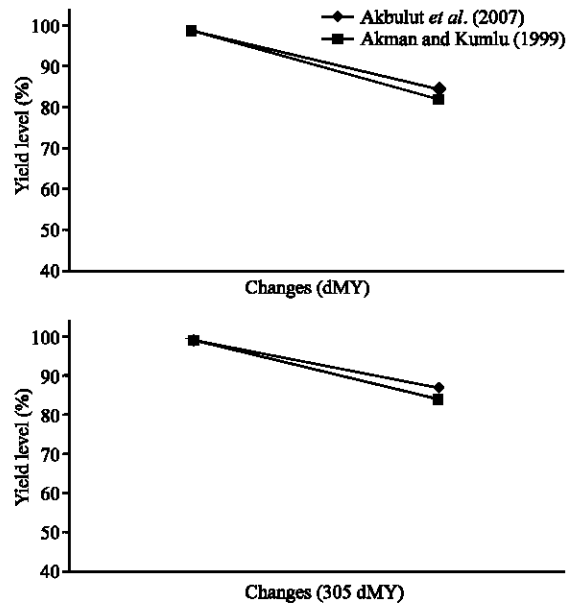


Fig. 1: Changes of milk yield losses in Holsteins of Turkey

dMY of the cows were determined as 6248,5655 and 18.54 kg, respectively. Besides, Akbulut *et al.* (2007) reported that 305 dMY and dMY of Holsteins reared in Turkey were calculated as 4721 and 15.48 kg, respectively. According to these reports, predicted milk yield losses were given in Table 4 and when milk production level was considered to be 100 point, obtained yield levels related to milk losses in the present study were shown in Fig. 1.

When the mean SCC of this study (705,419 cells mL⁻¹) was assessed by Table 1, this value was presented between 566-1130 cells mL⁻¹ (×10³). Thus, according to this chart, milk loss per lactation was predicted as 726 kg cow⁻¹. Due to price of raw milk per kg in Turkey is 0.5 TL (equal to \$ 0.3), annual milk loss per cow was estimated to be \$ 217.8. Although, Kim and Heald (1999) emphasized that financial loss \$ 200/year/cow is commonly acceptable, taking some precautions to decrease SCC in the herds is seen a useful step for dairy sector in Turkey.

CONCLUSION

Results here demonstrate that SCC of Holstein cows raised in Turkey conditions are relatively high. Moreover, milk production losses and also annual financial losses are closely associative with elevated SCC. In this sense, applying carefully managerial practices in the farms, such as carrying out proper milking procedure, recording regularly for SCC of raw milk, applying a payment system by lower SCC in milk and conducting more studies on the milk characteristics and its components in Holstein cows can be regarded as reasonable approaches.

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