Relationship between mastitis and body condition score in jersey cattle

Gökhan Gökçe[1*], *Ezgi* Şenses[1]

[1]Çukurova University, Faculty of Agriculture, Department of Animal Science, Div. of Animal Husbandry & Breeding, Adana, Turkiye

Abstract. The usefulness, validity and precision of the body condition score has been proven by many studies to evaluate body energy reserves. In general, the body condition score decreases in early lactation because cows allocate energy from their body reserves to support milk production and begin to increase during the remainder of lactation. The excessive loss of energy reserves during early lactation often associated with cows with higher body condition scores at calving often results in impaired health and reproductive performance. A high or low body condition score is also associated with higher incidences of metritis, milk fever, lameness, and mastitis. Positive genetic correlations have been noted between body energy reserve changes and somatic cell count or clinical mastitis. In this study, the relationship between body condition score and mastitis in Jersey cattle was investigated.

1 Introduction

Body condition scoring has been widely accepted as the most practical method for assessing changes in body fat store reserves in dairy cattle. Although most people view body condition scoring as a nutritional practice, body condition scoring in dairy cattle farms has significant effects on milk yield, herd health, reproductive performance, animal welfare and overall farm profitability [1].

Body condition score is the evaluation of the body structure of dairy cattle in categories 1 to 5, whether they are underweight or excessively fat. Body condition score is a system of 5, in which 1 refers to cachectic animal, 2 to thin, 3 to medium, 4 to obese, and 5 to obese. Regular monitoring of body condition score; It allows keeping a healthy and productive herd. It is also a widely used practical application for balanced nutrition of the herd and healthy herd management [2,3].

It has been reported that low body condition scores increase the risk of developing clinical ketosis and clinical mastitis [4].

In some studies, it has been stated that most of the health problems in cows (fatty liver, endometritis, mastitis, abomasum displacement, ketosis, etc.) occur after birth, causing loss of productivity, high treatment costs and prolongation of the period between two pregnancies. He stated that preventive measures can be taken by taking into account the relationship between the diseases that cause productivity losses and changes in body condition scores. For this reason, determining the body condition score has gained great importance in dairy cattle enterprises as an aid in herd management and determination of feeding programs [5, 6, 7].

Mastitis is an important udder disease that is most common in dairy cattle and causes economic loss as it negatively affects milk yield and milk quality. The presence of clinical mastitis is fairly easy to assess, whereas the subclinical form can be more difficult to diagnose and requires laboratory testing. Somatic cell count is one of the most important criteria that can be used to evaluate the quality of raw milk [8,9]. Somatic cells are constantly circulating in the blood, when the breast is damaged or infected, the body sends leukocytes to the infected or injured area at a high rate. Leukocyte counts increase markedly in response to pathogenic microorganism attack and can reach concentrations of millions per milliliter in cases of acute mastitis. Therefore, high somatic cell count may be a sign of mastitis [10].

This study was conducted to evaluate the relationship between body condition score and mastitis in Jersey cattle.

2 Material and method

The animal material of this study consisted of 20 Jersey cows in their second lactation in the Cukurova University Faculty of Agriculture Dairy Cattle Research and Application Farm. Milk samples were collected in the morning with the help of sampling cups in the automatic milking system, taking into account the hygiene conditions

The 5-point system specified in the previous study was used to determine the body condition score of cows [11].

* Corresponding author: ggokce@cu.edu.tr

The somatic cell count of the collected milk samples was determined by a somatic cell counter (Somatic Cell Counter DCC, DeLaval Group, Sweden).

The obtained data were subjected to the homogeneity test before the analysis and it was determined that the somatic cell numbers did not show normal distribution. Regression and correlation analyzes were performed by subjecting non-normal somatic cell count data to logarithmic transformation [12].

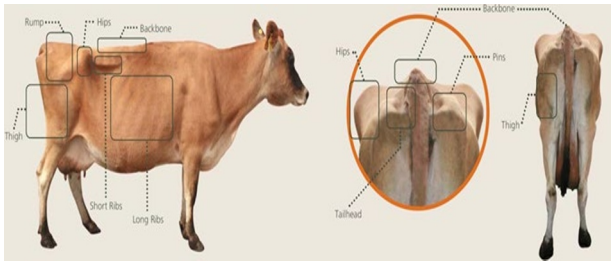

Fig. 1. Critical Points for Body Condition Scoring [13].

3 Results and discussion

The averages of lactation milk yields, somatic cell counts and body condition scores of Jersey cattle raised in Çukurova University Faculty of Agriculture Research and Application Farm are presented in Table 1.

When Table 1 is examined, it is seen that body condition score is 3.23±0,33, logarithmic somatic cell count is 5.41±0,16 cell/ml and milk yield is 3671.65±270,36 kg. In the study conducted, similar to our study, the average logSCC was determined as 5.5451±0.0082 cells/ml and the lactation milk yield was determined as 3726.21±115.77 kg [14].

In the study, the average somatic cell count was found to be 197,690 cells/mL, similar to our study [15].

According to the Turkish Food Codex communiqué on raw and heat-treated drinking milk (No: 2000/6) published by the Ministry of Food, Agriculture and Livestock in Turkey, a limitation has been imposed on the SCC required in milk, and SCC must be ≤500,000 per milliliter [16].

Table 1. Body Condition Score, Somatic Cell Count and Milk yield.

	N	Mean	Std. Deviation	F	p
BCS	20	3.23	0.33	33.92	0.68
LogSCC	20	5.41	0.16		
SCC	20	312978	93458		
MY	20	3671.65	270.36		

Table 2. Correlation between body condition score, logarithmic somatic cell count and milk yield.

	BCS	logSCC	MY
BCS	1	-0.229	0.394
logSCC	-0.229	1	-0.694
MY	0.394	-0.694	1

When Table 2 is examined, it is seen that there is a weak and negative correlation between body condition score, somatic cell count and milk yield. Although not statistically significant, a decrease in body condition score tends to cause an increase in somatic cell count and a decrease in milk yield.

We also see this relationship in the regression graph in Fig. 2. The regression coefficients between body condition score, somatic cell count and milk yield (R^2: 0.396; R^2: 0.482) were low.

There is a moderate and positive correlation between body condition score and milk yield. In many studies, it is reported that milk yield increases with increasing body condition.

The general belief is that cows in poor condition produce less milk at the beginning of lactation and in general. In a study, it was reported that both peak and lactation milk yields of low-condition cows were low, and in another study, it was reported that cows with sufficient body reserves would have high peak milk yield and persistence levels. Similarly, it is reported that the milk yield of cows giving birth in high condition will be higher [17-19].

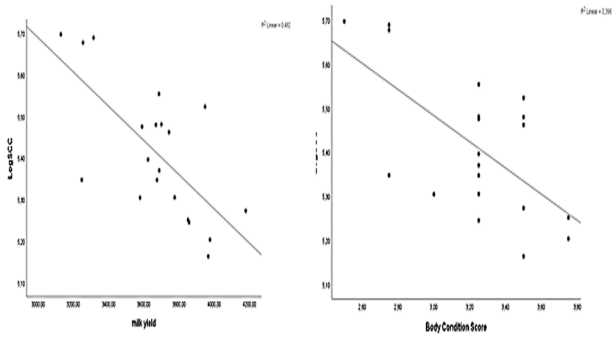

Fig. 2. Regression between body condition score and somatic cell count and milk yield.

4 Conclusion

The scarcity of animal material in our study may have caused some possible results to not be fully determined. In this context, it may be recommended to conduct studies with a larger number of animals.

In addition, knowing the body condition allows estimating milk yield, reproductive performance, metabolic and health problems, and arranging herd management and feeding programs. In this context, it would be appropriate to advise the breeders to make body condition scores at regular intervals.

References

1. J. M. Bewley and M.M., Schutz. The Professional Animal Scientist, **24**, 507-529 (2008)
2. E.E. Wildman, G.M. Jones, P.E. Wagner, R.L. J Dairy Sci., **65**, 3, 495-501 (1982)

3. J.E. Pryce, M.P. Coffey and G. Simm. J. Dairy Sci., **84**, 1508–1510.5 (2001)
4. Y.T. Grohn, H.N. Erb, C.E. Mcculloch and H. Saloneimi. J. Dairy Sci. **72**, 1876 (1989)
5. H. Kim, H.G. Kang. J Reprod Devolop, **49**, 6, 485-491 (2003)
6. R. Jorritsma, T. Wensing, T.A.M. Kruip, P. Vos and J. Noordhuizen. Vet. Res., **34**, 11-26 (2003)
7. N.K. Kara, *Siyah Alaca Irkı İneklerde Vücut Kondisyon Skorunun Döl Verim Parametrelerine Etkisi.* Doktora Tezi. Uludağ Üniversitesi, Bursa, Turkiye (2015)
8. R.J. Harmon, A Primer. 40th Annual Meeting, National Mastitis Council, Reno, NV. USA, pp: 3-9 (2001)
9. A. Kaygısız, İ. Kamak. KSÜ Doga Bilimleri Derg **15**, 3, 9-15 (2012)
10. Ö. Anitaş, S. Göncü, N. Koluman. Cukurova J Agric Food Sci., **32**, 1, 35-42 (2017)
11. J.D. Ferguson, D.T. Galligan, N. Thomsen. **77**, 9, 2695-703 (1994)
12. M. I. Yeşil. Siyah Alaca İnek Sütlerinde Mastitis İndikatörü Olarak Kullanılan Bazı Özellikler Arası İlişkiler. Çukurova Üni. Fen Bilimleri Ens. Doktora Tezi. Sf:84 (2018)
13. E.E. Wildman, G.M. Jones, P.E. Wagner, R.L. J Dairy Sci., **65**, 3, 495-501 (1982)
14. E. Kul. Jersey Sığırlarında Bazı Meme Özellikleri İle Süt Verimi Ve Sütteki Somatik Hücre Sayısı Arasındaki İlişkiler. Ondokuz Mayıs Üniversitesi. Yüksek Lisans Tezi (2006)
15. J.C. Hadrich, C.A. Wolf, J. Lombard, T.M. Dolak. Journal of Dairy Science, **101**, 4 (2018)
16. Anonymous, *Çiğ Süt ve Isıl İşlem Görmüş İçme Sütleri Tebliği (Tebliğ No:2000/6),* TGK 14 Şubat 2000 – Sayı: 23964, Turkiye (2000)
17. G.M. Jones. Body condition scores for evaluation of nutritional status. Virginia Cooperative Extension Service. Dairy guadelines publ. 404-104. pp. 8. (1990)
18. P. Dobbelaar. Veepro Holland Aug. **23**, 12-13(1995) N.H., Markusfeld, E. Ezra. Veterinary Record, **141**, 3, 67-72. (Abstr.) (1997)