



Short Communication

Effect of Body Condition Score on Biochemical Milk Parameters having Economic Importance in Dairy Goat during the First Month of Postpartum Period

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Abstract

The data were collected from 20 Turkish Saanen goats raised in Ismaili village of Tunceli Province during first four weeks of postpartum period. In the research, 10 goats having BCS 1 and 10 goats having BCS 2 were used. The dams in BCS 1 group had showed lower milk fat content as compared to dams in BCS 2 group until third week. The total solids and protein levels of goats did not differ between BCS 1 and BCS 2 groups during all weeks of research. We found positive high correlations between total solids and protein ($r=0.997$; $p<0.01$) in BCS 1 group and BCS2 group ($r=0.9998$; $p<0.01$). Similar correlations were found for both BCS group in study. From our results, the lower BCS has negative significant influence on the milk fat synthesis for dams having low fat depots. © 2013 Friends Science Publishers

Keywords: Body condition score; Milk; Biochemical parameters; Goat

Introduction

Importance of body size and score in dairy goat has been investigated by many authors. Most investigators agree that larger goats have higher milk yields (Cabiddu *et al.*, 1999). Phenotypic and genetic relationships between body measurements, body weight, and milk production have been investigated by a number of workers (Sieber *et al.*, 1988; Kaygisiz *et al.*, 2011), but the results have been inconsistent. In addition, much of the body size and body weight data have been obtained shortly before or after first lambing and mostly from university experiment stations. However, there were not statements about effect of body condition score (BCS) on goat milk biochemical components having economic importance. Milk protein, fat, total solids have economic value because they have high effect on dairy product yields (Tekelioglu *et al.*, 2010). They are therefore called economic parameters. The milk components can influence the quality and yield of milk (Lynch *et al.*, 1992).

Understanding the effective factors on milk constituents is of major importance to the dairy goat management. The body condition score (BCS) of a dam is an assessment of body fat that it possesses, and it is recognized by researchers and goat producers as being an important factor in animal management. The aim of this research is to present some basic knowledge about BCS of dam that influence biochemical milk parameters having economic importance in dairy goats during first weeks of postpartum period.

Materials and Methods

The data were obtained from 20 Turkish Saanen goats raised in Ismaili village of Tunceli Province for February month of year 2012. In the experiment, 10 goats having BCS 1 and 10 goats having BCS 2 were used. There were no goats with BCS 3-5 in herd. Therefore, we conducted an empirical study on BCS 1 and 2. Goat descriptions by the five condition scores follow: BCS 1: Very thin. No fat cover, BCS 2: Thin (bony), BCS 3: Backbone is not prominent, BCS4: Backbone and ribs cannot be seen, BCS5: Excessive fat.

Milk biochemical components having economic importance are strictly associated with pecuniary gain and environmental factors, especially during the first weeks of postpartum period (Cetin *et al.*, 2010a, b). Therefore, we studied only four week of postpartum period to see clearly the effects of BCS on milk components.

To determine milk composition, samples were obtained by hand milking on last day of each week. The samples (50 mL) were composites of milk collected at consecutive morning and afternoon and were collected into plastic vials preserved with microtabs, stored 4°C until analysed for determination of parameters. The milk samples from each goat were analysed separately by automatic analysis using a Farm Milk Analyzer (Funke Gerber Lactostar, 3510) for economic components such as protein, total solids and total fat. All of the data are indicated as mean \pm SEM. Correlations among parameters were

calculated using the Pearson correlation coefficients. Comparisons were done by using Independent samples t-test with help of the SPSS (Norusis, 1993).

Results

The milk biochemical parameters of goats in BCS 1 and BCS2 group are presented in Table 1–4, for all weeks. As shown in Table 1 and 2, low BCS point (BCS 1) resulted in lower fat content in milk for first and second weeks. The dams in BCS 1 group had showed lower milk fat level as compared to dams in BCS 2 group until third week.

The total solids and protein levels of goats did not differ between BCS 1 and BCS 2 groups during all weeks of study (Tables 1–4).

The correlations between milk components in BCS 1 and BCS 2 groups were presented for all weeks of research in Table 5 and 6. We found positive high correlations between total solids and protein ($r=0.997$; $p<0.01$) in BCS 1 group and BCS2 group ($r=0.9998$; $p<0.01$). No relationships were found among other observed parameters in study. Similar correlations were found for both BCS group in our study.

Discussion

Cimen *et al.* (2008) reported that light animals having lower adipose tissue were shown to be more sensitive to milk fat depression than heavy ones in early lactation period. Characteristically, light dam having lower fat depot, synthesizes and secretes more energy (in her milk) than she can consume in feed (Yildirim *et al.*, 2009). She can not eat enough to meet her energy need in early lactation in which body fat reserves are necessary to allow her to mobilize energy for high production (Schroeder, 2001). Hence, animals having low BCS in our study may not have sufficient reserves for milk and fat production in this period. As a consequence, light animals having low fat depot experience a more severe negative energy balance, which is associated with an increased risk of metabolic disorders and milk fat syndrome in early lactation period (Goff and Horst, 1997). There is no doubt that BCS govern an important amount of the variation in milk composition, especially in fat levels. One explanation to this result is that the compartment for energy distribution in a dam having higher adipose tissue is naturally larger than in a dam having lower fat depot, and if the large amount of energy is formed in the citric acid cycle of larger animals, concentrations in blood and milk will obviously be higher (Yildirim *et al.*, 2009). The effect of BCS on energy concentration such as fat and glucose will also depend on the absolute amount of energy components to be distributed in the body.

In this research, we found positive high correlations between total solids and protein ($r=0.997$; $p<0.01$) in BCS 1 group and BCS2 group ($r=0.9998$; $p<0.01$). According to report of Bencini and Purvis (1990), there are positive

Table 1: Economic parameters of milk for first week

Parameters	BCS		p value
	1	2	
Fat (%)	3.37±1.09	5.09±0.12 *	0.03
Protein (%)	6.7±0.12	6.5±0.27	NS
Total solids (%)	16.8±0.32	17.6±0.62	NS

* $p<0.05$, NS: Not significant

Table 2: Economic parameters of milk for second week

Parameters	BCS		p value
	1	2	
Fat (%)	3.40±0.88	4.78±0.17*	0.04
Protein (%)	6.20±0.22	6.43±0.11	NS
Total solids (%)	17.3±0.18	17.8±0.55	NS

* $p<0.05$, NS: Not significant

Table 3: Economic parameters of milk for third week

Parameters	BCS		p value
	1	2	
Fat (%)	4.41±0.22	4.80±0.42	NS
Protein (%)	6.31±0.18	6.53±0.12	NS
Total solids (%)	17.1±0.42	17.4±0.62	NS

NS: Not significant

Table 4: Economic parameters of milk for fourth week

Parameters	BCS		p value
	1	2	
Fat, %	4.52±0.32	4.83±0.77	NS
Protein	5.98±0.92	6.43±0.23	NS
Total solids	17.3±0.22	17.7±0.42	NS

NS: Not significant

Table 5: Correlations among biochemical components of goat milk in BCS1 group

Parameters		Fat	Protein	Total solids
Fat	Pearson Correlation	--	0.052	0.076
	<i>P</i>	--	0.895	0.846
Protein	Pearson Correlation	0.052	--	0.997**
	<i>P</i>	0.895	--	0.000
Total solids	Pearson Correlation	0.076	0.997**	--
	<i>P</i>	0.846	0.000	--

** Correlation is significant at the 0.01 level (2-tailed)

Table 6: Correlations among biochemical components of goat milk in BCS 2 group

Parameters		Fat	Protein	Total solids
Fat	Pearson Correlation	--	-0.237	-0.197
	<i>P</i>	--	0.540	0.611
Protein	Pearson Correlation	-0.237	--	0.998**
	<i>P</i>	0.540	--	0.000
Total solids	Pearson Correlation	-0.197	0.998**	--
	<i>P</i>	0.611	0.000	--

** Correlation is significant at the 0.01 level (2-tailed)

relationships between total solids and protein ($r=0.45$; $p<0.01$) in sheep milk.

From the results, the lower BCS point has negative significant influence on the milk fat synthesis for dams having low fat depots. Further study is needed to research

on milk parameters having economic importance such as protein, fat and total solids in dams during early postpartum period for different environmental conditions. Acquiring knowledge associated with economic components to increase production of milk with maximum rates of milk fat is fundamental for obtaining the economic gain. Therefore, further researches are needed to improve the interpretations about milk components associated with pecuniary gain in dairy goats having different BCS points considering the reasons for lower milk fat and to observe the effect of biochemical components having economic importance on productivity of milk and its products.

Information from this study indicates that BCS are more important to fat synthesis in milk for low BCS (BCS 1) points compared to higher BCS (BCS 2) during first weeks of postpartum period. It appears that BCS play a big role in dams having low BCS point for milk fat synthesis, especially in first two weeks of postpartum period.

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(Received 26 July 2012; Accepted 17 October 2012)