A study of somatic cell and their relation to some milk traits and udder measurements in Black and Meriz goats

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Abstract:

A total of 246 observation of test day milk yield (TDMY), fat percent and somatic cell count (SCC) of 25 lactating does (2-6 years old) from each of Black and Meriz goat were used in this study. Milk yield was recorded at monthly intervals, commencing from the 30th day after kidding till the does were dried off. Also, the external udder measurements of does were performed. Results revealed that a non-significant negative correlations were found between SCC and TDMY in both Meriz and Black goats except that at 3rd collection in Black goat was significant (r=-0.421, P<0.05). Fat content was positively correlated with SCC (P>0.05) in both breeds. In Meriz goat, SCC was negatively correlated with udder circumference (r=-0.550, P<0.01) and positively correlated with each of teat diameter (r=0.559, P<0.01) and teat length (r=0.665, P<0.01). All the correlation coefficients between SCC and udder measurements in Black goat were not significant.

Keywords: Somatic cell Count; Test day milk yield; Udder measurements; Does.

I. Introduction:

In dairy ruminants including goats, milk somatic cell count (SCC) has been widely used as an indirect predictor of health status, and is mainly reflect the number of neutrophils that migrate from blood to mammary glands in response to infection [1; 2; 3]. Moreover, it is generally agreed that SCC is higher in goat milk, especially in late lactation period for healthy does [4], because milk secretion is an apocrine process which results a higher number of round cytoplasmic particles and epithelial cells in the milk [5].

Mammary properties are also directly involved in economic production in dairy animals. Both morphologic and physiological mammary properties affect milk yield [6]. A relationship between morphological udder measures and milk production was noted in goats [7]. Moreover, a negative relationship was found between milk yield and SCC in goat [8]. Also, it was reported that SCC genetically correlated with udder floor position, teat length, teat width and teat

form in Alpine and Saanen goat [1]. The objective of this communication was to study the SCC and its relationship with milk traits and udder characteristics in Black and Meriz goat.

II. Materials and methods:

A total of 246 test day milk yield was recorded and the samples (246) were collected from 25 lactating does from each of local Black and Meriz goat (2-6 years old), raised in commercial flocks. Full details of management and feeding practices were described earlier by [9]. Milk was recorded at monthly intervals starting from the first month of kidding till the does were dried off. On the day of the test, the kids were separated from their mothers at 8:00 p.m. on the following morning does were hand milked at 8:00 a.m. and the quantity of milk was recorded.

The external udder measurements were performed before the does were milked as described by [10]. These measurements include udder length (A: UL) from attachment to middle of udder, and udder circumference (C: UC) above teats measured with a flexible tape. By using a caliper, teat length (F: TL) was measured from attachment of teat with udder to the end of teats. Teat diameter (E: TD) was taken in the middle of teats, udder width (B: UW) above teats at rear of udder and distance between teats (D: DBT) between two teats attachment with udder (Figure 1).

Milk samples (50 ml) were immediately analyzed by EKO MILK TOTAL[1] to determine the chemical composition of the milk. Also, somatic cells were counted by the direct microscopic method as described by [11].

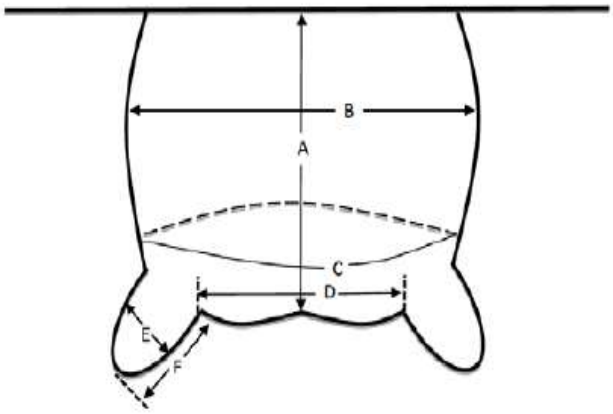

Fig I. Morphological parameters measured on udder and teats of Black and Meriz goats. A: udder length, B: udder width, C: udder circumference, D: distance between teats, E: teat diameter, F: teat length.

Correlation coefficient between SCC and each of TDM and fat percent for every sampling period were computed. Also, correlation coefficients between SCC at first period with udder measurements were calculated, by using SAS [12].

III. Results and Discussion:

A. Somatic cell, milk yield and fat percentage

Results of the correlation coefficients of somatic cell with each of TDMY and fat percent for the five sampling period in Black and Meriz goats are shown in Table (I). Results revealed that SCC of Meriz milk were negatively correlated with TDMY during the 1st (r=-0.30, P>0.05), 2nd (r=-0.341, P>0.05), 4th (r=-0.065, P>0.05), and 5th (r=-0.09, P>0.05) period. While, the correlation coefficient at 3rd sampling period was positive (r=0.079, P>0.05). In Black goat, the correlation coefficients of

[1] Eon Trading LLC, U.S.A

SCC with TDMY were negative at 3rd period (r=-0.471, P<0.05), 1st (r=-0.030, P>0.05), 4th (r=-0.210, P>0.05), and 5th (r=-0.202, P>0.05). However, a positive correlation was observed between SCC and TDMY at the 2nd sample (r=0.234, P>0.05). Similarly, [8] reported a negative relationship between somatic cell and test day yield for three monthly morning sample.

Somatic cells in Meriz milk were positively correlated with fat percentage for the 1st (r=0.313, P>0.05), 2nd (r=0.108, P>0.05), 3rd (r=0.265, P>0.05), and 4th (r=0.023, P>0.05) sampling period. While, at the 5th sampling period the correlation coefficient was negative (r=-0.131, P>0.05). Similarly, in Black goat milk, somatic cell were positively correlated with fat percentage during the 1st (r=0.025; P>0.05), 4th (r=0.093; P>0.05) and 5th (r=0.419; P<0.05) of sampling period. While, a negative correlation was observed at the 2nd and 3rd sample (r=-0.140, P>0.05, and r=-0.131, P>0.05, respectively). Based on pooled correlations, it appears that SCC was negatively (P<0.01) correlated with TDMY and positively (P<0.01) correlated with fat content in both breeds of goat (Table I). Similarly, [8] reported that somatic cell positively correlated with fat content. Many other studies reported a positive correlation between SCC and fat percentage of milk [13; 14; and 15].

Table.I: Correlation coefficient of SCC with TDMY and fat percent for the five sampling period in Black and Meriz goats.

Traits	Meriz		Black goat	
	TDMY	Fat %	TDMY	Fat %
SCC1	-0.300 NS	0.313 NS	-0.030 NS	0.025 NS
SCC2	-0.341 NS	0.108 NS	0.234 NS	-0.140 NS
SCC3	0.079 NS	0.265 NS	-0.471*	-0.131 NS
SCC4	-0.065 NS	0.023 NS	-0.210 NS	0.093 NS
SCC5	-0.090 NS	-0.131 NS	-0.202 NS	0.419*
Pooled correlation	-0.305**	0.278**	-0.499**	0.319**

SCC1, SCC2, SCC3, SCC4, and SCC5: somatic cell count at 1st, 2nd, 3rd, 4th, and 5th sampling period, respectively; TDMY: test day milk yield.
NS: non-significant, *: P<0.05, **: P<0.01.

B. Somatic cell and udder measurements

In Meriz goat, somatic cell was negatively correlated with UC (r=-0.550; P<0.01), UW (r= -0.154, P>0.05), and UL (r=-0.236, P>0.05) while positively correlated with TD (r=0.559; P<0.01), TL (r= 0.665; P<0.01) and DBT (r= 0.094, P>0.05). In Black goat, milk somatic cell was correlated with UW (r=-0.184, P>0.05), UC (r=-0.376, P>0.05), UL (r=-0.319, P>0.05) and TL (r=-0.021, P>0.05) negatively while, positively correlated with DBT (r=0.188, P>0.05) and TD (r=0.267, P>0.05) (Table II). Also, [8] reported that somatic cell was negatively correlated with udder width.

These observations were in accordance with recent studies who reported that higher udder and clearance from the ground, deeper clefts, and smaller

distance between teats were related in lower SCC of milk in cows [16 and 17]. However, it was reported that there was a moderate negative correlation with udder attachment and a moderate positive correlation with teat size [18]. In ewes, pendulous, deep and poorly attached udders are prone to injuries and may cause milking difficulty resulting in bacterial infections. A bigger teat may be more open to contamination through the sphincter [18].

Table.II: Correlation coefficients between somatic cell counts (SCC) and udder characteristics of the first test in Black and Meriz goats.

Traits	UW	UC	UL	DBT	TD	TL
Meriz	-0.154^{NS}	-0.550^{**}	-0.236^{NS}	0.094^{NS}	0.559^{**}	0.665^{**}
Black goat	-0.184^{NS}	-0.376^{NS}	-0.319^{NS}	0.188^{NS}	0.267^{NS}	-0.021^{NS}

UW: udder width; UC: udder circumference; UL: udder length; DBT: distance between teats; TD: teat diameter; and TL: teat length.
NS: non-significant, *: P<0.05, **: P<0.01

IV. Conclusion:

In this study, SCC values were found to be negatively correlated with milk yield and positively correlated with fat percentage of milk for both breeds. Also, Somatic cell was negatively (P<0.01) correlated with udder circumference and positively (P<0.01) correlated with teat diameter and length for Meriz only. So, pendulous, deep and poorly attached udders are more exposed to infection.

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