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SURVEY STUDY ON GOAT MILK FROM DIFFERENT BREEDS RAISED UNDER EGYPTIAN CONDITIONS

Eman . L. Moustafa , M.E. El-Demerdash . M.E. Hashem
Dairy Microbiology Department .
Animal Production Research Institute, Dokki, Giza, Egypt.

ABSTRACT

Five hundred milk samples were collected from different goat breeds, from different regions in Egypt during September 2007 till October 2008. Samples were chemically analyzed for protein, fat as well as somatic cell count (SCC) and microbiologically for total bacterial count (TC), Coliform and Staphylococcus aureus.

The results showed that Somatic cell count (SCC) in all samples obtained from Kafrelshiek had the highest values. While samples from Dakahlia had the lowest ones. Samples from Kafrelshiekh had the lowest protein and fat contents for all breeds. There were significant differences in TC of all samples among regions. The count of coliform was within the normal range, while samples from Kafre Elsheikh showed the highest Staphylococcus count. Also there were significant differences between some breeds and between some regions in all milk analysis.

Key words : Goat's milk , Goat breeds , somatic cell , microbiological quality

INTRODUCTION

Goat are the most versatile domestic animals in adaptation to arid and humid, tropical and cold, and desert and mountain conditions (**Gall, 1991; Quarterium, 1991 and Silanikove, 2000**).

Goat milk is characterized with its offensive odor. This is especially from buck whose odor floats strongly around the premises and can affect the flavour of the milk. The unpleasant odor is obvious in milk if ventilation, milking practices and cooling of milk are improper or insufficient.

Recently milked and cooled goat milk is odor free and hard to distinguish from cow milk in odor and taste **(Mowlem, 1988). Gall (1996)** provides detailed description and production data of 160 goat breeds based on size of population, productivity and unique characteristic .Milk yield production data vary much from country to country for the same breed, depending on feeding , climate and adaptation to diseases.

Somatic cell is widely used to monitor udder health and milk quality. It has been accepted as a quantitative index for mastitis conditions or degree of glandular irrigation in the mammary gland **(Park and Humphrey, 1986 and Poutrel and Lerondelle, 1983)**.They showed that the average SCC in goat milk was $9.08x10^5$/ml, while Staph. and TC were 3.323 x 10^3 and $1.544x10^4$/ml, respectively. Milk with high somatic or body cells and spoilage bacteria produced poor quality products. Normal goat milk has a higher cell count than normal milk from cows. Losses caused by clinical mastitis

include discarded milk, transient reduction in milk yield and premature culling. Perceived financial losses for clinical mastitis vary widely (**Prasad and Sengar, 2002**). Standard SCC is 750.000 cells/ml while the individual procedure milk must not to exceed 1,500,000/ml **(Young and Georg, 2006)**.Also bacterial limits must not exceed 100,000/ml prior to commingling with other procedure milk.

Feeding management affects on SCC in milk goats. Healthy dairy goat herd can be expected to produce milk with SCC under 500 $x10^3$ /ml. The presence of mastitis infection in dairy goat herds is reflected in bulk milk samples with somatic cell counts exceeding 1 x 10^6 cell/ml, whereas SCC in goat milk approach 750 x 10^3 /ml while still being normal .

Therefore, the aim of this survey was to study some chemical properties (protein%; fat%), somatic cell count (SCC) and some microbiological analysis (total bacterial count, coliform group, staphylococcus aureus) in goat breeds taken from different regions in Egypt (Kafre Elsheiekh Dakhlia, Domieta, Sharkia ,Burg El-Arab and Marsa Matrouh).

MATERIALS AND METHODS

Materials:

Milk samples were collected from different goat breeds; Zaraibi (Kafre Elsheikh , Dakahlia, Domiat and Sharkia), Damascus and Damascus x Baladi crossbreed (Kafre Elsheikh & Dakahlia), Baladi (Kafre Elsheikh and Sharkia), Barki and Damascus x Barki crossbreed (Burg EL-Arab and Marsa Matrouh). Milk samples were collected from individual animals in different flocks. The flocks sizes ranged from 10 to 40 heads while the number of animals used to collect samples were about 3-5 of each flock.

Table: Distribution of samples numbers collected of different flocks.

	Zaraibi	Damascus	Barki	Baladi	Dm*Baladi	Dm*Barki
Kafrel Elsheikh	28	28	0	40	35	0
Dakahlia	19	19	0	0	0	0
Domieta	50	0	0	0	0	0
Sharkia	35	0	0	0	40	0
Burg El Arab	0	0	45	0	0	82
Matrouh	0	0	27	0	0	40
Total	**132**	**47**	**72**	**40**	**75**	**122**

Methods:

Fat content and total protein were determined as described by **IDF (1993).** Somatic cell counts were estimated by the Fluoro-opto-electronic method using Fossomatic 5000; Foss Electric apparatus, 3400 Hillerod, Denmark.

Statistical analysis of variance and Duncan's test as well as average and standard error were carried out using a SPSS computer program **SPSS (1999)** .

Total bacterial count was determined by trypton glucose extract agar (TGEA) obtained from Oxoid as reported by the **American Public Health Association (APHA) (1993).**

Coliform group was enumerated on Violet red bile agar medium and incubated at 37 °C for 48 hr.

Staphylococcus aureus was counted on Baried parker agar media with sheep blood for appearance of hymolysis according to the method of **Higgs and Bramely (1981).**

RESULTS & DISCUSSION

Tables (1- 6) showed that SCC recorded the highest count in Kafre Elshiekh Damascus breed samples (4519.5 x 10^3) / ml, while Zaraibi samples which were taken from Dakahlia had the lowest level of SCC(344.05 x 10^3/ml).The highest SCC may be due to the season of lactation **(Osman et al 2004),** or to high microbial content which affected the quality of milk and its products **(Pyorala, 2003).**

SCC in this study was within the normal range where the results are in agreement with **Meharem et al (2008)** .They were lesser than the discriminating threshold values which given by **Zeng and Escobar (1996)** to be 9.3 x 10^5 /ml and **Haelein (2000)** to be 8.0 x 10^5 /ml.

The Protein content was low in samples collected from Kafre Elsheikh for Zaraibi, Damascus, Baladi and Damascus x Baladi crossbreed which may be due to the high SCC in those samples. Samples from Kafre Elsheikh showed the lowest protein values, but the highest protein values were in samples obtained from Dakahlia Damascus goats. There were significant differences among some breeds and also among some regions.

Fat content showed the same trend as protein content. It observed that Zaraibi, Damascus and Damascus x Baladi crossbreed samples obtained from Kafre Elsheikh recorded the lowest fat content, while Damascus milk samples from Dakahlia had the highest fat content.

Young and Georg (2006), and Brown et al. (1995) reported that the differences in protein and fat content between regions for the same breed, depends on feeding, climate and adaptation to diseases.

It was noticed that the protein and fat contents were decreased as SCC increased. This results are agreed with **Osman et al. (2004) and** in agreement with **Taleb, et al (2007),** who found relationship between protein content and SCC.

Moreover, in Barki goat milk, fat and protein contents were almost the same in Burg El-Arab and Marsa Matrouh.

Table (1): Statistical means of protein, fat and SCC of **Zaraibi** goat milk samples taken from different Flocks in Egypt regions.

Region	Protein %	Fat %	S.C.C x10^3
Kafre Elsheikh	2.83 ±0.05^{b}	3.85 ±0.06$^{a\,b}$	2062.2±410^{a}
Dakahlia	3.00±0.09^{ab}	3.75 ±0.10^{b}	344.05±58.26^{b}
Domieta	3.34±0.08^{a}	4.00±0.06^{a}	413.68±62.9^{b}
Sharkeia	3.45±0.07^{a}	3.52±0.06^{b}	2360.1±527^{a}

Table (2): Statistical means of protein, fat and SCC of **Damascus** goat milk samples taken from different Flocks in Egypt regions.

Region	Protein %	Fat %	S.C.C x10^3
Kafre Elsheiekh	2.75±0.05^{a}	3.44±0.07^{a}	4519.5±867^{a}
Dakahlia	3.84±0.08^{b}	4.2±0.06^{b}	541.8±20.4^{b}

Table (3): Statistical means of protein, fat and SCC of **Damascus x Baladi** goat milk samples taken from different Flocks in Egypt regions..

Region	Protein %	Fat %	S.C.C x10^3
Kafre Elsheikh	2.73±0.05^{a}	3.47 ±0.10	3193.6±898^{a}
Dakahlia	3.29±0.07^{b}	3.65 ±0.08	501.3±26.2^{b}

Table (4): Statistical means of protein, fat and SCC of **Baladi** goat milk samples taken from different Flocks in Egypt regions.

Region	Protein %	Fat %	S.C.C x10^3
Kafre Elsheikh	2.98±0.10^{b}	3.88±0.09^{b}	2706.3±872^{a}
Sharkia	3.37±0.00^{a}	4.02±0.04^{a}	2213.0±362^{b}

Table (5): Statistical means of protein, fat and SCC of **Barki** goat milk samples taken from different Flocks in Egypt regions.

Region	Protein %	Fat %	S.C.C x10^3
Burg-Elarab	3.44±0.08	4.04±0.09	477.77±90.93^{b}
Marsa Matroh	3.44±0.06	3.99±0.05	1051.4±224^{a}

Table (6): Statistical means of protein, fat and SCC of **Damascus x Barki** goat milk samples taken from different Flocks in Egypt regions.

Region	Protein %	Fat %	S.C.Cx10^3
Burg-Elarab	3.22±0.05	3.81±0.05	1075.3±460
Marsa Matroh	3.04±0.13	3.78±0.03	210.8±43.2

Different superscripts within the same column in all tables are significantly different (P > 0.05).

Total bacterial counts:

The highest total bacterial counts (TC) were found in Dakahlia and Kafre Elsheikh. Significant differences were detected within the same breed in different regions except Damascus breed and Damascus x Baladi crossbreed which showed non significant differences between them. Tables (7-12) and Fig.(1) showed that samples which obtained from Marsa Matroh and Burg -Elarab had the lowest TC 5.02 x 10^3 & 7.39 x 10^3,respectively. This may be due to the type of feeding and breeds. Barki Samples which obtained from Mrsa Matrouh had also the lowest TC, while crossbred (Baladi x Damascus) milk samples from Kafre Elsheikh had the highest TC.

Coliform group:

Coliform counts were presented in Tables (7-12 and Fig. 2). All milk samples obtained from different regions and different breeds had low counts and were near to the coliform standards in dairy food (1-10 x 10^2 c.f.u./ml). **Guthrie (1983).** Zaraibi samples recorded high significant differences between regions, also Barki samples showed low but significant differences among regions, while the other breeds did not show significant difference among regions.

Staphylococcus aureus :

Tables (7-12 and Fig. 3) indicated that there are differences in staphylococcus counts. It showed that the highest count was found with Damascus x Baladi crossbreed in Kafre Elsheikh (8.2 x 10^3 c.f.u. /ml). On the other hand, Zaraibi milk samples in Dakahlia had the lowest count (4.1 x 10^3 c.f.u. /ml). It also shown that there were no significant differences. Zaraibi samples revealed high significance among regions and low significance differences were noticed among Damascus, Damascus x Baladi, Damascus x Barki in different regions but no significance were between the other breeds in their regions.

Table (7): Statistical means of microbiological analysis estimates of **Zaribi** goat milk samples taken from different Flocks in Egypt regions.

Region	Total count x 10^3	coliformx10^2	Staph x10^3
Kafre Elsheikh	19.64 ± 2.50^b	11.33 ± 0.76^c	5.56 ± 0.23^b
Dakahlia	48.34 ± 7.18^a	15.96 ± 1.31^a	4.10 ± 0.17^c
Domieta	10.53 ± 2.43^b	11.10 ± 0.68^c	4.56 ± 0.37^c
Sharkia	9.57 ± 0.84^b	14.46 ± 0.40^b	6.73 ± 0.34^a

Table (8): Statistical means of microbiological analysis of **Damascus** goat milk samples taken from different Flocks in Egypt regions.

Region	Total count x 10^3	coliformx10^2	Staph x10^3

Kafre Elsheikh	34.93±7.82	12.23±0.75	8.03±0.61[a]
Dakahlia	33.34±4.42	12.96±1.21	5.10±0.17[b]

Table (9): Statistical means of microbiological analysis of **Damascus x Baladi** goat milk samples taken from different Flocks in Egypt regions.

Region	Total count x 10^3	coliformx10^2	Staph x10^3
Kafre Elsheikh	36.92±7.83	13.10±0.20	8.20±0.28[a]
Dakahlia	30.63±4.24	12.43±0.38	4.76±0.14[b]

Table (10): Statistical means of microbiological analysis of **Baladi** goat milk samples taken from different Flocks in Egypt regions.

Region	Total count x 10^3	coliformx10^2	Staph x10^3
Kafre Elsheikh	29.68±10.00[b]	12.96±0.70	7.23±0.45
Dakahlia	38.05±1.82[a]	13.56±0.89	6.33±0.33

Table (11): Statistical means of microbiological analysis of **Barki** goat milk samples taken from different Flocks in Egypt regions.

Region	Total count x 10^3	E.coli x10^2	Staph x10^3
Burg-El Arab	9.95±0.16[a]	11.33±0.52[a]	4.46±0.32
Matrouh	7.78±1.08[b]	9.73±0.23[b]	5.53±0.39

Table (12): Statistical means of microbiological analysis of **Barki x Damascus** goat milk samples taken from different Flocks in Egypt regions.

Region	Total count x 10^3	E.coli x10^2	Staph x10^3
Burg-El Arab	7.39±1.12	10.06±3.23	5.26±0.41[b]
Matrouh	5.02±1.24	11.06±0.46	7.03±0.29[a]

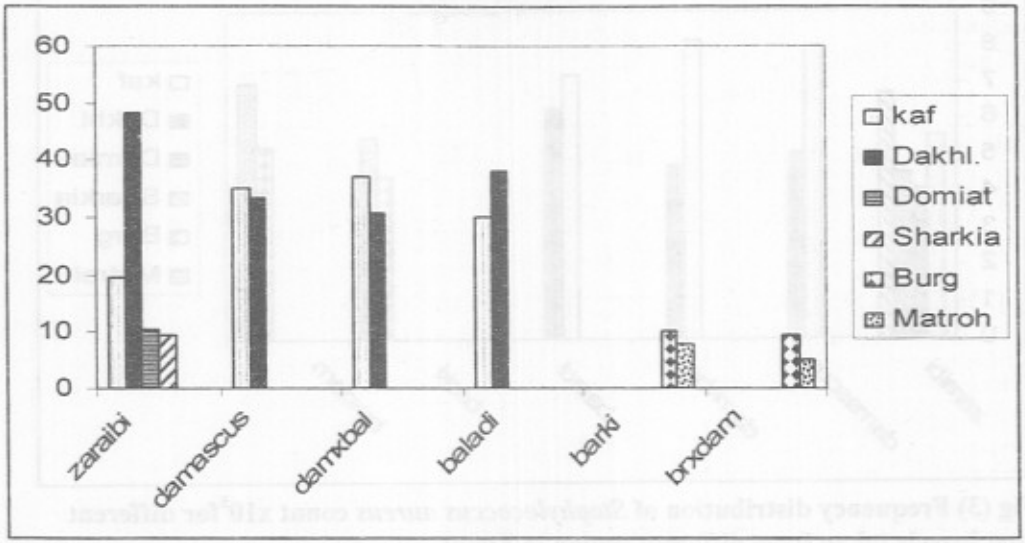

Fig (1) Frequency distribution of total bacterial count x10^3 for different goat breeds taken from different regions in Egypt

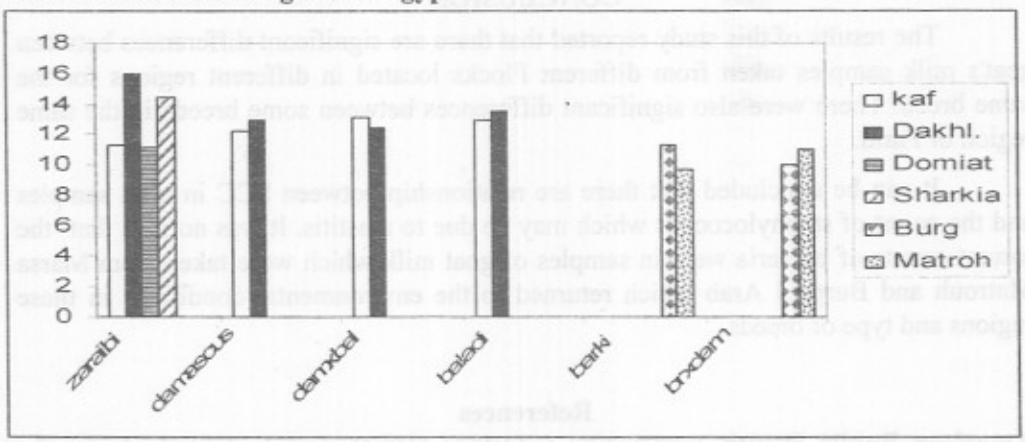

Fig (2) Frequency distribution of coliform count x10^2 for different goat breeds taken from different regions in Egypt

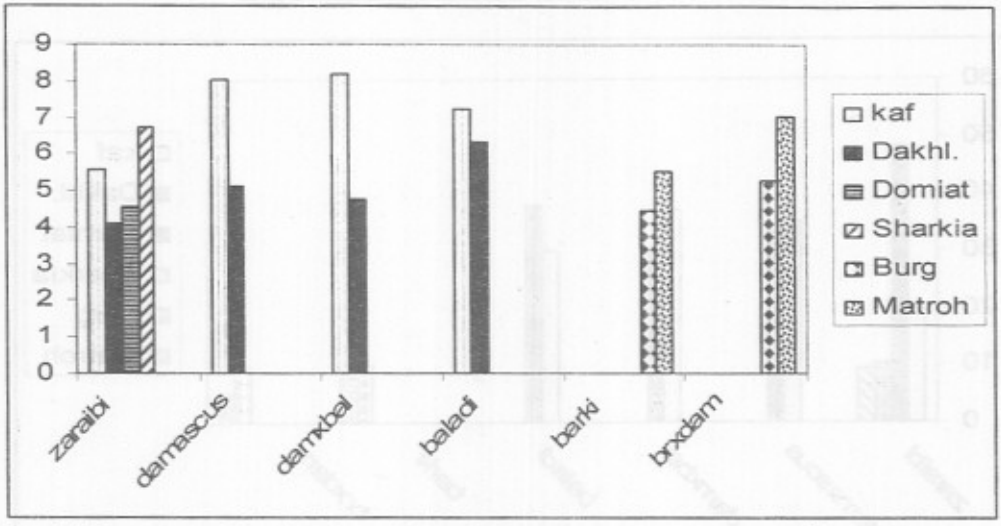

Fig (3) Frequency distribution of *Staphylococcus aureus* count x10^{3}for different goat breeds taken from different region in Egypt

CONCLUSION

The results of this study reported that there are significant differences between goat's milk samples taken from different Flocks located in different regions for the same breed. There were also significant differences between some breeds in the same region or Farm.

It can be concluded that there are relationship between SCC in milk samples and the count of staphylococcus which may be due to mastitis. It was noticed that the lowest counts of bacteria were in samples of goat milk which were taken from Marsa Matrouh and Burg-El Arab which returned to the environmental conditions in these regions and type of breeds.

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دراسة مسحية على ألبان سلالات الماعز المختلفة فى مصر

إيمان لبيب مصطفى – محمد السيد الدمرداش – محمد إسماعيل هاشم
قسم ميكروبيولوجيا الالبان - معهد بحوث الانتاج الحيوانى

تم تجميع 500 عينه لبن ماعز من سلالات ماعز مختلفة (زرايبى – دمشقى – برقى – بلدى – خليط دمشقي بلدى– خليط دمشقى برقى) من عدة محافظات فى مصر (كفر الشيخ – الدقهلية – دمياط – الشرقية – برج العرب – مرسى مطروح) فى الفتره من سبتمبر٢٠٠٧ وحتى اكتوبر٢٠٠٨ وتم تقدير كل من البروتين- الدهن- عدد الخلايا الجسدية (SCC)- العدد الكلى للبكتيريا- بكتيريا الكوليفورم -البكتيريا العنقودية Staphylococcus والتى تعتبر من اسباب أصابة الحيوان بمرض التهاب حمى الضرع.

واظهرت النتائج وجود فروق معنوية بين متوسطات المحافظات المختلفة فى نسبة البروتين والدهن وعدد الخلايا الجسدية لكل سلالة منفردة كما وجد أختلافات واضحة بين السلالات المختلفة، سجلت عينات الدمشقى بكفر الشيخ أعلى عدد خلايا جسديه بينما إحتوت عينات الزرايبى بالدقهليه على أقل عدد خلايا جسديه.

كما أوضحت عينات كفر الشيخ أقل محتوى بروتين ودهن فى كل السلالات حيث سجلت سلالةالبرقى ويليها خليط دمشقى برقى اعلى نسبة فى البروتين والدهن فى حين كانت سلالات الزرايبى والدمشقى والبلدى تحتوى اقل نسبة منهما.

العدد الكلى للبكتيريا كان اقل فى عينات برج العرب ومرسى مطروح.بالنسبه للكوليفورم سجلت سلالة الزرايبى اعلى عدد كما سجلت محافظه الدقهليه أعلى عدد أيضا. أماالبكتريا العنقوديه Staphylococcus سجلت أعلى عددفى سلاله البلدى وأعلى محافظه كانت كفر الشيخ .

يتضح من هذه الدراسه وجود اختلافات معنويه فيمابين معظم السلالات وبعضها كما يوجد اختلافات معنويه بين بعض المحافظات لنفس السلاله وذلك فى نسبه البروتين - الدهن -عدد الخلايا الجسديه -الأعداد الميكروبية .