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Relationship Between Somatic Cell Count and Udder Health in Damascus Goats

Doaa, F. Teleb[1*], Hafasa, F. H. Youssef[1], Azza M. El-Baz[2], M. A. El-Sherbieny[3]
1. Sheep & Goat Research Department, 2. Dairy Microbiology Research Department, 3. Biotechnology Research Department. Animal Production Research Institute, Ministry of Agriculture and Land Reclamation, Dokki,. Giza, Egypt.
* Corresponding author- Email address: d_fteleb@hotmail.com

ABSTRACT

This study aimed to investigate the relationship between SCC, milk yield and composition in Damascus goats in Egypt, as well as, to evaluate the validity of using SCC for monitoring early udder infection.

A total of 204 milk samples were collected at mid lactation (June 2013) from both halves of udders of 51 Damascus goats. Milk bacteriological examination was performed using all half milk samples of morning milking, while percentage of fat (F), total protein (P), lactose (L), total solid (TS), solid not fat (SNF) and SCC were estimated in all collected samples of morning and evening milking. In the present study, 68.3% of the udder half were bacteriologically free of mastitis (healthy), while 31.7% was infected. Seven types of microorganisms were isolated from the milk of Damascus goats. Intermammary infection (IMI) was categorized as 1- healthy (68.3%), 2- infected with single major pathogen (10.9%), 3- infected with single minor pathogen (7.9%), 4- infected with double major pathogens (2.97%), 5- infected with double minor pathogens (0.99%) and 6- infected with one major pathogen plus one minor pathogen (8.9%).

Milk yield was significantly higher in healthy than in infected goats, while insignificant changes were recorded on the percentage of protein, fat, lactose, total solid, solid not fat and SCC. Meanwhile, a negative insignificant correlation was detected between milk yield and SCC. Results showed that the highest milk yield was recorded in the 5th parity, while the lowest observed in the 1st parity. Moreover, percentages of protein, total solids and solids not fat were significantly higher for Damascus goats in the 2nd parity than other parities, with a parallel, but insignificant, increase in fat content. High SCC scores combine with alteration in milk composition, where protein and solid not fat percentage increased and lactose percentage decreased with the increase of SCC in milk (log SCC ranged from 6.51 to 7.25).

Although, a threshold of 1,000,000 cells /ml showed the best indication for IMI, this study showed that high SCC does not always reflect mastitis probably due to the apocrine secretion in goats. Animals with elevated SCC should declare positive mastitis after successful isolation and identification of bacteria causing mastitis. Nevertheless, in case of suspected udder infection, SCC in goat' milk could be suitable as early and cost-effective screening parameter till initiate further analysis.
Key words: *Somatic cell counts, intermammary infection, parity, milk quality, goats*

INTRODUCTION

Goat's milk composition is similar to cow's milk, there for, it is consider to be of great important for processing goat milk, cheese, yoghurts, fermented milk products, etc. On the other hand, goat milk is relatively used as an alternative to cow milk due to its ease digestibility and low allergencity (Mowlem, 2005). The chemical composition of goat milk and its products are affected by various factors; mainly nutrition, breed, stage of lactation, parity, environment, season and udder health status (Park *et al*., 2007).

Subclinical mastitis in goats has been reported as a common problem in herds. It is the main source of economic loss in milk production. It usually precedes the clinical forms of long duration, difficult to be detected, adverse effects

on milk quality and production and thus constitutes a reservoir of microorganisms that lead to infection of other animals within the herd (Hamed *et al*., 1993; Urech *et al*., 1999; Shearer and Harris, 2003). Therefore, it is important to find efficient practical and inexpensive early diagnosis techniques to predict it (Contreras *et al*., 1996).

The ability of SCC to predict IMI in goat milk is lower than in cow's milk because of the presence of many cytoplasmic particles due to the apocrine secretory process of goats (Raynal-Ljutovac et al., 2007). Threshold of SCC between healthy and infected half- udderes were estimated in goat between 700,000 to1,000,000 cells/ ml (Hinckley & Williams 1981) and 210,000 to 1,120,000 cells/ml (Leitner *et al*., 2004). Meanwhile, El- Saied et al. (2003) reported that 1,600,000 cells/ ml SSC is indicator threshold for the intramammary health status of the Egyptian Nubian goats (Zaraibi).

In Egypt, Damascus goat is considered the most important exotic goat breed, where the demand for this breed increases due to its high milk and meat production. In addition, it show good adaptability to the environment in Egypt as compared to other imported breeds, thereby making it a desired breed by farmers for the genetic improvement of local breed. Therefore, this study was designed to investigate the connection between SCC, milk yield and composition in Damascus goats raised in Egypt, as well as, to evaluate the validity of SCC for monitoring udder infection.

MATERIAL AND METHODS

The experimental work was carried out at Sakha experimental station, Kafr El-Sheikh Governorate, Animal Production Research Institute, Ministry of Agriculture and Land Reclamation.

Animals and management:

Animals were housed in semi-roofed yards. Feeding applied according to NRC (1981). Roughage (including Berseem, Trifoliumalexandrinum hay and bean straw) to concentrate ratio was 40:60. The ration was offered twice daily at 8 am and 3 pm and clean water was available all time.

Data and sampling:

A total of 204 milk samples were collected at mid lactation (June 2013) from both halves of udders of 51 Damascus goats. Samples were collected from both morning and evening milking. Teats of sampled animals were cleaned before milking using 70% ethanol. Animals were hand milked and the initial milk stripped from each half was discarded. Approximately 15 ml of milk samples were taken into sterile pre-labeled tubes and kept in icebox at 4°C until bacteriological and milk composition analysis. Both udders showed signs of clinical mastitis and milk samples showed obvious abnormal physical aspects were excluded from the study. In the present study, one sample was excluded from the analysis.

Bacteriological examination

Bacteriological tests were carried out to investigate the status and type of IMI by the Standard Plate Count (SPC) according to Houghtby *et al*. (1992). Milk bacteriological examination was performed using all half milk samples of morning milking (101 samples). Detection and enumeration of mastitis organisms were performed by serial dilutions of milk samples, isolation and enumeration of pathogens applied according to the standard method (APHA, 1993). The presumptive coliform bacterial count was counted using Mac Conkey agar media. The presumptive *Streptococccci* groups (Str) causing mastitis (*Str. agalactia, Str. disagalactia and Str. uberis*) were enumerated on modified Edward's media and blood was added to the media for identification of blood hemolytic bacteria. The presumptive *Staphylococcus aureus* (*Staph. aureus*) were counted on Barid Parker agar media with sheep blood for appearance of hymolysis. Blood agar with potassium tellurite was used with presumptive *Corynebacterium* species. All plates were incubated at 37ºC and examined after 24 hours, then again after 48 hours; these selective and differential media were

obtained from Oxiod (Hampshire, England). These selective and differential media were chosen for the isolation and identification of mastitis inducing pathogens according to Collins and Lyn (1979). The results were expressed as colony forming unit (CFU/ml) of milk. Subclinical IMI was diagnosed when ≥300 CFU/ml of each colony type was isolated (McDougall *et al*., 2010).

Milk yield, composition and SCC:

Total milk yields (MY) were calculated during lactation period of 210 days. Percentage of fat, total protein, lactose, total solid and solid not fat and SCC were estimated in all collected samples (203). Milk composition was estimated with infra-red spectroscopy (Milko-Scan 133B; N. Foss Electric, DK 3400 Hillerod, Denmark).

SCC of each milk sample was determined by the fluoro-opto-electronic method (Fossomatic 5000; Foss Electric apparatus, 3400 Hillerod, Denmark) 24 h post collection following the rules of the International Dairy Federation (1984). Original scales of SCC values were transformed to its corresponding logarithmic form according to Ali and shook (1980) to meet the characteristics of hypothesis testing. The calculated SCC was grouped into 3 classes, the 1st class ranged 4.67 to 5.99), 2nd class ranged 6.0 to 6.48 and the 3rd ranged 6.51 to 7.25.

Thresholds of SCC

To evaluate the validity of SCC for monitoring infection, sensitivity and specificity were calculated at selected thresholds. Sensitivity was defined as the proportion of infected quarters (with major pathogen) with SCC above the selected threshold, and specificity was the proportion of non-infected quarters with SCC below selected thresholds. An optimal SCC threshold was determined as a function of the tested sensitivity/specificity (Martin *et al*., 1987 and El-Saied *et al*., 2003). Threshold values selected were 500, 1000 and 1500 cells/ ml. The evaluation was carried out by using samples undergo both SCC and bacteriological examination.

Statistical analysis*:*

Statistical analysis was carried out using the general linear model procedure of SAS (SAS, 2000). Data was analyzed using the following model:

$$Y_{ijkln} = T_i + H_j + P_k + M_l + M*P_{kl} + e_{ijklm}$$

Where,

Y_{ijklm} is the studied (dependent) variable of log SCC, MY and F, P, L, TS and SNF%.

T_i is the fixed effect of sampling time, where I = 1 (morning) or 2 (evening).

H_j is the fixed effect of udder half, where j = 1 (right) or 2 (left).

P_k is the fixed effect of parity, where k = 1 to 6.

M_l is the fixed effect of (IMI), where m = animal health status (1=healthy and 2=infected)

$M*P_{kl}$ is the effect of interaction between IMI and parity.

$e_{ijklm}$is the random error effect.

Another model was used to study the effect of different SCC classes on MY and F, P, L, TS and SNF%:-

$$Y_{ij} = S_i + e_{ij}$$

Where;

Y_{ij} is the studied dependent) variable of MY and F, P, L, TS and SNF%.

S_i is the fixed effect of SCC category 1 to 3 (1= 4.67- 5.99, 2= 6.0- 6.48 and 3= 6.51- 7.25).

Significant differences between groups were tested according to Duncan (1955). Moreover, person Correlation coefficient was assessed among SCC class with MY and IMI.

RESULTS AND DISCUSSION

Bacterial types isolated

In the present study, 68.3% of the total half milk samples were bacteriologically negative half (healthy), while 31.7% was infected. Seven types of microorganisms were isolated from milk of Damascus goats. *Staphylococcus aureus*, *Coliform spp.*, *Streptococus uberis*, *Streptococcus agalactia* and *Streptococcus disagalactia* were considered as major pathogens. Meanwhile, *Corynebacteria* and *other Staphylococci spp.*

Table 1: LSM (±SE) of total milk yield (MY), composition and SCC as depending on udder half, sampling time, parity and udder health status.

Effect		Total MY	Milk composition (%)				
	SCC (Log_{10})	kg	F	P	L	TS	SNF
Udder half							
Right	6.26±0.09^{a}	170.24±7.72^{a}	3.67±0.14^{a}	2.76±0.09^{a}	4.57±0.06^{a}	11.71±0.18^{a}	8.04±0.10^{a}
Left	6.17±0.09^{a}	170.58±7.40^{a}	3.68±0.14^{a}	2.86±0.09^{a}	4.51±0.06^{a}	11.76±0.18^{a}	8.07±0.09^{a}
Milking time							
Morning	6.24±0.09^{a}	171.10±7.61^{a}	3.24±0.14^{a}	2.74±0.09^{a}	4.52±0.06^{a}	11.21±0.18^{a}	7.96±0.09^{a}
Evening	6.19±0.09^{a}	169.72±7.48^{a}	4.12±0.14^{b}	2.88±0.09^{b}	4.57±0.06^{a}	12.26±0.18^{b}	8.15±0.09^{b}
Parity							
1	6.12±0..21^{a}	135.38±16.05^{c}	3.88±0.35^{a}	2.87±0.20^{ab}	4.59±0.13^{a}	12.04±0.44^{ab}	8.16±0.02^{ab}
2	6.17±0.21^{a}	170.01±16.66^{b}	4.08±0.36^{a}	3.15±0.20^{a}	4.53±0.14^{a}	12.46±0.46^{a}	8.38±0.21^{a}
3	6.21±0.21^{a}	173.51±16.52^{ab}	3.86±0.36^{a}	2.59±0.20^{b}	4.65±0.13^{a}	11.80±0.45^{b}	7.94±0.21^{b}
4	6.06±0.21^{a}	189.03±16.31^{ab}	3.77±0.35^{a}	2.80±0.20^{b}	4.63±0.13^{a}	11.90±0.45^{b}	8.13±0.21^{ab}
5	6.25±0.19^{a}	191.06±14.99^{a}	3.63±0.32^{a}	2.73±0.18^{b}	4.49±0.12^{a}	11.55±0.41^{b}	7.92±0.20^{b}
6	6.34±0.26^{a}	181.32±20.51^{ab}	3.83±0.44^{a}	2.68±0.25^{b}	4.52±0.17^{a}	11.74±0.56^{b}	7.90±0.26^{b}
Health status							
Healthy	6.15±0.44^{a}	180.90±43.26^{a}	4.10±0.74^{a}	2.81±0.74^{a}	4.59±0.28^{a}	12.20±0.94^{a}	8.10±0.44^{a}
Infected	6.22±0.12^{a}	165.87±09.58^{b}	3.58±0.21^{a}	3.58±0.21^{a}	4.55±0.08^{a}	11.63±0.26^{a}	8.05±0.12^{a}

a and b = Means with the same letter are not significantly different.

were considered as minor pathogens. The most dominant bacterial types isolated in this study were *Staphylococci spp.* (19.80%), *Coliform spp.* (13.86%) and *Staphylococcus aureus* (10.89). Similar bacterial isolation was reported by El-Saied *et al*. (2003) in Egyptian Zaraibi goats and in lactating goats in Thunen- Institute of organic farming, Germany (Tanja *et al*., 2012). Moreover, Teleb *et al*. (2009) recorded that the most frequency pathogens isolated from milk samples of sub- clinically infected Zaraibi goats were *Staphylococcus aureus* (3.2 - 6.0%), *Streptococcus disagalactia* (3.2 - 3.6%), *Streptococcus uberis* (0 - 0.1%), *Coliform spp* (4.3 - 4.8%), *Staphylococci spp.* (7.2 - 7.5%), *Corynebacteria spp.* (15.1 - 16.9 %) and *Bacillus* (11.8 - 12.1 %). Eman *et al*. (2009) reported low counts of *Coliform* near to the standards in dairy food (1-10 x 10^2 CFU/ml).

Udder health status (IMI) was categorized in this study as 1- healthy (68.3%), 2- infected by a single major pathogen (10.9%), 3- infected by a single minor pathogen (7.9%), 4- infected by double major pathogens (2.97%), 5- infected by double minor pathogens (0.99%), 6- infected by one major pathogen plus one minor pathogen (8.9%).

Milk yield, composition and Somatic cell count (SCC):

Least square means (LSM) of total MY, SCC, as well as, percentage of F, P, L, TS and SNF at different sampling times (morning and evening), udder halves (left and right), parity and udder health status (IMI) are presented in Table 1.

The mean value of total MY in Damascus goats during lactation period of 210 days was 163.78 kg (ranged 81.70 - 258 kg). The overall mean of SCC was 6.15 (ranged 4.67 - 7.25), while the mean percentage of F, P, L, TS and SNF were 3.78, 2.79, 4.53, 11.79 and 8.01%, respectively. AL Khouri (1996) reported that total milk production as 2.5 kg/day during lactation period of 281-336 days in Damascus goats, while Eissa (1996) recorded milk yield of 0.91 kg/day during lactation period of 159 days. Similar to our results, Eman *et al*. (2009) reported mean value of 3.44±0.07, 2.75±0.05 and 4519.5±867 (log= 6.66) for F, P and SCC, respectively for Damascus goats. On the other hand, Hadjipanayiotou (1995) obtained mean values of 4.26, 4.09, and 13.21% for F, P, and TS, respectively, in Damascus goats which are higher than that recorded in the present study. The differences between SCC reported in this study (47×10^3- 1763.6×10^4 cell/ ml) and that reported by other authors could refer to multi factors such as stage of lactation, method of milking, season, breed and lactation number. Kalogridou-Vassliadou *et al*. (1992) reported that Alpine goats' milk had a slightly higher SCC and a wider range than Nubian milk (48,000 to 6,200,000 cells/mL vs. 78,000 to 2,800,000 cells/mL); Alpine goats' milk had a lower SCC than Anglo-Nubian goat's milk (Park and Nuti, 1985). In Bulgaria, SCCs were estimated as 2.5, 3.3 and 3.7 million cells/mL for Toggenberg, Saanen and Anglo-Nubian breeds, respectively (Petrova, 1997). Moreover, according to Fekadu *et al*. (2005), SCCs increase significantly as lactation advanced, which is considered normal in seasonal dairy goat herds. Zeng and Escobar (1996) and Vacca *et al*. (2010) reported a significant increase of SCC only in the period from spring till the summer. Zeng and Escobar (1995) reported that dairy goats with healthy udders may produce milk with > 1.0×10^6 cells/ml, particularly in late lactation.

Results showed that udder half had insignificant effect on milk yield, composition or SCC. Meanwhile, percentages of F, P, TS and SNF contents were significantly higher (*P*> 0.0001, 0.03, 0.0001, 0.01, respectively) in evening samples than in morning samples.

Milk yield, as well as percentages of P, TS and SNF were significantly (P > 0.001, 0.05 and 0.01, respectively) affected by parity (Table 1). The highest milk yield was recorded in the 5th parity, while the lowest level was observed in the 1st parity. Similarly, Zeng and Escobar (1995) and Kralickova *et al*. (2013) reported that goats in

1st parity had the lowest daily milk yield than those in the 2nd and 3rd parities. In other studies, the highest daily milk yield was recorded for goats in the 3rd and higher parity (Zumbo *et al*. 2004), while in the 1st parity (Strzałkowska *et al*., 2010).

Moreover, percentages of P, TS and SNF were significantly higher in Damascus goats in the 2nd parity than other parities, which was parallel with an insignificant increase in fat content. Kralickova *et al*. (2013) reported that goats in the 2nd parity had significantly higher contents of TS, F and P in milk compared to goats in the 1st and 3rd parity. Meanwhile, Zumbo *et al*. (2004) reported higher P and F levels in Nebrodi goats in the 3rd and higher parities. Teleb *et al*. (2009) reported that LSM of P, TS and SNF content in Zaraibi goats' milk were significantly affected by parity number with the highest levels observed in the 6th parity, while F content was significantly higher at the 1st parity. Strzałkowska *et al*. (2010) observed an increase in the contents of TS, F and P in goats in the 1st lactation. Addass *et al*., (2013) recorded the highest fat content (4.62± 0.03%) in goats in the 3rd parity. They also stated that fat content was significantly affected by breed and stage of lactation, while protein content was affected by parity and stage of lactation.

In the present study, parity had insignificant effect on SCC and lactose content. Similarly, Nudda *et al*. (2003) reported that SCC did not differ significantly among parities. Moreover, the highest level of lactose content was recorded in goats in the 3rd parity, which agree with Addass *et al*., (2013), who stated that lactose level increase with parity number and lactation stage (lactose level= 4.40± 0.04% at mid of lactation). Similar levels of lactose in milk were recorded in goats of different parities, where Zumbo *et al*. (2004) reported the highest lactose content in goats in the 1st and 3rd parity (4.70 and 4.71%, respectively). Carnicella *et al.* (2008) observed statistically higher lactose content in goats in the 1st and 2nd parity (4.7 %) compared to 3rd parity (4.6 %) while Strzałkowska *et al.* (2010) recorded the highest level in goats in the 2nd parity (4.55 %). Moreover, Carnicella *et al*. (2008) and Strzałkowska *et al.* (2010) reported that parity had a significant effect on all parameters of goat' milk. On the contrary, Zeng and Escobar (1995) stated that parity did not affect contents of basic milk components and SCC.

Results showed that milk yield was significantly (P>0.01) higher in healthy than infected goats half- udders, while insignificant change was recorded on the percentage of P, F, L, TS, SNF and SCC (Table 1). In addition, milk yield was negatively correlated with SCC (r= -0.02), where milk yield decreased with the increase of SCC in milk. Min *et al*. (2007) described that in uninfected glands, SCC decreased as milk yield increased. They added that it is often assumed that SCC can be used as a proxy for IMI and that an increase in SCC causes a decrease in MY. Rota *et al*. (1993) showed that SCC follows an inverse lactation curve (the low cell counts coincide with high milk yield and vice versa). Koop *et al*. (2010) reported a negative correlation between SCC and MY. They suggested that SCC may affected by milk yield via a dilution effect. Moroni *et al*. (2005a) suggested that the negative relationship between SCC and milk yield was attenuated by the presence of infected animals. Moreover, injury of udder cells reduces the synthesis of milk constituents in the udder, as lactose, and changes permeability of membranes and interstitial spaces that increase the passages of components from blood to milk (Schultz, 1977).

Both udder status (IMI) and its interaction with parity number had significant effect on SCC, MY and percentage of F, P and TS (P > 0.05, 0.04, 0.03, 0.01 and 0.05, respectively). Sanchez *et al*. (1999) reported a positive relation between IMI and parity number in half udders of older than 5th parity does.

In the present study, percentage of milk P, SNF contents were significantly (P > 0.01) affected by SCC classes (Table 2). Moreover, SCC correlates positively (r= 0.22, P > 0.02) with P and negatively with F and L percentage (r= -0.14, P > 0.05 and -0.17, P > 0.01, respectively). The increase in percentages of P and SNF and

decrease in L content were recorded with the increase of SCC in milk (SCC ranged 6.51- 7.25). Similarly, Ying *et al*. (2002) reported that SCC correlates positively with the P percentage. Jones (2006) reported that F and L% were lower in case of infected udder than in non-infected one. Kifaro, *et al*. (2009) reported that sub-clinical mastitis causes a significant decrease in milk butter fat and an increase in milk protein of dairy goat in Tanzania. They reported insignificant decrease in milk lactose with the increase of mastitis severity. Molefe *et al*. (2013) observed a decrease in L and F content in Ettawah and PESA goats with the severity of mastitis as reported by Hamed *et al*. (1993), while P and TS levels increased with mastitis in PESA goats. They stated that the increase in SCC results from the transfer of white blood cells from blood to milk, which leads to changes in milk composition (Pirisi *et al*., 2000).

The distribution percentage of the correct and false classifications, as well as sensitivity and specificity at different selected thresholds (500, 1000 and 1500 cells/ ml) are shown in Table 3. The most direct approach in selecting optimal thresholds to define presence of IMI is to select thresholds resulting in the lowest total number of diagnostic errors (Smith, 2006). A threshold of 1,000,000 cells /ml milk of Damascus goat in our study were shown to have a high sensitivity for identifying IMI. Result was lower than that reported by El- Saied et al. (2003) in Zaraibi (1,600,000 cells/ ml) and Smith and Sherman, 1994 (1.5 million or more).

CONCLUSION

Parity affects significantly milk yield in damascus goats, where the highest milk yield recorded in 5th parity and the lowest in 1st parity. Milk yield was significantly higher in healthy than infected goats, while no significant changes were observed in SCC or milk composition. A negative insignificant correlation was detected between milk yields and SCC. In addition, high SCC scores alter milk composition, where protein and solid not fat percentages increased and lactose percentage decreased with the increase of SCC in milk (SCC ranged 6.51- 7.256). A threshold of 1,000,000 cells/ml or more showed the best indication for imi. However, this study showed that high SCC does not always reflect mastitis, therefore it is unclear if the increase of SCC accompanied the decrease in milk yield reflects the effect of disease on milk production or result from the dilution effect of milk yield. Animals with elevated SCC would declare positive mastitis after successful isolation and identification of bacteria causing mastitis. Nevertheless, in case of suspected udder infection, SCC in goat's milk could be suitable as early and cost-effective screening parameter for subclinical mastitis till initiate further analysis. A further study on large scale of sampling during lactation period (early, mid and late lactation) is recommended to identify various SCC thresholds in milk of damascus goats.

Table 2: LSM (±SE) of total milk yield and composition as depending on SCC class.

SCC class	Milk composition (%)					Total milk yield (kg)
	Fat	Protein	Total solid	Solid not fat	Lactose	
4.67- 5.99	3.77±0.16 [a]	2.67±0.10 [b]	11.73±0.20 [a]	7.95±0.11 [b]	4.59±0.07 [a]	175.03±8.59 [a]
6.00- 6.48	3.66±0.13 [a]	2.75±0.08 [b]	11.69±0.17 [a]	8.03±0.09 [b]	4.59±0.06 [a]	165.79±7.21 [a]
6.51- 7.25	3.61±0.16 [a]	3.02±0.10 [a]	11.79±0.21 [a]	8.18±0.11 [a]	4.46±0.70 [b]	170.42±8.59 [a]

a and b = Means with the same letter are not significantly different.

Table 3: Percentages of correct and false classification and sensitivity with specificity on the different SCC thresholds levels for Damascus goats in Egypt.

Threshold levels (cells/ml) x 10^3	Correctly classified samples	False positive	False negative	Sensitivity	Specificity
500	25	85.7	27.3	14.3	72.7
1000	57.1	61.9	14.3	38.1	85.7
1500	18.2	90.0	38.1	10.0	61.9

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الملخص العربى

العلاقة بين مستوى تعداد الخلايا الجسدية و صحة الضرع فى الماعز الدمشقى

دعاء طلب- حافصة فهمى- عزة الباز- محمد الشربينى
معهد بحوث الإنتاج الحيوانى

يهدف هذا البحث الى دراسة العلاقة بين تعداد الخلايا الجسدية و إنتاج الحليب ومكوناته في الماعز الدمشقى بمصر، وكذلك التحقق من مدى صلاحية إستخدام تعداد الخلايا الجسدية كدليل على الإصابة المبكرة للضرع. .

تم جمع عدد 204 عينة لبن في منتصف فترة الحليب (يونيه 2013) من أنصاف أضراع عدد 51 عنزة دمشقى. تم إجراء الفحص البكتريولوجي فى جميع عينات اللبن من أنصاف الأضراع لحلبة الصباح، في حين قدرت نسبة الدهون (F) ، البروتين الكلي (P) ، اللاكتوز (L) ، والمواد الصلبة (TS) ، و المواد الصلبة الغير دهنية (SNF) و تعداد الخلايا الجسدية (SSC) في جميع عينات اللبن من حلبة الصباح والمساء. طبقا للفحص البكتريولوجى، تم تصنيف 68.3 ٪ من أنصاف الأضراع على إنها خالية من البكتريا المسببة لإلتهاب الضرع (سليمة)، بينما كان 31.7 ٪ مصاب. تم عزل سبعة أنواع من الكائنات الدقيقة من لبن الماعز الدمشقى و تم تصنيف العدوى بين الثديين كالآتى:- 1 –سليمة (68.3 ٪) ، 2 –عدوى بعدد واحد من مسببات الأمراض الرئيسية (10.9 ٪) ، 3 – عدوى بعدد واحد من مسببات الأمراض الطفيفة (7.9 ٪) ، 4 – عدوى بعدد 2 من مسببات الأمراض الرئيسية (2.97 ٪) ، 5 – عدوى بعدد 2 من مسببات الأمراض الطفيفة (0.99 ٪) و 6 – عدوى بعدد واحد من مسببات الأمراض الرئيسية وواحد من مسببات الأمراض الطفيفة (8.9 ٪) .

أظهرت النتائج إن إنتاج اللبن كان أعلى معنويا فى الماعز السليمة عن المصابة، في حين كانت هناك تغييرات غير معنوية فى نسبة كل من البروتين والدهون و اللاكتوز والمواد الصلبة و المواد الصلبة الغير دهنية وتعداد الخلايا الجسدية . كما كانت هناك علاقة سلبية ولكن غير معنوية بين إنتاج اللبن و تعداد الخلايا الجسدية . أظهرت النتائج أن أعلى إنتاج للبن تم تسجيله في الماعز ذات الولادة الخامسة بينما الأقل في الماعز عند أول ولادة. علاوة على ذلك، كانت النسب المئوية للبروتين ، المواد الصلبة الكلية والمواد الصلبة الغير دهنية أعلى بكثير فى الماعز الدمشقى في الموسم الثانى للولادة بالمقارنة بالمواسم الأخرى بالتوازى مع زيادة غير معنوية في نسبة الدهون. أرتبط أعلى معدل لتعداد الخلايا الجسدية بتغير في مكونات اللبن، حيث زادت نسبة كل من البروتين والمواد الصلبة الغير دهنية، بينما انخفضت نسبة اللاكتوز مع زيادة تعداد الخلايا الجسدية في اللبن (بين 6.51- 7.25).

وعلى الرغم من إن الحد 1.000.000 خلية جسدية/ مللى أظهر أفضل إشارة إلى الإصابة بالتهاب الضرع من عدمه، الإ أن الدراسة أظهرت أن ارتفاع عدد الخلايا الجسدية لا يعكس دائما التهاب الضرع و ربما يرجع ذلك إلى طبيعة الغدد المفرزة في الماعز . و ينبغي أن تعتبر الحيوانات التى سجلت ارتفاع فى عدد الخلايا الجسدية مصابة بعد النجاح فى عزل و تعريف البكتيريا المسببة لالتهاب الضرع. ومع ذلك، في حالة الاشتباه في إصابة الضرع يعتبر تعداد الخلايا الجسدية من الوسائل المناسبة و الأقل فى التكلفة لعمل مسح لفرز الحيوانات المصابة من السليمة لحين البدء فى مزيد من التحليل.