

## FACTORS AFFECTING MILK PRODUCTION IN A HERD OF DAMASCUS GOATS UNDER EGYPTIAN CONDITIONS

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**ABSTRACT:** *This study was carried out on a Damascus goats flock raised under Egyptian conditions in El-Rahb and Toukh Tanbesha farm which belonging to Animal Production Department, Faculty of Agriculture, Minufiya University, Shebin El-Kom, Egypt. The study was started from August 2010 to June 2014 to investigate milk production and factors affecting it during suckling period (90 days). The overall mean of total milk yield (TMY90) was 185.55 ± 50.30 kg and ranged from 86.45 to 311.15 kg. The effect of parity, season and year of kidding on TMY90 was significant ( $p < 0.05$ ) while the effect of type of birth was highly significant ( $p < 0.01$ ). The effect of body weight on TMY90 was non-significant. The overall mean of daily milk yield during suckling period (DMY90) was 2.05 ± 0.78 kg/day and ranged from 0.97 and 3.42 kg/day. The effect of parity and type of birth on DMY90 was highly significant ( $p < 0.01$ ) while the effect of season of kidding, year of kidding and body weight was significant ( $p < 0.05$ ). The overall means of milk component traits fat, protein, lactose, TS, and ash were 3.88 ± 0.79, 3.13 ± 0.29, 4.26 ± 0.37, 12.04 ± 0.99, and 0.76 ± 0.06%, respectively.*

**Key words:** *Damascus Goats, milk yield, milk component, daily milk, parity, season, year, body weight, type of birth, suckling period, factors affecting production.*

### INTRODUCTION

Goat milk is characterized by a high nutritive value, wholesome, easily digestible and possesses medicinal value. Hence, goat is called the "poor man's cow because it is a multipurpose animal which provides milk, meat, hair and skin. Damascus goats, which are known as Shami in Arabian countries, are considered the most important goat breed in some Arab countries such as Egypt and Syria due to their high milk, meat production and fertility. In Egypt, the total goat's population was about 4.2 million heads (FAO, 2010). Goats are an important source of meat in Egypt and contribute about 5 % of all the red meat consumed in the country (Galal *et al.* 2005). While the contribution of goat milk is just 1% per cent of total milk production (Soryal and Metawi, 2000). This breed is more adaptable to the environmental conditions in the previously mentioned countries, compared to other exotic breeds (Teleb *et al.* 2003 and Ahmed, 2010). Milk production is one of the most important functions related to the productivity and reproductive performance, and was found to be affected by many factors. Milk composition and quality are

important attributes that determine the nutritive value and consumer acceptability. Malau-Aduli *et al* (2001) reported that goat milk yield and composition are affected by breed, age, stage of lactation, season and plane of nutrition. The present study aimed to evaluate milk yield of Damascus goats and affecting factors during suckling period (90 days) under Egyptian conditions.

### MATERIALS AND METHODS

This study was carried out on a flock of Damascus goats in El-Raheb and Toukh Tanbesha farms which belonging to Animal Production Department, Faculty of Agriculture, Minufiya University, Shebin El-Kom, Egypt. A total number of 60 Damascus does with 180 lactations, were used during the period between August 2010 to June 2014. The age of does ranged from 2 to 8 years (1<sup>st</sup>-7<sup>th</sup> parities) with an average body weight of 44.85 kg. Natural mating was applied using three Damascus bucks, the ages of bucks ranged from 2-5 years with an average body weight of 60 kg. The goats were kept indoors at night and kept outside the yard for most time of the day. Natural light entered the stable through windows

during the daylight. The herd was managed under extensive conditions (ElKaschab, 2010). Does were fed concentrate mixture (14% crude protein), green fodder and roughage which was supplemented according to year-seasons. Concentrate mixture was given once a day at 08:30 am, where roughage was offered two times a day at 09:00 am and at 16:30 pm. All does were fed concentrate mixture, green fodder and roughage according to their maintenance and reproductive requirements (NRC, 2007).

Corn silage was offered once a day at 12:00 pm starting October 2013. All animals were subjected to the routine vaccination program against infectious diseases and also were treated against internal parasites.

All goats were kept together with their kids from kidding until weaning (three months). Kids were allowed to suckle their dams ad libitum from birth until weaning and were given free access to feed concentrates and roughages.

- **Milk production** was measured during the suckling period starting from the seventh day post kidding by isolating kids from their dams at 10.00 pm. In the morning at 10.00 am kids were weighted before and after suckling and the difference in kids weight was considered as milk yield of its dam. After suckling the does were hand milked in order to estimate residual milk (stripped milk). Suckled and residual milk represented the quantity of morning milk yield produced.
- **Daily milk yield** : was estimated for each doe by multiplying morning milk yield by two.
- Weekly milk yield: the daily milk yield was multiplied by 7 to get the preceding week milk production.
- **Total milk yield**: was calculated by summation milk yield of the weeks of the suckling period (13 weeks).
- **Milk components** :  
Milk samples were collected from all does (780 samples) at weekly intervals

starting from the seventh day post kidding until weaning through determination of daily milk yield. In mid suckling time of kids, 10 ml of milk was taken into clean dry plastic tubes and analyzed for fat, protein, lactose, TS and Ach using lactoscan milk analyzer.

### Statistical analysis.

Total milk yield (TMY90) and daily milk during suckling period was analyzed using SPSS computer program (Statistical Package for Social Science) version 11, (2001). Means between different groups were tested by Duncan test. Means between different groups were tested by Duncan test. Furthermore, the data were analyzed using Linear Model Procedures (GLM) with the following model:

$$Y_{ijklm} = \mu + B_i + L_j + P_k + S_l + Y_m + e_{ijklm}$$

Where:

- Y<sub>ijklm</sub> = the measured traits
- $\mu$  = the overall mean
- B<sub>i</sub> = the effect of i<sup>th</sup> body weight (i=1,2,) where:
  - 1 = 29 -39 kg (medium)
  - 2 =  $\geq$ 40 kg (heavy)
- L<sub>j</sub> = the effect of j<sup>th</sup> litter size of the doe (j=1,2,3) where:
  - 1 = single,
  - 2 = twins,
  - 3 = triple
- P<sub>k</sub> = the effect of k<sup>th</sup> parity (k=1,2,3,4) where:
  - 1 = first parity,
  - 2 = second parity,
  - 3 = third and fourth parity,
  - 4 =  $\geq$  5 parity
- S<sub>l</sub> = the effect of l<sup>th</sup> season of kidding (l=1,2) where:
  - 1 = winter from (21 September to 20 March ),
  - 2 = summer from (21 March to 20 September),
- Y<sub>m</sub> = the effect of m<sup>th</sup> year of kidding (m=1,2,3) where:
  - 1 = 2011
  - 2 = 2012
  - 3 = 2013
- e<sub>ijklm</sub> = the random error effect

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**RESULTS AND DISCUSSION**  
**Milk yield during suckling period (TMY90)**

Results in Table (1) indicated that the overall mean of milk yield of Damascus goats during suckling period (TMY90) was 185.55 ±50.30 kg and ranged from 86.45 to 311.15 kg. This result is higher than the findings of many workers in different countries on Damascus goats. In Egypt, Badawy and Youssef, (2008) reported that MY90 was 162 kg. In Cyprus Mavrogenis and Papachristoforou (2000) reported that MY90 was 169.5 kg . In Oman, El Hag *et al.*, (2000) reported that milk yield was 163 kg in 170 days . In Sudan, Mahmoud *et al.*, (2014)

reported that milk yield was 148.8 kg during suckling period (120 days), while Shaat *et al.* (2007) working on Zaraibi goats reported that TMY90 was 135.8 kg.

On the other hand, this result is less than those reported by many workers in different countries on Damascus goats. Louca *et al.* (1975); Ozcan and Güney (1983); Abbasoglu (1999); KESKÜN, *et al.*, (2004); Güney *et al.*, (2006); Guler, *et al.*,(2007) and Khazaal (2009) reported values ranged from 264.34 to 511 kg in 240 to 300 days. While, Abdelhamid *et al.*(2013) working on Zaraibi goats in Egypt estimated TMY90 as 213.4 kg.

**Table (1): Least squares means (LSM) ± Standard Deviation (SD) for milk yield during suckling period (TMY90).**

Factors studied	No. of animals	(TMY90) (kg) $\bar{X} \pm SD$
<b>Overall mean</b>	60	185.55 ± 50.30
<b>Parities</b> <span style="float:right">Sig.</span>		*
First	15	147.0 ± 44.14 <sup>c</sup>
Second	10	194.29 ± 41.56 <sup>b</sup>
Third / fourth	11	214.90 ± 28.63 <sup>a</sup>
≥ fifth	24	192.55 ± 52.96 <sup>b</sup>
<b>Body weight</b> <span style="float:right">Sig.</span>		NS
Medium ( 29-39 kg)	35	178.95 ± 49.58
Heavy ( ≥40 kg)	25	194.79 ± 50.82
<b>Type of birth</b> <span style="float:right">Sig.</span>		**
Single	22	137.80 ± 26.30 <sup>c</sup>
Twins	34	206.44 ± 32.93 <sup>b</sup>
Triple	4	270.72 ± 40.23 <sup>a</sup>
<b>Kidding season</b> <span style="float:right">Sig</span>		*
Winter	31	198.3 ± 49.81
Summer	29	171.91 ± 47.94
<b>Year of kidding</b> <span style="float:right">Sig</span>		*
2011	15	173.86 ± 38.5 <sup>b</sup>
2012	14	209.03 ± 63.56 <sup>a</sup>
2013	31	180.6 ± 46.72 <sup>b</sup>

NS = non significant \*\* = Highly significant p<0.01 \* = significant p<0.05

Variations among the different estimates of TMY90 may be due to production system, breeds, nutrition levels, genetic, lactation length, environment, and number of does under studies.

### **Factors affecting TMY90**

As shown in Table (1) the effect of different parities on TMY90 was significant ( $p < 0.05$ ) which were in agreement with the findings of many workers in different breeds of goats (Hassan *et al.*, 2001 and Hansen *et al.*, 2006). Means  $\pm$  SD of TMY90 for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>/4<sup>th</sup> and  $\geq$  5<sup>th</sup> parities were 147.0  $\pm$  44.14, 194.29  $\pm$  41.56, 214.90  $\pm$  28.63 and 192.55  $\pm$  52.96 kg, respectively.

It is obvious that the average of TMY90 increased with increasing parities, which may be due to improved efficiency of udder at mature does. This finding is similar with those observed by Macciotta *et al.* (2005), Hansen *et al.*, (2006), Mellado *et al.*, (2003), Singh *et al.* (2009), Bushara *et al.*, (2011) and Norris *et al.*, (2011). Differences between 2<sup>nd</sup> and  $\geq$  5<sup>th</sup> parities were not significant, while they were significant with 1<sup>st</sup>, 3<sup>rd</sup> and 4<sup>th</sup> parities.

The effect of body weight of does on TMY90 was non-significant. However heavy weight does had the highest average of 194.79  $\pm$  50.82 kg (Table 1) and the lowest TMY90 was produced from does which had the medium weight (178.95  $\pm$  49.58 kg). This result disagree with findings of Hermiz *et al.* (2004) who found that total milk yield was significantly ( $P < 0.01$ ) affected by weight of does at kidding in different goat breeds.

Increasing milk production in heavy weight dams may be due to good body condition, genetic and full maturity (Singh *et al.*, 2009).

Table (1) indicated that the effect of litter size on TMY90 was significant ( $p < 0.05$ ). These results are in agreement with those reported by many workers in different breeds of goats. Hassan *et al.* (2001), Ciapessoni *et al.* (2004), Singh and Ramachandran (2007), Zahraddeen *et al.*, (2009), Ahuya *et al.* (2009) and Zinat Mahal *et al.*, (2013).

On the other hand, this result disagree with findings of Mavrogenis *et al.*, (1984), Garcia *et al.*, (1985), Oudah (1988) and Das (1989) who found non-significant effect of litter size on milk production.

Average TMY90 was the highest for triple births 270.72  $\pm$  40.23 kg than does born twins and single kids which were 206.44  $\pm$  32.93 and 137.80  $\pm$  26.30 kg, respectively. It was obvious that does delivered triples and twins kids produced more total milk yield than does born single kids. This finding is similar with those estimated by Mavrogenis *et al.*, (1984); Macciotta *et al.* (2005); Singh and Ramachandran (2007); Zahraddeen *et al.*, (2009) and Hamed *et al.*, (2009).

Furthermore the effect of season of kidding (Table 1) on TMY90 was significant ( $p < 0.05$ ). This result is in agreement with those estimated by Prased and Senger (2002); Hermiz *et al.* (2004) and Hoste *et al.*, (2005). On the other hand, these results disagree with those reported by Singh and Ramachandran (2007) and Ahuya *et al.* (2009).

Average TMY90 of dams kidding in winter was higher (198.3  $\pm$  49.81 kg) than those kidding in summer (171.91  $\pm$  47.94 kg).

It is obvious that TMY90 increased in winter season than summer season which may be due to low temperature and the availability of green fodder (especially Egyptian Berseem).

As shown in Table (1) the effect of year of kidding on TMY90 was significant ( $p < 0.05$ ). Means  $\pm$  SD of TMY90 of does kidded during the year 2012 had the highest value (209.03  $\pm$  63.56 kg) than those in the year 2011 and year 2013 which were 173.86  $\pm$  38.5 and 180.6  $\pm$  46.72 kg, respectively. Differences between year 2011 and 2013 were not significant, while were significant with year 2012.

These results are in agreement with those reported by several workers in different breeds of goats; Ciapessoni *et al.* (2004); Hoste *et al.*, 2005) who indicated

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that year of kidding affects total milk yields. On the other hand, Singh and Ramachandran (2007) concluded that year of birth of kid was non-significant source of variation on lactation traits. The differences in TMY90 during year of kidding indicate variation in the weather, nutrition, welfare, housing and management. All interactions between factors affecting TMY90 were non-significant.

**Daily milk yield during suckling period (DMY90)**

Table (2) showed that the overall mean of daily milk yield during suckling period (DMY90) was  $2.05 \pm 0.78$  kg/day and ranged from 0.97 and 3.42 kg/day. The result in the present study is higher than those reported by many workers in different countries on Damascus goats. In Egypt,

Badawy and Youssef, (2008) concluded that DMY90 was 1.8 kg. In Cyprus, Mavrogenis and Papachristoforou (2000) reported that DMY90 was 1.88 kg. In Sudan, Mahmoud, *et al.*, (2014) estimated daily milk as 1.24 kg during suckling period (120 days), while Shaat *et al.* (2007) who working in Zaraibi goats reported that DMY90 was 1.50 kg. On the other hand, this result is higher than findings of several researches in different countries on Damascus goats. Louca *et al.* (1975); Ozcan and Güney (1983); Abbasoglu (1999); El Hag *et al.*, (2000); Güney *et al.*, (2006); Guler, *et al.*,(2007) and Khazaal (2009).

However, the present estimate is also less than that reported by Abdelhamid *et al.*, (2013) who working on Zaraibi goats and reported an average of 2.37 kg for DMY90.

**Table (2): Least squares means (LSM)  $\pm$  Standard Deviation (SD) for daily milk during suckling period (90 days).**

Factors studied	No. of animals	(DMY90) (kg) $\bar{X} \pm SD$
<b>Overall mean</b>	60	$2.05 \pm 0.78$
<b>Parities</b> <span style="float:right"><b>Sig.</b></span>		**
First	15	$1.62 \pm 0.64^c$
Second	10	$2.14 \pm 0.70^b$
Third / fourth	11	$2.36 \pm 0.69^a$
≥ fifth	24	$2.14 \pm 0.81^b$
<b>Body weight</b> <span style="float:right"><b>Sig.</b></span>		*
Medium ( 29-39 kg)	35	$1.97 \pm 0.73^b$
Heavy ( ≥40 kg)	25	$2.2 \pm 0.83^a$
<b>Type of birth</b> <span style="float:right"><b>Sig.</b></span>		**
Single	22	$1.52 \pm 0.51^c$
Twins	34	$2.28 \pm 0.67^b$
Triple	4	$2.97 \pm 0.98^a$
<b>Kidding season</b> <span style="float:right"><b>Sig</b></span>		*
Winter	31	$2.20 \pm 0.78^a$
Summer	29	$1.88 \pm 0.74^b$
<b>Year of kidding</b> <span style="float:right"><b>Sig</b></span>		*
2011	15	$1.91 \pm 0.67^b$
2012	14	$2.31 \pm 0.90^a$
2013	31	$2.00 \pm 0.74^b$

NS = Not significant \*\* = Highly significant  $p < 0.01$  \* = significant  $p < 0.05$

Fig. (1) illustrates the distribution of daily milk yield (DMY90) in Damascus does during suckling period. Daily milk increases gradually as stage of lactation increase and reaches the peak at 5<sup>th</sup> to 6<sup>th</sup> weeks after kidding. Thereafter, DMY90 declined gradually until 11<sup>th</sup> weeks then stayed constant to the end of suckling period. This result is in agreement with the findings of Louca *et al.*, (1975) and Haider (1977) in Damascus goats who reported that the lactation peak of Damascus goats were located between 5- 6 weeks post-partum. On the other hand, Mahmoud *et al.*, (2014) found that the peak of milk occurs during the 4<sup>th</sup> week for Damascus goats under Sudan conditions. However, this finding disagree with some other workers in different goat breeds (Fares 1964; Mabrouk *et al.*, 1987 and Oudah 1988).

### Factors affecting DMY90

As shown in Table (2) the effect of different parities on DMY90 was highly significant ( $p < 0.01$ ) which was in agreement with the findings of many workers in different breeds of goats (Hassan *et al.*, 2001 and Hansen *et al.*, 2006).

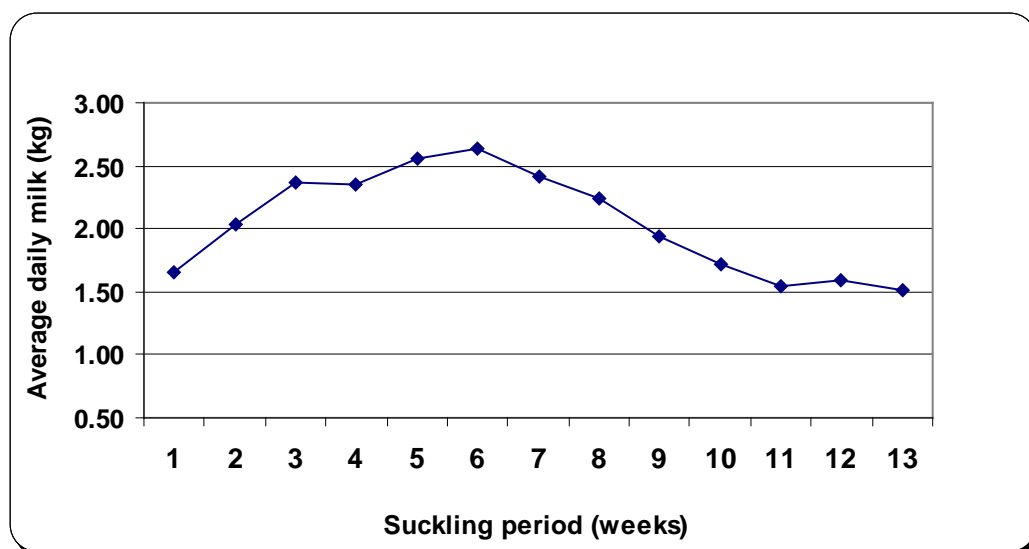
The average DMY90 was  $1.62 \pm 0.64$ ,  $2.14 \pm 0.70$ ,  $2.36 \pm 0.69$  and  $2.14 \pm 0.81$  kg, for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>/4<sup>th</sup> and  $\geq 5$ <sup>th</sup> parities, respectively (Table 2). It is obvious that the average

DMY90 reach the peak at 3<sup>rd</sup>/4<sup>th</sup> parities, and decline again thereafter, which may be due to improved udder efficiency and does maturities. This finding is similar with that reported by Macciotta *et al.* (2005), Hansen *et al.*, (2006), Mellado *et al.*, (2003), Singh *et al.* (2009), Bushara *et al.*, (2011) and Norris *et al.*, (2011). Differences between 2<sup>nd</sup> and  $\geq 5$ <sup>th</sup> parities were not significant, while it was significant with 1<sup>st</sup> and 3<sup>rd</sup> / 4<sup>th</sup> parities.

Furthermore, the present study indicated that the average daily milk was higher ( $2.2 \pm 0.83$  kg) for heavy weight does than those with medium weight ( $1.97 \pm 0.73$  kg). The effect of body weight of does on DMY90 was significant (Table 2)

Increasing daily milk in heavy weight dams than those with medium weight may be due to the better body condition, genetic and maturity of the former group of does. This result is similar with those reported by Singh *et al.* (2009).

Table (2) indicated that the effect of litter size on DMY90 was significant ( $p < 0.05$ ). These results are in agreement with those reported by many workers in different breeds of goats; Hassan *et al.* (2001); Ciapessoni *et al.* (2004); Singh and Ramachandran (2007); Zahraddeen *et al.*, (2009); Ahuya *et al.* (2009) and Zinat Mahal *et al.*, (2013).



**Fig. (1): Distribution of daily milk yield during suckling period.**

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Average of DMY90 was  $1.52 \pm 0.51$ ,  $2.28 \pm 0.67$  and  $2.97 \pm 0.98$  kg for does delivered single, twins and triple kids, respectively. It is obvious that does produced triples and twins kids showed more total milk yield and daily milk yield than does of single kids. This finding is similar with those observed by Mavrogenis *et al.*, (1984); Acciotta *et al.* (2005); Singh and Ramachandran (2007); Zahraddeen *et al.*, (2009) and Hamed *et al.*, (2009).

Also, the effect of kidding season on DMY90 (Table 2) was significant ( $p < 0.05$ ), which is in agreement with those reported by many workers (Prased and Senger, 2002 ; Hermiz *et al.* 2004 and Hoste *et al.*, 2005). Average DMY90 was higher ( $2.20 \pm 0.78$  kg) for dams kidding in winter than dams kidding in summer ( $1.88 \pm 0.74$  kg). On the other hand, these results disagree with those reported by Singh and Ramachandran (2007) and Ahuya *et al.* (2009).

As shown in Table (2) the effect of year of kidding on DMY90 was significant ( $p < 0.05$ ). Mean  $\pm$  SD of DMY90 for does kidding during the year 2012 was higher ( $2.31 \pm 0.90$  kg) than those kidding during 2011 and the year 2013 which were  $1.91 \pm 0.675$  and  $2.0 \pm 0.74$  kg, respectively.

Difference between year 2011 and 2013 was not significant, while it was significant with year 2012. These results are in agreement with those reported by several workers in different goat breeds (Ciapessoni *et al.* (2004); Hoste *et al.*, 2005). On the other hand, Singh and Ramachandran (2007) concluded that year of kidding was a non-significant source of variation on lactation traits.

All interactions between factors affecting DMY90 were non-significant, except the interactions of parity  $\times$  weight, parity  $\times$  litter size and parity  $\times$  year of kidding which were significant ( $p < 0.05$ ). The differences in DMY90 during year of kidding could be attributed to weather variation, management and concentrate mixture availability.

### **Milk components during suckling period**

Fat percentage during suckling period was  $3.88 \pm 0.79$  % (Table 3), which is close to those reported by Mahmoud, *et al.*, (2014) who found that milk fat was 3.85% during suckling period on Damascus goats. On the other hand, this result is higher than findings of several researches in different countries on Damascus goats.

**Table (3): Means  $\pm$ SD of milk components during suckling period**

<b>Suckling Weeks NO.</b>	<b>Fat % <math>\bar{X} \pm SD</math></b>	<b>Protein % <math>\bar{X} \pm SD</math></b>	<b>Lactose % <math>\bar{X} \pm SD</math></b>	<b>Ash% <math>\bar{X} \pm SD</math></b>	<b>TS% <math>\bar{X} \pm SD</math></b>
1.	$3.91 \pm 0.98$	$3.44 \pm 0.46$	$4.46 \pm 0.40$	$0.87 \pm 0.11$	$12.69 \pm 1.19$
2.	$3.90 \pm 1.03$	$3.29 \pm 0.33$	$4.37 \pm 0.60$	$0.78 \pm 0.07$	$12.36 \pm 1.30$
3.	$3.87 \pm 0.88$	$3.19 \pm 0.25$	$4.30 \pm 0.35$	$0.76 \pm 0.06$	$12.12 \pm 1.04$
4.	$3.84 \pm 0.92$	$3.14 \pm 0.29$	$4.24 \pm 0.32$	$0.74 \pm 0.04$	$11.96 \pm 1.03$
5.	$3.80 \pm 0.59$	$3.07 \pm 0.21$	$4.26 \pm 0.28$	$0.74 \pm 0.04$	$11.83 \pm 0.95$
6.	$3.76 \pm 0.78$	$3.08 \pm 0.24$	$4.24 \pm 0.31$	$0.74 \pm 0.03$	$11.82 \pm 0.96$
7.	$3.80 \pm 0.59$	$3.04 \pm 0.24$	$4.24 \pm 0.38$	$0.74 \pm 0.03$	$11.82 \pm 0.83$
8.	$3.79 \pm 0.75$	$3.04 \pm 0.24$	$4.23 \pm 0.32$	$0.73 \pm 0.03$	$11.81 \pm 0.91$
9.	$3.87 \pm 0.78$	$3.11 \pm 0.31$	$4.27 \pm 0.39$	$0.74 \pm 0.03$	$11.99 \pm 1.09$
10.	$3.97 \pm 0.75$	$3.05 \pm 0.24$	$4.26 \pm 0.31$	$0.74 \pm 0.04$	$12.04 \pm 0.91$
11.	$3.98 \pm 0.69$	$3.06 \pm 0.22$	$4.21 \pm 0.34$	$0.75 \pm 0.05$	$12.01 \pm 0.86$
12.	$3.97 \pm 0.55$	$3.09 \pm 0.23$	$4.17 \pm 0.31$	$0.76 \pm 0.05$	$11.99 \pm 0.71$
13.	$3.98 \pm 0.51$	$3.08 \pm 0.25$	$4.17 \pm 0.30$	$0.77 \pm 0.05$	$11.99 \pm 0.69$
overall	$3.88 \pm 0.79$	$3.13 \pm 0.29$	$4.26 \pm 0.37$	$0.76 \pm 0.06$	$12.04 \pm .99$

Fig (2) illustrates the average milk fat% during suckling period in Damascus goats. It is obvious that milk fat % was highest in the first and second weeks of suckling period and declined rapidly to minimum value at 6<sup>th</sup> week, then increased gradually up to 11<sup>th</sup> week and stayed constant until the end of suckling period. This result is comparable with that observed by Oudah (1988); Kala and Prakash (1990) and Eissa (1996) who reported that milk fat % increased with advancing lactation.

In Egypt, Shetaewi, *et al* (2001) and Badawy and Youssef, (2008) reported that average fat percentage was 3.28 % and 3.73%, respectively. GÜney *et al*, (2006) and Abdalla, *et al.*, (2013) reported an average of 2.64 and 3.6% at 2<sup>nd</sup> month of suckling period, respectively.

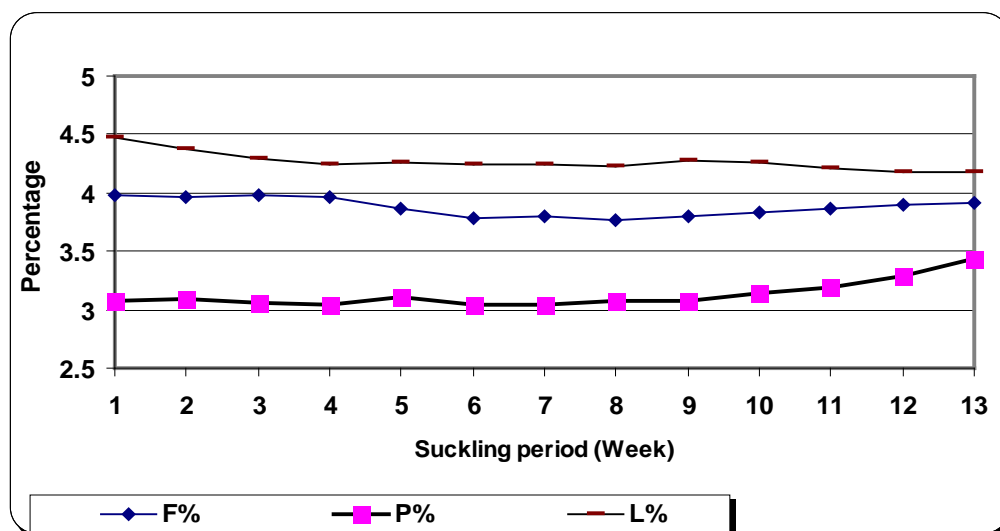
The average milk protein percentage was  $3.13 \pm 0.29$  % during suckling period (Table 3). This result is similar with those observed by Shetaewi, *et al* (2001) in Damascus goats who reported an average of 3.02% during suckling period.

On the other hand, this result is lower than those reported by Badawy and Youssef, (2008), Abdalla, *et al.*, (2013) and Mahmoud, *et al.*, (2014) in Damascus goats during suckling period who reported an average of 4.05, 3.58 and 3.27 %, respectively.

However, this result is higher than that of Abdelhamid, *et al.* (2013) on Zaraibi goat (2.48 % during suckling period).

It was observable that milk protein % (Fig. 2) was highest in the first week of suckling period and declined rapidly to a minimum value at 7<sup>th</sup> week, thereafter stayed constant until the end of suckling period. This result is similar with the observation of Chawla and Bhatnagar (1984), who reported that the percentage of protein content in milk was found to decline slightly with advancing lactation. However, Kala and Prakash (1990) found that milk protein % increased slightly with advanced lactation.

Table (3) indicated that the average milk lactose % was  $4.26 \pm 0.37$  % during suckling period. This result is higher than those found in other Damascus goats during suckling period. Badawy and Youssef, (2008) and Abdalla, *et al.*, (2013) reported that the average milk lactose was 4.16%, while, Mahmoud, *et al.*, (2014) who working on Zaraibi goat found that the average of milk lactose was 4.13 % during suckling period. Present result, however is lower than that observed by Mahmoud, *et al.*, (2014) in Damascus goats who observed that the average milk lactose was 4.75 % during suckling period (120 days).



**Fig. (2):** Distribution of milk fat (F), milk protein (P) and milk lactose (L) % during suckling period



## **Factors affecting milk production in a herd of Damascus goats under.....**

Average of milk lactose % was high in the first week of suckling period and declined rapidly to a minimum value at 4<sup>th</sup> week, thereafter stayed constant until 10<sup>th</sup> week where it decreased again with advancing lactation (Fig. 2). This result is similar with that observed by Kala and Prakash (1990) who reported that milk lactose % decreased with advancing lactation. On the other hand, Oudah (1988) who working on French Alpine goats observed that lactose content reached the minimum value during the 2<sup>nd</sup> month of lactation then increased gradually with advancement lactation.

The average milk ash content in Damascus goats during suckling period was  $0.76 \pm 0.06\%$  (Table 3) which is similar with findings of some researches on Damascus goat. Shetaewi, *et al* (2001) reported an average milk ash of 0.78% during suckling period (90 days), while KesKÜn *et al* (2004) indicated that milk ash was 0.77% during 240 days.

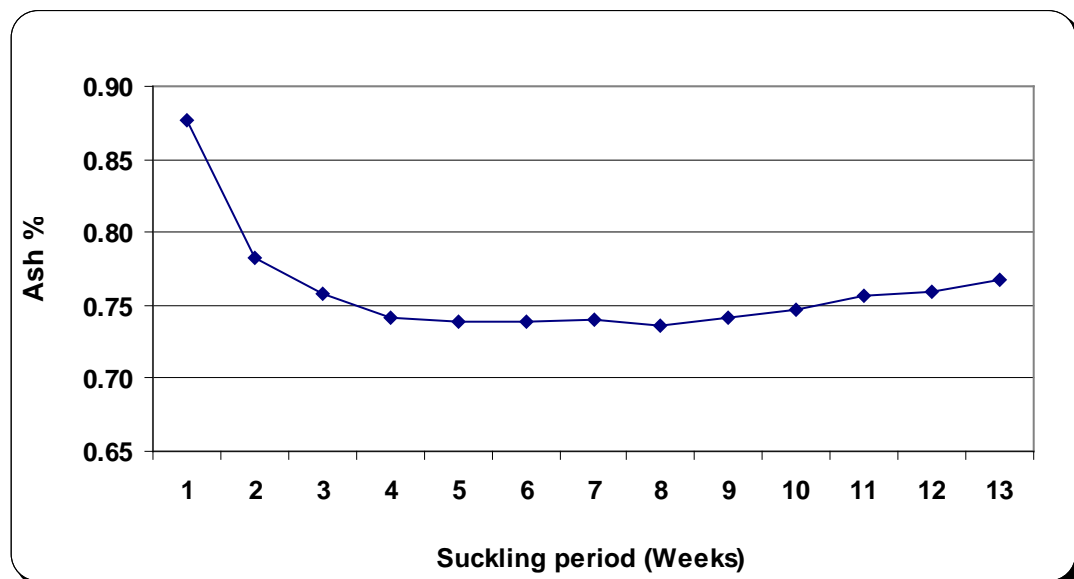
On the other hand, this result is higher than those reported by other workers in different countries on Damascus goats. Abdalla, *et al.*, (2013) and Mahmoud, *et al.*, (2014) indicated that the average milk ash was 0.63 % during suckling period.

It was observed that milk ash was markedly high in the first week of suckling period and declined rapidly to a minimum value at 4<sup>th</sup> week (Fig.3), after that it stayed constant to 8<sup>th</sup> week and increased gradually up to the end of suckling period.

Mean  $\pm$  SD of milk total solid (TS) in the present study was  $12.04 \pm 0.99$  % during suckling period (Table 3).

This result is higher than finding in Damascus goats by Shetaewi, *et al* (2001) who reported that TS was 11.6% during suckling period. On the other hand, this result is lesser than those reported by many researchers in Damascus goats during suckling period who reported range from 12.25 to 12.78 % (Badawy and Youssef, 2008 ; Abdalla, *et al.*, 2013 and Mahmoud, *et al.*, 2014).

Average of TS was high in the first week of suckling period and declined rapidly to a minimum value between 6<sup>th</sup> to 8<sup>th</sup> weeks, thereafter it increased gradually until 10<sup>th</sup> week where it stayed constant until the end of suckling period (Fig. 4). This result is similar with those findings of Akinsoyina *et al.* (1977) and Chawla and Bhatnagar (1984).



**Fig. (3): Distribution of milk ash % during suckling period.**

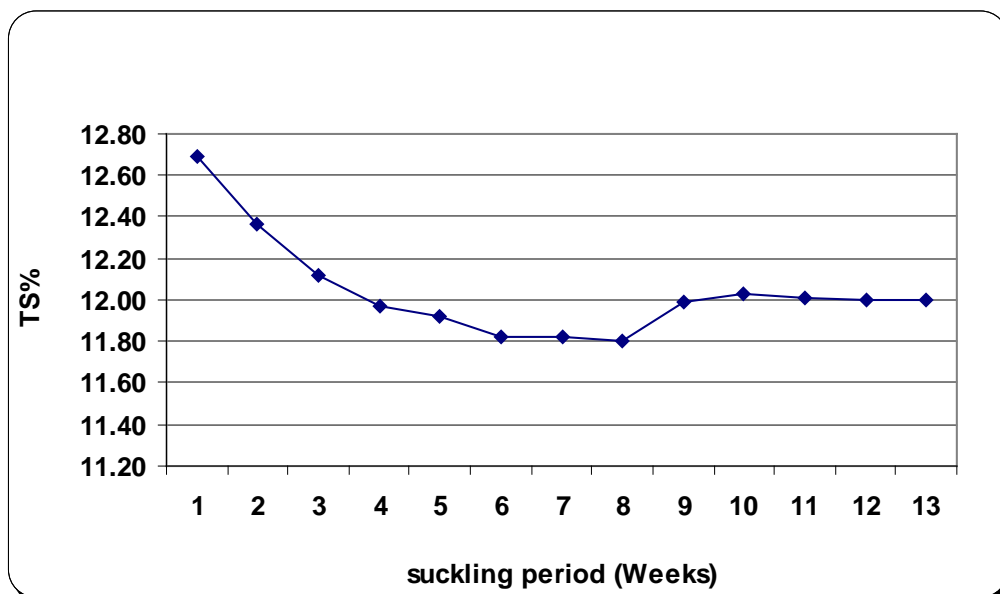


Fig. (4) Distribution of milk TS % during suckling period

On the other hand, this result disagree with those reported by Mashaly *et al.*, (1984) in Betal goats who observed that values of total solids increased gradually from the 2<sup>nd</sup> week of lactation and reached its maximum level at 10<sup>th</sup> week, where it declined gradually thereafter.

Variations among the different estimates of milk composition may be due to management, seasonality, nutrition levels, suckling period, breeds, litter size and the number of does studied.

### Conclusion

It can be concluded from the present results that milk production of Damascus goats were affected by many factors such as parity, body weight, litter size, seasons and year of kidding. Almost all traits studied showed variation, however, the variation detected during different years and seasons reflected the level of feeding and management in addition to some environmental effects. Availability of feed and fodder could never have been the same over the period of study (three years) due to several factors like provision of funds, quality and quantity of seeds and fertilizer, etc. Although, the present study investigate

only three months of lactation (suckling period), there is no doubt that Damascus goats have higher milk yield and milk components than other local goat breeds under Egyptian conditions. This is promising to produce goat breeds with relative high milk yield and better milk components under extensive production systems in Egypt with some environmental improvement and special breeding programs.

However it is needed to complete this work in the future to calculate the full milk yield after suckling period within a full lactation period.

### REFERENCES

- Abbasoglu, S. (1999). A study on reproduction and milk yield of Damascus Goats at Guzelyurt Enterprises at northern Cyprus. Master Thesis. Institute of Natural and Applied Sciences, Cukurova University, No. 1571, Adana, Turkey, p. 88.
- Abdalla, E. B., H. A. Gawish, A. M. El-Sherbiny, N. H. Ibrahim and A. S. El-Hawy (2013). Reproductive Efficiency of Damascus Goats in Salt-Affected Lands in South Sinai, Egypt. *Journal of American Science*, 9 (8): 170-177.

## **Factors affecting milk production in a herd of Damascus goats under.....**

- Abdelhamid, A. M., T. A. M. Ashmawy, F. Abou Ammou and Heba A. El-Sanafawy (2013). Effect of dietary inclusion of whole sunflower seeds on feeding lactating Zaraibi goats: Milk production and composition as well as mammary gland histology and economic efficiency. *International Journal of Biotechnology Research* Vol. 1(1), pp. 006-019
- Ahuya, C. O., J. M. K. Ojango, R. O. Mosi, C. P. Peacock and A. M. Okeyo (2009). Performance of Toggenburg dairy goats in smallholder production systems of the eastern highlands of Kenya. *Small Rumin. Res.* 83:7-13.
- Akinsoyina, A. O., A. U. Mba and F. O. Olubaja (1977). Studies on milk yield and composition of the West African Dwarf goat in Nigria. *Journal of Dairy Research*, 44 (1): 58-62.
- Badawy, M. T. and K. M. Youssef (2008). Impact of feeding system on physiological, reproductive and productive performance of shami goats during different physiological stages. *Egyptian J. Anim. Prod.*, 45(2):101-117
- Bushara, I., M. M. A. Abdel, A. Nikhaila and D. M. Mekki (2011). Productive and reproductive traits of Taggar goats as affected by type of ration under dry land farming system in western Sudan. *Egypt Journal Sheep Goat Science* 5:209 – 220.
- Chawla, D.S. and D. S. Bhatnagar (1984). Reproductive performance of Alpine and Saanen does under intensive management. *Indian Journal of Animal Sciences*, 54 (8):789-792.
- Ciapessoni, G., J. Pribyl, M. Milerski and V. Mares (2004). Factors affecting goat milk yield and its composition. *Czech J. Anim. Sci.* 49:465-473.
- Das, S. M. (1989). Preliminary results on evaluation and breeding of blended dairy goats in Tanzaina. In *African Small Ruminant Research and Development, Proceedings of conference held at Bamenda Cameroon, 18-25 January, 1989.*
- Eissa, M. M. (1996). Improving productivity of desert Barki goats by crossing with Damascus goats with special reference to milk production. Ph.D. Thesis, Fac. Agric., Alex. Univ.
- El Hag, M. G., A. H. Azam and R. S. Al Habsi (2000). Effect of system of management and Genotype on Reproductive performance of Goats in Oman. *Tropiculura*.
- EIKASCHAB, S. (2010). Sheep production. Awad, Arab House for publication and distribution , Cairo, S.B.N.977-17-8233-9
- Fares, A. H. (1964). Studies on goats milk yield and growth .M.Sc. Thesis. Faculty Agricultural Alexandria University.
- Garcia, B. O., P.J. Bravo, B. E. Garcia and E. Bradford (1985). Genetic improvement of Cirollo in Venezuela by means of crossbreeding with imported breed-3. Reproductive performance .Memorias, Asociacion Latinoamericana de produccion. *Animal*, 18:155(Animal Breeding Abstract, Vol.55 (5):3661).
- GÜLER, Z., M. KESKIN, T. MASATÇIĞLU, S. GÜL and O. BIÇER (2007). Effects of Breed and Lactation Period on Some Characteristics and Free Fatty Acid Composition of Raw Milk from Damascus Goats and German Fawn x Hair Goat B1 Crossbreds. *Turk. J. Vet. Anim. Sci.* 31(5): 347-354.
- Guney, O., O. Torun, O. Ozuyanik and N. Darcan (2006). Milk production, reproductive and growth performances of Damascus goats under Northern Cyprus conditions. *Small Rumin. Res.* 65:176-179.
- Haider, A. I. (1977). A study of growth rate and body measurements in Damascus goats. M.Sc.Thesis, Faculty of agricultural Alexandria University, Egypt.
- Hamed, A., M. M. Mabrouk, I. Shaat and S. BATA (2009). Estimation of Genetic Parameters and Some Non-Genetic Factors for Litter Size at Birth and Weaning and Milk Yield Traits in Zaraibi Goats. *Egyptian Journal of Sheep and Goat Sciences*, Vol. 4 (2), 55-64.
- Hansen, S., M. Therkildsen and D. V. Byrne (2006). Effects of a compensatory growth strategy on sensory and physical

- properties of meat from young bulls. *Meat Science* 74: 628 – 648.
- Hassan, A., M. Samak, A. Elkomy and M. Anwar (2001). Milk yield, body weight and some physiological traits of Baladi goats and their crosses with Damascus and Anglo-Nubian breeds in Egypt. *J. Dairy Sci.* 84 (Suppl.):1859. Abstract
- Hermiz, H. N., M. Singh, A. A. Al-Rawi and J. E. J. E. Alkass (2004). Genetic and non genetic parameters for milk traits in Iraqi local goat and their crosses. *Dirasat. Agric. Sci.* CABI Abstract.
- Hoste, H., J. F. Torres-Acosta, V. Paolini, A. Aguilar-Caballero, E. Etter, Y. Lefrileux, C. Chartier and C. Broqua (2005). Interactions between nutrition and gastrointestinal infections with parasitic nematodes in goats. *Small Ruminant Research* 60, 141–151.
- Kala, S. N. and B. Prakash (1990). Genetic and phenotypic parameters of milk yield and milk composition in two Indian goat breeds. *Small Ruminant Research*, 3: 475– 484.
- KeskÜn, M., Y. Kemal and O. BIŞER (2004). A Comparative Study on the Milk Yield and Milk Composition of Two Different Goat Genotypes under the Climate of the Eastern Mediterranean. *Turk J Vet Anim Sci*, 28 :531-536.
- Khazaal, K. (2009). Comparison of the performance of Shami (Damascus) and Saanen goats raised under similar environmental conditions in Lebanon. Nutritional and foraging ecology of sheep and goats. Zaragoza: CIHEAM / FAO / NAGREF, 2009. p. 379-385 (Options Méditerranéennes: Série A.Séminaires Méditerranéens; n. 85
- Louca, A., A. Mavrogenis and M. J. Lawlor (1975). The effect of early weaning on the lactation performance of Damascus goats and the growth rate of the kids. *J. Anim. Prod.* 20, 213.
- Mabrouk, M. M. S., A. F. M. EL-Erian, M. M. Tohamy and Y. A. A. EL-Dweny (1987). Milk production of Zaraibi and Alpine goats. *Assiut Journal of Agricultural Science*, 18 (2): 231-252.
- Macciotta, N. P. P., P. Fresi, G. Usai and A. Cappio-Borlino (2005). Lactation curves of Sarda breed goats estimated with test day models. *J. Dairy Res.* 74:470-475.
- Mahmoud, N. M. A., I. E. M. El Zubeir and A. A. Fadlemoula (2014). Effect of Stage of Lactation on Milk Yield and Composition of First Kidder Damascus does in the Sudan. *J Anim Prod Adv* , 4(3): 355-362.
- Malau-Aduli, B. S., I. O. Eduvie, C. A. M. Lakpini and A. E. O. Malau-Aduli (2001). Effects of supplementation on the milk yield of Red Sokoto do. *Proceedings of the 26th Annual Conference of Nigerian Society for Animal Production, ABU, Zaria, Nigeria*, pp 353-355.
- Mashaly, R. I., S. A. EL-Deeb, F. D. El-Nouty, G. A. Hassan and M. H. Salam (1984). Changes in milk yield and milk chemical and physical properties during lactation period in Egypt Baladi goats. *Egypt Journal Dairy Science*, 12: 123-134.
- Mavrogenis, A. B. and C. Papachristoforou (2000). Genetic and phenotypic relationships between milk production and body weight in Chios sheep and Damascus goats. *Livestock Production Science* 67: 81–87
- Mavrogenis, A. P., A. Constantinou and A. Louca (1984). Environmental and genetic causes of variation in production trait of Damascus goats. 1. Pre-weaning and post-weaning growth. *Anim. Prod.*, 38 (1):91-97.
- Mellado, M., R. Valdéz, J. García, R. López and A. Rodríguez (2003). Factors affecting the reproductive performance of goats under intensive conditions in a hot arid environment. *Journal of Small Ruminant Research* 63: 110 – 118.
- Milerski, M. and V. Mares (2001). Analysis of systematic factors affecting milk production in dairy goat. *Acta Univ. Agric. Et Silv. Mendel. Brun (Brno)*, 1, 43–50
- Norris, D., J. W. Ngambi, K. Benyi and C. A. Mbajjorgu (2011). Milk production of three exotic dairy goat genotypes in Limpopo Province, South Africa. *Asian Journal of Animal and Veterinary Advances* 6: 274 – 281.

**Factors affecting milk production in a herd of Damascus goats under.....**

- NRC (2007). Nutrient Requirements of Small Ruminants: Sheep, Goats, Cervids, and New World Camelids. National Research Council of the National Academies, National Academies Press, Washington, D.C., U.S.A.
- Oudah, E. S. Z. M. (1988). Performance of imported French Alpine goats under Egyptian conditions. M.Sc. Thesis. Faculty of Agricultural, Mansoura University, Egypt.
- Ozcan, L. and O. GÜney (1983). A study on performances of Damascus goats under Cukurova conditions. *J. Cukurova Univ., Fac. Agric.(Adana, Turkey)* 14 (1), 12–27.
- Özder, M. (2006). Keçi Irkları. S. 17-18. Editör: M. Kaymakçı. Keçi. yetisiricillği. Bornova.izmir.
- Prased, H. and O. P. S. Sengar (2002). Milk yield composition of the Brbrai goat breed and its crosses with Jamunapari, Beetal and Black Bengal. *Small Ruminant Research*, Vol, 45 (1): 79-83.
- Shaah, I., M. Mabrouk, A. A. Raheem and A. Hamed (2007). Estimated of heritability and corelation for milk and growth traits in Zaraibi goat. *Egyptian J. Anim. Prod.*, 44(2):161-171
- Shetaewi, M. M., A. M. Abdel-Samee and E. A. Bakr (2001). Reproductive performance and milk production of Damascus goats fed acacia shrubs or berseem clover hay in North Sinai, Egypt. *Trop. Anim. Health Prod.*, 33: 67-79.
- Singh, D. and N. Ramachandran (2007). Lactation performance of Sirohi goats under intensive production system. *Indian J. Small Rumin.* 13(2): Abstract.
- Singh, M. K., B. Rai and N. P. Singh (2009). Genetic analysis of milk production traits of Jamunapari goats. *The Indian Journal of Animal Science* 79: 83 – 86.
- SPSS (Statistical Package for Social Science) program version 11.0,(2001).
- Teleb, D. F., M. K. Gabr and K. M. Gaafar (2003). Manipulation of lactation and suckling on the resumption of postpartum reproductive activity in Damascus goats. *Small Rum. Res.*, 49: 183-192.
- Zahraddeen, D., I. S. R. Butswat and S. T. Mbap (2009). A note on factors influencing milk yield of local goats under semi-intensive system in Sudan savannah ecological zone of Nigeria. *Livestock Research for Rural Development*. 21: 1 – 11.
- Zinat Mahal, M. A., M. Y. Khandoker and M. N. Haque (2013). Effect of non genetic factors on productive traits of Black Bengal goats. *J. Bangladesh Agril. Univ.* 11(1): 79–86.

## العوامل المؤثرة على إنتاج اللبن فى قطيع ماعز دمشقى تحت الظروف المصرية

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### الملخص العربى

أجريت هذه الدراسة على قطيع الماعز الدمشقى بمزرعة الراهب و طوخ طنبشا , التابعة لقسم الإنتاج الحيوانى بكلية الزراعة - جامعة المنوفية - شبين الكوم واستمرت فترة الدراسة وتجميع البيانات من أغسطس 2010م إلى يونيه 2014. و كان الهدف من الدراسة هو تقييم إنتاج اللبن فى الماعز الدمشقى والعوامل المؤثرة عليه مثل عدد مرات الولادة، وزن الامهات، عدد المواليد، موسم الولادة ، سنة الولادة تحت الظروف المصرية. تم تقييم إنتاج اللبن الكلى و متوسط انتاج اللبن اليومى ومكونات اللبن من (نسبة الدهن، البروتين، اللاكتوز، الاملاح، المواد الصلبة الكلية) خلال فترة الرضاعة 90 يوم. كان المتوسط العام لإنتاج اللبن الكلى  $185.55 \pm 50.30$  كجم بمدى من 86.45 الى 311.15 كجم. كان لتأثير ترتيب موسم الولادة وسنة الولادة على انتاج اللبن الكلى تأثير معنوى ( $p \leq 0.05$ ) بينما كان تأثير نوع الولادة معنوى جداً ( $p \leq 0.01$ ) ولا يوجد تأثير لوزن جسم الامهات. ايضا متوسط انتاج اللبن اليومى خلال فترة الرضاعة كان  $2.05 \pm 0.78$  كجم/يوم والمدى من 0.97 الى 3.42 كجم/يوم. كان تأثير ترتيب موسم الولادة ونوع الولادة على انتاج اللبن اليومى معنوى جداً ( $p \leq 0.01$ ) بينما كان معنوى عند ( $p \leq 0.05$ ) مع تأثير موسم الولادة وسنة الولادة ووزن الجسم. كانت نسبة مكونات اللبن خلال فترة الرضاعة من نسبة دهن و بروتين ولاكتوز واملاح ومواد صلبة كلية  $3.88 \pm 0.79$  و  $3.13 \pm 0.29$  و  $4.26 \pm 0.37$  ,  $0.76 \pm 0.06$  و  $12.04 \pm 0.99$  على التوالى.