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 (1st-7th 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 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 weighed before and after suckling and the difference in kids weight was considered as milk yield of its dam. After sucking 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:

- \(Y_{ijklm}\) = the measured traits
- \(\mu\) = the overall mean
- \(B_i\) = the effect of \(i^{th}\) body weight (\(I=1,2,\) where:
  - 1 = 29 -39 kg (medium)
  - 2 = ≥40 kg (heavy)
- \(L_j\) = the effect of \(j^{th}\) litter size of the doe (\(j=1,2,3\) where:
  - 1 = single,
  - 2 = twins,
  - 3 = triple
- \(P_k\) = the effect of \(k^{th}\) parity (\(k=1,2,3,4\) where:
  - 1 = first parity,
  - 2 = second parity,
  - 3 = third and fourth parity,
  - 4 = ≥ 5 parity
- \(S_l\) = the effect of \(l^{th}\) season of kidding (\(l=1,2\) where:
  - 1 = winter from (21 September to 20 March ),
  - 2 = summer from (21 March to 20 September),
- \(Y_m\) = the effect of \(m^{th}\) year of kidding (\(m=1,2,3\) where:
  - 1 = 2011
  - 2 = 2012
  - 3 = 2013
- \(e_{ijklm}\) = the random error effect
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); Özcan 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).

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

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 ± SD of TMY90 for 1st, 2nd, 3rd/4th and ≥ 5th parities were 147.0 ± 44.14, 194.29 ± 41.56, 214.90 ± 28.63 and 192.55 ± 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 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 2nd and ≥ 5th parities were not significant, while they were significant with 1st, 3rd and 4th parities.

The effect of body weight of does on TMY90 was non-significant. However heavy weight does had the highest average of 194.79 ± 50.82 kg (Table 1) and the lowest TMY90 was produced from does which had the medium weight (178.95 ± 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).

As shown in Table (1) 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 ± 40.23 kg than does born twins and single kids which were 206.44 ± 32.93 and 137.80 ± 26.30 kg, respectively.

Average TMY90 of dams kidding in winter was higher (198.3 ± 49.81 kg) than those kidding in summer (171.91 ± 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 ± SD of TMY90 of does kidded during the year 2012 had the highest value (209.03 ± 63.56 kg) than those in the year 2011 and year 2013 which were 173.86 ± 38.5 and 180.6 ± 46.72 kg, respectively.

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
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 ± 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>
<thead>
<tr>
<th>Factors studied</th>
<th>No. of animals</th>
<th>(DMY90) (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall mean</td>
<td>60</td>
<td>2.05 ± 0.78</td>
</tr>
<tr>
<td>Parities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>15</td>
<td>1.62 ± 0.64c</td>
</tr>
<tr>
<td>Second</td>
<td>10</td>
<td>2.14 ± 0.70b</td>
</tr>
<tr>
<td>Third / fourth</td>
<td>11</td>
<td>2.36 ±0.69a</td>
</tr>
<tr>
<td>≥ fifth</td>
<td>24</td>
<td>2.14 ± 0.81b</td>
</tr>
<tr>
<td>Body weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium ( 29-39 kg)</td>
<td>35</td>
<td>1.97 ± 0.73b</td>
</tr>
<tr>
<td>Heavy ( ≥40 kg)</td>
<td>25</td>
<td>2.2 ± 0.83a</td>
</tr>
<tr>
<td>Type of birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>22</td>
<td>1.52 ± 0.51c</td>
</tr>
<tr>
<td>Twins</td>
<td>34</td>
<td>2.28 ± 0.67a</td>
</tr>
<tr>
<td>Triple</td>
<td>4</td>
<td>2.97 ± 0.98a</td>
</tr>
<tr>
<td>Kidding season</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>31</td>
<td>2.20 ± 0.78a</td>
</tr>
<tr>
<td>Summer</td>
<td>29</td>
<td>1.88 ± 0.74a</td>
</tr>
<tr>
<td>Year of kidding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>15</td>
<td>1.91 ± 0.67b</td>
</tr>
<tr>
<td>2012</td>
<td>14</td>
<td>2.31 ± 0.90a</td>
</tr>
<tr>
<td>2013</td>
<td>31</td>
<td>2.00 ± 0.74b</td>
</tr>
</tbody>
</table>

NS = Not significant ** = Highly significant p<0.01 * = significant p<0.05
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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 5th to 6th weeks after kidding. Thereafter, DMY90 declined gradually until 11th 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 4th 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±0.64, 2.14±0.70, 2.36±0.69 and 2.14 ±0.81 kg, for 1st, 2nd, 3rd/4th and ≥5th parities, respectively (Table 2). It is obvious that the average DMY90 reach the peak at 3rd/4th 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 2nd and ≥5th parities were not significant, while it was significant with 1st and 3rd/4th parities.

Furthermore, the present study indicated that the average daily milk was higher (2.2 ±0.83 kg) for heavy weight does than those with medium weight (1.97 ± 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.](image-url)
Factors affecting milk production in a herd of Damascus goats under...........

Average of DMY90 was 1.52 ± 0.51, 2.28 ± 0.67 and 2.97 ± 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±0.78 kg) for dams kidding in winter than dams kidding in summer (1.88 ± 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 DMY09 was significant (p<0.05). Mean ± SD of DMY90 for does kidding during the year 2012 was higher (2.31 ± 0.90 kg) than those kidding during 2011 and the year 2013 which were 1.91 ± 0.675 and 2.0 ± 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 × weight, parity × litter size and parity × 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 ±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 ±SD of milk components during suckling period

<table>
<thead>
<tr>
<th>Suckling Weeks No.</th>
<th>Fat % X ± SD</th>
<th>Protein % X ± SD</th>
<th>Lactose % X ± SD</th>
<th>Ash% X ± SD</th>
<th>TS% X ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>3.91 ± 0.98</td>
<td>3.44 ± 0.46</td>
<td>4.46 ± 0.40</td>
<td>0.87 ± 0.11</td>
<td>12.69 ± 1.19</td>
</tr>
<tr>
<td>2.</td>
<td>3.90 ± 1.03</td>
<td>3.29 ± 0.33</td>
<td>4.37 ± 0.60</td>
<td>0.78 ± 0.07</td>
<td>12.36 ± 1.30</td>
</tr>
<tr>
<td>3.</td>
<td>3.87 ± 0.88</td>
<td>3.19 ± 0.25</td>
<td>4.30 ± 0.35</td>
<td>0.76 ± 0.06</td>
<td>12.12 ± 1.04</td>
</tr>
<tr>
<td>4.</td>
<td>3.84 ± 0.92</td>
<td>3.14 ± 0.29</td>
<td>4.24 ± 0.32</td>
<td>0.74 ± 0.04</td>
<td>11.96 ± 1.03</td>
</tr>
<tr>
<td>5.</td>
<td>3.80 ± 0.59</td>
<td>3.07 ± 0.21</td>
<td>4.26 ± 0.28</td>
<td>0.74 ± 0.04</td>
<td>11.83 ± 0.95</td>
</tr>
<tr>
<td>6.</td>
<td>3.76 ± 0.78</td>
<td>3.08 ± 0.24</td>
<td>4.24 ± 0.31</td>
<td>0.74 ± 0.03</td>
<td>11.82 ± 0.96</td>
</tr>
<tr>
<td>7.</td>
<td>3.80 ± 0.59</td>
<td>3.04 ± 0.24</td>
<td>4.24 ± 0.38</td>
<td>0.74 ± 0.03</td>
<td>11.82 ± 0.83</td>
</tr>
<tr>
<td>8.</td>
<td>3.79 ± 0.75</td>
<td>3.04 ± 0.24</td>
<td>4.23 ± 0.32</td>
<td>0.73 ± 0.03</td>
<td>11.81 ± 0.91</td>
</tr>
<tr>
<td>9.</td>
<td>3.87 ± 0.78</td>
<td>3.11 ± 0.31</td>
<td>4.27 ± 0.39</td>
<td>0.74 ± 0.03</td>
<td>11.99 ± 1.09</td>
</tr>
<tr>
<td>10.</td>
<td>3.97 ± 0.75</td>
<td>3.05 ± 0.24</td>
<td>4.26 ± 0.31</td>
<td>0.74 ± 0.04</td>
<td>12.04 ± 0.91</td>
</tr>
<tr>
<td>11.</td>
<td>3.98 ± 0.69</td>
<td>3.06 ± 0.22</td>
<td>4.21 ± 0.34</td>
<td>0.75 ± 0.05</td>
<td>12.01 ± 0.86</td>
</tr>
<tr>
<td>12.</td>
<td>3.97 ± 0.55</td>
<td>3.09 ± 0.23</td>
<td>4.17 ± 0.31</td>
<td>0.76 ± 0.05</td>
<td>11.99 ± 0.71</td>
</tr>
<tr>
<td>13.</td>
<td>3.98 ± 0.51</td>
<td>3.08 ± 0.25</td>
<td>4.17 ± 0.30</td>
<td>0.77 ± 0.05</td>
<td>11.99 ± 0.69</td>
</tr>
<tr>
<td>overall</td>
<td>3.88 ± 0.79</td>
<td>3.13 ± 0.29</td>
<td>4.26 ± 0.37</td>
<td>0.76 ± 0.06</td>
<td>12.04 ± 0.99</td>
</tr>
</tbody>
</table>
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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 6th week, then increased gradually up to 11th 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 2nd month of suckling period, respectively.

The average milk protein percentage was 3.13 ± 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 7th 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 ± 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
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Average of milk lactose % was high in the first week of suckling period and declined rapidly to a minimum value at 4th week, thereafter stayed constant until 10th 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 2nd month of lactation then increased gradually with advancement lactation.

The average milk ash content in Damascus goats during suckling period was 0.76 ± 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 4th week (Fig.3), after that it stayed constant to 8th week and increased gradually up to the end of suckling period.

Mean ± SD of milk total solid (TS) in the present study was 12.04 ± 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 6th to 8th weeks, thereafter it increased gradually until 10th 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).
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\textsuperscript{nd} week of lactation and reached its maximum level at 10\textsuperscript{th} 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**


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SPSS (Statistical Package for Social Science) program version 11.0,(2001).


العوامل المؤثرة على إنتاج اللبن في قطيع مأز دمشقي تحت الظروف المصرية

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الملخص العربي

أجرت هذه الدراسة على قطيع المأز دمشقي بزراعة الراهب و طوخ طنبا弹簧 التابع لقسم الإنتاج الحيواني بكلية الزراعة - جامعة المنوفية - شبين الكوم،، واستمرت فترة الدراسة وجمع البيانات من أغسطس 2010م إلى يونيما 2014م. و كان الهدف من الدراسة هو تقييم إنتاج اللبن في المأز دمشقي والعوامل المؤثرة عليه مثل عدد مرات الولادة، وزن الأمهات، عدد المواليد، موسم الولادة، سنة الولادة تحت الظروف المصرية. تم تقييم إنتاج اللبن الكلي و متوسط إنتاج اللبومي ومكونات اللبن من نسبة الدهن، البروتين، اللاكتوز، الاملاح، المواد الصلبة الكلية خلال فترة الرضاعة 90 يوم. كان المتوسط العام لإنتاج اللبومي الكلي 185.55 ± 50.30 كجم بمدى من 86.45 إلى 311.15 كجم. كان تأثير ترتيب موسم الولادة وسنة الولادة على إنتاج اللبومي الكلي تأثير معنوي (0.05 ≤ p)، بينما كان تأثير نوع الولادة معنوي جيداً (0.01 ≤ p) ولا يوجد تأثير لوزن جسم الأمهات. أيضاً متوسط إنتاج اللبومي خلال فترة الرضاعة كان 2.05 ± 0.78 كجم/يوم وال مدى من 0.97 إلى 3.42 كجم/يوم. كان تأثير ترتيب موسم الولادة و نوع الولادة على إنتاج اللبومي معنوي جيداً (0.01 ≤ p)، بينما كان معنوي عند (0.05 ≤ p) مع تأثير موسم الولادة و سنة الولادة ووزن الجسم. كانت نسبة مكونات اللبن خلال فترة الرضاعة من نسبة دهن و بروتين ولاكتوز وعالام ومواد صلبة كلية 3.88 ± 0.79 و 3.13 ± 0.29 و 4.26 ± 0.37 على التوالي.