Milk Production Characterization Of Sohagi Sheep

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Key words: Sohagi sheep, milk yield, milk composition, somatic cell count.

Abstract: This study was carried out at the Animal Production Experimental Farm, Faculty of Agriculture, Sohag University. Milk yield and composition were determined in total of 118 Sohagi ewes. Lactation length, daily milk yield, total milk pre-weaning, total milk post-weaning and total milk yield were determined the results were 105.66±11.51days, 393±0.08ML, 28.08±5.49L, 13.92±5.35L, 41.99±9.80L, respectively Lactation curve peaked around the second week of lactation and decreased thereafter. Season of lambing had a highly significant effect (P< 0.01) on both milk yield , composition and lactation length. Ewes lambed at the spring season (February – 56.01±1.94 L) had greater milk yield compared to ewes lambed at the summer season (June –38.68±1.52 L) and autumn season (October – 36.68±2.80 L). Also, ewes lambed at spring season had a longer lactation length (118.35±2.29 day) than those lambed at summer (102.65±1.78 day). The differences due to number of suckling lambs were highly significant (P< 0.01) with total milk yield, milk yield pre-weaning, milk yield post-weaning and daily milk yield and significant (P< 0.05) with lactation length. Ewes reared single-born lambs produced 25.82±0.64L of milk, while those reared twins-born lambs produced 31.89±1.42L during the eight weeks of suckling. Ewe age had significant effects and milk post-weaning, daily milk yield and composition. A highly significant (p< 0.01) positive correlations was found between lambs birth weight and each of average daily milk yield or total milk pre-weaning. Also, a positive significant (p< 0.05& 0.01) correlations coefficients between weight ewes at lambing and each of average daily milk yield, total milk pre-weaning, total milk post-weaning, total milk yield or lactation length. Milk fat, protein, lactose, total solid, solid not fat, somatic cell count and milk energy were 4.93±1.18%, 4.34±0.67%, 4.53±0.42%, 14.51±1.57%, 9.54±0.93%, 269.085cells/ml and 3.54±1.12 MJ/L, respectively. There were a negative and

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significant ($p<0.05$ &$p<0.01$) correlations between daily milk yield with fat%, total solid%, protein%, somatic cell count cells/ml and milk energy (MJ/L). The current results demonstrate that Sohagi sheep is non-dairy sheep. So, Sohagi sheep producers must follow intensive production system, early weaning and early lambs fattening system.

Introduction

Sheep are useful for meat, milk and wool production, the relative importance of each varying with the country. In Egypt, sheep raised mainly for meat production with wool as a secondary product. Milk is of very minor importance except in coastal regions and oases, Galal., *et al*. (2005). They are also valued for milk in the Mediterranean region. In Egypt, sheep are non-dairy but produced 93.000 ton milk yearly (FAO. 2004) and a new demand on sheep milk cheese is developing either due to the increase tourism or to changing consumers performance. The growth of lambs is depend on ewes milk yield from birth to weaning. Lamb live weight and ewes milk yield were highly correlated during early and middle lactation period and these correlation coefficients declined as lactation progressed (Ünal, 2008). Variation in milk constituents and somatic cell count (SCC) in ewe milk is significantly affected by successive lambing, stag of lactation and type of birth (Olechnowicz *et al*., 2009). Changes in the yield and quality of ewe milk through lactation are influenced by both seasonal and physiological factors (Sevi *et al*., 2002). Sohagi sheep is an Upper Egypt breed that has not previously been reported in Egyptian sheep breed literature Galal *et al*. (2005).The objective of this work was to study the milk production characterization, lactation curve and milk composition of Sohagi ewes.

Materials and Methods

This experiment was carried out at the Animal Production Experimental Farm, Faculty of Agriculture, Sohag University, Sohag. Sohag located in the middle of Upper Egypt between 26° 36´ 26 N latitudes and 31° 47´ 80 E longitudes. The climate is dry and subtropical condition. Data were obtained from the Sohagi sheep flock.

A small flock has just (2001) been formed by the College of Agriculture, University of Sohag. The animals are shallow body, medium in size with relation long nick and legs. The head is medium with straight profile and ewes are mostly polled while rams are both horned and polled. The ears are vestigial. The body is covered with coarse wool ranging from cream to white. The head is generally dark brown but cream with dark rings around the eyes. The tail varies in shape from wide base terminated into a sort segment to a lesser wide base ending into cylindrical part

extending well below the hocks. There is no information available for breed characteristics.

The flock fed concentrates and roughage. Hay and green fodder (*Trifolium Alexandrium and Sorghim*) were used as roughages, free access to water and block common salt. Parturitions took place from February, June and October. Routine lambs management such as iodine treatment of the navel, injection of Vitamin E-Selenium, car tagging was practiced. Lambs kept with their dams in individual boxes for three day after birth. Milk yield was estimated in (118) ewes. Ewes were selected after one week parturition to participate in the experiment based on soundness of udder and lamb viability. Milk yield estimated in three lambing seasons of June 2008, October 2008 and February 2009. Milk yield during the suckling period (pre-weaning - eight weeks) was estimated by weight suckle- weight method (Ünal, 2008). Lambs were separated from their dams at 17 pm on the evening preceding the recording day. In the following morning day at 7 am, lambs were weighted and allowed to suckle their dams for 15 minutes period. Their body weights were then recorded and lambs separated again until 17 pm, at which time the procedure was repeated. After finished suckling, ewes were hand milked to remove any surplus milk. The difference in weight of the lamb before and after suckling represented the amount of milk yield of the ewe. After lambs were weaned (8 weeks), milk yield was estimated by hand milking twice daily. Ewes were considered dry of when the amounts of produced milk was $\leq$ 100 ml per day (Izadifard and Zamiri, 1997).

Milk samples were collected weekly during three laming seasons through lactation period. 50 ml were collected by hand milking of both sides of the udder and pooling samples into one sample per ewe. Sample were frozen and stored at -5°C. Milk samples were analyzed for crude protein, fat, lactose, total solid, solid not fat, using a Milkoscan device (Foss Electric, Denmark), and somatic cell counts were estimated by the Fluoro-opto- electronic method using Fassomatic 5000, Foss Electric apparatus, 3400 Hillerod, Denmark at the Dairy Services unit, which belonging to the Animal Production Research Institute, Sakha, Kafr El- Sheikh Governorate. Milk energy values were calculated from the chemical composition using equation proposed by Economides (1986) as follows:

Calorific value (MJ/L) = 1.94 + 0.43 x where: x = fat%.

Simple correlation coefficients were estimated for milk yield and components, regression of age and weight of ewe at lambing on

milk composition. Somatic cell count data was measured as 100.000 (hundred thousand) cells per ml.

Least- Squares Means Method (LSM) of the data were analyzed using GLM procedure (SAS, 1998) and Duncan's multiple range test (Duncan, 1955). Constant was fitted for the effects of season of lambing, type of birth and age of dam on milk yield and lactation length. Data of milk yield were analyzed using the following model:

$Y_{ijk}= \mu + S_i + T_j + A_k + e_{ijk}$ (Model 1)

Data of milk composition were analyzed using the following model:

$Y_{ijl}= \mu + S_i + T_j + W_l + e_{ijl}$ (Model 2)

μ = overall mean

S_i= the fixed effect of lambing season

i= 1(February), 2 (June), 3 (October).

T_j= the fixed effect of type of birth

j= 1 (single), 2 (twines).

A_k= the fixed effect of age of ewe

k= 1 (< 2), 2 (>2-≤ 3), 3 (>3-≤4), 4 (>4-≤5), 5 (>5).

e_{ijk} = random error (Model 1)

W_l= the fixed effect of lactation weeks l= 1 (w2) …..... .....9 (w18).

e_{ijl} = random error (Model 2)

Results and Discussion

Milk yield: Table (1) shows parameter of lactation performance in Sohagi sheep. Estimated mean lactation length, milk yield, milk yield pre-weaning, milk yield post-weaning and daily milk yield were 105±1.51 day, 41.99±9.80 L, 28.08±5.49 L, 13.92±5.35 L and 0.393±0.08 ml, respectively. Milk production peaked found to be around the second week of lactation and decreased thereafter. Milk production decreased after weaning due to removal of suckling stimulus. The same results found by (Lambussiere, 1988). The shape of the lactation curve (Fig.1) was similar to that for most non dairy breeds (Zare Shahneh *et al*., 2005). Milk produced pre-weaning amounted 66.9% from the total milk yield, but, the percentage of total milk post-weaning amounted 33.1% from the milk yield of Sohagi ewes. The reduction in milk production after weaning may be due to removel of suckling stimulus. In a similar study with Farafra sheep Hamdon *et al*. (2006) reported that the mean daily milk yield, milk yield before weaning, milk yield after weaning, total milk yield and lactation length were 0.675 g, 46.0, 13.4, 59.4 kg and 88 days, respectively. Also, Kassab *et al* (2009) reported that average daily milk yield and total milk yield were 0.786 g and 44.03 kg, respectively in Sohagi sheep.

Ewes lambed at spring season (February – 56.01±1.94 L) had greater milk yield compared to those lambed at summer season (June –38.68±1.52 L) or autumn

season (October – 36.68±2.80 L) as shown in Table (1). Also, ewes lambed at spring season had a longer lactation length (118.35±2.29 day) than those lambed at summer (102.65±1.78 day). The spring lambed ewes, showed more persistency in their week milk yield which resulted in higher total milk. Seasonal variation could be attributed mainly to nutritional and husbandry, i.e. availability of green fodder in addition of possible effect of the ambient environmental conditions. Ewes lambed during spring season (February) were fed green fodder (Egyptian clover) during late pregnancy period and the whole lactation period. Seasonal differences had a highly significant effect ($P< 0.01$) on both milk yield and lactation length (Table, 1). The same results were found by Morsy (2002) and Hamdon *et al*., (2006).

Ewes reared single-born lambs produced 25.82±0.64 L of milk, while those reared twins-born lambs produced 31.89±1.42 L during the eight weeks of suckling (Table, 1) The differences due to number of suckling lambs were highly significant ($P< 0.01$) with total milk yield, milk yield pre-weaning, milk yield post-weaning and daily milk yield and significant ($P< 0.05$) with lactation length. Daily milk yield, total milk pre-weaning and total milk were higher by about 19.5%, 23.5% and 26% for ewes suckling twins than those suckling single lamb, respectively. This phenomenon could be attributed to the ability of twin lambs to empty more completely the udder of their dams. Similar results were reported by Hassan (1995), Mousa *et al*. (1997), Hamdon *et al*. (2006) and Űnal *et al*. (2007) who indicated that ewes rearing twins produced much milk than those suckling single lambs.

Ewes of (>5) years old shared relatively higher milk yield than younger ones (Table, 1). Age of ewe was of a significant effect ($p< 0.05$ & $p< 0.01$) on milk post- weaning and daily milk yield. Generally, average milk yield was increased with advancing increase age of ewe. These results are agreement with Mousa *et al*. (1997) and Morsy (2002).

A highly significant positive correlations ($p< 0.01$) between lambs birth weight and each of average daily milk yield, total milk pre- weaning. These results was found confirm that the heavy lambs showed a good ability to stimulate their dams to produce more milk particularly during existed their early life. Also, Al-Saigh and Al Khauzai (1993) found that the correlation coefficients and the linear regressions between lambs birth weight and their dams milk yield were highly significantly.

Table (2) shows that, there were a positive significant

($p<0.05\&0.01$) correlations coefficients between ewes weight at lambing and each of average daily milk yield, total milk pre-weaning, total milk post-weaning, total milk yield and lactation length. These results are in agreement with Al- Saigh and Al Khauzai (1993) and Mousa *et al*. (1997).

Milk composition:

Table (3) shows the least squares means for milk composition. The average fat, protein, lactose, total solid, solid not fat, milk energy and somatic cell amounts were 4.93±1.18%, 4.34±0.67%, 4.53±0.42%, 14.51±1.57%, 9.54±0.93%, 3.54±1.12 MJ/L and 269.085cells/ml, respectively.. Mahram (1996) worked on Barki sheep, found that fat, total solid and protein milk were 4.0-4.48%, 17.06% and 4.2%, respectively. While, Morsy (2002) reported that fat, protein and milk energy were 6.5%, 4.9% and 4.4 MJ/kg, in Ossimi sheep, respectively. Ochoa-Cordero *et al*. (2002) reported that the averages of milk components were 16.71 for total solids, 5.63 for fat, 5.21 for protein and 4.54 for lactose of Rambouillet ewes. With local Farafra sheep, Hamdon *et al*. (2006) reported that fat, total solid, solid not fat, protein, and milk energy were 5.95%, 15.59%, 10.01%, 5.31% and 4.34 MJ/ kg, respectively. With local Sohagi sheep Kassab *et al*. (2009) found that average daily fat, daily protein and daily energy were 5.46%, 5.11% and 4.29 MJ/ kg, respectively.

Somatic cells are natural component of the milk, low somatic cell count (SCC) when their milk SCC lower than 500.000/ml and high somatic cell count when their milk SCC higher than 1.000.000/ml (Albenzio, *et al*. 2004) and they reported that average of SCC were 245±32 in the lower SCC groups and 1834±112 cells/ml in the higher SCC group. While, Olechnowicz *et al*., (2009) found that the mean log somatic cell count was 5.19 and the mean content of fat, protein and lactose in milk was 5.45, 6.12 and 4.92%, respectively.

Table (3) shows the least squares means of somatic cells count, which was 269.085 cells/ml. Season of lambing had a significant effect ($p< 0.01$) on somatic cells count. Lagriffoul *et al*. (2006) found that of loss of milk production was about 10% to 15% for the sheep with SCC over 500.00 to 700.00 cells/mL.

Season of lambing had a significant effect ($p< 0.01$) on milk composition. The autumn lambing ewes (October) had a higher fat%, protein%, total solid% and milk energy (MJ/L) than both summer lambing (June) and spring lambing ewes (February). These results may be attributed to the availability of Egyptian clover and metabolic

and endocrine changes related to the climate. Similarly, Morsy (2002) reported that the ewes lambed in winter season had the highest value of fat%, protein%. and milk energy 6.1, 5.0% and 4.2 MJ/Kg compared with ewes lambing in summer season 5.7, 4.5%. and 4.00 MJ/Kg, respectively. Table (3) and Figure (2) proved that milk composition (fat, TS and SNF) increased gradually throughout the 18 weeks of lactation. The differences between lactation weeks in milk composition were statistically highly significant ($p<0.01$).

Table(4) shows that regression coefficients of the milk components percentages on age and weight of ewe at lambing. Age of ewe had a significant effect on protein%, TS% and SNF%. Weight of ewe had a positively and highly significant effect ($P< 0.01$) on fat% and lactose%, but negatively and highly significant effect ($P< 0.01$) on TS%, SCC and milk energy. Similarly, Latif *et al*., (1989) found that age of ewe had a significant effect on the percentages of protein milk, where it was the highest at the age of 3-4 years. Also Hamdon *et al*. (2006) reported that the regression coefficients of protein% on age of ewe was positively and highly significant ($P< 0.01$) Table (5) shows that, there were negative and significant ($p<0.05$ &$p<0.01$) correlations between daily milk yield with fat%, TS%, protein%, SCC cells/ml and milk energy (MJ/l). There is no differences in protein% with high and low SCC. But, fat% increased significantly with high SCC and negative correlation between lactose% with SCC, In Farafra and Chios sheep, Hamdon, *et al*. (2006) reported correlation of -0.67 between milk yield (ml per day) and fat,-0.66 between milk yield and total solid,-0.08 between milk yield and solid non fat. Olechnowicz, *et al*. (2009) found positive correlation coefficients between log SCC and percentages of fat and protein in milk, amount 0.24 and 0.18. negative correlation coefficients between log SCC and lactose percentage, -0.49. The correlation coefficients between percentages of fat and protein and lactose content were negative, -0.53 and -0.42, respectively.

It could be concluded that , Sohagi sheep producers must follow intensive system production and early lamb fattening system because of low milk production other sheep.

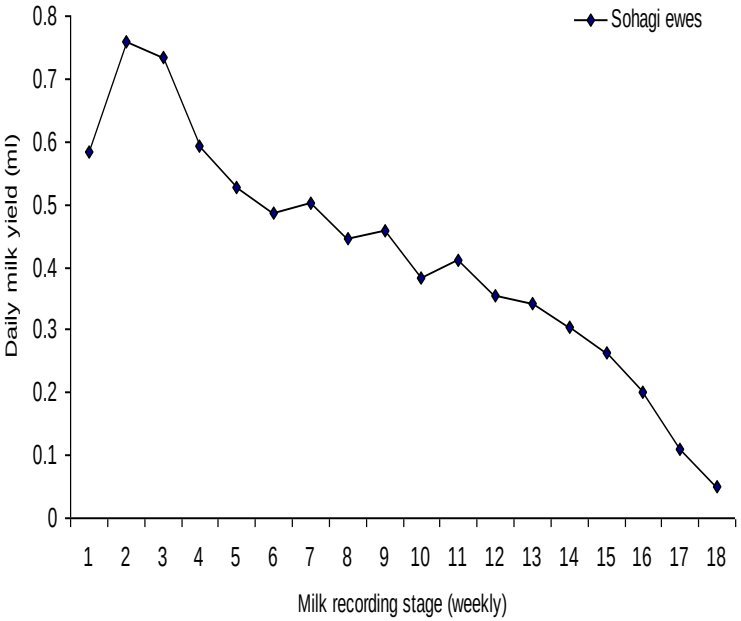

Fig.1. Lactation curve of Sohagi ewes

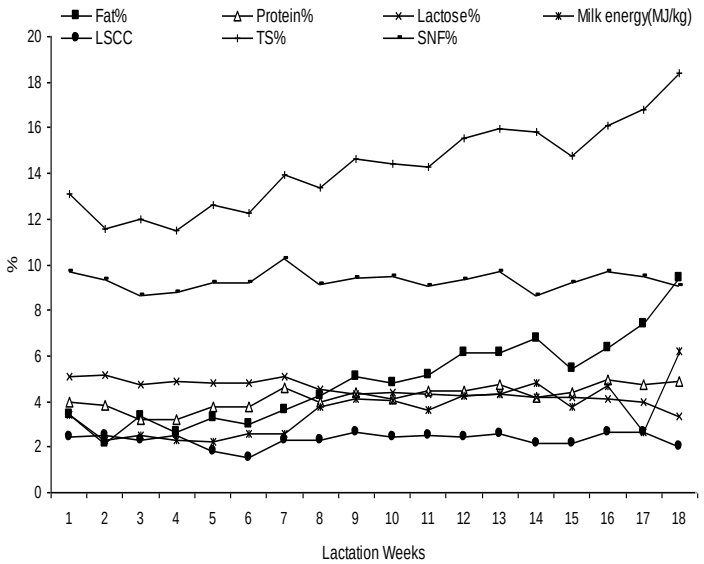

Fig. 2. Milk compstion of Sohagi Sheep

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توصيف إنتاج اللبن فى الأغنام السوهاجى

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تم اجراء الدراسة بمزرعة تجارب الإنتاج الحيوانى – كلية الزراعة – جامعة سوهاج لتقدير إنتاج اللبن ومكوناته فى قطيع أغنام السوهاجى (118 نعجة) وكانتطول فترة الحليب وانتاج اللبن اليومي وانتاج اللبن قبل الفطام إنتاج اللبن بعد الفطام و إنتاج اللبن الكلى هو 105.66±11.51 و 393±0.08 مل و28.02± 5.49 لتر و13.92 ± 5.35 لتر و 41.99± 9.80 لتر على التوالى، و يصل منحنى انتاج اللبن الى قمته عند الاسبوع الثانى ثم ينخفض تدريجياً حتى أخر فترة الحليب خلال. كانت الفروق بين مواسم الولادة عالية المعنوية (0.01). النعاج التى تلد خلال موسم الربيع (فبراير- 56.01±1.94 لتر) تعطى محصول لبن كلى أعلى من النعاج التى ولدت خلال موسم الصيف (يونيو – 38.68±1.52 لتر) ثم النعاج التى ولدت خلال موسم الخريف (أكتوبر- 36.68±2.80 لتر)، بينما النعاج التى تلد فى موسم الصيف يكون طول فترة الحليب (118.35±2.29 يوم) اطول عن النعاج التى تلد فى موسم الصيف (102.35±1.78 يوم)، الفروق عالية المعنوية بين النعاج التى ترضع فرد او توائم من الحملان حيث النعاج التى ترضع توائم (31.89 ±1.42 لتر) تنتج لبن أكثر من التى ترضع فرد (25.82±0.04 لتر) من الحملان. عمر النعاج يؤثر معنويا على انتاج اللبن و مكوناتة حيث تزداد كمية إنتاج اللبن بتقدم عمر النعجة ، و النعاج التى عمرها (أكبر من 5 سنوات) تنتج أعلى كمية من اللبن. بينما مكونات اللبن من نسبة الدهن و البروتين و اللاكتوز و الجوامد الدهنية و الجوامد الكلية الغير دهنية و الخلايا الجسدية و طاقة اللبن كانت 4.93±1.18 و 4.34±0.67 و 4.53±1.57 و 9.54±0.93 و 269.085 خلية/مل و 3.54±1.12 ميجاجول/لتر لبن على التوالى. توجد علاقة سالبة عالية المعنوية (0.01) بين محصول اللبن اليومى و نسبة الدهن و نسبة المواد الصلبة الكلية و نسبة البروتين و طاقة اللبن. النتائج المتحصل عليها توضح ان اغنام السوهاجى ليس اغنام انتاج لبن و لذلك ينصح باتباع نظام الانتاج المكثف و فطام الحملان مبكرا لتسمينها.