

## **PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF EWE LAMBS FED DRIED SUGAR BEET TOPS**

**BY**

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### **ABSTRACT**

Twenty-seven winter born 3/8 Finn. 5/8 Rahmani crossbred ewe lambs, with an average live body weight (LBW) 13 kg and aged 2 months were used in feeding trial for 300 days to investigate the effect of feeding dried sugar beet tops (DSBT) as a replacement of berseem hay (BH) on their productive and reproductive performance. The animals were randomly assigned to three similar groups and were fed on concentrate feed mixture at level of 2% of LBW. Quantities of roughages, BH, a mixture of BH and DSBT or DSBT were given to complete the nutritional requirements according to NRC (1985). Three digestion trials were carried out using nine Rahmany rams aged about two years and weighed 45-50 kg to evaluate the different tested roughages BH (I), mixture of BH + DSBT (II) or DSBT (III). The results indicated that, dry matter digestibility increased ( $P < 0.5$ ) for rations II and III compared to ration I. While the digestibility of CP was lower for rations II and III ( $P < 0.05$ ) than that for ration I. However, the differences in the digestibility of OM, C F, EE and NFE between the three different experimental rations were not significant. The TDN and DCP values for ration III (DSBT) was significantly lower ( $P < 0.05$ ) than that for rations I and II. But there is no significant differences between rations I and II. There was no significant difference in the ruminal pH between the different animals it ranged from 6.28 to 6.39, while the  $\text{NH}_3\text{-N}$  concentration was lower ( $P < 0.05$ ) and total VFA concentration was higher ( $P < 0.05$ ) for ewe lambs fed ration II and III in comparison with those fed the control ration. This may be due to the higher fiber digestibility and lower protein digestibility in DSBT than BH. The results of feeding trial indicated that, the average daily gain was 116, 114 and 111 g/day for groups I, II and III, respectively being not significantly differ and there were no differences in feed efficiency (kg DM/ kg gain). However, feed cost as

LE/kg gain decreased by 18.30 and 29.95% while, economical efficiency improved by 22.32 and 42.86% for ewe lambs fed rations II and III (containing DSBT), respectively compared to the control ration (containing BH). Ewe lambs of group I (100% BH) attained puberty 25.89 and 18.11 days younger than those in groups II and III, respectively. At this age, ewe lambs of group II were heavier (4.59 and 1.56 kg) than those in groups I and III, respectively. However, the differences were not statistically significant in either age or body weight at puberty. The average daily progesterone concentration of ewe lambs for different groups during the first oestrous cycle appeared mostly to relate to the cycle length. The oestrous cycles occurred in different groups during the whole experimental study lied within the normal length (16-20 days), this means more regular and consistent oestrous activity.

**Keywords:** Dried sugar beet tops; berseem hay; digestibility; rumen fermentation; daily gain; puberty, progesterone profile; oestrous activity.

### INTRODUCTION

Many problems confront development of livestock sector, one of those is shortage of feedstuffs and the high cost of concentrate feed mixture. In Egypt, berseem is the main forage in winter season for livestock. On contrast, it is well known that in summer, there is a serious shortage in feedstuffs, which represents a real problem. Large area about 135,623 feddans are cultivated with sugar beet crop under supervision of Delta company of sugar at Kafr El-Sheikh Governorate and Dakahlia company of sugar, which produced about 1,695 million tons fresh sugar beet tops (the average of tops yield for the commercial varieties 12.5 tons/feddan) contained about 210,759 tons DM, the total nutritive value of these by-products is about 118,025 tons of TDN and 17,493 tons of DCP (Improvement of Sugar Beet Production and Utilization, 2000).

Sugar beet tops (SBT) have high perishable nature, it is fermented quickly causing flying breeding nuisance and always present potential air, plant disease and water pollution problems (Baker, 1995). Also, there are some problems in using fresh sugar beet tops because it's high moisture, potassium and oxalic acid content, which lead to diarrhea and must be taken in consideration when used in animal feeding and ration formulation (Podkowka, 1983 and Bendary et al., 1992). So, drying or ensilage of tops is one of the important methods for its conversion, which may contribute in solving some of the problems as resources of animal feeding shortage, and

minimizing pollution especially in the summer season. Moreover, it may offer a reduction of feed cost and minimize quantities of the expensive feedstuffs used in animal feeding (Mohi El-Din, 1998).

Kripal et al. (1975), using sheep, compared three types of silage made from wilted SBT, a mixture from SBT with lucerne or SBT plus oat forage and urea. The results indicated that the average intake of dry matter was 3.61, 3.84 and 2.38 kg/100 kg body weight for the three types of silage, respectively. The animals were in a positive nitrogen balance and the nutritive value was 6.00, 7.83 and 5.99% as digestible crude protein and 58.23, 63.07 and 61.88% TDN (on DM basis). Bendary et al. (1999) reported that using of sugar beet tops (dried or silage mixed with berseem) compared with rice straw and berseem hay along with concentrate mixture for growing Friesian calves had appreciable reduction in feeding costs without any health troubles and no effects on semen characteristics.

It is known that the reproductive performance of sheep is affected by many factors such as level and source of nutrients in their diets, breeding, season of birth, breed and management of the flock. The role of nutrition in the expression of the reproductive potential of sheep involves long term programming, as well as contemporary effects, improvements in energy and protein nutrition enhance reproductive efficiency (Robinson et al., 2002). Mukasa-Mugerwa and Lahlou Kassi (1995) reported that, better nutrition increased ovulation and pregnancy rates, reduced pre and postnatal losses, minimized postpartum an estrous interval, increased lamb growth rates and enhance puberty.

Robinson (1990) showed that under nutrition, characterized by a cessation in weight gain for an 8 weeks period from 6 weeks of age, reduced ovulation rates in ewes for up to 3 years. In other study, Rhind et al. (1998) indicated that a pre weaning restriction in growth rate, leading weaning weights of 23.0 vs. 26.2 kg, significantly reduced lifetime reproductive performance.

The objective of this study was to investigate the effect of feeding 3/8 Finn.5/8 Rahmani crossbred ewe lambs on dried sugar beet tops (DSBT) as a replacement of berseem hay (BH) on their productive and reproductive performance. Also, study its effect on reduction the cost of animal feeding especially in summer season.

#### **MATERIALS AND METHODS**

This work was conducted at the Animal Production Department, Faculty of Agriculture, Kafr El-Sheikh, Tanta University and Sakha

Experimental Farm, belonging to the Animal Production Research Institute, Ministry of Agriculture, Egypt.

### 1- Digestibility trials:

Three digestion trials were carried out using nine (3 in each) Rahmany rams aged about two years and weighed 45-50 kg to evaluate the following tested roughages as follows: I- 100% berseem hay (BH, control). II- 50% BH + 50% dried sugar beet tops (BH + DSBT). III- 100% dried sugar beet tops (DSBT). The animals were fed ad libitum on these roughage rations and water was available continuously. Each trial was continued for 14 days as preliminary period followed by 7 days as collection period. At the end of collection period, composite feed and feces samples were prepared and preserved for analysis according to AOAC (1990).

### 2- Feeding trial:

Feeding trial was conducted using twenty-seven winter born 3/8 Finn. 5/8 Rahmani crossbred newly weaned ewe lambs, with an average live body weight (LBW) 13 kg and aged 2 months for 300 days. The animals were randomly assigned to three similar groups (9 in each). Ewes in all groups were fed on concentrate feed mixture at level of 2% of LBW. Quantities of roughage, BH, a mixture of BH and DSBT or DSBT were given to complete the nutritional requirements according to NRC (1985), the requirements were adjusted monthly according to the LBW. Water and trace mineralized salt blocks (Biomix 112) were available all the day. Animals were weighed (before feeding) on 2 consecutive days at the beginning and at the end of the treatment period and bi-weekly during the experimental period, growth rates and pubertal body weights were determined.

### 3- Rumen samples

Rumen liquor samples were taken 3 hours after morning feeding by using stomach tube from 4 animals per each treatment at the middle of the feeding trial, Ruminal pH was determined directly by using Beckman pH meter, while 1 ml concentrated Hcl was added to the rest sample to stop microbial activity and after that filtered through a double layer of cheese cloth and stored in polyethylene bottles in freezer until analysis. Total volatile fatty acids (VFA's) concentrations were estimated by using steam distillation methods (Warner, 1964). The concentration of ammonia-N ( $(\text{NH}_3\text{-N})$ ) was determined by using magnesium oxide (MgO) as described by the AOAC (1990).

#### **4- Oestrous detection:**

Starting from June 2001 (4 months old) up to the end of the study, ewes lambs were detected for the onset of oestrous two times daily at 8 a.m. and 4 p.m. 30 minutes each. Two vasectomized rams were used. Ewe lambs, which were seen to be receptive and stood for mounting by the ram were considered being in oestrous. During January mating season 2002, number of ewes mated, lambled and number of lambs born were recorded.

#### **5- Blood sampling and hormone assay:**

Blood samples (about 6 ml) were taken from the jugular vein twice weekly in vacutainer tubes to determine serum progesterone level (P4) during the first estruses cycle. After 30 minutes, samples were centrifuged for 15 minutes at 2500 r. p. m. for serum separation. Serum was stored in labeled cuvettes at -20°C till hormone assay. Direct radio-immune-assay technique was conducted for serum progesterone level determination using (COAT-A-COUNT) kits. The standard curve ranged between 0 and 40 ng/ml. Sensitivity of the procedure can detect as little as 0.02 ng/ml.

#### **6- statistical analyses:**

The data were statistically analyzed using General Linear Models Procedure (one way ANOVA model) adapted by SPSS (1997), where appropriate means were separated using Duncans's multiple range tests (1955).

## **RESULTS AND DISCUSSION**

### **Productive performance:**

#### **1- Chemical composition:**

Chemical composition of different ingredients is shown in Table (1). Results indicated that CP content was nearly similar in both berseem hay and dried sugar beet tops. However, berseem hay was lower in EE, NFE and ash content but it was higher in CF content comparing with dried sugar beet tops. These results were in agreement with those reported by Ali (1996) and Bendary et al. (1999), who found that berseem hay was lower in NFE and ash content, while it was higher in CF content comparing with dried sugar beet tops.

**Table (1). Chemical composition of the feed ingredients used in the experimental rations.**

Ingredients	DM	Dry matter composition, %					
	%	OM	CP	CF	EE	NFE	Ash
Dried sugar beet tops	81.75	75.86	12.43	14.28	1.71	47.44	24.14
Berseem hay	87.01	88.38	12.87	30.22	0.96	44.33	11.62
Concentrate feed mixture*	88.95	90.79	15.23	11.97	3.21	60.38	9.21

\*concentrate mixture composed of 35% undecorticated cotton seed cake, 23% yellow corn, 32% wheat bran, 4% rice bran, 3% molasses, 2% limestone and 1% common salt.

## 2- Digestibility and nutritive value:

The average feed intake, nutrients digestibility and nutritive value of the different experimental roughages used in ewe lambs feeding are presented in Table (2). Dry matter intake ranged from 1.15 to 1.25 kg/day being not significant. Dry matter digestibility increased ( $P<0.5$ ) for rations II and III compared to ration I. While the digestibility of CP was lower for rations II and III ( $P<0.05$ ) than that for ration I. However, the differences in the digestibility of OM, C F, EE and NFE between the three different experimental rations were not significant. Results also, indicated that the nutritive value expressed as TDN and DCP for ration III (DSBT) was significantly lower ( $P<0.05$ ) than that for rations I and II. But there is no significant differences between rations I and II. Substitution of 50% berseem hay with dried sugar beet tops (ration II) improved ( $P>0.05$ ) the digestibility of NFE compared to berseem hay ration as well as increased ( $P<0.05$ ) the digestibility of DM and OM. This may be due to the higher content of NFE (47.44% vs. 44.33%) and lower content of CF (14.28% vs. 30.22%) in dried sugar beet tops comparing with berseem hay. Bendary et al. (1999) found that the digestibility coefficients of CP and CF were significantly higher ( $P<0.05$ ) in rations contained dried sugar beet tops (DSBT) or silage (SBTS) compared with that contained rice straw and berseem hay. Also, they indicated that the inclusion of DSBT or SBTS with concentrate mixture increased values of TDN and DCP% comparing with rice straw and berseem hay. However, Mohi-El-Din (1998) indicated that the digestibility of OM, CP, EE and NFE for DSBT were higher than those for SBTS but CF digestibility for DSBT was lower. The DCP content in SBTS was higher ( $P<0.05$ ) than that in DSBT while, the TDN value was similar for both of DSBT and SBTS.

**Table (2). Feed intake, nutrient digestibilities and nutritive value of the experimental roughages used in ewe lambs feeding (Mean  $\pm$  SE).**

Items	Rations		
	I	II	III
<b>Feed intake (kg, DM)</b>			
Berseem hay	1.25	0.61	--
Dried sugar beet tops	--	0.58	1.15
<b>Total</b>	1.25	1.19	1.15
<b>Digestibility, %</b>			
DM	52.35 $\pm$ 1.3 <sup>b</sup>	60.99 $\pm$ 2.6 <sup>a</sup>	63.36 $\pm$ 2.4 <sup>a</sup>
OM	53.63 $\pm$ 2.1	57.64 $\pm$ 2.7	57.89 $\pm$ 2.3
CP	62.70 $\pm$ 1.1 <sup>a</sup>	56.96 $\pm$ 2.7 <sup>ab</sup>	54.29 $\pm$ 2.4 <sup>b</sup>
CF	37.59 $\pm$ 2.7	38.98 $\pm$ 3.2	44.18 $\pm$ 3.4
EE	52.76 $\pm$ 3.4	42.02 $\pm$ 3.3	49.98 $\pm$ 3.7
NFE	62.05 $\pm$ 1.7	68.37 $\pm$ 2.4	64.62 $\pm$ 2.2
<b>Nutritive value, %</b>			
TDN	48.12 $\pm$ 1.2 <sup>a</sup>	48.71 $\pm$ 2.1 <sup>a</sup>	45.64 $\pm$ 1.7 <sup>b</sup>
DCP	8.07 $\pm$ 0.1 <sup>a</sup>	7.32 $\pm$ 0.3 <sup>ab</sup>	6.75 $\pm$ 0.3 <sup>b</sup>

<sup>a,b</sup> Means within a row with different superscripts are significantly different.

I. 100% Berseem hay.

II. 50% Berseem hay + 50% dried sugar beet tops.

III. 100% dried sugar beet tops.

### **3- Rumens fermentation:**

The average pH values, ammonia-nitrogen (NH<sub>3</sub>-N) and total volatile fatty acids (VFA's) concentrations in the rumen liquor of ewe lambs fed different rations are given in Table (3). There was no significant difference in the ruminal pH between the different animals it ranged from 6.28 to 6.39. The concentration of NH<sub>3</sub>-N was lower (P<0.05) while total VFA concentration was higher (P<0.05) for ewes fed ration II and III in comparison with those fed the control ration. This may be due to the lower protein digestibility and higher fiber digestibility for DSBT than BH. On the other hand, higher NFE content and its digestibility for DSBT caused an increase in ruminal VFA concentration for ewe lambs fed rations contained 50 or 100% DSBT. These results are in accordance with those reported by Saleh et al. (2000) who indicated that substitution of 50 or 100 of berseem hay with dried sweet potato tops (higher NFE content) increased the efficiency of energy utilization by lambs and consequently ruminal VFA's concentration. El-Ashry (1971) and Haaland et al. (1982) indicated that increasing protein level in the diet increased the ruminal NH<sub>3</sub>-N

concentration. On the other hand, Ali (1996) found that the ruminal pH values and  $\text{NH}_3\text{-N}$  concentrations for two groups of Friesian heifers fed on DSBT and rice straw along with CM was about the same. But the concentration of total VFA's for animals fed on DSBT was higher than those fed on rice straw. However, Mohi El-Dine (1998) reported no significant differences in the ruminal pH values, VFA's and  $\text{NH}_3\text{-N}$  concentration for lactating cows fed rations containing DSBT, SBTS or BH comparing with those fed on control ration (BH+ rice straw). Eweedah (1986) reported no significant differences in the rumen pH value for Buffalo calves fed rations containing DSBT or SBTS, while the total VFA and  $\text{NH}_3\text{-N}$  concentrations for animals fed on DSBT were higher than those fed SBTS.

**Table (3).** Average values of pH,  $\text{NH}_3\text{-N}$  and VFA's concentrations in rumen liquor for ewe lambs fed the different experimental rations (Mean  $\pm$  SE).

Items	Groups		
	I	II	III
pH	6.39 $\pm$ 0.11	6.32 $\pm$ 0.08	6.28 $\pm$ 0.02
$\text{NH}_3\text{-N}$ (mg/100 ml. R. L.)	13.93 $\pm$ 0.55 <sup>a</sup>	10.10 $\pm$ 0.76 <sup>b</sup>	10.79 $\pm$ 0.88 <sup>b</sup>
VFA's (meq/100 ml. R. L.)	11.35 $\pm$ 1.52 <sup>b</sup>	17.57 $\pm$ 1.36 <sup>a</sup>	19.87 $\pm$ 1.32 <sup>a</sup>

<sup>a,b</sup> Means within a raw with different superscripts are significantly difference.

#### 4-Growth performance:

Data concerning growth performance for ewe lambs fed different rations are presented in Table (4). Total feed intake was nearly similar in all groups. However average daily gains were 116, 114 and 111 g/day for groups I, II and III, respectively being not significantly differ. The data also, showed that there is no differences in feed efficiency (kg feed, DM/ kg gain).

The feed cost as LE/kg gain decreased by 11.91 and 22.83% while, economical efficiency improved by 13.04 and 29.71% for ewe lambs fed rations II and III (containing DSBT), respectively compared to the control ration (containing BH). These results are in accordance with those reported by Mahmoud et al. (2001) who found that no significant differences in the average daily gain of lambs fed on different levels of DSBT as well as the feed conversion (kg TDN/kg gain) which was nearly similar. However, the feed cost was decreased and the economical efficiency improved by increasing the proportion of DSBT in the complete pelleted rations. The same trend was also reported by Bendary et al. (1999) who found that feeding growing Friesian calves on rations containing DSBT or SBTS increased average daily gain by



30.3 and 36.4% and reduced feed cost by 33.8 and 33.7%, respectively compared with calves fed control ration (rice straw plus berseem hay).

**Table (4).** Mean of growth performance for ewe lambs fed different experimental rations.

Items	Groups		
	I	II	III
<b>DM intake, kg/day</b>			
Berseem hay	0.578	0.281	---
Dried sugar beet tops	---	0.281	0.546
Concentrate mixture	0.578	0.562	0.546
Total DM intake, kg	1.156	1.124	1.092
<b>Growth performance</b>			
Initial wt., kg	13.11	12.56	12.23
Final wt., kg	47.89	46.78	45.56
Total gain, kg	34.78	34.22	33.33
Av. Daily gain, g/day	116	114	111
Feed efficiency (kg DM/kg gain)	9.966	9.860	9.838
Feed cost (LE/kg gain)*	10.16	8.95	7.84
Economical efficiency**	1.38	1.56	1.79

There is no significant differences between the different groups for average daily gain.

\*based on the assumption that the prices of each one ton from concentrate feed mixture, berseem hay and dried sugar beet tops were 1200, 600 and 200 LE, respectively and one kg body weight on selling was 14 LE in year 2004.

\*\* Economical efficiency = Money output (price of weight gain) / Money input (price of feed consumed).

### **Reproductive performance:**

#### **1- Onset of the breeding season:**

In view of the present results (Table 5) onset of the breeding season has been considered as the first time at which the first oestrous occurs. The onset of breeding season (first oestrous) occurred in average by Oct. 16 of the year birth (about 8 months age). Onset of puberty (Sept. 16) in the present winter born crossbred ewe lambs (group 3) is close to that in the winter born local Rahmani (August. 23) as reported by Mounib et al. (1956), while Sallam (1992) reported that the summer born Rahmani ewe lambs reached their first oestrous in April while the summer Ossimi ewe lambs reached their first oestrous in Sept. 28 in the year following their year of birth. These findings are in general agreement with the findings of Papachristoforou et al. (2000) who found that the Chios ewe lambs born in February reached

their puberty in early September at 30 weeks of age, 5 weeks later than those born in autumn.

Results obtained in Table (5) indicated that the ewe lambs of group 1 (100% BH) attained puberty 25.89 and 18.11 days younger than those in group 2 (50% DSBT+50% BH) and group 3 (100% BH), respectively. At this age, ewe lambs of group 2 were heavier (4.59 and 1.56 kg) than those in group 1 and group 3, respectively. However the differences were not statistically significant in either age or body weight at puberty. In the work by Foster (1981) reported that puberty in autumn-born lambs started about 4 weeks later in season but at an older (4 months) age compared with spring-born lambs. Sallam (1992) found that the summer born ewe lambs of  $\frac{1}{4}$  F. O. were the fastest in reaching their first breeding season. The same author Who added also, ewes have come in ovulatory oestrous (puberty) 43 and 20 days earlier than those of Ossimi and  $\frac{1}{2}$  F.O. groups, respectively. The average dates of onset of the breeding season were August 16, September 28 and September 5 in the year following their year of birth for the three breed groups, respectively. The conception rate after the natural mating for the all responding ewe lambs are presented in (Table 5). Results showed that the highest rate of conception (100%) was observed in groups I and II, while the lowest (85.71%) was recorded in group III, (ewe lambs fed DSBT), the differences between groups were not statistically significant. The highest litter size (1.40) was recorded for the ewe lambs fed ration II (containing 50% BH + 50% DSBT), while litter size was 1.14 and 1.00 for groups I and II, respectively. Number of lambs born alive/ewe lambing was not altered significant.

### 2- Regularity of oestrous activity:

The onset of the first oestrous in all ewe lambs ranged from September 18 to October 17, September 18 to December 13 and September 16 to December 21 in ewe lambs of groups 1, 2 and 3, respectively (Table 6). The same trend has been described by Papachristoforou et al. (2000) for February-born ewe lambs. They found that almost all ewe lambs were cycling regularly from mid October to the beginning of January, whereas for autumn-born lambs and adults ewes the respective period was from September until the end of winter. All ewe lambs of group 1 (control) experienced their first oestrous during September and October, while 77.798% of ewe lambs in group 2 during the respective period. Otherwise, the onset of puberty in the ewe lambs of group 3 has been distributed almost equally over four months, from September to December.

The percentages of spring-born ewe lambs of Galway, Finnish Landrace, Finngalway and Dorset X Finn. breed groups reaching puberty by the first breeding season were 45.2, 86.2, 84.0 and 85.6%, respectively (Quirke, 1978). Differences between Galway ewe lambs (45.2%) and those of the other groups were lightly significant ( $P < 0.01$ ). The majority of the Galway females would not reach puberty during their first season unless they were close to or above 38 kg live weight (Quirke and Gosling, 1979).

Average number of heats (up to December) exhibited per ewe lamb and distribution of ewe lambs according to the number of heats exhibited by each ewe within each group are shown in (Table 7). The average number of heats experienced per ewe lamb during the first breeding season was 5.56, 4.00 and 4.56 heat/animal for group 1, 2 and 3, respectively. The difference was not statistically significant. Ewe lambs within each group were classified according to the number of heats occurred, into three categories (Table 7). Out of 27 ewe lambs reached puberty for the three groups, only one oestrous has been experienced by 11.11, 11.11% and none of the group 3, 2 and 1, respectively. The majority of animals in group 1 (66.67%) and group 3 (55.56%) lied within the third category (having 6-8 heats), but 66.67% of animals in group 2 lied within the second category (2-5 heats). These results indicate the regularity of oestrous activity was not affected by the treatment.

Breed differences in the frequency distribution of ewe lambs due to the number of heats occurred were reported by many authors. Wiggins et al. (1970) reported that the percentages of ewe lambs having 1 and 2-3 oestrous periods ranged from 4.5 and 31.8% in Hampshire X Rambouillet to 17.8 and 52% in Rambouillet. Ewe lambs having 4-5 oestrouses ranged from 19.2% in Rambouillet to 36.4% in Hampshire X Rambouillet and those having 6-10 oestrous periods ranged from 8.3% in Columbia X Rambouillet to 30.4% in Dorst X Rambouillet breed group. In the current study all the oestrous cycles occurred in different groups lied within the normal length (16-20 days). This means more regular and consistent oestrous activity.

In the two grades, of Suffolk X Ossimi crossbred ewe lambs (35-45% and 70-90% Suffolk) during the first breeding season, the short oestrous cycles (<14 days) were rare in both groups, but relatively more longer cycles (19-23 days) were recorded for the first group (7.4 vs. 3.2%). Ewe lambs of both groups had the same proportion of normal (15-19 days) cycles (86.2 and 86.2%, respectively) Aboul Naga et al. (1980).

In the present work, ewe lambs of the group 1 were of the longest normal oestrous cycle (18.8 days) while those of the group 3, were of the shortest length (17.5 days), the ewe lambs of the group 2 came in between (17.75 days). Sallam (1992) found that ewe lambs of the Ossimi breed were of the longest normal oestrous cycle (17.78 days) and those of the  $\frac{1}{2}$  F. O. were of the shortest length (17.16 days), the  $\frac{1}{4}$  F. O. ewe lambs came in between (17.54 days).

### 3- Puberty progesterone profile:

Serum progesterone concentration were determined in 15 animals (5 of each group) to study the hormone profile during the first oestrous cycle (Table 8). The trend of increasing levels from day 0 of the first oestrous cycle to day 6 was the same for all groups with higher rates of increase from day 7 to day 14 (Plateau) in group 1 than in the other two groups. The average values of progesterone levels during plateau were 3.74, 2.38 and 1.22 for the three groups, respectively. Differences were statistically significant ( $P < 0.05$ ) between group 1 and 3, while concentrations appeared to be almost similar in the three groups from day 15 to day 20. The rate of increase in the average daily progesterone levels due to treatment was more pronounced in ewe lambs of group 1 followed by that in group 2 than in those of group 3. The average daily progesterone concentration have been obtained in the studied ewe lambs of different groups during the first oestrous cycle appeared mostly to relate to the cycle length.

The circulating progesterone concentration during the oestrous cycle has been reported to vary in a cyclic pattern with lowest values of 0.03-0.6 ng/ml on days -1 to +2 and highest values of 1.4-6.0 ng/ml on days 8-14 (Quirke and Gosling, 1979; McNeilly, 1985; Gabr, 1986; Sallam, 1992 and Sallam, 1999). Progesterone concentration in the current study are in line with those reported by forenamed authors. Sutarna et al. (1988a) reported that the mean concentration of plasma progesterone between days 8 and 13 in the pre pubertal ewe lambs was non significantly lower than in the pubertal ones. Conversely, Sutarna et al. (1988b) found the levels within 72 hours around ovulation to be below 0.2 ng/ml with no significant differences between the pre pubertal and mature females. Who also, reported that plasma progesterone level during the luteal phase of the cycle (days 6-14) varies between breeds. Gaber (1986) reported a level of 2.68 ng/ml in Rahmani and 1.88 ng/ml in Ossimi ewes 6-14 days post breeding. Sallam (1999) found that the progesterone concentration on day 12 to 17 in crossbred ewes post breeding were 2.62, 2.50, 3.16, 3.31, 4.24 and 4.45 ng/ml, respectively.

**Table (5). Effect of nutrition on puberty and number of lambs born/ewe during the first breeding season.**

Groups	No. of lambs	Date of birth (M±SE)	Birth weight (kg, M±SE)	Puberty			No. of ewes		No. of lambs born	No. of lambs born/ewe
				Mean date (M±SE)	Age (days, M±SE)	Live weight (kg, M±SE)	Mated	Lambled		
I	9	Feb. 13 ± 2.80	3.50 ± 0.27	Oct. 1 ± 3.60	231.9 ± 3.28	34.30 ± 1.49	7	7	8	1.14
II	9	Feb. 9 ± 2.54	3.45 ± 0.23	Oct. 25 ± 9.73	257.8 ± 9.9	39.89 ± 0.78	5	5	7	1.40
III	9	Feb. 9 ± 2.23	3.45 ± 0.30	Sep. 16±11.8	250.0 ± 10.63	37.33 ± 1.33	7	6	6	1.00

**Table (6). Monthly distribution of occurrence of first estrus in ewe lambs for different treated groups.**

Month	Group I			Group II			Group III		
	No.	%	Cumulative %	No.	%	Cumulative %	No.	%	Cumulative %
Sep.	5	55.56	55.56	2	22.22	22.22	3	33.33	33.33
Oct.	4	44.44	100	5	55.56	77.78	3.	33.33	66.66
Nov.	--	--	--	--	--	--	1	11.11	77.77
Dec.	--	--	--	2	22.22	100	2	22.23	100

**Table (7). Frequency distribution of oestrous occurred and oestrous cycle length in ewe lambs of the three groups during the first breeding season.**

Group	No. of animals	Ewe lambs having one heat		Ewe lambs having 2-5 heats		Ewe lambs having 6-8 heats		Av. No of heats/ewe lamb Mean $\pm$ SE
		N	%	N	%	N	%	
I	9	0	0.00	3	33.33	6	66.67	5.56 $\pm$ 0.76
II	9	1	11.11	6	66.67	2	22.22	4.00 $\pm$ 0.57
III	9	1	11.11	3	33.33	5	55.56	4.56 $\pm$ 0.78

**Table (8). Progesterone concentration (ng/ml) during the first oestrous cycle in ewe lambs of the three groups.**

Group	Oestrous cycle stage (days)			Average daily (ng/ml)	Oestrous cycle length (days)
	0-6	7-14	15-20		
I	0.41 $\pm$ 0.11 <sup>A</sup>	3.74 $\pm$ 0.58 <sup>Bb</sup>	1.12 $\pm$ 0.58 <sup>A</sup>	1.94 $\pm$ 0.38	18.8 $\pm$ 0.48
II	0.44 $\pm$ 0.19 <sup>A</sup>	2.38 $\pm$ 0.35 <sup>Bab</sup>	0.73 $\pm$ 0.52 <sup>A</sup>	1.37 $\pm$ 0.28	17.75 $\pm$ 0.85
III	0.49 $\pm$ 0.24 <sup>A</sup>	1.22 $\pm$ 0.23 <sup>Ba</sup>	1.02 $\pm$ 0.44 <sup>A</sup>	1.08 $\pm$ 0.26	17.50 $\pm$ 1.04
Overall	0.45 $\pm$ 0.17 <sup>A</sup>	2.76 $\pm$ 0.35 <sup>B</sup>	0.98 $\pm$ 0.30 <sup>A</sup>	----	18.07 $\pm$ 0.44

<sup>A,B</sup> Means within a row with different superscripts are significantly different.

<sup>a,b</sup> Means within a column row with different superscripts are significantly different.

According to the results obtained in this study, it could be concluded that inclusion of dried sugar beet tops in ewe lambs rations is beneficial, it improved feed conversion and economical efficiency (13.04-29.81%), due to decrease the feed cost (11.90- 22.83) compared to the traditional ration (containing BH). Moreover, there is no any adverse effect on the productive and reproductive performance of ewe lambs as a results of replacement berseem hay with dried sugar beet tops.

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### الملخص العربي

### الأداء الإنتاجي والتناسلي لإناث الحملان المغذاة عرش بنجر السكر المجفف

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استخدم في هذه الدراسة 27 من إناث الحملان الخليطة (8/3 فيلينيدي ، 8/5 رحمانبي) المولودة شتاء ومتوسط وزنها 13 كجم وعمرها شهرين في تجربة غذائية لمدة 300 يوم وذلك لدراسة تأثير استبدال عرش البنجر المجفف كبديل لأدريس البرسيم علي الأداء الإنتاجي والتناسلي لهذه النعاج. قسمت هذه الحيوانات عشوائيا إلى ثلاث مجاميع متماثلة بكل مجموعة 9 حملان وغذيت علي العلف المركز بمعدل 2% من وزن الحيوان. كما غذيت علي المواد المائلة المختبرة كالآتي:

- ١- ١٠٠% دريس البرسيم (المجموعة المقارنة). ٢- ٥٠% دريس برسيم + ٥٠% عرش بنجر مجفف (المجموعة المختبرة الأولى). ٣- ١٠٠% عرش بنجر مجفف (المجموعة المختبر الثانية) وذلك لتكملة الاحتياجات الغذائية لهذه الحيوانات طبقاً للمقررات الغذائية للـ NRC. وقد تم إجراء ثلاث تجارب هضم باستخدام ٩ كباش رحماني متوسط وزنهم ٤٥-٥٠ كجم وعمرهم سنتين وذلك لتقييم العلائق المألوفة المختبرة. وقد أظهرت الدراسة النتائج الآتية:
  - ١- كان هناك زيادة معنوية (٥%) في معامل هضم المادة الجافة بالنسبة للعليقة الثانية والثالثة بالمقارنة بالعليقة المقارنة في حين كان هناك انخفاض معنوي (٥%) في هضم البروتين بالنسبة للعليقة الثانية والثالثة بالمقارنة بالعليقة المقارنة.
  - ٢- لم يكن هناك اختلافات معنوية بالنسبة لمعامل هضم كل من المادة العضوية، الألياف الخام، المستخلص الأثيري، المستخلص الخالي من الأروت بين العلائق للتجريبية الثلاث.
  - ٣- انخفضت معنويًا (٥%) القيمة الغذائية في صورة مجموع المواد الغذائية المهضومة والبروتين المهضوم بالنسبة للعليقة الثالثة بالمقارنة بالعليقة الأولى والثانية في حين لم يكن هناك اختلافات معنوية بين كلا من العليقة الأولى والثانية.
  - ٤- لم يكن هناك اختلافات بين المجموعات المختلفة بالنسبة لدرجة حموضة الكرش وكانت تتراوح ما بين ٦,٢٨-٦,٣٩ في حين لزداد تركيز الأحماض الدهنية الطيارة للكلية وانخفض تركيز الأمونيا في سائل الكرش بالنسبة للحيوانات المغذاة علي العليقة الثانية والثالثة بالمقارنة بالحيوانات المغذاة علي العليقة المقارنة وهذا يرجع لارتفاع معدلات هضم الألياف وانخفاض هضم البروتين بالنسبة لعرش البنجر المجفف بالمقارنة بدريس البرسيم.
  - ٥- لم يكن هناك اختلافات معنوية بالنسبة لمعدل النمو اليومي حيث كان ١١٦، ١١٤، ١١١ جم/يوم بالنسبة للمجموعات الأولى والثانية والثالثة علي التوالي. في حين تحسن معدل تحويل الغذاء (كجم مادة جافة/كجم زيادة)، وأيضاً الكفاءة الاقتصادية بمعدل ١٣,٠٤، ٢٩,٧١% نتيجة انخفاض تكلفة الغذاء (جنية/كجم زيادة في وزن الحيوان) بنسبة ١١,٩١، ٢٢,٨٣% بالنسبة للمجموعة الثانية والثالثة علي التوالي.
  - ٦- كان متوسط عمر البلوغ الجنسي لحيوانات المجموعة الأولى ٢٣١,٩ يوم مبكرة بحوالي ٢٥,٨٩، ١٨,١١ يوم بالمقارنة بحيوانات المجموعة الثانية والثالثة علي التوالي. كما أظهرت حيوانات المجموعة الثانية زيادة في وزن الجسم عند عمر البلوغ الجنسي حوالي ٤,٥٩، ١,٥٦ كجم بالمقارنة بحيوانات المجموعة الأولى والثالثة علي التوالي.
  - ٧- لم تكن هناك اختلافات معنوية بين المجموعات الثلاث بالنسبة لعمر البلوغ الجنسي وكذلك وزن الجسم عند البلوغ. أيضاً طول دورة الشبق في المجموعات الثلاث خلال فترة الدراسة كانت تقع داخل طول الدورة الطبيعية (١٦-٢٠ يوم). كان متوسط تركيز هرمون البروجسترون اليومي في خلال أول دورة شبق مرتبط بطول دورة الشبق في المجموعات الثلاث.