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THE EFFECT OF FEEDING DRIED SUGAR BEET TOPS ON THE PRODUCTIVE AND REPRODUCTIVE PERFORMACE OF RAM LAMBS

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ABSTRACT

Twenty four crossbred lambs (1/2 Finish Landrace × 1/2 Rahmani) aged 3 months old with 17.95 kg average body weight and were randomly blocked by weight in three equal groups A, B and C and were fed on the following rations: I- 50% concentrate mixture (CM) + 50% berseem hay (BH),control; II- 50% CM + 25% BH + 25% dried sugar beet tops (DSBT); III- 50% CM + 50% DSBT, respectively. The aim of the present study is to studying the effect of feeding DSBT as a replacement of berseem hay in the ration on the productive and reproductive performance of ram lambs. Three digestibility trails were done for the nutritional evaluation of tested rations.

The main resultes showed that the DM, OM, CP and NFE digestibility coefiecients as well as nutritive value expressed as TDN and DCP content of ration II were not significantly differed compared with those of ration I (control), but they were significantly reduced when the level of DSBT was increased up to 50% in ration III. However, the digestibility of CF increased ($P<0.05$) by increasing the level of DSBT in (ration III) comparing with ration I (control). Concentration of NH_3-N was lower ($P<0.05$) while concentration of total VFA's was higher ($P<0.05$) in rumen liquor of rams fed on ration III than those fed on rations I and II. The effect of feeding has insignificant effect on blood urea, glucose, haemoglobin, total protein, albumen and globulin concentrations. Average daily gain (ADG) for groups A and B was higher ($P<0.05$) than that for group C. Feed efficiency as kg DM / kg gain improved by 9.93 and 13.13 % for lambs in groups A and B, respectively compared to lambs in group C. Feed cost as L.E / kg gain decreased by 16.23 and 18.30 %, while economical efficiency improved by 19.47 and 22.57% for lambs fed on rations II and III comparing with those fed on control ration I.

Ram lambs in group B expressed first ejaculation (puberty) younger by 51.4 and 33.2 days than those in groups A and C, respectively. No significant differences in testosterone concentration (TC) in serum of ram lambs in the three groups at all stages of sexual development. Rams given ration I and II were produced semen in greater ($P<0.05$) quality (volume, motile spermatozoa, live spermatozoa, sperm cell concentration and sperm output) than those given ration III. However, the percentage of abnormal spermatozoa and abnormal acrosome were lower ($P<0.05$) in group A than those in groups B and C.

Keywords: Dried sugar beet tops, berseem hay, digesitibility, testosterone concentration, semen quality and sheep.

INTRODUCTION

The nutritional status of livestock in Egypt indicated that there is a serious shortage in feed stuffs in summer season. To fill this gap all available agricultural by-products should be utilized. In Egypt especially in Kafer El-Sheikh and Dakahlia governorates large quantities of sugar beet tops are produced as an agricultural by-product after harvesting the sugar beet crops.

The experiments which carried out under Egyptian condition indicated that the average of tops yield for the commercial varieties was about 12.5 tons/feddan (Project of Improvement of Sugar Beet Production and Utilization, 1990).

In the season 2000-2001 about 130,000 faddans have been cultivated with sugar beet crop under supervision of Delta Company of Sugar at Kafer El-Sheikh Governorate and Dakahlia Company of Sugar, which produced about 1.625 millions tons fresh sugar beet tops contained about 156,000 tons DM (Ali and Darwish, 2001). Mahmoud *et al.* (2001) reported that dried sugar beet tops can be used in the sheep feeding as a partial replacement of traditional high quality roughages such as berseem hay (high price feeds) to reduce the cost of animal feeding especially in summer season without any health troubles.

It is generally known that reproductive performance of male is affected by level and source of nutrients in their diets as well as other factors including breeding and management of the herd. Nutrition is the major factor affecting the reproductive performance of males (Varvikko, 1986). The efficiency of reproduction is markedly affected by live body weight and nutritional status of farm animals (Ferrell, 1993). However, Ali and Darwish (2001) found that the replacement rate of 50% berseem hay by dried sugar beet tops in the ration of Buffalo bulls increased ($P<0.05$) the total live normal motile sperm per ejaculate compared with those fed on other two rations (the replacement rate was 0.0 and 100%). The present study aimed to study the effect of feeding DSBT as a replacement of berseem hay in the ration on the productive and reproductive performance of ram lambs.

MATERIALS AND METHODS

The present work was conducted at the Animal Production Experimental Farm, Faculty of Agriculture, Kafer El-Sheikh, Tanta University and Sakha Research Station, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt. Sugar beet tops were collected from different areas of Kafer El-Sheikh Governorate after harvesting sugar beet crop and spread on ground and turning it from time to time till drying then the dried sugar beet tops (DSBT) was collected and stored as pills.

In this experiment, three adult Rahmani rams averaged 50.2 kg live body weight were kept individually in metabolic cages and used in three digestibility trials to evaluate the following rations: I- 50% concentrate mixture (CM) + 50% berseem hay (BH) made from 3 rd cut (control) II- 50% CM + 25% BH + 25% dried sugar beet tops (DSBT) III- 50% CM + 50% DSBT. Rumen fluid samples were collected at the end of the collection period at 3 hours past feeding by using a stomach tube, at the same time blood samples were taken from the jugular vein of each animal. The animals were fed individually at maintenance level according to NRC (1988) recommendation. Water was available at all time.

At the end of collection period, samples of feed and feces were collected and stored to a proximate analysis (AOAC, 1990). The pH of rumen liquor samples was determined directly by using Beckman pH meter, while ammonia nitrogen (NH_3-N) concentration was tested by the AOAC (1990). Total volatile fatty acids (VFA's) concentrations was also measured (Warner, 1964). Blood plasma was separated and was stored at –20 °C for blood urea-nitrogen (BUN) determintion by diacetyl monoxime colorimetrically methods (Patton and Crouch, 1977) and glucose was determined by the method described by Trinder (1969). Total protein and albumin were measured by the procedure of Armstrong and Carr (1964) and by Doumas *et al.* (1971), respectively. Globulin was estimated by the difference between total protein and albumin. Whole blood was collected in EDTA for hemoglobin analysis by the method described by (Drabkin, 1932).

Twenty four crossbred lambs (1/2 Finnish Landrace × 1/2 Rahmani) aged 3 months old with 17.95 kg average body weight were used in feeding trial and were randomly blocked by weight in three equal groups A, B and C which were fed on the previous three rations (I, II and III), respectively. Animals were weighed once biweekly during the experimental period (210 days).

Lambs in the three treated groups were subjected to observation the detect changes in sexual behavior, once every 10 days interval during the period from 3 months of age till the occurrence of puberty (first successful ejaculate with motile sperm). Libido test for each animal was measured within 20 minutes test period using a female sheep in induced oestrus, considering the following criteria: first mounting ; first mounting with erection (first penile protrusion) and puberty (age at first collected ejaculate containing motile sperm). To ensure the availability of at least two ewes in estrus at each time of libido test, four ewes were subjected to estrus synchronization by hormonal treatment, planned at a time suitable four the time of libido test.

Body weight, scrotal circumference measurements and blood sampling (for testosterone determination) were carried out biweekly. Scrotal circumference was measured to indicate testicular size for each lamb using a flexible plastic tape around the greatest diameter of the tests and scrotum according to Hann *et al.* (1969). Blood samples were taken at 14 days interval, blood was taken into vacutainer tubes and incubated at room temperature for 2 hours, then centrifuged at 2500 r.p.m. for 30 minutes to separate blood serum. Serum was stored in labled cuvettes at –20°C till hormone assay. Direct radio-immuno-assay technique was conducted for serum testosterone level determination using Immunotech kits (I125) Immunotech, France.

After the occurrence of puberty or the stage at which male ejaculated first sperm. Semen was collected by means of an artificial vagina once weekly for a period of 8 weeks. Ejaculated volume, mass motility of sperm were estimated by procedure of Melrose and Laing (1970). Live and abnormal spermatozoa percentage were estimated by the method of Hancok (1951). Acrosome abnormalities (%) was determined by using a Giemsa stain procedure as the method described by Watson (1975). Sperm cell concentration ($x10^9$/ ml) was determined by the direct cell count using the

Neubauer Haemocytometer. The total sperm output per ejaculate was calculated by multiplying sperm cell concentration by ejaculate volume.

Data was statistically analyzed by super ANOVA program version 1.11 (Jim *et al.*, 1991) and Duncan's Multiple Range Test was employed to test for significant differences (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition of feed ingredients and calculated composition of tested rations are presented in Table (1). It was found that ash, EE and NFE content of DSBT was higher than those of berseem hay by about 55, 47 and 4%, respectively, while its content of CP, CF was lower by about 16 and 34%, respectively. These results are in accordance with those reported by Bendary *et al.* (1996), Mohi El-Din (1998), Mahmoud *et al.* (2001) and Ali and Darwish (2001), They reported that DSBT was higher in NFE and ash content and it was lower in CF and CP content compared with berseem hay.

Table 1: Chemical composition of feed ingredients in experimental rations

Ingredients	DM %	%, On DM basis					
		OM	Ash	CP	CF	EE	NFE
DSBT	88.95	78.06	21.56	12.07	15.21	2.57	48.59
Berseem hay	89.53	86.06	13.94	14.32	23.09	1.75	46.90
Concentrate mixture	90.81	90.96	9.04	15.43	13.05	2.85	59.63
Calculated composition							
Ration I (control)	100	88.51	11.49	14.88	18.07	2.30	53.26
Ration II	100	86.60	13.40	14.31	16.10	2.51	53.68
Ration III	100	84.70	15.30	13.75	14.13	2.71	54.11

Concentrate mixture composed of 30% undicorticated cotton seed meal, 25% yellow corn, 20% wheat bran, 10% rice bran, 5% soybean meal, 6% molasses, 3% limestone and 1% common salt.

Results in Table 2 showed that the DM, OM, CP and NFE digestibility coefiecients as well as nutritive value expressed as TDN and DCP content of ration II (50% CM+25% BH+25% DSBT) were not significantly differed compared with those of ration I control (50% CM+50% BH), but they were significantly reduced when the level of DSBT was increased up to 50% in ration III(50% CM+50% DSBT). However, the digestibility of CF was increased ($P<0.05$) by increasing the level of DSBT in ration III comparing with ration I (control). The same results were reported by Mahmoud *et al.* (2001), who found that when Rahmani rams fed on three different complete pelleted rations, the digestibility of DM, OM and NFE were significantly higher, while digestibility of CF was lower ($P<0.01$) in the control ration 1 (50% BH) and ration 2 (25% BH + 25% DSBT) than those in ration 3 (50% DSBT).While, digestibility of CP and EE were decreased ($P<0.01$) by increasing the level of DSBT in the rations. Also, they reported that increasing the level of DSBT in the rations decreased ($P<0.01$) nutritive value as TDN and DCP content.

Table 2: Dry matter intake, digestibility coeficients of nutrients and nutritive value of tested rations fed to rams.

Items	Rations		
	I	II	III
DM intake, g / day			
Berseem hay	800	400	000
Dried sugar beet tops	000	400	800
Concentrate mixture	800	800	800
Total DM intake	1600	1600	1600
Digestibility coeficients, %			
DM	65.21[a]	66.53[a]	62.01[b]
OM	68.51[a]	68.05[a]	65.95[b]
CP	62.12[a]	65.19[a]	59.98[b]
CF	54.08[b]	58.88[b]	60.74[a]
EE	60.03[a]	59.83[ab]	56.19[b]
NFE	62.93[a]	64.01[a]	59.05[b]
Nutritive value, %			
TDN	55.64[a]	56.55[a]	52.21[b]
DCP	9.24[a]	9.33[a]	8.25[b]

a, b values with different letters on the same row differ significantly at 0.05

Also,Ali and Darwish (2001) found that DM digestibility in ration containing 50% BH + 50% DSBT or 100% DSBT was higher ($P<0.05$), while CP digestibility was lower ($P<0.05$) than those in 100% BH ration. No significant differences in digestibility of OM, CF, EE and NFE among three rations. However, the nutritive value (TDN and DCP) for control (100% BH) and 50% BH + 50% DSBT was higher ($P<0.05$) than that for 100% DSBT ration. In addition, Bendary *et al.* (1999) reported that digestion coefiecient of CP and CF were higher ($P<0.05$) in rations contained sugar beet tops hay (SBTH) or silage (SBTS) compared with that contained rice straw and berseem hay (control). Also, the inclusion of SBTH or SBTS with CM increased the nutritive value as TDN and DCP comparing with control.

Results in Table (3) indicated that ruminal pH value decreased by increasing DSBT in the rations II and III comparing with ration I (control), but the differences were not significant. Concentration of NH_3-N was lower ($P<0.05$) while concentration of total VFA's was higher ($P<0.05$) in rumen liquor of rams fed on ration III than those fed on rations I (control) and II. These results may be due to that ration III have higher CF digestibility and lower CP digestibility (table 2). These results are in agreement with those reported by El-Ashry (1971) and Haaland *et al.* (1982), indicated that the ruminal NH3-N concentration increased by increasing protein level in the diet. Also, Mahmoud *et al.* (2001) who found that the ruminal pH value ($P<0.01$) and NH_3-N concentration for Rahmanil ambs decreased ($P<0.05$) while total VFA's concentration increased ($P<0.01$) by increasing the level of DSBT in the complete pelleted rations.

Table 3: Some rumen liquor and blood parameters for rams fed different rations.

Items	Rations		
	I	II	III
Rumen liquor			
pH	6.61	6.50	6.27
NH_3-N, mg/100 ml	28.72[a]	27.15[a]	25.85[b]
VFA's, meq./100 ml	13.53[b]	14.72[b]	16.41[a]
Blood parameters			
Urea, mg/ dl	24.02	23.82	23.43
Glucose, mg/ dl	51.80	52.32	53.45
Hemoglobin, g%	12.02	12.45	11.92
Total protein, g/100 ml	6.21	6.32	5.85
Albumen, g/100 ml	3.15	3.25	3.05
Globulin, g/100 ml	3.06	3.07	2.80

a, b values with different letters on the same row differ significantly at 0.05

The average of some blood parameters for rams consumed tested rations is presented in Table (3). The differences between the rams fed tested rations were not significant in urea, glucose, haemoglobin, total protein, albumen and globulin concentrations. These results were within the normal average as discribed by Williams (1997) who reported that the normal values of urea nitrogen, glucose and plasma protein in the sheep blood were 8 – 20 mg; 40 –80 mg and 6 – 8 g/ 100 ml, respectivly. Also, Mahmoud *et al.* (2001) found that the blood constituents of Rahmani lambs fed on different levels of DSBT were 18.5 –27.0, 52.4 – 65.7 mg/ dl for uerea and glucose, respectively, 11.3 – 11.7 g% for haemoglobin, 5.5 – 6.3, 3 – 3.3 and 2.5 – 3.2 g/100 ml for total protein, albumen and globulin, respectively.

Data in Table (4) showed that total DM intake was nearly similar in all groups. However, average daily gain (ADG) for groups A and B (fed on rations I and II, respectively) was higher ($P<0.05$) than that for group C (fed on ration III). These results may be due to higher TDN and DCP in ration I (control) and II than ration III (Table 2). Feed efficiency as kg DM / kg gain was better and decreased by 9.93 and 13.13 % for lambs in groups A and B, respectively compared to lambs in group C. Feed cost as L.E / kg gain decreased by 16.23 and 18.30 %, while economical efficiency improved by 19.47 and 22.57% for lambs fed on rations II and III comparing with those fed on control ration I.

In this respect, Bendary *et al.* (1999) found that feeding growing Friesian calves on rations containing DSBT or SBTS caused an increase in average daily gain by 30.3 and 36.4 %, respectively, while feed cost reduced by 33.8 and 33.7 %, respectively in compared with calves fed control ration containing rice straw plus berseem hay. Also, Mahmoud *et al.* (2001) reported that no significant differences in the average daily gain (ADG) of lambs fed on different levels of DSBT. Also, they found that feed conversion (kg TDN / kg gain) was nearly similar. However, the feed cost was decreased and the economical efficiency improved by increasing the incorporation of

DSBT in the complete pelleted rations.Similer result have been reported by Ali and Darwish (2001) they found that no significant differences in ADG for buffalo bulls fed on different levels of DSBT as a replacement of berssem hay. However, feed efficiency and economical efficiency improved, while fed cost decreased with increasing DSBT in the rations.

Table 4: Average growth performance of lambs fed on three different rations.

Items	Groups		
	A	B	C
Growth performance			
No. of animals	8	8	8
Duration of trial, days	210	210	210
Av. Initial wt., kg	19.0	18.1	16.7
Av. Final wt., kg	48.5±2.3[a]	50.7±1.6[a]	43.3±1.5[b]
Total gain, kg	29.5±1.8[a]	32.6±1.4[a]	26.6±1.7[b]
Av. Daily gain, g/day	140±8.5[a]	155±6.4[a]	127±8.1[b]
DM intake, g			
Berseem hay	598	317	000
Dried sugar beet tops	000	317	598
Concentrate mixture	598	634	598
Total intake, as DM	1196	1268	1196
Feed efficiency			
Kg DM/kg gain	8.48	8.18	9.42
Kg TDN/kg gain	4.72	4.63	4.92
Kg DCP/kg gain	0.78	0.76	0.78
Feed cost/kg gain, L.E*	5.30	4.44	4.33
Economical efficiency	2.26	2.70	2.77

a, b values with different letters on the same row differ significantly at 0.05

* was calculated according to price for season 2002 (Pounds/ton): concentrate mixture 800, berseem hay 4 0 and dried sugar beet tops 120

Economical efficiency = price of kg gain (12 L.E) / feed cost (L.E / kg gain)

The development in reproductive performance of the animals in three groups during the pre-pubertal period and up to stage of puberty are presented in Table 5. Mean age of three groups (A, B and C) at 1st mounting were 154.2, 172.6 and 156.2; at 1 st mounting with erection were 179.2, 183.6 and 186.2; and 1 st ejaculation or puberty were 245.0, 211.8 and 263.2 days, respectively, but the differences were not significant. Ram lambs in group B expressed first ejaculation (puberty) younger by 51.4 and 33.2 days than those in groups A and C, respectively. These results are in agreement with the results of Ragab *et al.* (1966), they reported that Rahmani ram lambs reached puberty at age ranged between 177 and 456 days when they used the sexual behaviour and penis development method for determining the age at puberty. Also, El-Ashry *et al.* (2000), found that Rahmani ram lambs reached puberty at age ranged between 286 and 311 days.

Tharwat (1985) reported that the age of puberty for Barki ram lambs was 243 days when he used the testicular histology method for deterimination. However, Castrillejo *et al.* (1995) found that onset of puberty (expressed as morphologically establisied spermatogenesis) in Corriedule ram lambs is attained at 180 – 216 days of age when they reach 23 cm of

scrotal circumferences and 191 g of testis weight. Crossbreed ram lambs (1/2 Romanove x 1/2 Rahmani) reached puberty at age ranged between 211 and 263 day (El-Shamaa, 2002).

Ram lambs in group B reached puberty earlier (211.8 days) with a higher ADG (155 g/ day) comparing with those in group A (245 days puberty age and 141 g / day ADG) and group C (263.2 days puberty age and 127 g / day ADG). These results indicated that age at puberty was affected by ADG.

Table 5: Pre-pubertal characters of reproductive performance of ram lambs as affected by the different rations.

Character	Groups			Overall mean
	A	B	C	
1st mounting :				
Age, days	154.2±21.8	172.6±6.2	156.2±5.5	161±7.4
Body weight, kg	24.4±1.1	30.4±2.8	26.2±2.3	27±1.3
Scrotal circumferences, cm	12.6±0.6	19.0±2.5	14.6±1.3	15.4±1.1
Testosterone concentration, ng / ml	2.02±0.27	2.08±0.23	1.82±0.13	1.97±0.1
1st mounting with erection :				
Age, days	179.2±28.6	183.6±7.7	186.2±5.5	183±9.3
Body weight, kg	27.0±1.5^{b}	34.0±0.9^{a}	36.6±1.8^{a}	32.5±1.1
Scrotal circumferences, cm	14.0±1.6^{b}	21.0±1.7^{a}	20.8±1.3^{a}	18.6±1.1
Testosterone concentration, ng / ml	2.86±22	2.22±0.25	2.08±0.12	2.38±0.2
1st ejaculation (puberty) :				
Age, days	245.0±26.5	211.8±9.2	263.2±30.1	240.0±23.5
Body weight, kg	38.0±3.2	37.4±1.4	39.6±2.3	38.3±2.3
Scrotal circumferences, cm	19.4±0.8^{b}	25.2±0.3^{a}	19.6±0.6^{b}	21.4±0.6
Testosterone concentration, ng / ml	3.02±0.32	2.64±0.4	2.86±0.37	2.84±0.2

a, b values with different letters on the same row differ at 0.05

Data in Table 5 showed that average overall mean of scrotal circumferences increased from 15.4 cm at first mounting to 18.6 cm at first mounting with erection to 21.4 cm at first ejaculation (puberty). Scrotal circumferences at first mounting with erection increased significantly by increasing the level of DSBT in the ration, while those at first ejaculation (puberty) for ram lambs in group B were significantly higher than those for ram lambs in groups A and C. The present results are in agreement with that found by Perez-Clanget *et al.* (1998), who concluded that improved nutrition accelerated the testicular growth. Scrotal circumferences was increased with age advance in all treated groups (figur 1).

Results in Table 5 showed that no significant differences in testosterone concentration (TC) in serum of ram lambs in the three groups at all stages of sexual development. However, TC at puberty increased by 15.0, 12.2 and 15.7 % comparing with TC at first mounting in the serum of three groups, respectively. Also, TC was increased with increasing age (figure 2). These results are in agreement with that found by Skinner *et al.* (1968) who found that the total amount of testosterone increased steadily with advancing age. They added that there was considerable variation in TC in the testes and the mean concentration of testosterone for ram lambs at 168 days of age was 17.45 ug /100 g. Gomes *et al.* (1971) reported that the TC in spermatic venous blood plasma from yearling rams was 8.2 ug / 100 ml.

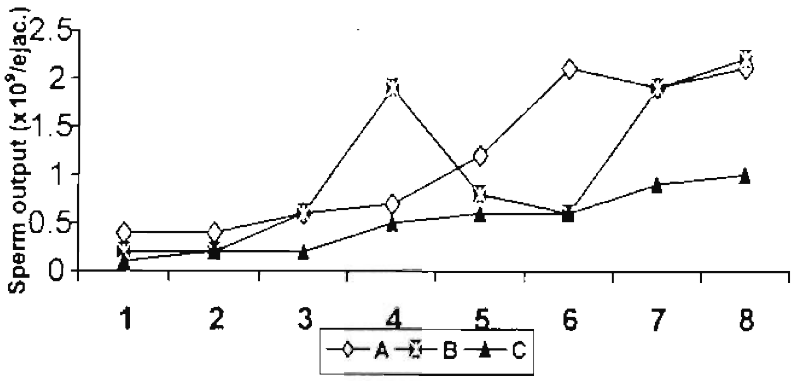

Figure (1): Monthly scrotoal circumference (cm) changes from 3 to 10 months of age for crossbred ram lambs as affected by the experimental rations.

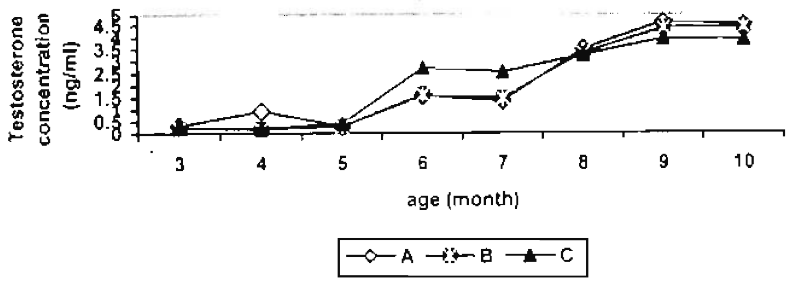

Figure 2: Monthly blood serum levels of testosterone (ng/ml) changes from 3 to 10 months age for crossbred ram lambs as affected by the experimental rations.

Schanbacher and Crouse (1980) found that there was fluctuation in blood serum testosterone in Suffolk ram lambs (ranged between 0.8 and 3.4 ng / ml). On the other hand, El-Shamaa (2002) reported that TC ranged from 1.45 to 2.70 ng / ml at age of puberty in Romanovy crossbred ram lambs.

Significant differences among treatment ($P<0.05$) as well as among weeks within each treatment were found in all seminal characteristics examined (Table 6). Ram lambs given ration I (group A) and ration II (group B) were produced semen in greater ($P<0.05$) quality (volume, motile spermatozoa, live spermatozoa, sperm cell concentration and sperm output) than those given ration III (group C). However, the percentage of abnormal spermatozoa and abnormal acrosome were lower ($P<0.05$) in group A than those in group B and C.

The present results are in agreement with that found by Ali and Darwish (2001), who reported that the highest value of total live normal motile sperm per ejaculate (2468 x 10^6) for Buffalo bulls fed on 20 % BH plus 20 % DSBT, followed by those fed on 40 % BH (2024 x 10^6) and the lowest value (1479 x 10^6) was recorded for those fed on 40 % DSBT.

Table 6: Mean values of semen physical characteristics, scrotum circumferences and testosterone concentration for crossbred ram lambs as affected by the different rations.

Characteristics	Groups			Overall mean
	A	B	C	
Ejaculate volume (ml)	0.513^a ±0.05	0.463^a ±0.05	0.300^b ±0.02	0.425 ±0.04
Sperm motility (%)	68.7^a ±2.9	70.5^a ±3.1	58.1^b ±3.8	65.1 ±3.3
Live sperm (%)	64.3^a ±2.3	65.6^a ±3.2	56.7^b ±3.9	62.2 ±3.1
Abnormal sperm (%)	5.1^b ±0.3	10.1^a ±2.2	9.3^a ±0.8	8.2 ±1.1
Abnormal acrosome (%)	5.0^b ±0.3	7.3^a ±1.2	7.5^a ±0.9	6.6 ±0.9
Sperm cell concentration (×10^9/ml)	2.09^a ±0.10	2.05^a ±0.13	1.63^b ±0.10	1.91 ±0.12
Sperm output (×10^9/ ejaculate)	1.17^a ±0.11	1.07^a ±0.14	0.52^b ±0.12	0.92 ±0.11
Scrotal circumferences (cm)	17.3^b ±0.8	19.2^a ±0.8	18.0^b ±0.8	18.1 ±0.8
Testosterone concentration (ng/ml)	1.795 ±0.38	1.639 ±0.28	1.892 ±0.26	1.775 ±0.31

a, b values with different letters on the same row differ at 0.05

Most of the mean values for the semen characteristics of three groups (Table 6) lie within one range reported by previous studies (Mann and Lutwek-Mann, 1981; Chemineau *et al.*, 1991; El-Ashry et al., 2000 and El-Shamaa, 2002).

All semen characteristics were improved ($P<0.05$) significantly with age advance in all groups (figure 3). The overall mean values of the increase in ejaculate volume (ml), sperm motility, live spermatozoa %, sperm cell concentration x 10^9 / ml and sperm output x 10^9 / ejaculate due to advances in age were 37.8, 18.1, 16.2, 20, and 78 %, respectively, while abnormal spermatozoa and abnormal acrosome were decreased by 35.5 and 34.0 %, respectively. These findings are in agreement with those reported by other workers (Colas *et al.*, 1975; El-Ashry *et al.*, 2000 and El-Shamaa, 2002).

It could be concluded that DSBT could be used successfully as a replacement (50%) for berseem hay (high price feeds) without any deterious effects on productive and reproductive performance, and semen quality as well as decreasing the feeding cost.

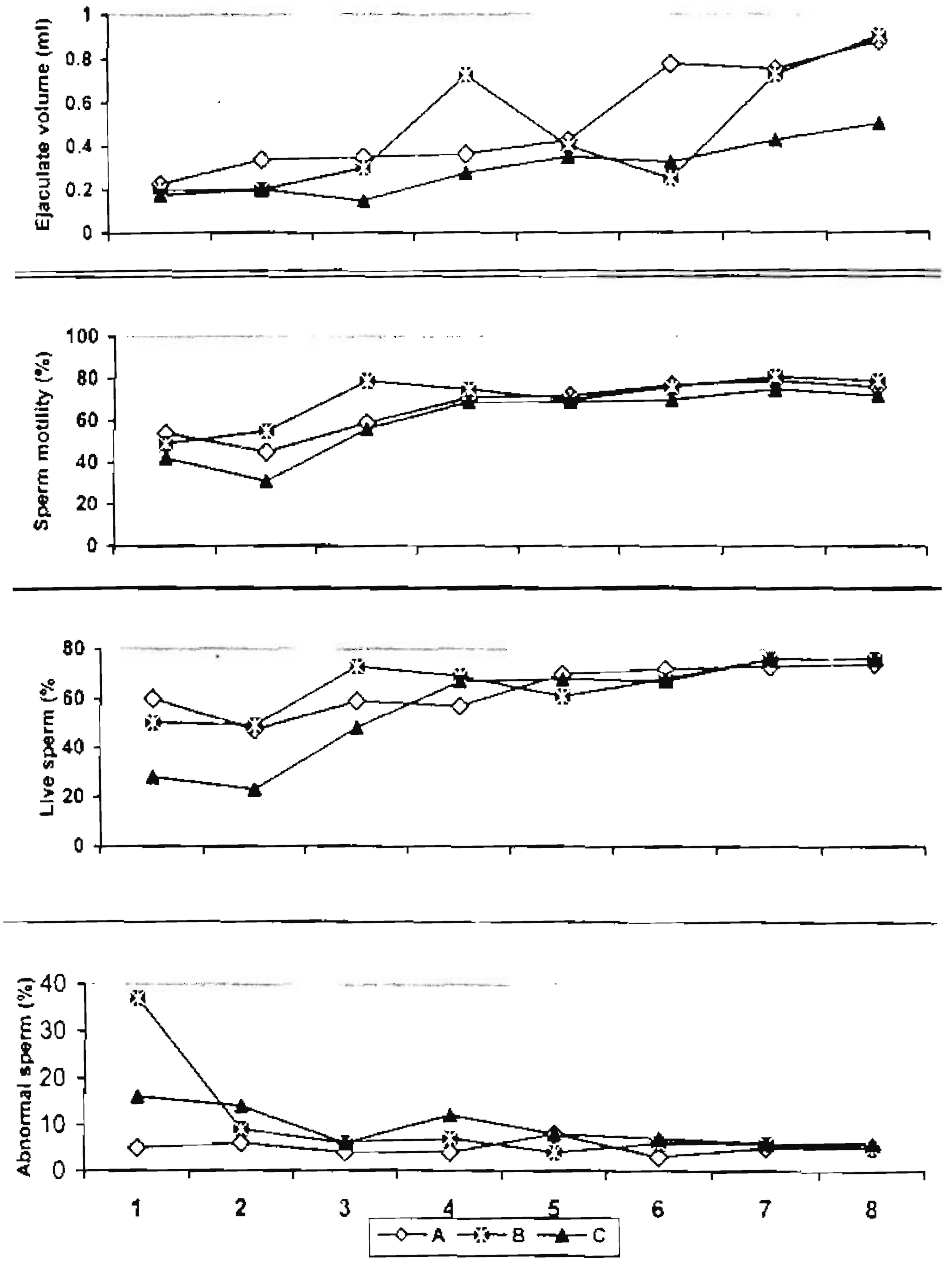

Figure (3): Mean values of semen charactertistics changes during 8-weeks after post-pubertal for crossbred ram lambs as affected by the experimental rations.

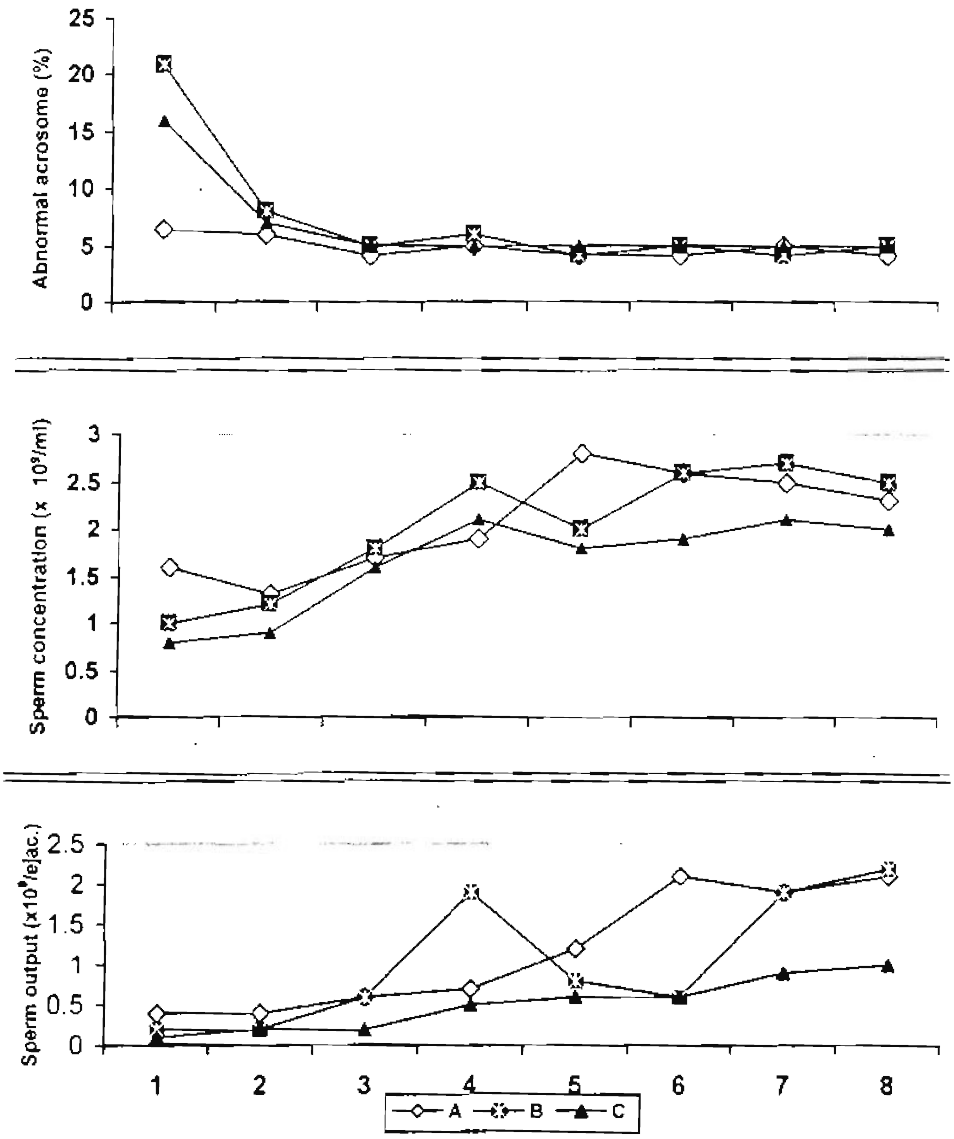

Figure (3): Cont.

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تأثير تغذية عرش بنجر السكر المجفف على الاداء الانتـــاجى والتناســلى لذكــور الحملان

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اجريت هذه الدراسة بهدف بحث اثر التغذية على عرش بنجر السكر المجفف على الاداء الانتاجى والتناسلى لذكور الحملان ، لذلك اجريت تجربة نمو على ٢٤ من ذكـــور الحمـــلان (٢/١ فلنـــدى × ٢/١ رحمانى) عمرها ثلاث شهور ومتوسط وزنها ١٧,٩٥ كجم وقسمت الى ثلاث مجموعات متســاوية هـــى أ ، ب، ج وغذيت على الثلاث علائق التالية على الترتيب ، العليقة الاولى (كنترول): ٥٠% مخلوط علف مركز + ٥٠% دريس برسيم والعليقة الثانية: ٥٠% مخلوط علف مركز + ٢٥% دريس برســيم + ٢٥% عـــرش بنجر السكر المجفف والعليقة الثالثة: ٥٠% مخلوط علف مركز + ٥٠% عرش بنجر السكر المجفف . كمـا اجريت ثلاث تجارب هضم لتقييم العلائق المختبرة غذائيا.

أوضحت نتائج تجارب الهضم ان القيمة الهضمية للمادة الجافة والمادة العضوية والبروتين الخـــام والمستخلص الخالى من الازوت علاوة على القيمة الغذائية فى صورةTDN وبروتين مهضوم فـــى العليقـــة الثانية لم تختلف معنويا مقارنة بها فى العليقة الاولى (كنترول) ولكنها كانت اقل معنويا عندما ازداد مســـتوى عرش بنجر السكر المجفف الى ٥٠% فى العليقة الثالثة بينما القيمة الهضمية للالياف الخـــام ازداد (٠,٠٥) وبزيادة مستوى عرش بنجر السكر المجفف فى العليقة الثالثة مقارنة بالعليقة الاولى (الكنترول) . كان تركيز الامونيا اقل (٠,٠٥) بينما تركيز الاحماض الدهنية الطيارة اعلى (٠,٠٥) فى سائل كرش الكبـــاش المغـــذاة على العليقة الثالثة مقارنة بالعليقتين الاولى والثانية ، لم يكن هناك فروق معنوية فى مكونات الـــدم للكبـــاش المغذاة على الثلاث علائق.

اوضحت نتائج تجربة النمو ان معدل النمو لحملان المجموعتين أ ، ب كان اعلى (٠,٠٥) عنـــه لحملان المجموعة ج كما ازداد معامل تحويل الغذاء (كجم مادة جافة / كجم زيادة فى وزن الحيوان) بنســـبة ٩,٩٠ ، ١٣,١% لحملان المجموعتين أ ، ب على التوالى مقارنة بحملان المجموعة ج .

انخفضت تكلفة التغذية بنسبة ١٦,٢ ، ١٨,٣% بينما تحسنت الكفاءة الاقتصاديـــة بنســـبة ١٩,٥ ، ٢٢,٦% للحملان المغذاة على العليقتين الثانية والثالثة مقارنـــة بـــالحملان المغـــذاة علـــى العليقـــة الاولـــى (الكنترول).

اظهرت حملان المجموعة ب اول قذفة منوية (البلوغ) عند عمر ٢١١,٨ يوم مبكرا بـــ ٣٣,٢ ، ٥١,٤ يوما عن المجموعة أ ، ج على التوالى .

لم تكن هناك فروق معنوية فى تركيز هرمون التستستيرون فى سيرم دم الحمـــلان بيـــن الثـــلاث مجاميع المختلفة فى مراحل التطور الجنسى .

كان محيط الخصية ٢١ ، ٢٥,٢ سم اعلى معنويا (٠,٠٥) فى حملان المجموعة ب عند مرحلـــة اول وثبة مع حدوث انتصاب وكذلك عند مرحلة البلوغ (اول قذفة) على التوالى مقارنة بحمـــلان المجموعـــة أ،ج .

انتجت حملان المجموعين أ ، ب سائل منوى ذات صفات اعلى معنويا (٠,٠٥) من حيث حجـــم القذفة ، النسبة المئوية للحيوانات المنوية المتحركة ، النسبة المئويـــة للحيوانـــات المنويـــة الحيـــة ، تركـــيز الحيوانات المنوية (×١٠ ^{٩} اسبرم/مل) وكذلك العدد الكلى مـــن الحيوانـــات المنويـــة فـــى القذفـــة (×١٠ ^{٩} اسبرم/قذفة) مقارنة بحملان المجموعة ج بينما كانت النسبة المئوية للحيوانات المنوية الشاذة وكذلـــك النســـبة المئوية لشواذ الاكروسوم منخفضة معنويا (٠,٠٥) فى حملان المجموعة أ مقارنـــة بحمـــلان المجموعتيـــن ب،ج.