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EFFECT OF USING SUGAR BY - PRODUCTS ON REPRODUCTIV PERFORMANCE OF RAM LAMBS

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ABSTRACT

To investigate the effect of feeding growing lambs on dried sugar beet pulp (DSBP) or/and dried sugar beet tops (DSBT) as replacement of concentrate feed mixture (CFN) or/and berseem hay (BH) on characteristics of puberty, testosterone profile, scrotal circumference and physical semen characteristics of ram lambs, 24 ram lambs (3/4 Romanof x % Rahmani) aged 5 mo with 23.46 kg average body weight were divided into four groups, 6 animals in each. Ram lambs in the 1st group (G1) were fed on ration composed of 50% CFM+50% BH (control ration). Ration of the 2nd, 3rd and 4th groups were as the following: G2: 25% CFM+25% DSBP+50% BH; G3: 25% CFM+25% DSBP+37.5% BH+12.5% DSBT and G4: 25% CFM+25% DSBP+25% BH+25% DSBT. Results show that the dietary treatment had no significant effects on puberty characteristics of ram lambs including age, body weight, scrotal circumference and testosterone concentration at different puberty stages (first mounting, mounting accompanied with erection and mounting accompanied with erection and ejaculation of 1st sperm. The group differences in physical semen characteristics of the 1st ejaculate at puberty including ejaculate volume (EV), percentage of initial motility (IM) and abnormal sperm (AS), sperm cell concentration (SCC), and output of live sperm (LS) and live normal sperm (LNS) were not significant. Only LS percentage in G3 decreased ($P<0.05$) as compared to G1 (control). Ram lambs in G4 fed mixed of 25% DSBP+25% DSBT showed higher ($P<0.05$) testosterone concentration and lower scrotal circumference than in G1. During the collection period of semen, EV and percentages of IM and AS were not affected significantly by dietary treatment. However, inclusion of 25% DSBP (G2) in diet of ram lambs decreased ($P<0.05$) percentage of LS and inclusion of 25% DSBP 25% DSBT (G4) increased ($P<0.05$) SCC/ejaculate and LNS output as compared to the control and other treatment groups. Output of TS increased ($P<0.05$) in G4 than in G2 and G3, but did not differ from that in the control group (G1). It could be concluded that inclusion of 25% dried sugar beet tops and 25% dried sugar beet pulp could be used successfully as a replacement of 25% of berseem hay and 25% of concentrate feed mixture in diet of ram lambs.

INTRODUCTION

Sugar beet *(Beta vulgaris)* has been introduced in Egypt on commercial scale in year 1981/1982 (EI-Bilassi, 1987). In 2004/2005 a large area was about 168000 feddans cultivated with sugar beet in Egypt, which produced about 200000 tons of dried sugar beet pulp (DSBP) as a by-product of' sugar beet manufacture. It also produced about 2.1 million tons of fresh sugar beet tops (FSBT) as an agricultural by-product which contained about 200000 tons DM. These by-products were produced from nearly 3444000 tons fresh sugar beet which produced by the Dakahlia Company of sugar at

Dakahlia Governorate, the Delta Company of Sugar at Kafr El-Shiekh Governorate, the Fayoom Company of Sugar and Abo Korkas Company of Sugar. Also, West Noparia is prepared now to receive large quantities of sugar beet and the expansion in planting the crop in Egypt which may increase the by-product of sugar beet.

In 2004 the Dakahlia Company of sugar received about 964043 tons of fresh sugar beet (FSB) from area of about 52263 feddans cultivated with sugar beet which produced about 62056 tons from DSBP and about 653288 tons of (FSBT) contained about 62.193 tons of DM.

Under Egyptian condition, average of tops yield for the commercial varieties was 12.5 tons/faddan (Improvement of Sugar Beet Production and Utilization, 1990). The residue remaining after extraction of the plant juice, sugar beet pulp (SBP) is an important feed in many areas (Close and Menke, 1986) for both dairy cows (Hemingway *et al.,* 1986; Parkins *et al.,* 1986) and fattening cattle and sheep (Kelly, 1983; McDonald *et al.,* 1985). Usually SBP is sold in the dried state for easy transportation (Mostafa, 2004). DSBP produced in Egypt now is exported for hard currency and also because the Egyptian farmers have not been accustomed to its use as feed for their livestock (Abdelhamid, 1988).

Mahmoud *et al.* (1998) showed that DSBP could be incorporated in lamb finishing rations and replace up to 50% of energy source. Moreover, lambs fed on DSBP rations were heavier than those fed the traditional control rations. Also, Mohsen *et al.* (1999) found that DSBP when corrected for its protein deficiency by adding 0.4% urea and 0.1% sulfur could be successfully used as a replacement for traditional concentrate mixture in supplying up to 50% of the TDN needed for Angora goats. Also nutritive value and performance of growing kids were improved and feed cost increased.

The crude fiber of dried sugar beet pulp is quite digestible and its lignin content is low (El-Ashry *et al,* 2000; Eweedah, 2001; Saleh *et al.,* 2001). Also, Bendary *et al.* (1992) and Mohi El-Din (1998) mentioned that large quantities of SBT are produced as an agricultural by-product after harvesting the sugar beet crops. Thus, the availability of using SBT (dried or silage) for livestock as a replacement of traditional high quality roughages such as berseem hay (high price feeds).

On the other hand, there are some problems in using fresh sugar beet tops (FSBT) because it is high in moisture, potassium and oxalic acid content which lead to diarrhea and must be taken into consideration when used in animal feeding and ration formulation (Podkowka, 1983; Bendary *et al.,* 1992). So, drying or ensiling of SBT is a method for conservation which may contribute in solving some of the problems as resource of animal feeding shortage and minimize pollution especially in the summer season (Ali and Darwish, 2001). Moreover, it may offer a reduction of feed cost and minimize quantities of the expensive feedstuffs used in animal feeding (Mohi El-Din, 1998).

The objective of this study was to investigate the effect of feeding growing lambs on dried sugar beet pulp (DSBP) or/and dried sugar beet tops (DSBT) as replacement of concentrate feed mixture or/and berseem hay on

characteristics of puberty, testosterone profile, scrotal circumference and physical semen characteristics of ram lambs.

MATERIALS AND METHODS

The experimental work of this study was conducted at Mahlet Mousa Experimental Station, Animal Production Research Institute, Ministry of Agricultural, in cooperation with Animal Production Department, Faculty of Agriculture, Mansoura University and the Dakahlia Company of Sugar, Egypt during the period from July 2005 to February 2006.

Animals and feeding system:

Twenty four growing ram lambs (3/4 Romanof x 1/4 Rahmani) with an average age of 5 months and 23.46 kg average body weight were used in this study. Animals were divided into four groups with respect to their body weight, 6 animals in each. The experimental period lasted for 186 days. The composition of the experimental rations is presented in Table (1).

Table (1): Formulation of the experimental rations:

Ingredient	Ration l (control, G1)	Ration 2 (G2)	Ration 3 (G3)	Ration 4 (G4)
Berseem hay (BH)	50.00	50.00	37.50	25.00
Concentrate mixture (CM)	50.00	25.00	25.00	25.00
Dried sugar beet pulp (DSBP)	-	25.00	25.00	25.00
Dried sugar beet tops (DSBT)	-	-	12.5	25.00
Total	100	100	100	100

The concentrate feed mixture (CFM) contained 13% undecorticated cotton seed meal, 20% wheat bran, 12% soybean meal, 25% yellow corn, 20% rice bran, 7.5% molasses, 1% common salt and 1.5% limestone.

All rations were given almost in two equal parts at 8.0 a.m. and 4.0 p.m. according to their body weight to cover their requirements according to NRC (1988). Fresh water was available all times. All animals were weighed at the beginning of the experimental and thereafter at biweekly intervals still the end of the experiment. Feed intake was, calculated every two weeks according to the changes in animal body weight.

Preparation of sugar beet by-products:

The Dakahlia company of sugar, Dakahlia Governorate is producing large quantities of DSBP in pellet form as a by-product of sugar beet industry. Sugar beet tops (SET) were collected from different areas of Dakahlia Governorate after harvesting sugar beet crop and spread on ground over a layer of rice straw, then turning it from time to time (before sunrise and after sun down) till drying (the drying period was about 7 days) then DSBT collected and stored as pills.

Puberty detection of ram lambs:

Ram lambs in all tested groups were subjected to observation to detect changes in sexual behavior, at 10 day-intervals from the beginning of the experimental period till the occurrence of puberty (first successful ejaculate with motile sperm).

To ensure the availability of at least two ewes were synchronized to oestrus by hormonal treatment. Each ewe was given intramuscular injection of 25 mg progesterone (Luton, Misr Co. for Pharma Ind. SAA, Cairo) for five successive days, followed by a single injection of 5 mg estradiol benzoate (Folone Misr Co. for Pharma Ind. SAA, Cairo) 24 h after the last progesterone injection.

Oestrus was detected for ewes 24-48 h after last hormonal injection (using interact ram). Treatment for oestrous synchronization was planned at a time suitable for the time of libido test. At different stages of puberty (mounting, mounting with erection and mounting with erection and ejaculation of motile sperm), age, body weight, scrotal circumference and testosterone concentration in blood serum.

Testosterone concentration and scrotal circumference:

Concentration of testosterone was determined in blood serum at 0, 2, 4, 6, 8, 10, 12 and 14 wk of the experimental period as well as at different stages of puberty. Total serum testosterone assay was conducted by radio immune assay method (RIA). Determination- Pontex 335 kit (I^{125}) was used to measure the levels of testosterone. Types of testosterone assayed were (A) total testosterone (direct extraction-coated tubes) and (B) free testosterone. It is well known that total testosterone in serum include free testosterone and that bound to 1 pound to sex steroid hormone binding globulin (SHBG) albumin, corticosteroid binding globulin (CBG). According to the instructions of the producing company (Pontex Santa Monica), the solvents used in this assay break the protein binding during extraction process. The standard curve of testosterone ranged between 0.1 and 25.6 ng/ml.

Scrotal circumference measurement was carried out monthly (1, 2, 3, 4, 5 and 6 months of the experimental period and during different stages of puberty according to Han *et al.* (1969).

Semen evaluation:

Semen of the first ejaculate at puberty) or during the collection period was collected by means of an artificial vagina. Before ejaculation, ram lambs were sexually stimulated by allowing two false mounts followed by 5 minutes restrain. Semen was evaluated for ejaculate volume (EV), percentage of initial motility (IM) (Melros and Laing, 1970), livability (LS) and abnormality (AS) of spermatozoa (Hancock, 1951) and sperm cell concentration (SCC, $x10^9$/ml) using Neubauer haemocytometer.

Total sperm output (TS x 10^9/ejaculate) was calculated as sperm cell concentration/ml x ejaculate volume (ml). Live normal sperm output (LNS $x10^9$/ejaculate) was calculated according to the following: Total live normal sperm output/ejaculate = total sperm output x live sperm (%) x normal sperm (%).

Statistical analysis:

Statistical analysis for the obtained data of the stages of puberty and semen characteristics was analyzed by one way ANOVA serum. However, testosterone concentration and scrotal circumference were analyzed by factorial analysis. Duncan multiple range test was used to test the significant differences among means (Duncan, 1955).

RESULTS AND DISCUSSION

Characteristics of ram lambs at different stages of puberty:

Data in Table (2) show that the dietary treatment had no significant effects on puberty characteristics of ram lambs including age, body weight, scrotal circumference and testosterone concentration at different puberty stages (first mounting, mounting accompanied with erection and mounting accompanied with erection and ejaculation of 1st sperm.

Regardless the observed changes in all criteria studied at different puberty stages in all groups, the present results indicated that inclusion of DSBP or/and DSBT in diets of ram lambs had no harmful effect of puberty characteristics of ram lambs. The observed gradual increase in testosterone concentration throughout different stages of puberty reaching the maximum level at 1st ejaculation was reported by Saihab *et al*. (1989) as indicator of increasing testicular parameters between 7 and 10 month of age.

Table (2): Puberty characteristics of ram lambs in tested groups at different stages of puberty.

Characteristics	Tested group			
	G1	G2	G3	G4
I" mounting:				
Age (day)	184.4±7.07	168±8.52	185.8±8.01	182.2±7.13
Body weight (kg)	26.1±1.86	25.72±1.62	28.48±1.09	26.96±2.67
Scrotal circumference (cm)	19.3±1.88	19.3±1.50	21.48±1.31	19.93±1.87
Testosterone (ng/ml)	0.400±0.21	0.586±0.14	0.240±0.03	0.595±0.31
Isl mounting with erection				
Age (day)	207.8±9.07	190.8±10.74	202.2±10.73	209.3±7.48
Body weight (kg)	28.9±1.30	29.42±1.67	30.8±1.13	31.3±0.95
Scrotal circumference (cm)	22.20±1.78	21.95±0.89	23.38±1.30	23.10±1.19
Testosterone (ng/ml)	0.832±0.26	0.797±0.19	0.580±0.09	1.048±0.34
1st ejaculation (puberty)				
Age (day)	237.8±11.24	216.7±16.07	223.4±11.72	231.3±5.38
Body weight (kg)	32.5±0.69	32.56±2.06	34.02±0.76	32.97±2.61
Scrotal circumference (cm)	24.88±0.37	24.48±0.20	25.96±0.13	24.82±0.35
Testosterone (ng/ml)	1.393±0.12	2.238±1.18	2.470±1.19	2.962±1.19

All differences are not significant at P<0.05.

In accordance with the present results, Mann and Mann (1981) found significant rise in testosterone level at several weeks before start of ejaculation of semen with motile sperm. Similarly, EI-Ashry *et al.* (2000) found that Rahmani lambs reached puberty age between 286-311 days. Ragab *et al.* (1966) reported that Rahmani lambs reached puberty at 177-456 d when they used

the sexual behavior and penis development method for determining the age at puberty. Tharwat (1985) found that the age at puberty was 243 d when used the testicular histology method for puberty determination in Barki ram lambs. Similar results were reported by Ali and El-Saidy (2003). Also, El-Ashry *et al.* (2000) reported that Rahmani rams lambs reached puberty at about 48.4% of mature body weight.

Regarding scrotal circumference, ram lambs in G3 reached puberty at 223.4 d with scrotal circumference of 25.9 cm and body weight of 34.0 kg. Similarly, All and El-Saidy (2003) found that in ram lambs fed ration in which BH was replaced by 50% DSBT, the scrotal circumference was 25.2 cm at age of 211.8 d. Also, Saihab *et al*. (1989) reported that body weight at puberty of Awassi rams was 34.4 kg. In this respect, Dyrmundsson (1973) observed that physiological puberty in Clum Forst ram lambs were attained at approximately 35.4% of the adult body weight

Characteristics of the 1st ejaculate at puberty:

Results presented in Table (3) revealed insignificant group differences in physical semen characteristics of the 1st ejaculate at puberty including EV, percentage of IM and AS, SCC, and output of LS and LNS. However, only LS percentage in G3 significantly ($P<0.05$) decreased as compared to G1 (control).

Table (3): Physical semen characteristics of the first ejaculate of ram lambs in tested groups.

Characteristics	Tested group			
	G1	G2	G3	G4
Ejaculate volume (EV, ml)	0.75±0.155	0.66±0.154	0.66±0.088	0.53±0.111
Initial motility (IM, %)	73.6±3.52	76.6±5.00	68.3±5.57	77.5±2.72
Live sperm (LS, %)	$67.7±0.75^{a}$	$65.2±2.30^{ab}$	$59.5±1.70^{b}$	$64.2±2.27^{ab}$
Abnormal sperm (AS, %)	1.61±0.83	1.51±0.24	1.31±0.18	1.61±0.49
SCC ($x10^9$/ejac.)	1.21±0.95	1.00±0.25	0.86±0.18	0.85±0.25
LS output ($x10^9$/ejac.)	0.74±0.28	0.59±0.25	0.47±0.19	0.49±0.17
LNS output ($x10^9$/ejac.)	0.74±0.28	0.59±0.25	0.47±0.19	0.49±0.17

a and b: Means within the same row with different superscripts are significantly different at P<0.05. SCC: Sperm cell concentration. LS: Live sperm. LNS: Live normal sperm.

As expected, poor quality semen was produced in association with the 1st ejaculates at puberty in all tested groups. In accordance with the present results, many investigators found that semen quality at puberty was low in quality and reached normal level by advance of age and consequently the complete development of the sex organs (Gabr *et al.,* 1997; Ortize *et al.,* 1997; El-Shamaa, 2002).

Changes in testosterone concentration:

Results in Table (4) showed significant effect of dietary treatments on overall mean of serum testosterone concentration in ram lambs at different sampling times. Only ram lambs in G4 fed mixed of 25% DSBP+25% DSBT showed significantly ($P<0.05$) higher testosterone concentration than G1, but did not differ from that in G2. However, the differences in testosterone concentration between each of G2 and G3 and G1 were not significant.

Generally, it is known that the blood serum testosterone concentration was used as an indicator to sexual maturity. Linder (1961) found that concentration of testosterone concentration ranged from 1.7 to 10.5 ng/100 ml in spermatic venous blood of rams

Table (4): Means and standard errors (SE) of serum testosterone concentration (ng/ml) for tested groups at different weeks of the experimental period.

Period (week)	Tested group			
	G1	G2	G3	G4
0	0.240±0.03	0.329±0.08	0.540±0.22	0.267±0.09
2	0.159±0.03	0.595±0.31	0.223±0.07	0.586±0.14
4	0.484±0.17	0.626±0.14	0.334±0.08	I.870±1.60
6	0.832±0.26	1.574±0.50	1.528±0.91	1.100±0.14
8	1.086±0.43	0.983±0.62	0.943±0.17	2.238±1.19
10	0.639±0.25	0.862±0.15	1.471±0.71	3.975±1.52
12	0.570±0.20	1.371±0.57	1.398±0.97	2.790±0.69
14	1.079±1.14	3.789±1.44	1.888±0.47	2.016±0.86
Overall mean	$0.636±0.104^{b}$	$1.266±0.371^{ab}$	$1.041±0.206^{b}$	$1.853±0.286^{a}$

a and b Means within the same row or column with different superscripts are significantly different at P<0.05.

Changes in scrotal circumference:

Results in Table (5) showed significant effect of dietary treatments on overall mean of scrotal circumference if ram lambs at different sampling times. In an opposite trend to testosterone concentration, ram lambs in G4 fed mixed of 25% DSBP+25% DSBT showed significantly (P<0.05) lower scrotal circumference than in G1, but did not differ from that in G3. However, the differences in between each of G2 and G3 and G1 were not significant.

Scrotal circumference was used generally as an indicator for testicular size. The present results are in agreement with those reported by Saihab *et al.* (1989), who found the highest increase in testicular parameters between 7 and 10 mo of age at 34.1 kg body weight. Ali and El-Saidy (2003) found that scrotal circumference increased with age advance when (1/2 Finish x 1/2 Rahmani) ram lambs were fed rations containing DSBT at rate of 50 and 100% as a replacement of BH.

Table (5): Means and standard errors (SE) of scrotal circumference (cm) of ram lambs in tested groups during different months of the experimental period.

Month	Tested group			
	G1	G2	G3	G4
1	19±1.40	19±1.8	19.5±1.8	18.3±1.7
2	23.6±1.5	22.3±1.6	22.5±1.7	21.8±1.6
3	25.1±1.1	25.6±1.3	24.8±09	24±1.3
4	25.6±0.4	26.5±0.8	25.3±0.8	24.3±1.1
5	26.3±0.5	26.6±0.7	25.6±0.7	24.6±1.0
6	26.5±0.4	26.8±0.4	25.8±0.9	24.8±1.2
Overall mean	$24.3±0.75^{a}$	$24.5±0.68^{a}$	$23.9±0.60^{ab}$	$23.0±0.64^{b}$

a and b Means within the same row with different superscripts are significantly different at P<0.05.

Physical semen characteristics of ram lambs:

Results in Table (6) show that EV and percentages of IM and AS were not affected significantly by dietary treatment. However, inclusion of 25% DSBP (G2) in diet of ram lambs significantly (P<0.05) decreased percentage of LS and inclusion of 25% DSBP 25% DSBT (G4) significantly (P<0.05) increased SCC/ejaculate and LNS output as compared to the control and other treatment groups. On the other hand, TS output significantly (P<0.05) increased in G4 than in G2 and G3, but did not differ from that in the control group (G1). Similar ejaculate volumes were reported in rams by Ali and El-Saidy (2003).

Table (6): Physical characteristics of semen collected from ram lambs in the experimental groups.

Characteristics	Tested group			
	G1	G2	G3	G4
Ejaculate volume (ml)	0.85±0.07	0.80±0.05	0.82±0.06	0.84±0.07
Initial motility (%)	78.7±6.3	77.2±4.4	79.4±4.9	80.3±1.1
Live sperm (%)	86.9±7.4^{a}	82.8±4.8^{b}	87.1±5.4^{a}	86.6±0.71^{a}
Abnormal sperm (%)	9.1±0.58	7.9±45	9.0±0.91	9.4±0.84
SCC (x10^{9}/ml)	1.66±0.24^{b}	1.71±0.18^{b}	1.67±0.17^{b}	2.26±0.18^{a}
TS output (x10^{9}/ejac.)	1.42±0.46^{ab}	1.37±0.38^{b}	1.35±0.38^{b}	2.01±0.72^{a}
LNS out put (x10^{9}/ejac.)	1.19±0.43^{b}	1.09±0.35^{b}	1.14±0.39^{b}	1.62±0.54^{a}

a and b: Means within the same row with different superscripts are significantly different at P<0.05. SCC: Sperm cell concentration. TS: Total sperm. LNS: Live normal sperm.

Changes of sperm motility was attributed to testicular and epididmal development. Gabr *et al.*, (1997) and El-Harairy *et al.* (2002) found that feeding rams on diets containing fish meal or *negilla sativa* meal increased (P<0.05) percentage of motility of spermatozoa compared with rams in the control group. This means that type of feeding could be affect sperm motility percentage. In disagreement with the present results, Ali and El-Saidy (2003) found that feeding rams on rations containing DSBT at rate of 50% as a replacement of BH significantly increased LS percentage compared with the control group and those fed ration containing DSBT at rate of 100% as replacement of BH. Similar results were reported by Ali and Darwish (2001).

It was suggested that decreasing AS percent may be due to the development and maturation of testicular tissues and epididymal duct. Also, testosterone level known to be necessary for normal spermatogenesis (Mann and ClutwakMann, 1981). Generally, the present AS percentages in all groups are with a range of abnormal sperm cells from 7.5 to 13.17% as reported by El-Ashry *et al.* (2000); El-Harairy *et al.* (2002) and El-Shamaa (2002). Also, El-Badawy (2003) found that AS percent ranged from 8.0 to 12.7%. In accordance with the present results, Ali and El-Saidy (2003) found that feeding rams on rations containing 25% DSBT as a replacement of BH resulted in normal sperm concentration (2.05 x 10^{9} sperm/ml) with insignificant differences comparing with the control group. While, the replacement of all BH by DSBT resulted in significant decrease in SCC. Moreover, Ali and El-Saidy (2003) in mature cross bred rams fed DSBT as a replacement of BH at rate of 50%. Values of TS output/ejaculate were

significantly (P<0.05) higher as replacement of BH at rate of 100% than those fed DSBT. However, Bendary *et al.* (1999) found that no significant differences in TS output x10^9 sperm/ejaculate when Friesian calves fed ration contained DSBT or summer ration contained CM and BH. In accordance with increasing LNS output in G4, Ali and Darwish (2001) found that LNS output increased by about 18% for buffalo bulls fed ration contained DSBT as a replacement of BH at rate of 50%.

CONCLUSION

From the obtained results, it could be concluded that inclusion of 25% dried sugar beet tops and 25% dried sugar beet pulp could be used successfully as a replacement of 25% of berseem hay and 25% of concentrate feed mixture in diet of ram lambs.

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تأثير استخدام مخلفات بنجر السكر على الآداء التناسلى لذكور الحملان

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استخدم فى هذا لبحث 24 حولى (4/3 رومانوف × 4/1 رحمانى) عمر 5 شهور ، متوسط الوزن 23.46 كجم لمعرفة تأثير التغذية على لب بنجر السكر المجفف و/أو عرش بنجر السكر المجفف كإحلال لمخلوط العلف المركز أو / و دريس البرسيم على البلوغ الجنسى ، مستوى هرمون التستستيرون ، محيط الخصية ، والصفات الطبيعية للسائل المنوى للحملان . تم تقسيم الحملان الى اربع مجاميع (6 حولى/ مجموعة) ، غذيت حملان المجموعة الاولى على عليقة مقارنة تتكون من 50% مخلوط علف مركز+50% دريس برسيم . وكانت عليقة المجموعات الثانيه والثالثه والرابعه كلآتى: المجموعة الثانية: 25% مخلوط علف مركز+25% لب بنجر مجفف+50% دريس برسيم . المجموعة الثالثة: 25% مخلوط علف مركز+25% لب بنجر مجفف+37.5% دريس برسيم+ 12.5% عرش بنجر مجفف. المجموعة الرابعة: 25% مخلوط علف مركز+25% لب بنجر مجفف+ 25% دريس برسيم+25% عرش بنجر مجفف. أوضحت النتائج ان المعاملة الغذائية ليس لها تأثير معنوى على البلوغ الجنسى للحملان من حيث العمر، وزن الجسم، محيط الخصية، تركيز هرمون التستستيرون فى مراحل البلوغ المختلفة (أول وثبة، وثبة مع انتصاب، وثبة مع انتصاب والحصول على أول قذفة بها حيوان منوى حى) . كانت الاختلافات بين المجموعات التجريبيه غير معنويه فى الصفات الطبيعية للسائل المنوى لأول قذفة عند البلوغ مشتملة على (حجم القذفة، النسبه المؤيه الحيوية والشواذ، تركيز الحيوانات المنوية، اجمالى عدد الحيوانات المنوية الحية والحيوانات المنوية الحية الطبيعية). كانت النسبه المؤيه للحيوانات المنوية الحية أقل معنويا ($P<0.05$) فى المجموعة

الثالثة مقارنة بالمجموعة الاولى (كنترول). اظهرت حوالى المجموعة الرابعة أعلى قيمة معنوية ($P<0.05$) فى تركيز هرمون التستستيرون واقل قيمة فى محيط الخصية عنها فى المجموعة الاولى (الكنترول). لم يكن هناك تأثيرا معنويا للمعاملة الغذائية على حجم القذفة والنسبه المؤيه للحيوانات المنويه المتحركه والشاذة خلال فترة جمع السائل المنوى . بينما انخفضت النسبة المئوية للحيوانات المنوية الحية معنويا ($P<0.05$) فى المجموعة الثانية . بينما زاد تركيز الحيوانات المنوية/القذفة والمعدل الكلى للحيوانات المنوية الطبيعية الحية معنويا ($P<0.05$) فى المجموعة الرابعة مقارنة بالمجموعة الأولى (الكنترول) و المجموعات المعاملة الاخرى . زاد تركيز هرمون التستستيرون معنويا ($P<0.05$) فى سيرم دم حوالى المجموعة الرابعة عنه فى المجموعة الثانية والثالثة بينما لم تكن الفروق معنوية بينها وبين المجموعة الاولى (الكنترول).

توصى الدراسة بنجاح إستبدال 25% من مخلوط العلف المركز وكذا 25% من دريس البرسيم فى علائق الحوالى الذكور ب25% من لب بنجر السكر المجفف و25% من عرش بنجر السكر المجفف لما لهما من تأثير على تحسين الاداء التناسلى فى الحملان المستخدمه فى التربيه.

قام بتحكيم البحث

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