FLUSHING, SUCKLING AND SEXUAL MATURITY OF SMALL RUMINANTS FED DIET CONTAINING SILAGE OF TRITICALE, BERSEEM OR ITS MIXTURE

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Abstract

Objective of this study was to investigate the effect of three types of silage (triticale, berseem and their combination) supplemented to concentrate fed mixture (CFM) on productive, as suckling milk amount, growth rate of newborns and reproductive efficiency, as fertility rate and sexual development of male lambs to be used as sires. Two small ruminate breeds (ewes and does) were assigned into three treatment groups. Forty-two ewes (n=14 ewe in each treatment) and fifty-seven does (n=19 does in each treatment). All animals were received diets at 21 days pre-mating season (as flushing diet) up to weaning. The feeding treatments (T) offered as following: T1 contained 60% CFM + 40% triticale silage, T2 included 60% CFM + 40% admixture silage (50% triticale and 50% berseem) and T3 contained 60% CFM + 40% berseem silage. To determine suckling milk amount of maternal; twelve ewes (n=4 in each treatment) and eighteen does (n=6 in each treatment) symmetrical in reproductive and productive characteristics were used. The maternal in suckling treatment were received the same T1, T2 and T3 diets mentioned above. In respect of the newborn growth rate, all suckling lambs and kids from birth up to weaning were used. In sexual maturation evaluation, fifteen healthy Rahmani lambs with normal genitalia, aged 150 days and at initial body weigh (22.21±0.42 kg) were allocated into three treatments; five lambs / treatment. Results showed that ewes and does in T2 group had a higher reproductive performance, parity patterns and reproductive ability than those in other treatments (T1 and T3). The clearly differences were observed among the dietary treatments during suckling period of ewes and does. The maternal fed on T2 produced more ($P<0.05$) amounts in suckling milk than those maternal fed T1 and T3. Consequently, T2 improved ($P<0.05$) newborns growth rate compared to newborns in either T1 or T3 groups. Furthermore, T2 group achieved better ($P<0.05$) sexual developments (i.e., age at puberty, body weight, scrotal circumference, testicular diameter, testicular length, testicular volume and semen characteristics at puberty) than T1 and T3 groups. These findings indicate that the inclusion of admixture silage has no adverse effects on productive and reproductive performance, suckling milk production and growth rate of newborns. Admixture silage causes earlier sexual maturation and goodness semen parameters of Rahmani male lambs. Thus, mixing more than types of silage may be a promising strategy nutrition in the future.

Key words: Nutrition ewes, goats, berseem or triticale silage, flushing, milk yield, sexual maturation.

INTRODUCTION

The total yield of green fodder insufficient and does not satisfy the needs of the livestock in Egypt. The way to overcome this problem is planning proper diets for animals require keeping part of fodder available in the different seasons. Among the green fodder materials, it can be referred to berseem and triticale silage. The recent Egyptian researches have focused on cheaper, easy obtainable alternative feedstuffs as protein source, uncommon forage and in reclaimed land region such as triticale. *Triticosecale wittmack* is the first cereal crop developed by crossing wheat (*Triticum spp*.) and rye corn (*Secale cereal L*.). Thus, triticale is a softer grain than wheat and barley, which may make it easier to mill for livestock diets. Thence, triticale is one of the important new forage might have used as well as berseem to solve the problem of diet by conservation as hay or silage. In earlier study, Brid *et al.* (1999) demonstrated that triticale, barley, wheat, sorghum and maize when fermented in rumen given fermentation characteristics 60, 67, 48, 44 and 42% also, enzymes digestion 70, 45, 43, 28 and 29%, respectively. Furthermore, last authors reported that triticale contains a high energy (10-14 M jol/kg DM) and crude protein (12.9%). The silage admixture showed that the silage duration of fodder materials increased in line of increasing the share of grasses. In this context, Ahmed *et al.* (2013) defined that using mixture silage (triticale and berseem) in feeding Zaraibi nanny goats could present positive contributed on total dry matter intake, feeding value and feed utilization efficiency. Furthermore, El-Emam *et al.* (2014) pointed out that using mixing silage between berseem and triticale had good palatability, adequate feeding value, did not have any negative impact on rumen fermentation and exhibited better percentage of feeding values.

Therefore, the aim of this study was to compare the effect of feeding different types of silage as triticale or berseem alone and its admixture on flushing of ewes and does, suckling milk amount of these maternal, growth rate of newborns during suckling and sexual development of male lambs' for upbringing as sires.

MATERIALS AND METHODS

The experiment was launched at El-Serw Experimental Research Station belonging to Animal Production Research Institute (APRI), Agricultural Research Center, Ministry of Agriculture, Egypt. The experimental was carried out between May 2013 and June 2013.

Silage preparation and protocol of experiments

Three silage materials (triticale, berseem and its admixture) were harvested, wilted, chopped and treated with 3% molasses on fresh weight basis. Thereafter, each kind of silage material was packaged individually in plastic bags contained 60-70 kg and stored anaerobic for 60 days. After fermentation, three types of rations were performed and offered as three treatments (T1, T2 and T3) to animals. T1 consisted of 60% concentrate fed mixture (CFM) + 40% triticale silage, T2 contained 60% CFM + 40% admixture silage as 50% triticale and 50% berseem and T3 included 60% CFM + 40% berseem silage. The CFM ingredients were 41% yellow corn, 26.5 % undecorticated cotton seed meal, 25% wheat barn, 3.5% molasses, 2.5% limestone, 1% common salt and 0.5% minerals mixture. The T1, T2 and T3 rations presented to animals two times daily at 8.00 and 15.00 hours during the experimental period. Also, fresh water and mineral salt templates were available throughout experimental period. Chemical composition of T1, T2 and T3 analysis using the method of AOAC (2007) are given in Table 1.

Table 1. Chemical composition of CFM and silage materials consumed by maternal and lambs.

Item (%)	Chemical analysis (on DM basis)			
	CFM	100% triticale	50%berseem 50%triticale	100% berseem
DM	90.50	31.13	30.01	30.85
OM	94.00	91.13	89.61	88.00
CF	14.90	29.95	29.39	28.90
CP	15.00	11.29	12.67	13.95
EE	2.97	2.60	2.40	2.15
NFE	61.13	47.29	45.15	43.00
Ash	6.00	8.87	10.39	12.00
Gross energy (MJ/kg DM)	18.28	17.73	17.48	17.19

Experimental procedures

Animals feeding and reproductive management

Ninety–nine maternal (forty-two Rahmani ewes and fifty-seven Zaraibi nanny goats) were used in this experiment. The mean of ewe body weight was 42.59±0.53 kg at age between 3.5 and 4.6 years. Average body weight was 31.84±0.41 kg and age between 3.6 and 4.8 years for trial nanny goats. Accordingly, each ruminant breed was allocated into three treatments (N= 14 ewes and 19 does / each treatment) and received independently T1, T2 or T3 rations. All treatment of ewe and does were afforded as flushing systematic diets throughout critical dietary periods at 21 days pre-mating to finally mating season, at trimester of gestation and continued until maternal weaning their newborns.

Consequently, the reproduction performance was recorded and calculated as conception rate (number of does or ewes conceived / does or ewes mated), fertility

percentage (number of does kidded or ewes lambed / does or ewes mated), fecundity (total number of kids or lambs born / does or ewes mated) and prolificacy (number of a live kids or lambs born / does kidded or ewes lambed).

Type of porn

Parity patterns as single birth rate was recorded as number of does kidded or ewes lambed single/ number of does kidded or ewes lambed. Twins birth rate was calculated as number of does kidded or ewes lambed twins/ number of does kidded or ewes lambed. Triplet birth rate was calculated as the number of does kidded triplet/number of does kidded.

Milk production during suckling period

After parturition, 12 ewes and 18 does of previous maternal selected to evaluate the suckling milk harvest. All maternal distributed into three equal groups (n=4 in each of ewes and n=6 in each of goats) similar in productive, reproductive parameters and parity. Each treatment was housed in separated shaded milking pen during suckling period (60 days for ewes and 90 days for does). Thence, T1, T2 or T3 were given particularly to each maternal treatment during suckling period. The milk yield during suckling period was estimated by oxytocin method portrayed by Khalifa *et al.* (2013).

Live BW of lambs and kids during suckling period

The live body weight changing (LBW) of lambs and kids, of maternal fed trial rations from birth till weaning. In the morning, the body weight of newborns was registered fortnightly through suckling months. The LBW estimated after newborns were separated from their maternal one hour.

Puberty detection Sexual maturation of male lambs

Fifteen healthy Rahmani lambs with clinically normal genitalia, aged 150 days and average initial body weigh of 22.21±0.42 kg were randomly divided into three treatments (n=5 in each). Assessments were made on lambs over a period of 170 days (totally 320 days post- partum) of age. All lambs were managed under same environmental condition, kept in separate pens and fed separately T1, T2 or T3 rations. Measurements of body weight, scrotal circumference (SC), testicular diameter (TD), testicular length (TL) and testicular volume (TV) were taken up to displayed puberty age (mounting, erection and ejaculation) using an estrous ewe offered to lambs daily. Then, at pubertal age, semen characteristics as ejaculate volume (ml), progressive motility (%), live sperm (%), abnormal sperm (%) and sperm cell concentration ($N\times10^9$) were determined. The measurements of sexual maturation such as the SC was obtained using a cloth tape and measured in centimeters (cm) as the largest diameter of scrotum after pushing the testes firmly into the scrotum. The TD was measured in the anterior-posterior plane using a pair of vernier calipers and a metal reference ruler used to determine the diameter of each testis. The TL was

measured from the top of the testis to the bottom of the epididymis with a pair of vernier calipers and a metal reference ruler used to determine the diameter of each testis. The TV (cm^3) was calculated using formula by Carson and Amann (1972): testes volume= $\sum$ length of each testis × diameter ^{2} of each testis.

Statistical Analysis

Data of each breed were subjected to analysis using Statistical Package for Social Sciences (SPSS for Windows, Version 20, 2011). Duncan's test option of the same program was used to identify significant differences between mean values. Data was presented as the mean ± standard error.

RESULTS AND DISCUSSION

Feeding from flushing to weaning

The reproductive change of either ewes or nanny goats that consumed trial rations (T1, T2 and T3) from pre-mating to weaning are indicated in Tables 2 and 3, respectively. In the present study, it has been found that maternal received T1 or T3 showed depressed results on reproductive performance compared to maternal nurtured T2. Hence, the admixture silage could be had better nutritive value than solo silage materials. The same trend was explained with Ahmed *et al.* (2013) who cleared that feeding values as TDN was significantly ($P<0.05$) higher with mixture silage (64.10 %) than severally berseem (62.19%) or triticale (62.44%) silage. Moreover, last authors defined that admixture silage attained higher total DM intake (1423 g/h) than either solo silage of berseem (1399 g/h) or triticale (1384 g/h). It's worth mentioning the importance of the ovulation rate because it determines the potential of newborn production which monitor tool to increase parity. It is likely therefore that, T2 diet achieved an increasing number of lambs (15 lambs) and kids (43 kids) compared to T1 (11 lambs and 30 kids) and T3 (12 lambs and 35 kids). Thus, maternal fed T2 diet furnished a good energy requirement, whereas, less energy impaired the embryonic develop, fetal growth, maintenance of metabolic processes, mammary gland growth, colostrum and milk yield of pregnant maternal (Ambreen *et al.,* 2014). As a consequence, mixed minerals in T2 ration could ameliorate reproductive behavior of maternal compared to maternal fed solo minerals in T1 and T3. Accordingly, Akhtar *et al.* (2014) explicated that mineral mixtures in the food stuff could improve reproductive efficiency of pregnancy buffaloes. On the other hand, feeding T2 could be improved blood glucose level according to El-Emam *et al.* (2014). Glucose is considered a primary nutrient required by both mammary gland and gravid uterus for metabolism. This observation is confirmed by Brown *et al.* (2014) who demonstrated that glucose is converted to inositol by glucose-6-phosphate: 1-phosphate cyclase and to sorbitol by aldose reductase; the balance between these two pathways is regulated by nicotinamide adenine dinucleotide phosphate (NADP)

derived from the placental uptake of glutamate (prolonged excitation of glutamate is toxic and harmful to offspring nerve cells) from the fetus.

Table 2. Reproductive performance of ewes consumed T1, T2 or T3 rations.

Item	Experimental groups		
	T1	T2	T3
No. of ewes mated	14	14	14
No. of ewes conceived	11	13	12
Conception rate,%	78.57	92.86	85.71
No. of ewes lambed	10	13	11
Fertility rate,%	71.43	92.86	78.57
No. of ewes born a live lambs	10	13	10
Total number of born lambs	11	15	12
No. of live lambs at birth	7	15	11
Fecundity rate, %	78.57	107.14	85.71
Prolificacy rate, %	70.00	115.38	100.00
No. of one day old-live lambs	7	15	11
Parity patterns:-			
No. of ewes lambed single	9	11	10
Single rate, %	90.00	84.62	90.91
No. of ewes lambed twins	1	2	1
Twinning rate, %	10.00	15.38	9.09

Table 3. Reproductive performance of dairy goats consumed T1, T2 or T3 rations.

Item	Experimental groups		
	T1	T2	T3
No. of does mated	19	19	19
No. of does conceived	19	19	19
Conception rate,%	100.00	100.00	100.00
No. of does kidded	18	19	17
Fertility rate,%	94.74	100.00	94.47
No. of does born a live kids	17	19	17
Total number of born kids	30	43	35
No. of live kids at birth	27	36	33
Fecundity rate, %	157.89	226.32	184.21
Prolificacy rate, %	150.00	189.47	194.12
No. of one day old-live kids	27	36	33
Parity patterns:-			
No. of does kidded single	6	1	1
Single rate, %	33.33	5.26	5.88
No. of does kidded twins	12	12	14
Twinning rate, %	66.67	63.16	82.35
No. of does kidded triplet	-	6	2
Triplet rate, %	-	31.58	11.77

Milk yield during suckling period

Changing in milk yield throughout the suckling period when ewes and does fed the tested diet are shown in Fig. 1 and 2, respectively. The demonstration of suckling milk value during estimation days were clearly differed among T1, T2 and T3 rations. In the current study, the suckling milk amount of maternal fed T2 was significantly larger ($P<0.05$) than that produced by maternal in both T1 and T3. The highest milk yield of maternal consumed T2 may relate to an increment of VFA's and a better

ruminal utilization of diet by the simultaneous intake of mixture silage materials. In this contextual relationship, Ahmad *et al.* (2013) proved that the milk yield in goats improved when VFA's in rumen fluid were 11.70, 11.07 and10.73 m Eq/100 ml for admixture silage, triticale silage and berseem silage, respectively. On the other hand, somatic cell count (SCC) is often deduced indirectly from the fact that infected dairy animals show a higher SCC and lower milk yield. The present study on daily milk yield are harmonized to those of Ahmad *et al.* (2013) who cleared that average milk harvest was 1.171, 1.231 and 1.319 kg when the SCC reached 419×10^3, 413×10^3 and 397×10^3 in diary Zaraibi goats fed silage types as triticale, berseem and their mixtures, respectively. The protein in the treatment rations affected the concentration of ammonia nitrogen in rumen fluid, probably as a result of a greater amount of protein degradation in the rumen. Consequently, increasing protein degradation may also reflect the more neutral rumen pH thereby; increasing ruminal bacterial colonization and ruminal fermentation activity suggested that increased milk production (Ghaffari *et al.,* 2014).

Fig 1: Average daily milk yield (kg) during suckling period.

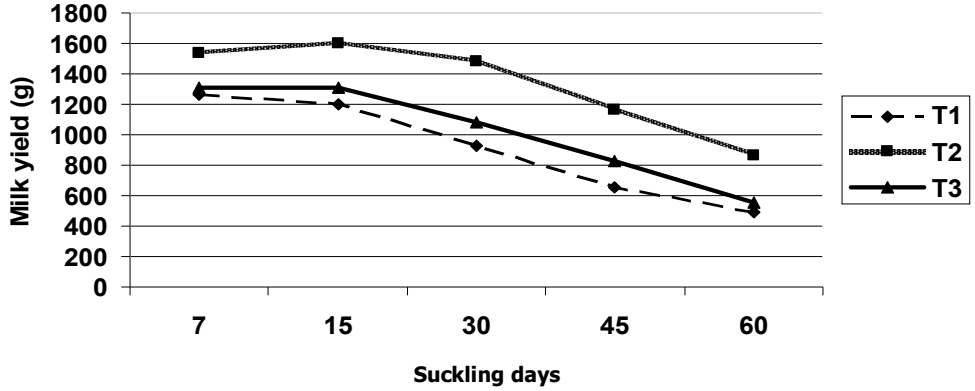
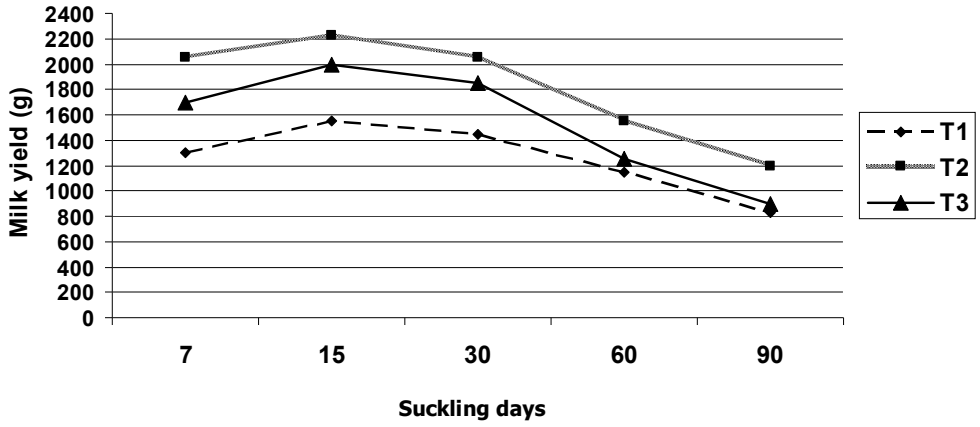


Fig 2 : Average daily milk yield (g/dy) during suckling period of goats.



Growth rate of lambs and kids during suckling period

The following figures indicated that growth rate of lambs (Fig. 3) and kids (Fig.4) which their maternal nourished T1, T2 or T3. The live body weight (LBW) of newborn was affected ($P<0.05$) by supplemented different silage materials. Thus, maternal fed T2 and T3 produced heavier weight than those maternal received T1. Subsequently, the lambs recorded mean birth weight 1.90, 2.55 and 2.57 kg while, kids had 1.50, 1.61 and 1.56 kg when their maternal nurtured T1, T2 and T3, respectively. Also, the weaning weight of lambs and kids increased gradually with T2 (12.6 and 9.07 kg), T3 (12.57 and 8.33 kg) as compared to T1 (11.00 and 7.49 kg), respectively. However, there were no significant differences among the lamb and kid weights consumed T2 and T3. Furthermore, the daily weight gains of lambs and kids from birth to weaning revealed marked change with supplemented silage materials in their maternal diets. Thus, average daily gain of lambs with T1, T2 and T3 was 151.67, 167.50 and 166.67 g/h/d, respectively. However, average daily gain of kids with T1 was (66.56 g/h/d) less than kids of T2 (98.99 g/h/d) and T3 (75.22 g/h/d). At all events, the welfare and survival of newborn up to weaning depend on the rapid development of a joint between maternal and their newborn. The maternal fed either T2 or T3 could produce desirable amount of suckling milk to meet growth rate requirements of lambs and kids to allow them better daily gain than T1 diet (Figs. 1 and 2). Based on the previous findings, welfare of ewes and does fed T2 had a better preferable influence on birth and weaning weights of offspring than T1 and T3. This notion was conformed by Mahboub *et al.* (2013), who dissected that adequate maternal had given superior nutrition during late gestation resulted in improved colostrum and/or milk availability for the offspring, therefore affecting growth and offspring survival to weaning.

Fig. 3: Live body weight (kg) of lambs born from ewes fedi T1,T2,or T3 rations.

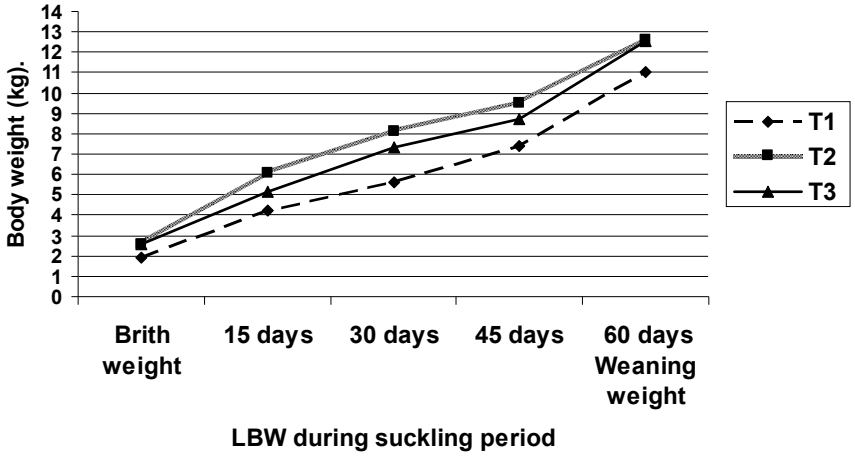
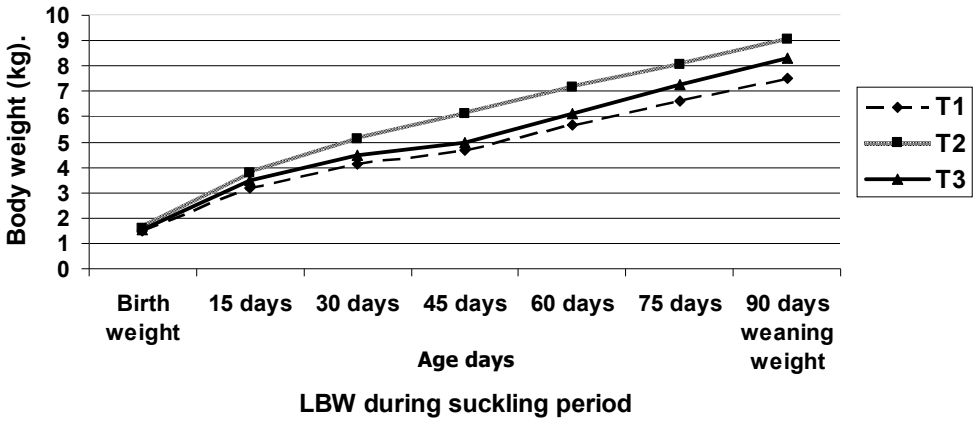


Fig.4: Change in LBW of suckling kids from does fed T1, T2 or T3 rations.



LBW during suckling period

Sexual development of male lambs

Results in Table 4 showed that the mean of sexual development and semen quality of pubertal lambs received T1, T2 and T3. There were significantly low ($P<0.05$) sexual maturation and semen characteristics of lambs fed T1 which may be related to lower values of feed intake than T2 and T3. Relevant to the above results, El-Emam *et al.* (2014) reported that different silage materials had lower DM intake and TDN with berseem 1262 g/h and 63.50%, triticale 1256 g/h and 63.70% than their mixture 1281g/h and 65.19%, respectively. In the current study, puberty development was presented early when lambs fed T2 as a good feeding condition compared to T1 and T3. The sexual development of lamb appears to be more closely associated with body growth than age. According to studies carried out by Sultana *et al.* (2011) who suggested that the system of nutrition such as protein, energy and minerals are more well-defined variables influencing onset of puberty and attainment body weight. With reference to relationship among puberty, nutrition, sexual maturation and semen parameters, lambs that received T2 achieved better sexual development and semen quality than lambs fed T1 and T3. As stated previously, it is clear that nutrition influence the release of luteinizing hormone (LH) which play an important role in advancement timing of sexual puberty by controlling development of seminiferous tubules and stimulation spermatogenesis process (Kaya *et al.,* 2013). In the current study, lambs fed T1 had low proportion of functional seminiferous tubules, reduced sperm output and elevated percentage of morphologically abnormal sperm. Inconsistent, the largest testicular development was observed with T2 lambs which had a clear evidence of sexual performance and paralleling with several reproductive parameters such as age at puberty and semen parameters. Accordingly, Al-Kawmani *et al.* (2014) suggested that animals with small testicles have reduced sperm

production and poor semen quality. In a more detailed study, El-Emam *et al.* (2014) affirmed significant differ among silage materials as triticale, berseem and their admixture on some serum blood minerals such as calcium 10.17, 10.43 and 10.60 mg/dI, phosphors 8.33, 8.20 and 8.70 mg/ dI and magnesium 2.3, 2.47 and 2.53 mg/dI, respectively. Furthermore, it is well known that a reduction in glucose availability by caloric restriction, fasting or low feed intake impairs LH hormone secretion which caused negatively refluxed on testicular development (Kiani, 2013). Otherwise, T2 may be provided male lambs by more suitable energy that had rapidly pubertal age, semen secretion and body conditions than T1and T3. These findings are in accordance with Esmaeili *et al.* (2014), who indicated that the energy materials deposited in the scrotum was directly related to the concentration of energy in the diet, energy concentrations accelerate testicular development.

Table 4. Sexual development and semen characteristics of pubertal male lambs fed silage treatments.

Item	Silage treatment		
	T1	T2	T3
Sexual maturation			
Age at puberty (days)	302.00±5.71^{a}	285.50±1.07^{b}	300.20±3.94^{a}
Body weight at puberty (kg)	42.08±1.85^{b}	44.72±0.55^{a}	42.280.85^{b}
Scrotal circumference (cm)	23.64±0.52^{b}	25.76±0.35^{a}	24.02±0.33^{b}
Testicular diameter (cm)	3.74±0.14^{b}	4.64±0.19^{a}	4.08±0.17^{b}
Testicular length (cm)	10.92±0.24^{b}	12.50±.34^{a}	11.96±0.41^{b}
Testicular volume (cm^3)	165.57±15.71^{c}	285.80±29.97^{a}	213.91±22.26^{b}
Semen characteristics			
Semen volume (ml)	0.56±0.05^{b}	0.78±0.37^{a}	0.62±0.58^{b}
Progressive motility (%)	77.00±2.55	81.00±1.87	79.00±2.45
Live sperm (%)	81.80±2.03	84.60±1.54	83.60±1.72
Abnormal sperm (%)	22.60±1.03	21.40±0.51	21.80±0.86
Sperm concentration ($n\times10^9$/ml)	1.76±0.11^{c}	2.26±0.14^{a}	1.99±0.08^{b}

$^{a, b, c}$ Means followed by different superscript letters within the same row are significantly different ($P < 0.05$).

CONCLUSION

The obtained results confirm that admixture between two silage materials triticale and berseem enhanced reproductive activity and could be achieved the highest harvest of newborn in ewes and does without any detrimental effect on weaning weight. Furthermore, admixture silage materials could be used safely in feeding ewes and lactating goats' to improve milk yield at suckling stages. Results presented in this work prove significantly rapid sexual maturation in male lambs fed admixture silage materials without any irritating effect on semen characteristic at puberty than lambs fed individual of either triticale or berseem silage.

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الدفع الغذائي والرضاعة والنضج الجنسى للمجترات الصغيرة المغذاه بعلائق تحتوى على سيلاج التريتيكال أو سيلاج البرسيم منفردين أو مختلطين

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الغرض من هذه الدراسة تقييم تأثير ثلاثة أنواع من السيلاج (سيلاج التريتيكال و سيلاج البرسيم و مخلوطيهما) على الكفاءة الإنتاجية (كمية لبن الرضاعة، ومعدل نمو المواليد) والتناسلية (معدل الخصوبة) للنعاج الرحماني والعنزات الزرايبي، والتطور الجنسى لذكور الحملان لإستخدامها كطلائق. قسمت النعاج والعنزات إلى ثلاثة معاملات إستخدمت 42 نعجة (14 نعجة لكل معاملة) و57 عنزة (19 عنزة لكل معاملة).وتم تغذية الأمهات 21 يوم قبل موسم التلقيح (كدفع غذائى) حتى الفطام.وكانت المعاملات كالتالى:- المعاملة الأولى غذيت على 60% علف مركز+ 40% سيلاج تريتيكال، المعاملة الثانية غذيت على60% علف مركز + 40% (50% سيلاج تريتيكال +50% سيلاج برسيم) و المعاملة الثالثة غذيت على60% علف مركز + 40% سيلاج برسيم. وتم قياس كمية لبن الرضاعة للأمهات المغذاه على العلائق السابقة باستخدام 12 نعجة (4 نعجة لكل معاملة) ، 18 عنزة (6عنزة لكل معاملة) وكانت الأمهات (النعاج والعنزات) مشابهة فى الصفات الأنتاجية والتناسلية. وتم دراسة معدلات النمو للحملان والجداء من الولادة حتى الفطام. ولدراسة التطور الجنسى للحملان الذكور استخدم 15 حولى (5 حولى لكل معاملة) عند عمر 150 يوم وبمتوسط وزن 21و22 كجم وذات اعضاء جنسية طبيعية. وقد اظهرت النتائج أن النعاج والعنزات التى غذيت على المعاملة الثانية حققت أعلى أداء تناسلى ، معدلات ولادة ، وقدرة تناسلية مقارنة بالمعاملة الأولى والثالثة وهناك تغيرات واضحة بين المعاملات فى كمية اللبن اثناء فترة الرضاعة لكلا من النعاج والعنزات وكانت أمهات المعاملة الثانية أكثر فى كمية لبن الرضاعة من أمهات المعاملة الأولى والثالثة. وبذلك نجد أن المعاملة الثانية حققت معدلات نموللمواليد أعلى من معدلات نمو مواليد كلا من المعاملة الأولى والثالثة. كما حققت المعاملة الثانية أعلى معدلات فى التطور الجنسى (مثل: العمر عند البلوغ، وزن الجسم، محيط الخصية، طول الخصية، حجم الخصية، وصفات السائل المنوى عند البلوغ) من المعاملة الأولى و الثالثة. ويستنتج من ذلك أن المعاملة الثانية (مخلوط سيلاج التريتيكال والبرسيم) حقق تأثيرا إيجابيا على الأداء الإنتاجى والتناسلى، كميات لبن الرضاعة ومعدلات نموالحملان والجداء حتى الفطام. كما أظهر(خلط السيلاج) قدرته على تعديل النضج الجنسى وإعطاء سائل منوى جيد لذكور الحملان الرحمانى.ومن هنا يمكن ان يكون خليط السيلاج بديلا جيداعن إستخدام السيلاج منفردا ويجب أن يكون الإستراتيجية الغذائية الواعدة فى المستقبل.