EFFCT OF AUTUMN AND WINTER SEASONS ON SEMINAL TRAITS AND TESTICULAR MEASUREMENTS OF AWASSI RAM LAMBS

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ABSTRACT

The objective of this study was to compare between the effect of autumn (decrease daylight) and winter (increase daylight) seasons on some reproductive traits in Awassi ram lambs for selecting them on the onset of sexual activity as in their flock . This study was performed at the Ruminant Research Station, Abu Ghraib- belong to the Directorate of Agricultural Researches during the two periods, autumn (17-24 November) and winter (26 January –3 February) seasons using twelve Awassi ram lambs aged 12-13 month. The study has observed non-significant difference between seasons for semen parameters, seminal plasma parameters, testosterone, cortisol concentrations, testicular measurements and reaction time. However, this study revealed positive correlation between ejaculate volume and total spermatozoa per ejaculate($P\leq0.01$), mass activity and individual motility ($P\leq0.01$), semen protein with seminal triglyceride ($P\leq0.01$), seminal protein and seminal cholesterol ($P\leq0.05$) and seminal cholesterol with seminal Aspartate Aminotransferase (AST) ($P\leq0.05$).In conclusion, the costs were reduced depending on autumn season for estimation the sexual activity of ram lambs to select them for the sheep flocks.

Key Words: Autumn, winter, Awassi ram lambs, seminal traits.

INTRODUCTION

Many important factors have impact on reproductive capacity and semen production of rams such us, body weight, photoperiod, climatic temperature and management. These factors can reflect huge variations of semen characteristics (Karagiannidis *et al*., 2000; Al-Mjamaii, 2011; Mukasa-Mugerwa and Ezaz, 1992; Perez *et al*., 1997; Ibrahim *et al*., 2016) as well as they decline metabolic impulses at hypothalamic-pituitary axis (Barb and Kraeling, 2004).

The sexual activity of a ram reaches its peak at the fall and this activity drops down of the late winter of spring and summer. Decreasing time lengths stimulates the secretion of plasma SSH, ICSH and testosterone in rams, while increasing day light inhibits these hormones (Hafez and Hafez, 2000). "Lambs born in autumn from long hours of daylight, then to short hours of daylight

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accelerates this sexual development, depending on the breed" (Hafez and Hafez, 2000).

The sexual capacity of rams can be measured by semen quality, hormones concentration, in addition to the testicular measurements, whose correlated with testicular development (Daudu,1984; Al-Rubaay *et al*., 2011; Moghaddam *et al*., 2012 ; Ibrahim *et al*., 2016). Therefore, there are difference in testicular size testosterone level, spermatogenesis efficiency and semen quality between breeding and non-breeding season in ram (Kafi *et al*. 2004; Moghaddam *et al*. 2012). In addition, the serum testosterone rises at an earlier age in the ram lamb (Chakraborty *et al*. 1989).

In Iraq, Awassi sheep and other local breed are continues breeding animal (Alwahab *et al*., 1982), but the first limiting factor for sexual activity was associated with nutrition and availability of the pasture in late spring and summer (May and Jun) when daylight increasing, where the ewes mated.

The objective of the current first study in the literature of Iraq was to determine effect of autumn (decrease daylight) and winter (increase daylight) seasons on some sexual capacity characteristics of Awassi ram lambs according to short of daylight.

MATERIALS AND METHODS

This study was undertaken at the Ruminant Research Station-Abu Ghraib which belongs to the Directorate of Agricultural Researches during the two periods; autumn (17-24 November) and winter (26 January –3 February) using twelve Awassi ram lambs (aged 12-13 month). Semen was collected using artificial vagina (Evans And Maxwell, 1987), after false mount for increasing libido (Fahey *et al*., 2012).

Immediate examination includes: ejaculate volume by graduated tube, colour, mass activity, individual motility (Walton, 1933), dead spermatozoa percentage (Swanson and Bearden, 1951), abnormal spermatozoa percentage (Hancock, 1951), spermatozoa concentration (Salisbury *et al*., 1943), spermatozoa per ejaculated according for the following equation:

Spermatozoa per ejaculate =Vol. Eja.(ml) × Sperm. concentration.

In addition of pH using special Indicator paper (Ural Yt-U, Germany).

Chemical analysis of seminal plasma includes: triglyceride measurement according the method described by Buccolo and David (1973) by using Kit (Biolabo Company, France), total protein measurement depending on the method described by Green *et al.*, (1982) by using Kit manufactured by Syrbio

Company, Syria, glucose measurement depending on the method described by Cooper (1973) using Kit manufactured by Biomaghreb Company, Spanish, cholesterol examination used the method described by Allain (1974) using Kit produced by Biomaghreb Company, Spanish, ALT and AST examination depending on the method described by Reitman and Frankel (1957) using Kit produced by Syrbio Company, Syria.

To elucidated the testicular development, the testis measurements (Scrotal circumference, Right testes length, left testes length, Right testes diameter and Left testes diameter).

Concentration of serum testosterone and cortisol hormone were determined using ELISA method (Testosterone and cortisol : Monobind Inc., USA). The sensitivity of the testosterone assay was 0.38pg and the intra- and inter assay coefficients of variation was 5.67% and 6.1% respectively. The sensitivity of the cortisol assay was 62.5pg, the intra-assay 6.9% and inter-assay 8%.

Statistical analysis

The data analyzed using according to Completely Randomized Design (CRD), with two groups and 12 replicates, and the differences between means were tested using least significant differences at 0.05.

RESULTS AND DISCUSSTION

Table 1 noticed non-significant effect between autumn and winter in ejaculated volume (ml), semen color, mass activity (%), individual motility (%), dead spermatozoa (%), abnormal spermatozoa (%), spermatozoa concentration /ml $\times 10^9$, total spermatozoa per ejaculate $\times 10^9$ and semen pH, although increase both the ejaculated volume (0.89 ml), mass activity (70.83%), individual motility (75.00 %) and retrogress in life spermatozoa (dead spermatozoa 10 %) in autumn season as compared with Winter season. The increase in dead spermatozoa in autumn may returned to the increasing of pH and mass activity. The relationship between mass activity and both pH and dead spermatozoa was positive. In addition, the correlation between pH and dead spermatozoa was positive (Table 5).

Table 1.Effect of autumn and winter seasons on semen parameters for Awassi ram lambs

Indicator	Season				Significance
	Autumn		Winter		
	X	SE	*X*	SE	
Ejaculated volume (ml)	0.89	0.06	0.76	0.09	N.S
Semen color	3.00	0.00	3.00	0.00	N.S
Mass activity %	70.83	2.74	67.50	0.97	N.S
Individual motility %	75.00	1.95	71.25	0.90	N.S
Dead spermatozoa %	10.00	1.63	4.00	0.86	N.S
abnormal spermatozoa%	2.00	0.62	1.21	0.53	N.S
Spermatozoa concentration (ml $\times 10^9$)	3.53	0.42	4.16	0.30	N.S
Total spermatozoa per ejaculate ($\times 10^9$)	3.16	0.44	3.15	0.49	N.S
Semen pH	6.88	0.06	6.82	0.02	N.S

N.S: No significant.

Tables (2 and 3) revealed non-significant effect between autumn and winter in seminal triglycerides (mg/dl), seminal protein (g/dl), seminal glucose (mg/dl), seminal cholesterol (mg/dl), seminal ALT (IU/L), seminal AST (IU/L), testosterone (ng/mmol) and cortisol concentration (mg/dl). However, the testosterone hormone was increased, while cortisol hormone, ALT and AST were decreased in autumn season .

Table 2.Effect of autumn and winter seasons on some seminal plasma parameters for Awassi ram lambs

Indicator	Season				Significance
	Autumn		Winter		
	X	SE	*X*	SE	
Seminal triglycerides (mg/dl)	65.67	7.03	74.17	7.10	N.S
Seminal protein (g/dl)	20.13	2.46	22.03	1.91	N.S
Seminal glucose (mg/dl)	2.33	0.59	1.92	0.54	N.S
Seminal cholesterol (mg/dl)	32.50	2.92	28.08	2.57	N.S
Seminal ALT (IU/L)	5.78	0.72	7.18	0.73	N.S
Seminal AST (IU/L)	271.31	31.35	275.00	42.32	N.S
Testosterone hormone (ng/mmol)	0.86	0.17	0.74	0.22	N.S
Cortisol hormone (mg/dl)	1.34	0.14	1.47	0.20	N.S

N.S: No significant**.**

Table 3. Effect of autumn and winter seasons on serum testosterone and cortisol hormone for Awassi ram lambs

Hormones	Season				Significance
	Autumn		Winter		
	X	SE	*X*	SE	
Testosterone hormone (ng/mmol)	0.86	0.17	0.74	0.22	N.S
Cortisol hormone (mg/dl)	1.34	0.14	1.47	0.20	N.S

N.S: No significant.

Table 4 displays non-significant effect between autumn and winter seasons in scrotal circumference (cm), right testes length (cm), left testes length (cm), Right testes diameter (cm), Left testes diameter (cm) and Reaction Time (sec.), with preference autumn season in diameter of right and left testes in addition of reaction time as compared with winter season.

Table 4. Effect of autumn and winter seasons on testicular measurements and reaction time in for Awassi ram lambs

Indicator	Season				Significance
	Autumn		Winter		
	X	SE	*X*	SE	
Scrotal circumference (cm)	28.46	0.85	29.17	0.64	N.S
Right testes length (cm)	13.38	0.26	14.00	0.33	N.S
Left testes length (cm)	13.25	0.26	13.71	0.28	N.S
Right testes diameter (cm)	70.33	1.85	68.21	1.47	N.S
Left testes diameter (cm)	69.88	1.44	67.54	1.19	N.S
Reaction time (sec.)	22.59	3.50	27.52	3.64	N.S

N.S: No significant.

In this study, the positive correlation ($P \leq 0.01$) between ejaculated volume with total spermatozoa per ejaculate, mass activity with individual motility ($P \leq 0.01$) and dead spermatozoa ($P \leq 0.05$) was found (Table 5). The relationship was positive between: seminal protein and seminal triglyceride ($P \leq 0.01$), seminal protein with seminal cholesterol ($P \leq 0.05$) as well as seminal cholesterol and seminal AST (Table 6).

Table 5. Correlation Coefficient between semen characteristics, reaction time and scrotal circumference for Awassi ram lambs during autumn and winter seasons

	Ejaculated volume	Mass activity %	Ind. motility %	Dead sperms %	Abn. sperms %	Sperm con.	Total sperm. Per Eja	pH	Reaction Time
Ejaculated volume	1	.103	.034	-.108	-.201	-.032	.697**	-.093	-.070
Mass activity %		1	.567**	.414*	.082	.313	.354	.420*	-.093
Individual motility %			1	.151	.098	.188	.187	.162	-.026
Dead sperms %				1	.259	.013	-.074	.422*	-.124
Abnormal sperms %					1	.128	-.017	.-.031	-.051
Sperm concentration						1	.671**	.154	.198
Total spermatozoa per ejaculated							1	.062	.069
pH								1	-.018
Reaction time									1

** Correlation is significant at the 0.01
* Correlation is significant at the 0.05

Table 6. Correlation Coefficient between serum testosterone, cortisol hormone and some semen biochemical parameter for Awassi ram lambs during autumn and winter seasons

	Testosterone hormone	Cortisol Hormone	Semen triglycerides	Seminal protein	Seminal glucose	Seminal cholesterol	Seminal ALT	Seminal AST
Testosterone hormone	1	-.124	.174	.021	.039	-.156	.155	.081
Cortisol hormone		1	-.156	.125	-.040	-.188	-.044	-.062
Seminal triglycerides			1	.646**	-.015	.312	-.101	.375
Seminal protein				1	.110	.476*	-.042	.413
Seminal glucose					1	.386	.111	.182
Seminal cholesterol						1	.299	.469*
Seminal ALT							1	-.005
Seminal AST								1

** Correlation is significant at the 0.01
* Correlation is significant at the 0.05

Ali and Taha (2012) found that better sexual activity of Awassi rams (adult ram) in Iraq during autumn season, especially in October. Moghaddam *et al.*, (2012) observed the best quality of semen in Iranian crossbreed rams (adult ram) during autumn season.

The current results didn't exhibite the significance effect obviously between all parameters and measurements in spite of some exceptions of these parameters such, increase of ejaculated volume, mass activity, Individual motility and testosterone concentration while cortisol concentration, ALT and AST decrease in autumn as compared with winter season. These parameters is very important as indicators for sexual activity, as well as was the best coefficient of variation in some parameters in autumn season (Table 7), Thus, absences the significant effects (as its progress young rams to the maturity) and coefficient of variance that's may be give a good indicator on sexual behavior of Awassi ram lambs (Although continues breeding animal) in short daylight may be led to select rams of the onset sexual` activity as good rams of flock.

Table 7. Coefficient of variation between autumn and winter seasons in some Parameters for Awassi ram lambs

Indicator	Season	
	Autumn	Winter
	C.V	C.V
Ejaculated volume	21.63	41.63
Mass activity	13.4	4.99
Individual motility	8.99	4.36
Dead sperms	56.52	74.81
Abnormal sperms	107.13	153.27
Sperm concentration	245.44	402.24
Total sperms	205.73	187.56
Reaction Time	186.39	218.32
Testosterone Hormone	147.40	99.30
Cortisol Hormone	281.95	211.27

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تأثير فصلي الخريف والشتاء في بعض صفات السائل المنوي ومقاييس الخصية للحملان العواسية الذكرية

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المستخلص

تهدف الدراسة الحالية للمقارنة بين فصلي الخريف (انخفاض ساعات النهار) والشتاء (ارتفاع ساعات النهار) على بعض الصفات التناسلية لدى الحملان العواسية الذكرية في بداية نشاطها التناسلي لاختيارها ذكوراً لقطعان الأغنام. أُجريت هذه الدراسة في قسم بحوث الثروة الحيوانية/ دائرة البحوث الزراعية/ وزارة الزراعة لموسمي الخريف (17-24 تشرين الثاني) والشتاء (26 كانون أول – 3 شباط) باستخدام حملان عواسية ذكرية بعمر 12-13 شهرا. بينت نتائج الدراسة عدم وجود فروق معنوية في صفات المني وصفات البلازما المنوية وتركيز هرموني التستستيرون والكورتيزول وبعض مقاييس الخصية فضلاً عن وقت تحفيز الذكور. وأظهرت الدراسة وجود معامل ارتباط موجب عالي المعنوية ($P\leq0.01$) بين كلا من حجم القذفة وعدد الحيامن في القذفة الواحدة، الحركة الجماعية والحركة الفردية، البروتينات والدهون الثلاثية في البلازما المنوية فضلاً عن وجود معامل ارتباط موجب ومعنوي ($P\leq0.05$) بين كلا من البروتينات وكلسترول البلازما المنوية والكلسترول مع AST في البلازما المنوية. الاستنتاج من هذه الدراسة هو إمكانية الإفادة من فصل الخريف للتقييم المبكر للحملان الذكرية واختيارها كذكور جيدة لقطعان الأغنام وبالتالي تقليل كلف الإنتاج.

الكلمات المفتاحية: الخريف، الشتاء، حملان عواسية ذكرية، صفات مني.