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EFFECT OF SEASON ON SOME REPRODUCTIVE BEHAVIOURAL CHARACTERISTICS OF AWASSI SHEEP UNDER SUB-TROPICAL MEDITERRANEAN CLIMATIC CONDITIONS

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ABSTRACT

The present study was planned to investigate some reproductive behavioural characteristics in six fat-tailed male, single born Awassi rams. Mating behaviour characteristics were recorded for every two months starting from June for a year. Each ram was arranged to mate with 2 different ewes in similar live weight. The ewes were synchronised for oestrus using progesterone sponges and PMSG. The ewes were checked for oestrus at least three times a day, and were considered to be in heat when they stood for mounting by a teaser. After that, ewe in heat was transferred to another individual unit (5 m x 10 m) for mating with the experimental ram. Each ram was allowed to mate maximum 2 ewes during each joining. The observed behavioural characteristics were sniffing, Flehmen, licking, low-strech, scraping to earth, striking by the front feet to the earth surface, striking by the front feet to the shoulder of ewe. It was concluded that the sexual behavioural characteristics of Awassi sheep differed in different seasons.

Key words: Awassi sheep, seasonal reproductive behaviour characteristics.

INTRODUCTION

In intensive production system, livestock keeping under restricted un natural environment has caused some problems and their solutions cannot be sorted out through investigations on nutrition, body physiology or disease control, but it requires investigations on animal behaviour (Fraser and Broom, 1990). Behaviour is the response of animal to internal and external stimulus. Like other behavioural characteristics, reproductive behaviour also has a great importance to manage a stock unit. Understanding of the basics of reproductive behaviour will therefore eventually improve the reproductive success. Libido develops during puberty and, after maturation, it persists at a fairly constant level for the remainder of the animal's lifespan. Male libido is primarily dependent on the production of testosterone by the testis, but there is genetic variation amongst animals in its extent (Fraser and Broom, 1990).

It is known that breed, nutrition and photoperiod have effect on sexual activity (Delgadillo *et al*., 2004). For sheep, photoperiod is defined as the primary environmental factor controlling seasonal reproduction (Papachristoforou *et al*., 2000; Demirören, 2002).

There are different reproductive behavioural characteristics known courtship components before and during the mating of rams. They include; nosing the perineum, nudging, olfactory reflex, flicking of the tongue, striking out with a forelimb, low-pitched bleat. One of the behavioural components of male sexual display in all hoofed stock except the pig is the "olfactory reflex" known as flehmen. In this reflex, animal fully extends the head and neck, contracts the nares and raises the upper lip while taking shallow respiration.

It is well known that sheep shows oestrus depending on seasons. However, their detailed sexual behaviour throughout a year has not been properly investigated. To the best of our knowledge, the literature is lacking for the seasonal changes in sexual behaviour of rams, including Awassi breed. The aim of the present study is therefore to determine the reproductive behavioural characteristics of Awassi rams for a year under sub-tropic East Mediterranean Climatic conditions.

MATERIALS AND METHODS

The present study was carried out on 6 Awassi rams at Research and Training Farm of Agriculture Faculty of Mustafa Kemal University in Antakya province of Turkey. All ram lambs (45 head) born in February 2004 were reared as male group from May until September. All were used in mating during the September 2005, the natural mating season of the region. Their mating activities and fertility were recorded. Based on their performance in the year 2005, six rams of similar live weight (55±5.2 kg) were selected. Mating behaviour characteristics of the rams were evaluated for every two months beginning from June for one year. Each ram was arranged to mate with 2 different ewes of similar live weight. Rams were allowed to stay together with ewes only during mating in every two months. They were isolated from ewes after mating until next breeding date. Ewes were inserted progesterone sponges 14 days before mating date. After this time period, the sponges were

removed and 500 IU PMSG were injected (Nelis, 1995). The ewes were checked for oestrus at least three times a day, and were considered to be in heat when they stood for mounting by a teaser. After that, ewe in heat was transferred to another individual pen (5 x 10 m^2) for mating with the experimental ram. Each ram was allowed to mate maximum 2 ewes during each joining. The observed behavioural characteristics were sniffing (Sn), Flehmen (Fl), licking (Lc), low-strech (Ls), scraping to earth (Se), striking by the front feet to the earth surface (Sfe), striking by the front feet to the shoulder of ewe (Sfs). These characteristics were expressed as number until mating. Mounting time (sec) is the time interval between ram introduction into heated ewes' pen and jumping on her. Mating time (sec) is the time interval recorded from ram introduction into the pen to the end of copulation. Time intervals between first copulation and second mount (FCSM), and between first and second copulation (FSC) are expressed as seconds. Sniffing means that smelling of ewe sexual organ by ram. The classic head-raised, lip-curling behaviour of the ram as it smells oestrus females is called the Flehmen response.

The experimental ewes and rams were allowed grazing separately during the day time. On return to the sheep house, ewes and rams were fed with 1 kg alfalfa hay and 1.5 kg of concentrate, given in Table 1. This diet was prepared based on the nutritional requirements of small ruminants recommended by NRC (1985). Water was offered to animals *ad libitum*.

Table 1. Composition of the diet given to experimental animals

Ingredients	**%**
Barley (890 g DM, 2937 Kcal ME, 110.4 g CP and 49 g CF kg^{-1})	48
Wheat bran (910 g DM, 2548 Kcal ME, 130 CP and 76 CF kg^{-1})	18
Cotton seed meal (900 g DM, 2025 Kcal ME, 319.5g CP and 129.6 g CF kg^{-1})	22
Alfalfa straw (850 g DM, 1530 Kcal ME, 150g CP and 290 g CF kg^{-1})	10
Salt	1
Vitamin & mineral mixture (obtained from a commercial source)	1
Calculated composition per kg fresh diet	
ME (Kcal)	2467
Dry matter (DM), g	887
Crude protein (CP), g	161
Crude fibre (CF), g	95
Ash, g	64
Ca, g	8
P, g	6
Na, g	7

Statistical analyses between months due to mating behaviour were done using repeated measures analysis and alphabetical order between groups were done by Bonferroni multiple comparison test in SPSS program (SPSS programmes for windows).

RESULTS

Mounting and mating time of rams during different months have been presented in Table 2. The mounting and mating period were different significantly during the months. In February shortest time interval for mounting and mating was recorded.

Table 2. Changing of mounting and mating time (sec) during the year

Traits	**February**	**April**	**June**	**August**	**October**	**December**	***P***
Mounting	24.5 ± 2.2^a	41.0 ± 3.0^b	38.9 ± 2.8^b	42.9 ± 1.9^b	37.9 ± 2.7^b	56.9 ± 1.9^c	P<0.01
Mating	35.6 ± 3.6^a	86.4 ± 3.2^b	71.1 ± 3.1^c	67.2 ± 5.4^c	66.7 ± 5.8^c	99.9 ± 3.8^d	P<0.01

Different superscripts in same row show significant difference

Table 3 indicates the time intervals between first insemination and second mount (FISM) and between first and second insemination (FSI) throughout the experimental year.

Table 3. Time intervals (min) between first insemination and second mount (FISM); between first and second insemination (FSI)

Traits	February	April	June	August	October	December	*P*
FISM	2.42±0.26[a]	4.17±0.22[bc]	3.43±0.16[ab]	4.65±0.23[c]	3.19±0.21[ab]	5.40±0.17[c]	P<0.05
FSI	4.37±0.32[a]	6.35±0.26[bc]	5.67±0.26[ab]	8.01±0.35[c]	5.46±0.27[ab]	7.70±0.18[c]	P<0.05

Different superscripts in same row show significant difference

Table 4 shows the different reproductive behavioural characteristics during the year. As seen these characteristics had differences during the year.

Table 4. Differentiation of the behaviours of rams with same ewe due to first and second mating during the experimental period

Behavioural characteristics	February	April	June	August	October	December
	First mating					
Sniffing	18	18	15	19	14	15
Flehmen	12	15	11	8	12	11
Licking	8	1	4	6	7	4
Low-strech	9	4	10	3	6	5
Scraping to earth	15	19	16	21	19	22
Striking by the front feet to the earth surface	9	11	5	9	9	7
Striking by the front feet to the shoulder of ewe	6	14	7	16	9	19
Ram number	6	6	6	6	6	6
Mating number	12	12	12	12	12	12
	Second mating					
Sniffing	14	17	12	16	11	12
Flehmen	12	10	9	11	10	13
Licking	12	7	4	7	5	4
Low-strech	6	6	12	5	2	5
Scraping to earth	11	16	13	21	16	22
Striking by the front feet to the earth surface	12	15	14	9	14	8
Striking by the front feet to the shoulder of ewe	13	16	20	16	14	19
Ram number	6	6	6	6	6	6
Mating number	12	12	12	12	12	12

Figure 1 shows the first observed behavioural characteristics in each month as a percentage. As seen from the figure, the first showed characteristics were differed by the month.

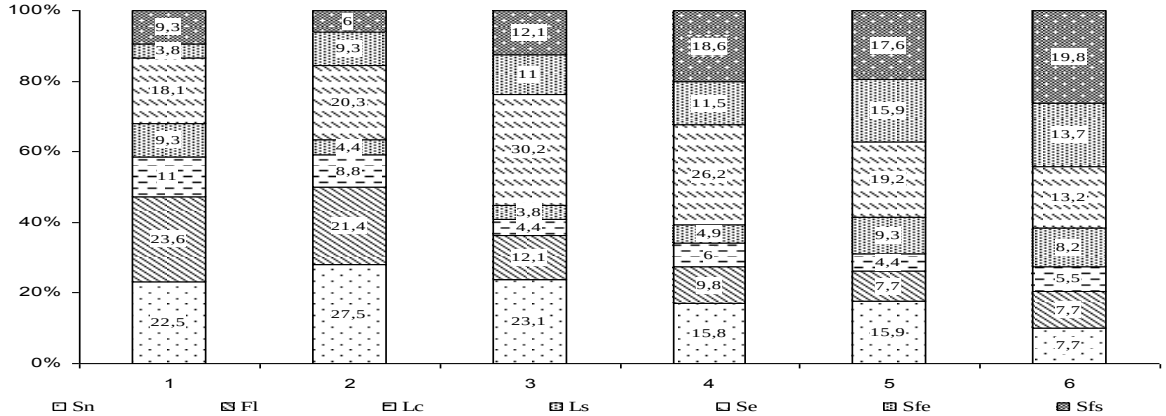

Figure 1. Percentage of first showing behavioural characteristics in each month. The order of behavioural elements are Sn, Fl, Lc, Ls, Se, Sfe and Sfs from bottom to top of the column. The number on x axis shows the months from February to December with two months interval.

DISCUSSION

As seen in Table 2, the mounting and mating time duration were affected significantly by the months. These time durations were minimum in February and maximum in December. The same variations due to the months were observed for the time intervals between first insemination and second mount and between first and second insemination (Table 3). These characteristics could be accepted as an indicator of Libido. Libido is the term which is used to denote sexual drive or the degree of sexual urge of animals. A ram with a high libido will exhibit an eagerness to mount and attempt to breed a ewe (Gill, 2004). Some breeds of rams show libido almost continuously once they reach puberty. In other breeds, there is a marked decline in libido during the non-breeding season. These situations could be arised from the reduction of testosterone hormone level in blood as testosterone is in part responsible for mating behaviour and libido (Türk and Demirci, 2005). As the breeding season approaches and testosterone production increases, the ram will generally become more sexually active.

As seen in Table 4, some behavioural characteristics were affected by the months and between first and second mating during the experimental period. The influence of smelling and seeing on sexual behaviour is obvious when Table 4 and Figure 1 is evaluated together. Smell of females is important factor for mating. As seen in Figure 1, the behaviours related to odour (sniffing, flehmen, licking) has got important proportion compared to all the characteristics in February and April. During the active period due to the oestrus (from June to October), the first seen behavioural characteristics were scraping to earth followed by the striking by the front feet to the shoulder of ewe in August and October. These months are natural breeding periods for Awassi sheep in the region (Kaymakçı and Sönmez, 1992). These differences could be resulted from the odour density of sexual compounds in urine. During natural breeding period, more odour density due to sexual factors in urine could be detected without getting close to ewes and for this reason first sexual behaviour could be different from unbreeding period.

As expected, the sexual behavioural characteristics of Awassi sheep were found to be dependent on seasons. It is known that the breeders are advised to increase the number of rams in out of season breeding. These findings supports the reasons for why the number of ram should be increased for breeding during out of season. This study also serves to fill the gap in the literature on sexual behaviour of Awassi ram throughout a year.

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