

## Effect of ewe breed on the reaction time and semen characteristics in the ram

Kheradmand, A.<sup>1\*</sup> and Babaei, H.<sup>2</sup>

<sup>1</sup>Department of Clinical Sciences, College of Veterinary Medicine, University of Lorestan, Khorram Abad, Iran; <sup>2</sup>Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran

\*Correspondence: A. Kheradmand, Department of Clinical Sciences, College of Veterinary Medicine, University of Lorestan, Khorram Abad, Iran. E-mail: kheradmand\_a@lu.ac.ir

### Summary

The aim of this study was to determine the effect of ewe breed on the reaction time and semen characteristics in the ram. For this purpose, from the native sheep breeds in Iran, seven Lory rams and four ewes (two Lory and two Ghezel breeds) were selected. Seven rams were individually subjected to 4 weekly trials in which one of the following two treatments was applied alternately. All of rams were scheduled twice weekly to introduce with the same (Lory) and different (Ghezel) ewe breed individually. In each session, the reaction time and number of mounts before ejaculation were recorded. At two another sessions per week, sperm evaluation was performed in each group after collection of semen by artificial vagina. When the both breeds of the ram and ewe were the same, the mean of reaction time, number of mounts, ejaculation volume, sperm concentration and sperm viability were 44.6 sec, 2.7, 0.97 ml,  $4.49 \times 10^9$  sperm/ml and 88.9%, respectively and when the breeds were different, the means were 61.5 sec, 2.9, 1.0 ml,  $4.52 \times 10^9$  sperm/ml and 88.4%, respectively. The reaction time was significantly lower in the first group ( $P < 0.01$ ). However, there was no significant difference in the other parameters between the two groups. It was concluded that during semen collection, when the both breeds of the ram and ewe are the same, the reaction time becomes significantly lower, but the number of mounts and semen characteristics (volume, sperm concentration and viability) did not differ.

**Key words:** Ewe breed, Lory ram, Semen characteristics

### Introduction

Reproductive effects of male-female interactions (bio-stimulation) have been widely studied in many species. In particular, bio-stimulation has received special attention in small ruminants because of its possible application in reproductive management (Walkden-Brown *et al.*, 1999). Sexual stimulation refers to techniques used to facilitate sexual performance (Hale and Almquist, 1960). For example, changing the stimulus female has been reported to shorten the reaction time (RT) to ejaculation of males in two consecutive collections in several species (Thiery and Signoret, 1978). Also ewes show a preference for rams of their own breed or for a ram of their particular group, if that group is mixed with other groups of different origin (Arthur *et al.*, 1996).

On the other hand, in sheep, exposing

sexually satiated males to new, unmated and estrous females restores their sexual performance up to 95% of original ejaculation rate (Pepelko and Clegg, 1965). It has been suggested that in the "ram effect program", different breeds of rams may differ in their ability to stimulate ewes (Ax *et al.*, 2000). However, it is unknown whether change in the ewe breed than the ram breed, can affect the reaction time or semen characteristics or not.

The aim of this study was to determine the effect of ewe breed (same and different from the ram breed) on the RT and to compare semen characteristics during collection in two different ewe breeds.

### Materials and Methods

This study was conducted in the farm of Lorestan University (latitude: 33° 29' N, longitude: 48° 22' E, altitude: 1125 m) in

Lorestan province in Iran during the months of January and February (2004). Experiments were performed using seven Lory rams aged between 18 and 21 months and weighing  $68.5 \pm 3.1$  kg and four ewes (two Lory and two Ghezel breeds) that are the native sheep breeds in Iran. The animals were kept separately in individual pens and fed daily hay and concentrate.

The rams were trained for semen collection into an artificial vagina (AV) using the ewes treated with estrogen 1 to 2 days previously (1 mg estradiol benzoate, Aburaihan Pharmaceutical Co., Iran). Four experimental trials were carried out per week with both breeds of ewes (two sessions per week for each breed). During the first session of both groups (on two separate days), all of rams were exposed individually to the same ewe breed (Lory) and in another session exposed to the different ewe breed (Ghezel). Time from introduction of the ram to his first ejaculation (reaction time) and number of mounts before each ejaculation were recorded.

Semen was collected at the second session of each group by AV, which is the most reliable method for laboratory sperm evaluation (Janett *et al.*, 2001). During the semen collection, as the ram mounted the ewe, his penis was gently guided inside the AV with a temperature between 42-45°C (Chemineau *et al.*, 1991).

### Semen examination

Immediately after collection, semen tube was incubated in a water bath at 37°C and sperm evaluation including volume, concentration and viability was determined within 20 min of ejaculation. The sperm concentration was measured using an improved Neubauer haemocytometer counting chamber according to the method of World Health Organization (1992). For determination of sperm viability percentage, sperm staining was performed using eosin 1% and aniline blue 4% (Ax *et al.*, 2000).

### Statistical analysis

Results were analysed using the SPSS version 10. For comparison of the reaction time, number of mounts before ejaculation, semen volume, sperm concentration and

viability between the two groups of ewe breeds, upon evaluation of equality of variances by Levene's test, independent sample t-test was applied (Petrie and Watson, 1999). Data were reported as mean ( $\pm$ SD). Values were considered to be statistically significant at  $p < 0.05$ .

## Results

### Reaction time (RT)

Results show that the RT was between 39-51 sec, as the ewe breed was the same with the ram breed and 55-69 sec, when the ewe breed differed (Table 1). This time was significantly lower in the first group ( $P < 0.01$ ).

### Number of mounts

The mean number of mounts before ejaculation was 2.7 and 2.9, when the ewe breeds were similar and different with the ram breed, respectively. These numbers did not show any significant difference.

### Ejaculate volume

Semen volume in the same and different ewe breed were 0.8-1.1 ml and 0.9-1.2 ml, respectively, which there were no significant difference between groups.

### Sperm concentration and viability

Sperm concentration was  $4.2-4.7 \times 10^9$  and  $4.2-4.8 \times 10^9$  sperm/ml and sperm viability was 88.9 and 88.4%, as the ewe breeds were similar and different with the ram breed, respectively (Table 1).

**Table 1: Mean ( $\pm$ SD) of RT, number of mounts and semen characteristics of Lory rams during collection in the two different ewe breeds**

Parameter	Ewe breed with the ram	
	Same (Lory)	Different (Ghezel)
Reaction time(s)	44.6 $\pm$ 3.75*	61.5 $\pm$ 3.95
No. of mounts	2.7 $\pm$ 0.62	2.9 $\pm$ 0.66
Ejaculate volume (ml)	0.97 $\pm$ 0.08	1.0 $\pm$ 0.08
Sperm concentration ( $\times 10^9$ /ml)	4.49 $\pm$ 0.14	4.52 $\pm$ 0.15
Sperm viability (%)	88.9 $\pm$ 2.1	88.4 $\pm$ 3

\*Significant at  $p < 0.01$

## Discussion

The effect of a new stimulus animal on

the sexual response of males has been documented (Hale and Almquist, 1960; Pepelko and Clegg, 1965; Thiery and Signoret, 1978). But, all of these reports are dependent on some degree of sexual satiation. There are a few studies concerning the effect of different ram breeds on the female stimulus or their reaction time (Ibrahim, 1997; Ax *et al.*, 2000). However, there is no literature pertaining to the effect of changing of ewe breed on the reaction time and number of mounts before ejaculation or semen quality.

Lezama and Orihuela (2001) found that changing the stimulus animal after the first ejaculation had a minimal effect, suggesting that the greater the satiation to a previous stimulus animal, the greater the response to a new estrous female. Also according to study of Prado *et al.*, (2002), the simultaneous presence of two female goats while bucks are collected, reduced the number of mounts performed before the second ejaculation and the latency between ejaculations. However, the number of mounts and RT before the first ejaculation and semen quality did not differ.

In our study, the RT was significantly lower as the ewe breed was the same with the ram than when the ewe breed differed ( $P < 0.01$ ). However, there was no significant difference in the number of mounts before ejaculation between groups. It may be due to the preference of rams to bred with their own ewe breed than the different ewe breed. But in another study, by using of two different breeds of ram (5 local and 5 crossbred rams), the mean of RT for both breeds were  $43.7 \pm 4.4$  sec. The local rams were slightly quicker in response than the crossbred rams, but the difference was not significant (Ibrahim, 1997). However, in our investigation the RT differs from the Ibrahim's study, so that this time was higher (above one min) in the rams exposed to the different ewe breed.

On the other hand, unlike the Ibrahim's study, it has shown that in the "ram effect" program, different breed of rams, may differ in their ability to stimulate ewes. For example, when Dorset rams were used as teasers, 67% of the ewes were bred during the first two weeks of their breeding season, compared to only 34% with Romney rams

(Ax *et al.*, 2000). But in the two above-mentioned studies, there were no discussion about the difference in the ewe breed.

Semen volume and sperm concentration are important variables considered in the most studies of artificial insemination (Ollero *et al.*, 1996). Based on our finding, semen volume, sperm concentration and viability ranged from 0.97 ml,  $4.49 \times 10^9$ , 88.9% and 1.0 ml,  $4.52 \times 10^9$ , 88.4% in the two different ewe breeds that were not statistically significant. Semen volume and sperm concentration are comparable to those reported by Ibrahim (1997) in autumn, who established 0.67 ml and  $4.3 \times 10^9$  sperm/ml. However, most of the ejaculates in the present study had higher volume and similar concentration to those reported by Ibrahim.

In conclusion, our results show that during sperm collection, when the restrained ewe and ram breed are the same, the reaction time becomes significantly lower, however, the number of mounts before ejaculation, semen volume, sperm concentration and viability do not differ.

## Acknowledgements

The authors thank the Research Deputy of Lorestan University for providing the expense of this study.

## References

- 1- Arthur, GH; Noakes, DE; Pearson, H and Parkinson, TJ (1996). *Veterinary reproduction and obstetrics*. 7th. Edn., London, W. B. Saunders Co., PP: 27-28.
- 2- Ax, RL; Dally, MR; Didon, BA; Lenz, RW; Love, CC; Varner, DD; Hafez, B and Bellin, ME (2000). Artificial insemination. In: Hafez, B and Hafez, ESE (Eds.), *Reproduction in farm animals*. (7th. Edn.), Philadelphia, Lea & Febiger. PP: 387-388.
- 3- Chemineau, P; Cagnie, Y; Guerin, Y; Orgeur, P and Vallet, JC (1991). Training manual of artificial insemination in sheep and goats. FAO Animal Production and Health Paper, No. 83. Paris, France.
- 4- Hale, EB and Almquist, JO (1960). Relation of sexual behavior to germ cell output in farm animals. *J. Dairy Sci.*, 43: 145-169.
- 5- Ibrahim, SA (1997). Seasonal variations in semen quality of local and crossbred rams raised in the United Arab Emirates. *Anim.*

- Reprod. Sci., 49(2-3): 161-167.
- 6- Janett, F; Hussy, D; Lischer, C; Hassig, M and Thun, R (2001). Semen characteristics after vasectomy in the ram. *Theriogenology*. 56: 485-491.
  - 7- Lezama, V and Orihuela, A (2001). A note on the effects of libido reestablishment on the semen characteristics of hair sheep rams. In: *Proceeding II Congreso Internacional sobre pequeños ruminantes y camelidos*. Merida Yuc., Mexico.
  - 8- Ollero, M; Muino-Blanco, T; Lopez-Perez, MJ and Cebrian-Perez, JA (1996). Viability of ram spermatozoa in relation to the abstinence period and successive ejaculations. *Int. J. Androl.*, 19: 287-292.
  - 9- Pepelko, EW and Clegg, T (1965). Studies of mating behavior and some factors influencing the sexual response in the male sheep *Ovis aries*. *Anim. Behav.*, 13: 249-257.
  - 10- Petrie, A and Watson, P (1999). *Statistics for veterinary and animal science*. 1st. Edn., London, Blackwell Science. PP: 81-85.
  - 11- Prado, V; Orihuela, A; Lozano, S and Perez-Leon, I (2002). Management of the female stimulus during semen collection and its association with libido re-establishment and semen characteristics of goats. *J. Anim. Sci.*, 80: 1520-1523.
  - 12- Thiery, JC and Signoret, PJ (1978). Effect of changing the teaser ewe on the sexual activity of the ram. *Appl. Anim. Ethol.*, 4: 87-90.
  - 13- Walkden-Brown, SW; Martin, GB and Restall, BJ (1999). Role of male-female interaction in regulating reproduction in sheep and goat. *J. Reprod. Fertil. Suppl.*, 52: 243-257.
  - 14- World Health Organization (1992). *WHO laboratory manual for the examination of human semen and sperm-cervical mucus interaction*. Cambridge, Cambridge University Press. PP: 11-13.