

## Some Factors Affecting Semen Characteristics, Mating and Lambing Performance of Rahmany Rams

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**A**N EXPERIMENT was conducted to study the influence of some mating practices (ram-to-ewe ratio and teasing) and season of mating (autumn vs. spring) on mating and lambing performances of Rahmani sheep. Semen characteristics of the rams were also investigated. Eight rams and 210 ewes were available in each mating season.

Different semen characteristics :ejaculate volume, sperm concentration /ml, directional motility, % of dead sperm cells and abnormal sperm cells were significantly better in the spring than in the autumn season.

Decreasing ram-to-ewe ratio from 1:30 to 1:20 had non-significant effect on different mating performance parameters. The presence of a teaser ram increased, non-significantly, % of ewes served during the first oestrous cycle and over the five weeks of joining, but increased % of ewes reserved.

The wider ram -to-ewe ratio (1:30) significantly ( $P < .05$ ) decreased lambs born/ewe lambing. Other lambing parameters were not significantly affected by mating type.

Autumn mating resulted in a highly significant increase in % of ewes served in both oestrous cycles. More than 81% of ewes were served during the first three weeks of joining in the autumn vs. 72.9% in the spring. Some lambing parameters (ewes conceived/ewe joined, ewes conceived per ewe joined and present at lambing/ewe served) did not show significant seasonal variations. Other parameters (lambs born/ewe lambed and ewes gave multiple births /ewe lambed) were significantly higher in the autumn.

Mating management constitutes the most important single aspect determining the success of reproduction (Von Tonder, 1972).

The results reported in this paper were undertaken with the intention of obtaining information upon the influences of some mating practices *i.e.* ram-to ewe ratio and teasing, on mating and lambing performance of local Rahmani rams. Semen characteristics of the rams were also investigated.

### Material and Methods

The present experiment was carried out at El-Serw Experimental Farm, Animal Production Research Institute, located in North Delta. Eight Rahmani rams, 2-3 years old and 210 Rahmani ewes, 2-6 years old, were derived from the flock in two successive mating seasons, the autumn (September 1975), and the spring (May 1976). One week prior to the mating time, two ejaculates were collected from each ram using artificial vagina, volume of each ejaculate was recorded to the nearest 0.1 ml. Directional motility, number of sperm cells/ml number of abnormal sperm cells, % of dead sperm cells were estimated in a combined sample of the two ejaculates.

In each season, the ewes were randomly allotted to eight groups, each group was given at random one of the eight rams previously tested for semen characteristics. Three types of mating were adopted, one ram/30 ewes (three groups), one ram + teaser /30 ewes, (two groups), one ram/20 ewes (three groups). Each group was continuously kept in a 7x10 meter pen for 35 days (nearly two oestrous cycles) after which the rams were separated from the ewes. Mating performance of each group was studied by estimating number of ewes served/ewe joined in each oestrous cycle, number of ewes reserved/ewe joined and number of ewes served weekly. At lambing time the following parameters were estimated for each mating group or type: ewes conceived/ewe joined, ewes conceived/ewe present at lambing, ewes lambed/ewe served, lambs born/ewe lambed and ewes gave multiple birth/ewe lambed. The flock grazed on Egyptian clover (*Trifolium alexandrinum*) from December till May. During summer and autumn months the animals either grazed crop residuals or were pen-fed on clover hay plus supplements of concentrate mixture (13% digestible protein and 50% starch value). An allowance of 1/4 kg of concentrates was given to each ewe one week before and two weeks during each mating season. An extra amount of 1/3 kg of the concentrate mixture was also provided to each ram two weeks before and throughout the mating season.

Metrological information used were obtained from a neighbouring metrological station.

The data were subjected to analysis of variance (Snedecor and Cochran, 1979) and t-test was carried out to test the significancy of the differences between the mating types.

### Results and Discussion

#### A. Semen characteristics

Semen qualities of the studied rams (Table 1) fall within the range reported other workers for local rams (Hafez *et al.*, 1954, El-Shahidi, 1973; El-Gamal, 1975; and Mohamed, 1978). According to the known indices, semen collected in the two seasons is judged to be of good quality.



Ejaculate volume, sperm cell concentration/ml, directional motility, % abnormal sperm cells, % of dead sperm cells were better in the spring than in the autumn (Table 1). Seasonal differences were statistically significant ( $P < 0.01$ ) for all seminal characteristics studied (Table 2). Seasonal variations in semen qualities of the ram in the sub-tropical region were observed and reported by many authors (Juma and Dessouky, 1969; El-Gamal, 1975 and Mohamed, 1978).

TABLE 1. Physical semen characteristics of Rahmani rams.

Seasons	Volume ml $\times \pm \text{S.E.}$	Sperm cell concentration ( $\times 10^6$ ml) $\times \pm \text{S.E.}$	Directional motility (%) $\times \pm \text{S.E.}$	Abnormal sperm (%) $\times \pm \text{S.E.}$	Dead sperms $\times \pm \text{S.E.}$
Autumn	$0.70 \pm 0.05$	$3.48 \pm 0.08$	$69.5 \pm 3.3$	$8.4 \pm 0.8$	$31.1 \pm 3.4$
Spring	$1.14 \pm 0.11$	$3.80 \pm 0.2$	$80.8 \pm 2.6$	$5.6 \pm 0.6$	$20.8 \pm 2.2$
Overall mean	$0.92 \pm 0.10$	$3.65 \pm 0.05$	$75.1 \pm 3.0$	$7.0 \pm 0.7$	$25.9 \pm 2.8$

TABLE 2. Analysis of variance for semen characteristics.

Source of variation	d.f.	Ejaculate volume (ml)		Sperm cell concentration ( $\times 10^6$ /ml)		Advanced motility %		Abnormal sperm cells %		Dead sperm cells %	
		M.S.	CV%	M.S.	CV%	M.S.	CV%	M.S.	CV%	M.S.	VC%
Between seasons	1	0.77*	46.9	393.8*	46.2	232.1*	42.9	39.8*	47.4	138.8*	32.6
Between animals within seasons	14	0.09	53.9	49.9	53.8	33.1	57.1	4.9	52.6	28.6	67.4

+ Mean Squares      ++ Variance component percent

\*  $P < 0.05$

\*\*  $P < 0.01$

Ambient temperature and day length during spermatogenesis had been reported to be the main climatic factors causing seasonal variations in semen quality (Hafez *et al.*, 1954 and Cupps *et al.*, 1960). They believed that high temperature affects spermatogenesis via sperm migration and pituitary functions. The adverse effect of long photo-period was discussed by Ortavant (1956)

and Fowler (1962). They showed that increasing day length induced degeneration of testicular germ cell. Ambient temperature was 21 and 32° in April and August respectively, *i.e.* one month before semen collection in the spring and the autumn respectively. Day length averaged 12.0 and 13.9 hr during March and July, respectively. The results reported here is supported by the findings of Mohamed (1978) who found that periods of ingest day length were related to the best semen quality of Ossimi and Rahmani rams and *vice-versa*.

Better semen characteristics in the spring season than in the autumn could be attributed to better nutritional conditions during the earlier season. Improved nutrition was reported by Mattner and Braden (1975) to promote semen quality of rams. Individual variations among rams in semen characteristics proved to be high and contributed the highest to the variation in different semen characteristics studied (Table 2). Hafez *et al.* (1954) and El-Gammal (1975) reported also high individual variations in different semen characteristics of indigenous rams.

#### B. Mating performance

The presence of a teaser ram increased % of ewes served in the first oestrous cycle and allover the 35 days of joining. However, higher % of ewes were reserved in teased groups in both seasons (Table 3). It seems that the competition between the teaser and fertile ram on ewes in oestrous did not allow the fertile ram to copulate the ewe in a proper way. However, differences due to teasing failed to attain statistical significance (Table 4). Similar observations were given by Schinckel (1954). Effect of ram to ewe rats was found to differ from one season to another. Decreasing this ratio from 1:30 to 1:20 improved the mating performance parameters in the autumn, but reverse was the case in the spring. However, the differences were light and statistically non-significant.

Percent of ewes served in the first oestrous cycle was higher in the autumn than in the spring and consequently % of ewes served in the second oestrous cycle was less (Table 3). Seasonal differences in both parameters were statistically highly significant where it was intangible and non-significant for other mating performance parameters (Table 4).

For different types of mating, % of ewes served in the autumn reached its peak in the first week of joining. After the second and the third week of joining 65.7 and 81.9% of the ewes were served, respectively (Fig. 1). In the spring, % of ewes served was at its maximum in the third week of joining. After two three weeks of joining only 40.5 and 72.9% respectively of the ewes were served respectively. Oestrus occurrence in local ewes was reported to be more intense in the autumn than in the spring (Mounib *et al.*, 1956; Aboul-Naga, 1977 and Mohamed, 1978). It may be suggested that of autumn mating season is adopted to obtain three lambing crops per two years, the ram could be left with ewes for only three weeks. Interaction between type of mating x season was highly significant for ewes served in the 35 days of joining (Table 4).



TABLE 3. The effect of ram-to-ewe ratio and teaser ram on the mating performance of Rahmani sheep in autumn and spring seasons.

Season	Type of mating	% of ewes served in 1st oestrous cycle	% of ewes served in 2nd oestrous cycle	% of ewes reserved	% of ewes served in 35 days
Autumn	1:30	75.6	11.5	10.0	88.2
	1:30 + teaser	84.7	10.3	15.0	94.9
	1:30	89.9	8.4	5.0	89.3
	Average	83.4	10.1	10.0	93.8
Spring	1:30	62.2	34.5	11.1	96.6
	1:20 + teaser	68.4	31.7	16.7	100.0
	1:20	60.0	25.0	6.7	85.0
	Average	63.5	30.4	11.5	93.9

TABLE 4. Analysis of variance for mating performance traits.

Source of variation	d.f.	No. of ewes served in 1st oestrous cycle	No. of ewes served in 2nd oestrous cycle	No. of ewes reserved	No. of ewes served in 35 days
Type of mating (M)	2	50.2	32.5	151.0	84.5
Season (S)	1	76.38	915.1	1.2	1.8
MXS Interaction	2	64.1	3.0	3.0	432.2**
Error	10	20.6	23.54	38.6	28.2

\*\* $P < 0.01$ 

## C. Lambing performance

The presence of a teaser ram in the mating pen improved different lambing parameters in the spring (Table 5). While in the autumn only fertility parameters, i.e. ewes conceived by ewe/joined or present at lambing and ewe lambing/ewe served, were promoted by using a teaser ram. The decrease in number of ewes assigned to the ram from 30 to 20 ewe improved most of the lambing performance traits considered, especially number of lambs born/ewe lambing.

Type of mating, however, had a non-significant effect on all parameters except lambs born/ewe lambing (Table 6). The t-test showed a non-significant difference between teased and unteased groups and a significant ( $p < 0.05$ ) difference between the two ram-to-ewe ratios. The smaller ram-to-ewe ratio had been reported by Prud-Hon *et al.* (1976) to give higher rate of fertility than the wider ratio.

TABLE 5. The influence of ram-to-ewe ratio and teasing on lambing performance.

Season	Type of mating	Ewe conceived /ewe joined	Parameter		Lambs born/ ewe lambing	Ewes giving multiple births
			Ewe conceived /ewe Present at lambing	Ewe lambed/ ewe served		
Autumn	1:30	0.689	0.732	0.829	1.51	0.482
	1:30 + teaser	0.783	0.811	0.839	1.48	0.479
	1:20	0.783	0.798	0.83	1.161	0.591
	Average	0.752	0.780	0.827	1.56	0.517
Spring	1:30	0.778	0.778	0.804	1.20	0.208
	1:30 + teaser	0.883	0.883	0.883	1.26	0.247
	1:20	0.8766	0.781	0.906	1.39	0.390
	Average	0.809	0.814	0.864	1.28	0.282

TABLE 6. Analysis of variance for lambing performance.

Source of variation	d.f.	Ewes conceived/ ewes joined	Mean squares		Lambs born/ ewes lambing	Ewes giving multiple births
			Ewes/conceived/ewes present at lambing	Ewes lambed/ ewes served		
Type of mating (M)	2	63.66	56.05	37.95	0.428*	143.01
Season (S)	1	56.17	16.91	71.24	1.32**	833.48**
MXS Interaction	2	30.66	17.56	75.09	0.05	12.48
Error	10	22.87	35.39	74.36	0.5	44.

\*  $P < 0.05$ \*\*  $P < 0.01$

The fertility traits were found to be non-significantly better in the spring than in the autumn. This can be attributed to the better semen characteristics of the rams in the spring and to the high number of services performed by these rams in the spring mating as had been recorded by Ashmawy *et al.* (1979). On the other hand, parameters concerning prolificacy were significantly ( $P < 0.01$ ) higher in the autumn than in the spring season. The shorter day length during the autumn may likely increased ovulation rate in the local ewes. Aboul-Naga (Unpublished) recorded similar findings on the local ewes bred three times each two years.

Finally it is worthy mentioned that, the work reported here focused attention on two sources of the reproductive failure in the local sheep. The first occurred at mating time as the proportion of ewes conceived/ewe joined ranged from 0.689 to 0.883, which means a reproductive wastage of 0.117 to 0.311 per ewe joined. The second took place along the course of pregnancy as ewes lambd served ranged from 0.804 to 0.906. Thus the proportion of ewes served and per ewe failed to give birth was 0.094 to 0.196. It should be stated that the mating practices used in this study did not succeed in reducing any of these two sources of reproductive wastage. It may be suggested to carry out further research work on this area of study.

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### بعض العوامل المؤثرة على خصائص السائل المنوي والاداء عند التلقيح وعند الولادة في الكباش الرحمانى

عادل أبو النجا ، جلال الدين محمد عشماوى و سيد محمد الشخلة  
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استخدم 8 كباش ، ٢١٠ نعجة رحمانى فى دراسة عن تأثير بعض أساليب التلقيح ( اختلاف نسبة الذكور الى الاناث ، ووجود الكباش الكشاف من عدمه ) ، وموسم التلقيح ( الخريف مقابل الربيع ) على الاداء عند التلقيح وعند الولادة كما درست خصائص السائل المنوى فى كلا موسمي التلقيح .

كانت جميع خصائص السائل المنوى ( حجم القذف ، تركيز الحيوانات المنوية فى السم ٣ ، الحركة ، النسبية المثوية لكل من الحيوانات المنوية الميتة والفاسدة ) أفضل احصائيا فى الربيع عنها فى الخريف .

من ناحية الاداء التلقيحي : فقد ادى خفض عدد النعاج المخصصة للكباش من ٣٠ الى ٢٠ الى تحسين جميع المؤشرات ( نسبة النعاج الملقحة خلال كل دورة شبق ، وخلال فترة خمسة أسابيع ، النسبة المثوية للنعاج المعاد تلقيحها ) ، الا أن التحسين الناتج فى أى من هذه المؤشرات لم يصل الى مستوى المعنوية احصائيا . كذلك فقد ادى تواجد الكباش الكشاف الى زيادة ( غير معنوية احصائيا ) فى نسبة النعاج الملقحة خلال دورة الشبق الأولى وخلال فترة ٣٥ يوما ، وفى نسبة النعاج المعاد تلقيحها .

من ناحية الاداء عند الولادة : لم يؤد اختلاف عدد النعاج المخصصة للكباش الى تغير معنوى فى أى من المؤشرات التى درست باستثناء عدد الحملان المولودة لكل نعجة ولدت اذ انخفضت معنويا بزيادة نسبة النعاج المخصصة للكباش .

فيما يختص بتأثير الموسم : فقد ادى التلقيح فى الخريف الى زيادات معنوية فى نسبة النعاج الملقحة أثناء كلا من دورتي الشبق كما كان موسم التلقيح أقصر حيث لقحت ٨١٪ من النعاج خلال الثلاث أسابيع الأولى من بداية الموسم مقابل ٧٢.٩٪ لقحت فى الربيع .

لم تحدث تغيرات معنوية راجعة للموسم فى بعض المؤشرات الخاصة بالاداء عند الولادة ( عند النعاج المخصصة عن النعاج الملقحة ، عدد النعاج المخصصة من النعاج المخلوطة والموجودة عند الولادة ، عدد النعاج الوالدة من النعاج الملقحة ) ، بينما كانت بعض المؤشرات الأخرى ( عدد الحملان المولودة لكل نعجة والدة ، عدد النعاج التى أعطيت ولادات توأمية لكل نعجة ولدت ) أفضل معنويا فى الخريف عنها فى الربيع .