Relationship Between Semen Quality and Breeding Performance in Fat Tailed Rams

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To study the semen quality of docked and undocked rams, 36 samples of semen from three docked and three undocked rams were tested during summer and winter months. The normal colour of semen from both groups was milky white in summer as well as in winter. However, the consistency was watery in summer but it was thick creamy during winter. The volume of ejaculate was high during winter and low in summer. The sperm density was significantly higher for docked rams (0.01 level of probability) and progressively increased from early summer to late winter.

The motility rating was significantly higher for the docked group but seasonal variations were significant for both groups. Less number of abnormal and dead sperms was observed in the semen collected from docked rams. There was no significant effect on pH of semen as affected by season. However, the pH was slightly higher in the semen collected from docked rams. The longevity of the spermatozoa was greater for docked rams (significant at 0 01 level of probability). The semen retained motility more than 10 days in winter and not less than seven days in summer. The docked rams covered more ewes during the breeding season. Thus, docking of rams favoured semen quality and breeding performance in fat tailed sheep.

INTRODUCTION

Sheep raising is a profitable enterprise in West Pakistan and fat tailed sheep are among the more popular breeds. Yet, the productive performance of the fat tailed sheep as measured by the percentage lamb crop is lower than other breeds of sheep. The lower conception rate noticed in the fat tailed sheep may result from physical or physiological deficiencies. It could also be caused by the large fat tail which may be a hindrance at the time of mating or cause semen of lower quality. This paper reports an experiment which was conducted during 1964-65 to evaluate semen quality and breeding performance and to determine if the presence of the fat tail has any effect upon semen quality.

REVIEW OF LITERATURE

A good deal of research has been done and much has been learnt about artificial insemination in sheep. Bishop *et al.* (1954), Erb *et al.* (1950), and Margoline *et al.* (1943) have reported that there was a relationship between

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fertility and livability under storage. Other workers reported that the motility of ram spermatozoa can be maintained for several days (Goode and Rudduck, 1948).

Comstock *et al.* (1943) observed a marked seasonal trend in spermatozoal density, percentage of abnormal spermatozoa in Shorpshire and Hampshire rams. Spermatozoal quality was at its lowest during the summer and early autumn months of July and September. Similarly, Maqsood (1951) reported a marked decrease in volume and spermatozoal density, and increase in abnormal spermatozoa and a decrease in libido in Suffolk rams in non-breeding season (Spring and Summer). It has been observed that high temperature affected the quality of semen as well as spermatogenesis.

Moore (1924) and Phillips and Mckenzie (1934) observed that the increased temperature of testis caused seminal degeneration. Insulation of the scrotum or direct application of heat to this organ produced deleterious effects on semen quality. This was supported by Mckenzie and Berliner (1937).

Dutt (1954) found that low conception rate in ewes bred early in the breeding season (August to September) was due principally to failure of fertilization. Later, Dutt and Simpson (1954) and Dutt and Bush (1955) found that the fertility rate in ewes was greatly improved when rams were kept in an air-conditioned room at 45°F. to 48°F. during the summer months. Roussel *et al.* (1964) supported the view that the incandescent light had no effect on the volume and concentration of spermatozoa. There was a reduction in the motility with the increase of temperature and humidity. The percentage of abnormal spermatozoa was also increased. The main effect was on the midpiece which was bent. Long duration of summer days caused decline in semen quality as a consequence of the effect of light.

MATERIALS AND METHODS

Young lambs (6 males and 15 females) of the salt range breed were purchased for the experimental flock. These lambs were nearly uniform in size, age, and body weight. The young lambs were purchased so as to facilitate the docking operation at an early age. The animals were kept under observation until they attained maturity. Thirty-six samples of semen from both docked and undocked rams were tested for semen quality during the experiment.

Semen was collected from the rams of both groups by the use of the electric ejaculator. Observations were recorded for each sample on colour, consistency, volume, concentration, motility, morphology (abnormal sperm percentage) and percentage dead sperm using the methods described by Herman and Madden (1950). The pH was determined using a universal indicator paper. The semen was extended with boiled skimmed milk with streptomycin

and penicillin added at a rate of one gramme each per 100 ml. of extender. The dilution rate was not standard but was varied according to the need for semen. It was never less than 1 to 10 and seldom exceeded 1 to 40.

During the breeding season all the rams and ewes (docked and undocked) were allowed to be in the same pen. Careful observations were recorded about the mating. The purpose of this procedure was to evaluate mating vigour and performance. An evaluation of fertility was made at lambing time.

RESULTS AND DISCUSSION

The results of the experiment would indicate that the docked rams produced a superior quality semen to the rams possessing the fat tail. The normal colour of semen collected from both the groups was milky white or creamy in summer as well as in winter. The consistency was watery in the summer months but it was thick and creamy during the winter. The volume of semen obtained from the docked rams was 1.69 ml. and ranged from 1.17 to 2.17 ml. This was significantly higher than the volume produced by the undocked rams. The average volume of semen produced by this group of rams was 1.46 and ranged from 1.00 to 1.67 ml.

As shown in table 1, it was observed that the sperm concentration of both groups of rams was higher during the winter months than observed in summer months. It was further observed that the docked rams showed significantly higher sperm concentration during the winter months as well as summer months as compared to the undocked rams. However, the sperm density progressively increased from early summer to late winter. Due to early maturity in the month of May, only secretions were obtained and a lack of spermatozoa was noted in both the docked and undocked rams, although the secretions collected from the rams were white in colour and gave the physical appearance of semen.

TABLE 1. *Monthly Mean Value of Sperm Concentration**

Rams	June	July	Nov.	Dec.	Jan.	Means
Docked	121.00	127.33	151.33	165.00	177.67	148.47**
Undocked	100.00	101.67	117.67	121.00	121.33	112.33
Mean:	110.50	114.50	134.50	143.00	149.50	

* Number of spermatozoa x 10,000=sperm concentration per cubic millimeter of semen.
Each figure represents mean of 3 readings in each month.
** Significant at .01 level of probability.

During the month of May the secretions obtained were lacking in spermatozoa although the physical appearance was like semen and whitish in colour.

The observations agree with those obtained by Williams (1947) who observed that a white ejaculate does not necessarily denote the presence of sperm in it. Similarly, Comstock *et al.* (1943) observed a marked seasonal trend in spermatozoal density, percentage of abnormal spermatozoa in Shorpshire and Hampshire rams. Spermatozoal quality was at its lowest during the summer and early autumn months of July and September. The data representing the monthly mean value of motility rating of docked and undocked rams are shown in table 2.

TABLE 2. *Monthly Mean Value of the Motility Rating of Docked and Undocked Rams.**

Rams	June	July	Nov.	Dec.	Jan.	Means
Docked	64.69	60.08	64.69	65.95	64.69	64.02**
Undocked	53.85	51.76	57.86	56.79	56.84	55.42
Mean:	59.27	55.92	61.27	61.37	60.76	

* Each figure represents mean of 3 readings in each month.

** Significant at .01 level of probability.

As is evident from table 2 the motility rating of docked rams was significantly higher than that from the undocked rams. However, the motility was higher during the winter months than the summer for both docked and undocked rams (significant at 0.05 level of probability). The percentage of abnormal sperm was observed to be less in semen of docked rams than that which appeared in the semen of undocked rams. The monthly variations in summer and winter were not significantly different. The docking operation favoured the production of less number of abnormal spermatozoa and ultimately resulted in improved and better semen quality. The percentage of dead sperm of docked and undocked rams was observed to be lower in docked as compared to the semen tested from undocked rams. Percentage of dead spermatozoa was high during the summer (hot season) and was favourably low during winter for the docked rams. It was further observed that there was no significant effect of season on the pH of the semen.

The spermatozoa of docked rams retained their motility more than 10 days during the winter and less than seven days in summer, while the spermatozoa collected from the undocked rams retained their motility for a

shorter time. The difference in longevity of the two groups was significantly different. The results of this experiment agree with the observation of Maqsood (1951).

Breeding Performance

The docked rams appeared to be more vigorous in their sexual activity than the undocked rams. All of the rams were allowed to be in the same pen with 15 ewes and careful notes were made of the mating pattern. A total of 11 ewes were mated by the docked rams while only four were mated by the undocked rams. A total of ten conceptions resulted from the 11 matings of the docked rams but only 2 conceptions resulted from the four matings of the undocked rams. A summary of the results is presented in table 3.

TABLE 3. *Breeding Performance of Docked and Undocked Rams*

Rams	Number of ewes conceived	Number of ewes failed	Total
Docked	10	1	11
Undocked	2	2	4
Total	12	3	15

These results of the breeding performance of the rams on the comparative basis of semen quality agree to those observed by many workers including Dutt (1954).

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