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Short communication

RESISTANCE OF BULL AND BUCK SPERMATOZOA TO COLD SHOCK

Ejaculated spermatozoa are highly sensitive to rapid decline in temperature and this effect is generally known as cold shock. Impairment of membrane integrity demonstrated by the leakage of potassium, adenosine triphosphate, lipoproteins, enzymes and other important intracellular constituents from gametes occur as a result of cold shock (Cupps, 1991).

Cold shock test eliminate all weak and infirm spermatozoa, and hence this test is a better criterion for evaluating a bull than assessment based on either initial motility or live sperm concentration. This can be used as one of the basis for screening and grading of A.I. bulls under field conditions (Tewari *et al*, 1969). The cold shock resisting ability of the bovine semen was found to be positively correlated with the post thaw recovery rate (Sharma *et al.*, 1990).

The rate of cooling is an important factor, influencing the intensity of cold shock, but spermatozoa from all species do not respond in the same manner to cold shock. In addition to species linked differences, there are marked variation in storage and freezability of sperms within species. Hence present work was taken upto assess the effect of cold shock on bull and buck sperms and to study their comparative effects.

Semen samples were collected from three young bulls and bucks, maintained at the AI centre attached to the Department. Samples with good quality on the basis of preliminary evaluation were utilized for the study. Six samples from each animal were collected at regular intervals. Immediately after collection semen smears were prepared using eosin-nigrosin stain for live sperm count. Then 0.5 ml of the semen samples in a 5 ml test tube was placed in a waterbath maintained at 0°C. After each five minutes upto 30 minutes, semen smears were prepared for live sperm count. About 300 to 350 sperms in each smear were counted under oil immersion of microscope to determine the live sperm percentage. The data was subjected to statistical analysis (Snedecor and Cochran, 1967).

The data on the effect of cold shock on ejaculated spermatozoa of bull and buck are given in Table I and II. There was sudden reduction in the live sperm percentage due to cold shock effect for the first five minutes. This was highly significant ($P<0.01$). The rate of reduction was more in buck semen than in bull semen. Susceptibility to cold shock may be related to the lipid composition of spermatozoa (Mann and Mann, 1981). Different semen samples from same animals showed varying ability to withstand cold shock. The capacity of spermatozoa to withstand cold shock was different for bull and buck.

Buck semen with average 91.82 per cent initial live sperm had only 23.80 per cent live sperm after five minutes of cold shock. At the same time, the bull semen with 89.5 per cent initial live sperm had 57.10 per cent live sperm after five minutes. It is clear that buck sperm is more sensitive to cold shock than bull sperm. Bull spermatozoa showed better ability to adjust immediately with cold temperature.

After 30 minutes, of cold shock effect only 2.78 per cent live sperm were noted in buck

semen, whereas bull semen had 16.90 per cent live sperm showing the lowered ability of buck spermatozoa to withstand cold shock. This may be the reason for lower post thaw motility generally noted for buck spermatozoa as compared to bull spermatozoa.

Table 1 Effect of cold shock on buck spermatozoa

Buck No.	Volume (ml)	Consi-stency	Mass activity	Live sperm percentage at 5 min. intervals						
				Initial	5 min.	10 min.	15 min.	20 min.	25 min.	30 min
1474	0.78	Creamy	++++	89.98	47.33	30.68	21.19	11.58	8.68	3.23
1457	0.68	Creamy	++++	92.57	8.39	7.02	5.70	4.95	3.60	2.46
1420	0.65	Creamy	++++	92.91	15.69	10.97	8.65	6.44	4.53	2.66
Average	0.70	Creamy	++++	91.82	23.80	16.22	11.84	7.65	5.60	2.78

Table 2 Effect of cold shock on bull sprmatozoa

Bull No.	Volume (ml)	Consi-stency	Mass activity	Live sperm percentage at 5 min. intervals						
				Initial	5 min.	10 min.	15 min.	20 min.	25 min.	30 min
204	6.00	Thick milky	++++	89.61	62.83	46.90	37.02	32.64	27.63	18.33
1466	4.75	Thick milky	++++	84.56	39.51	29.25	22.89	18.22	13.97	10.50
215	5.83	Thick milky	++++	94.34	68.97	47.08	38.42	30.42	23.61	21.89
Average	5.52	Thick milky	++++	89.50	57.10	41.07	32.77	27.10	21.73	16.90

Summary

There was significant reduction in live sperm percentage after five minutes of cold shock both in bull and buck semen. The reduction was more in buck semen than in bull semen. Different samples from same animals showed varying ability to withstand cold shock. It is presumed that buck spermatozoa are more sensitive to cold shock than bull spermatozoa.

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