IJAR 18(1), 1997; 57-58

Acrosomal Changes during Liquid Preservation of Boar Semen with BTS, KIEV and BI-1 Dilutors*

R.P. PANDEY and B.K. SINGH

Animal Production Research Institute, R.A.U.
Pusa (Samastipur) Bihar.

ABSTRACT

Changes in acrosome morphology of 12 semen samples diluted with BTS, Kiev and BI-1 dilutors and preserved for 0, 24, 48 and 72 hours were evaluated. Highly significant ($P < 0.05$) effect of both hours of preservation and dilutors was noted on the incidence of damaged apical ridge. The percentage of DAR increased significantly at 48 hours of preservation with BTS and Kiev dilutors where as with BI-1 dilutor it increased earlier at 24 hours of preservation. The incidence of missing special ridge was detected at 48 hours of preservation with BTS and Kiev dilutors. Highly significant effect ($P < 0.01$) of both hours of preservation and dilutors was recorded on incidence of loose acrosomal cap at 24, 48 and 72 hours of preservation.

The acrosome and its enzymes play essential role in the penetration and fertilization of mammalion ova (Bedfort, 1968; Stambaugh and Buckkley, 1969) and ultimately affects the breeding effeciency. Significant changes in the acrosomal abnormalities are associated with infertility (Buttle and Hancock, 1965, Saacke *et al.*, 1968). Boender (1968) suggested that the loss of apical ridge occured concomittantly with loss of fertilizing capacity of sperms during in vitro aging. However, in India limited work has been carried out to identify the acrosomal changes during different stages of liquid preservation of boar semen diluted with BTS, Kiev and BI-1 dilutors.

MATERIALS AND METHODS

Smears prepared from freshly diluted as well as preserved semen samples (24, 48 and 72 hours) were evaluated to assess the changes in acrosome morphology. The preserved semen samples were brought at 37°C and then smears were prepared out of them, which were stained with Giemsa according to Watson (1975). Acrosome morphology was classified into four types according to Pursel *et al.*, (1974) which was as follows:

(i) Normal apical ridge (NAR) (ii) Damaged apical ridge (DAR) (iii) Missing apical ridge (MAR) (iv) Loose acrosomal cap (LAC)

RESULTS AND DISCUSSION

The mean value of damaged apical ridge, missing apical ridge and loose acrosomal cap with BS, Kiev and BI-1 dilutors at 0, 24, 48 and 72 hours of preservation, recorded in present study, has been presented in Table - 1. Highly significant effect ($P < 0.01$) of hours of preservation on the occurance of DAR was recorded. The effect of dilutors on the occurance of DAR was non-significant at 0 and 72 hours but had significant effect at 24 and 48 hours of preservation with BL-1 dilutor, Pursel *et al.*, (1974) recorded gradual increase in the percentage of DAR as storage time increased, which corroborates the present finding.

* Part of the thesis, submitted to Birsa Agricultural University for award of Ph.D. degree

The presence of MAR type acrosome with BTS and Kiev dilutors was recorded at 48 hours whereas, with BL-1 dilutor it was observed earlier at 24 hours of preservation. Highly significant effect of hour of preservation on this character was noted but the effect of dilutors was significant only at 48 hours. Pursel *et al.,* (1974) also observed the effect of preservation time on its incidence but only with trisextender.

The percentage of LAC type acrosome did not differ at 0 hour of preservation with the three dilutors, but increased significantly with the advancement of preservation time (Table-1). Dilutor-wise comparision indicated higher incidence of LAC type acrosome at 24 hours with BL-1 as compared to other dilutors. Here it is interesting to note that the occurance of this abnormalty was lower with kiev dilutor at 48 and 72 hours as compared to others but nonsignificant differences between BTS and BL-1 dilutor was recorded. Analysis of variance revealed significant effect of dilutors on the prevalance of LAC at 24, 48 and 72 hours of preservation. Pursel *et al.,* (1974), however, did not find significant increase in the incidence of LAC when he used BL-1 dilutor and studied upto 72 hours of preservation.

Table 1. Mean acrosomal changes during preservation with different dilutors.

Hours of Preser-	Acrosomal changes (%)								
	BTS			Kiev			BL-1		
vation	DAR	MAR	LAC	DAR	MAR	LAC	DAR	MAR	LAC
0 hour	0.583^{Da} ±0.193	0.0	1.250^{Da}1 ±0.279	0.750^{Da} ±0.217	0.0	1.66^{Ba}1 ±0.207	0.666^{Da} ±0.188	0.0	1.000^{Ca}1 ±0.246
24 hours	2.683^{Cb} ±0.287	0.0	2.067^{Cb}1 ±0.355	2.500^{Cb} ±0.230	0.0	1.750^{Bc}1 ±0.278	9.583^{Cb} ±0.656	0.416^{B} ±0.192	4.083^{Ba}1 ±0.228
48 hours	9.583^{Bb}	0.500^{B}	4.583^{Ba}1	$10,416^{Bb}$	0.416^{B}	3.750^{Ab}1	13.916^{Ba}	0.750^{B}	4.66^{Ba}1
72 hours	14.166^{Ab} ±1.168	1.250^{A} ±0.278	5.66^{Ab}1 ±0.395	14.833^{Ab} ±0.726	1.083^{A} ±0.288	4.166^{Ac}1 ±0.297	17.416^{Aa} ±0.596	1.833^{A} ±207	6.166^{Aa}1 ±0.365
Overall	6.604 ±0.916	0.437 ±0.111	3.541 ±0.294	7.125 ±0.870	0.375 ±0.092	2.708 0.228	10.395 ±0.949	0.750 ±0.131	3.979 ±0.302

Values bearing different capital superscripts in a column differ significantly.
Values bearing same small superscript in a row did not differ significantly.

REFERENCES

Bedford, I.M. (1968) Ultrastructural changes in the sperm head during fertilization in the rabbit. Amer. J. Anat., *123:*329

Boender, J. (1968). Morphological changes of the acrosome of boar spermatozoa during aging and cold shock. Proc. 6th Inf. cong. Anim. Reprod. Artif. Insem. *2:* 1217.

Buttle, H.R.L. (1965). Sterile Boars with "Knobhed" spermatozoa. J. Agril. Sci.*65:* 255-260.

Pursel, V.G.; Johnson, L.A. and Schulman, L.L. (1974). Acrosome Morphology of boar spermatozoa during in vitro aging. J. Anim. Sco., 38 *1:* 113-116.

Saacke, R.G., Amanu, R.R. and Marshall, C.E. (1968). Acrosomal cap abnormalities of sperm from sub-fertile bulls, J. Anim. Sci., *27:* 1391.

Stambough, R. and Buckley, J. (1968). Jelentification and subcellular loealization of the enzymes affecting penetraction of zona pellucleda by rabbit spermatozoa. J. Repord. Fertil., *19:* 423.

Watson, P.F. (1975). Use of a ciemsa stan to detect changes in acrosomes of