VITAMIN C LEVELS ON PERCENTAGE SPERM ABNORMALITIES OF CHILLED BULL SEMEN IN CHICKEN AND QUAIL EGG YOLK EXTENDER AT DIFFERENT STORAGE PERIODS

[1*]Achi, J.N., [2]Achi, N.P., Barje, P.P. and [3]Alphonsus, C.
[1]Department of Animal Science, Ahmadu Bello University, Zaria
[2]Dairy Research Programme, National Animal Production Research Institute/Ahmadu Bello University, Shika-Zaria.
[3]Department of Animal Science, Kaduna State University, Kafanchan Campus.
*Corresponding Author: jessicagoje@gmail.com. +2348065611639

Abstract
An experiment was conducted to evaluate Vitamin C levels on percentage sperm abnormalities of chilled bull semen in chicken and quail egg yolk extender at different storage periods. Semen was collected from three bulls between 2 – 3 years of age weekly with the aid of artificial vagina. Extenders were prepared from the egg yolk of chicken and quail and three inclusion levels of Vitamin C (0, 3 and 6mg/ml), respectively. Abnormal spermatozoa percentages were counted using a hand counter, and recorded as ratios. The results shows that the inclusion levels of Vitamin C on chicken and quail egg yolk extender had significant effect ($P<0.05$) on abnormal cells of bull spermatozoa on semen pH at 0, 24, 48 and 72 hours respectively.
Keywords: Bull semen, Friesian x Bunaji, Sperm abnormalities, Vitamin C, Egg yolk.

Introduction

Some techniques of reproductive physiology have been applied to animal breeding for the achievement of faster genetic improvement. These techniques include artificial insemination, oestrus synchronization, induction of multiple ovulation, anti-steroid immunization, long term storage of gametes and embryo transfer (Gordon, 2004). Using Artificial insemination (AI) as the first biotechnology widely implemented in practice is important for selection and breeding of cattle (Gravance *et al*., 2009). The process of AI involves semen collection, evaluation, processing, preservation and final introduction into the genitalia of an oestrous female (Thibier and Wagner, 2002). Semen that has undergone processing with the principle of preservation can be stored in temperatures as low as 5^0C and -196^0C. However, negative changes in sperm membranes in relation to storage time and the extender has been demonstrated (Watson, 2000[b]; Frydrychová *et al*., 2010). The use of chilled (liquid) semen has been said to be a cheap solution to the decline fertility of frozen semen and is more effective and efficient (Sri *et al*., 2012) without the need for liquid nitrogen and the incidence of fertility decline compared to frozen semen (Gadea *et al*., 2004).

Materials and Methods

The study was carried out at the Artificial Insemination Unit of the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika-Zaria, Nigeria. Three (3) Friesian × Bunaji bulls between 2-3 years of age were used for the experiment. The bulls were kept under intensive management system. Semen was collected by means of an artificial vagina weekly from three bulls on each collection day. A dilution rate of 1:4 v/v (semen: diluent) was used. The dilution was done in 5ml boujour bottles. Boujour bottles each containing the diluted semen using the different egg yolk extenders were stored in a refrigerator at 5^0C over a period of 3 days and monitored or evaluated at 0, 24, 48 and 72 hours. Abnormal spermatozoa percentages were counted using a hand counter, and recorded as ratios

Results and Discussion

The non-significant effect of egg yolk type on MPD (Mid piece droplet), DH (Detached head), FT (Free tail), CT (Coiled tail) and BT (Bent tail) of the spermatozoa disagrees with the study of Al-Daraji, (2002) who showed that increase in orange juice as a source of Vitamin C in liquid storage of roosters semen had significantly lower abnormalities (Head, Neck, Tail) than the control group and also agrees with Hu *et al.*

(2010) who reported that increase in supplementation level of Vitamin C up to 6mg/ml decrease the total spermatozoa abnormalities with more normal cells after cryopreservation of bull semen.

Conclusion

It was concluded that supplementation with vitamin C up to 6mg/ml of Friesian x Bunaji semen after cryopreservation for 72 hours maintained sperm quality thereby decreasing abnormalities.

References

Al-Daraji, H.J. (2012). Effect of Diluent Supplementation with Different Levels of Orange Juice on Semen Quality during Liquid Storage of Roosters' Semen. *International Journal of Veterinary Science*, 1(1): 5-9.

Hu, J., Tan, W., and Zhoa X. (2010). The Cryoprotective Effect of Ascorbic Acid Supplementation on Bovine semen Quality. *Animal Reproductive Science*, 12(1):71-72.

Gadea, J., Vasquez, F.G., Matas C., Gardon, J. C., Canovas. S,.and Gumbao D. (2005). Cooling and Freezing Boar Spermatozoa: Supplementation of the Freezing Media with Reduces Gluthatione Preserves Sperm Function. *Journal of Andrology*.6(9):3.

Gordon, I. (2004). Artificial Insemination. In: Gordon, I. (Ed) *Reproductive Technologies in Farm Animals*. Oxfordshire: CABI Publishing, pp 49-81.

Gravance, C. G., Casey, M. E. and Casey, P. J. (2009). Pre-freeze Bull Sperm Head Morphometry Related to Post-Thaw Fertility. *Animal Reproduction Science*, 114: 81-88.

Sri, W., Hermanto,N., Agus, B., and Panji, B. (2012). Effects of Sperm Concentration and Length of Storage at 5^0C on Motility of Goat Spermatozoa. *World Academy of Science, Engineering and Technology*, 66:1099-1101.

Thiebier, M., and Wagner, H.G. (2002).World Statistics for Artificial Insemination in Cattle. *Livestock Production Science*, 74(20): 3-12.

Watson, P.F. (2000[b]). The Causes of Reduced Fertility with Cryopreserved Semen. *Animal Reproduction Science*, 61(4): 81–92.

Table 1: Effect of Vitamin C levels on Percentage Sperm Abnormalities of Chilled Bull semen in Chicken and Quail Egg yolk extender at different Storage Periods.

	ABN	MPD							DH							FT						
ST	E+V(mg/ml)	C0	C3	C6	Q0	Q3	Q6	**LOS**	C0	C3	C6	Q0	Q3	Q6	**LOS**	C0	C3	C6	Q0	Q3	Q6	**LOS**
0		0	0	0	0	0	0	NS	3.0^{b}	5.0^{a}	2.0^{ac}	5.0^{a}	3.0^{b}	3.0^{b}	*	4.0^{b}	5.0	2.0	2.0^{a}	4.0^{b}	4.0^{b}	*
24		0	0	0	0	0	0	NS	4.0^{ab}	6.0^{a}	5.0^{b}	5.0^{b}	5.0^{b}	5.0^{b}	*	6.0	6.0	5.0	4.0^{b}	5.0^{ab}	5.0^{ab}	NS
48		0	0	0	0	0	0	NS	5.0^{c}	7.0^{a}	5.0^{c}	6.0^{b}	5.0^{c}	4.0^{cd}	*	7.0	6.0	6.0	5.0	5.0	5.0	NS
72		0	0	0	0	0	0	NS	5.0^{cd}	9.0^{a}	6.0	8.0^{bc}	6.0^{c}	8.0^{b}	*	7.0	9.0^{a}	7.0^{b}	6.0	6.0	7.0	*
SEM		0.09							0.10							0.68						

^{abcd}Means within the same row with different superscripts are significantly different (P<0.05). SEM - Standard Error of Mean, LOS - Level of Significance, Free Tail - FT, Mid Piece Droplet - MPD, Detached Head - DH. V - Vitamin C, C - Chicken Egg Yolk Extender, Q - Quail Egg Yolk Extender, ST - Storage Times, ABN - Sperm Abnormalities, E – Extenders

Table 1 Continued: Effect of Vitamin C levels on Percentage Sperm Abnormalities of Chilled Bull semen in Chicken and Quail Egg yolk extender at different Storage Periods.

	ABN	CT							BT						
ST	E+V(mg/ml)	C0	C3	C6	Q0	Q3	Q6	**LOS**	C0	C3	C6	Q0	Q3	Q6	**LOS**
0		0.0	0.0	0.0	0.0	0.0	0.0	NS	2.0	2.0	3.0	3.0	2.0	2.0	NS
24		0.0	1.0	0.0	0.0	0.0	0.0	NS	3.0	3.0	4.0	3.0	2.0	3.0	NS
48		1.0	1.0	1.0	0.0	0.0	0.0	NS	3.0	4.0	4.0	5.0	2.0	3.0	NS
72		2.0	1.0	1.0	2.0	0.0	1.0	NS	4.0	4.0	6.0	7.0	3.0	4.0	NS
SEM		0.68							0.64						

SEM - Standard Error of Mean, NS – Not significant, LOS - Level of Significance, Coiled Tail - CT and Bent Tail - BT, ABN - Sperm Abnormalities, E - Extenders, V - Vitamin C, C - Chicken Egg Yolk Extender, Q - Quail Egg Yolk Extender