APRW -13

Effect of Vitamin C Levels in Chicken Egg Yolk Extender on Sperm Motility in Chilled Stored Bull Semen

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Abstract
An experiment was conducted to evaluate the effect of vitamin C levels in chicken egg yolk extender on sperm motility in chilled stored bull semen. Semen was collected from the bull with the aid of artificial vagina and three (3) types of extenders were prepared using chicken egg yolk with each extender divided into three aliquots having 0, 3 and 6 mg/ml Vitamin C levels. Bottles containing the diluted semen using the chicken egg yolk extenders were stored in a refrigerator at 5^{0}C over a period of 3 days and monitored or evaluated at 0, 24, 48 and 72 hours. The result showed that there was a general decline in motility of semen as storage time increases, although samples with 6 mg/ml Vitamin C levels had better results. It can be concluded that adding Vitamin C in chicken egg yolk extender maintained motility of chilled semen even at 72 hours of preservation at 5^{0}C.

Keywords: Semen, bull, Vitamin C, chicken, egg yolk, motility

Introduction

Semen that has undergone processing with the principle of preservation can be stored in temperatures as low as 5^{0}C and -196^{0}C. However, negative changes in sperm membranes in relation to storage time and the extender have been demonstrated (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).

Chicken egg yolk has been used as a basic component of extenders for bull semen since 1939 (Amirat *et al*., 2004) and still remain popular. Although the addition of egg yolk changes the composition of an extender, it's recommended because of the excellent protection, it offers to sperm cells (Celeghini *et al*., 2008). Also, its wide availability (Sugulle *et al*., 2006), beneficial effects on sperm viability as a protectant of the plasma membrane and acrosome against cold shock during chilling or cryopreservation (Amirat *et al*., 2004).

This experiment was conducted to evaluate the effect of vitamin C levels in chicken egg yolk extender on sperm motility in chilled stored bull semen.

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. Semen was collected by means of an artificial vagina. Three (3) types of extenders were prepared using chicken egg yolk with each extender divided into three aliquots having 0, 3 and 6 mg/ml Vitamin C levels. A dilution rate of 1:4 v/v (semen: diluent) was used. The dilution was done in 5ml boujour bottles. Bottles each containing the diluted semen using the different egg yolk extenders were stored in a refrigerator at 5^{0}C over a period of 3 days and evaluated at 0, 24, 48 and 72 hours. The gross motility was estimated immediately semen was collected from the bulls by taking a drop of semen on aglass slide with cover slide under a microscope at 400 × magnifications, mounted on a warm stage maintained at 37^{0}C. A wet semen mount was made using a drop of semen placed on a microscope slide. Gross motility was estimated as percentage score according to the procedure outlined by Zemjanis (1971).

Results and Discussion

Sperm motility showed a general decline with the storage time increasing although, 6 mg/ml of Vitamin C in the extender was better. The result agrees with Hu *et al.* (2010) and Azawi and Hussein (2013) who reported that inclusion of Vitamin C to Awassi ram and bovine semen extender significantly increased motility at the different times of preservation at 5^{o}C while semen extenders without Vitamin C (control) had lower motile sperm cells respectively. Studies have shown that sperm cells are usually exposed to oxygen and visible light radiation during the process at cryopreservation leading to the formation of reactive oxidative species (ROS) also known as free radicals (Aysun, 2009) such as hydroxyl ion, superoxide, lipid peroxides, single oxygen and excess of ROS (reactive oxidative species) impairs motility and capacity of fertilization due to the oxidative stress damage incurred on the sperm cells by free radicals (Bucak *et al.,* 2010). Anti-oxidants such as Vitamin C are agents that break the oxidative chain reaction thereby reducing oxidative stress which leads to the decrease in sperm motility (Bansal and Bilaspuri, 2009). In general, anti-oxidants suppress the formation of ROS hence maintaining sperm motility during cryopreservation (Sikka, 2001).

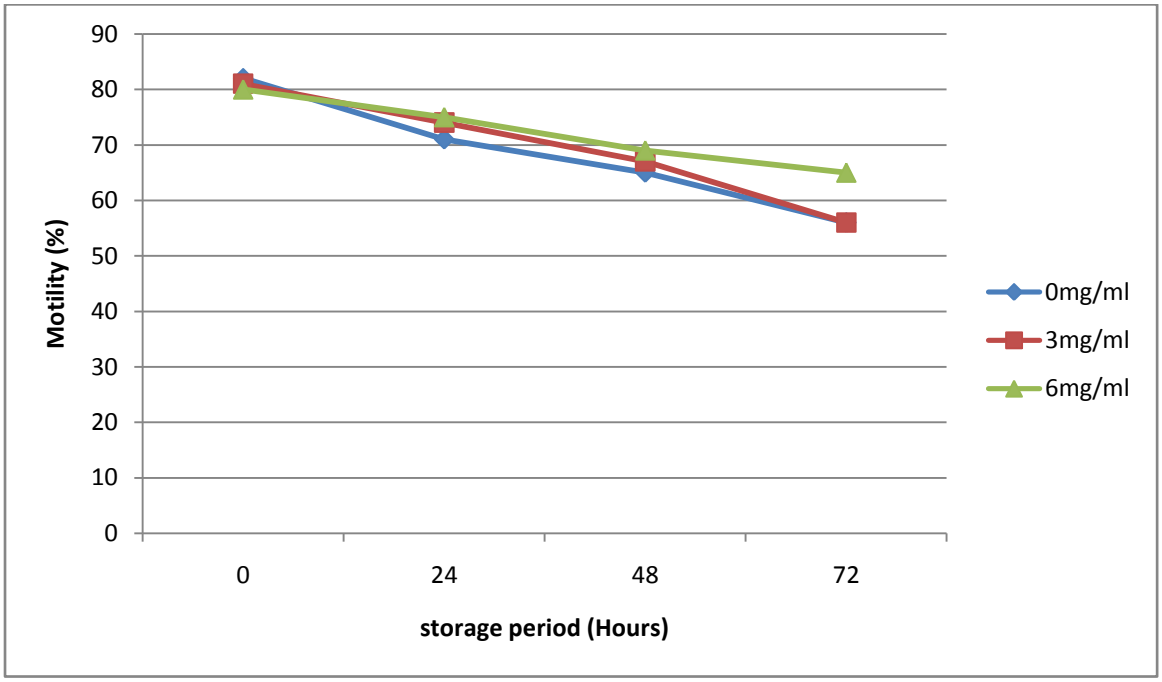

Figure 1: Effect of Vitamin C levels in chicken egg yolk extender on sperm motility in chilled bull semen

Conclusion

It can be concluded from the present study that inclusion of Vitamin C at 6 mg/mlin chicken egg yolk extender maintained bull semen motility over storage time at 5^0C.

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