

Effect of vitamin E and Mn²⁺ on the thiol status of cattle bull spermatozoa under induced oxidative stress

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Abstract :

Ferrous ascorbate – FeAA (FeSO₄ + ascorbic acid) – has been used in the past to induce oxidative stress. In this study, the effects of various doses of vitamin E (1 mM, 2 mM, 2.5 mM) and Mn²⁺ (60 μM, 100 μM, 200 μM) on total thiol (TSH), glutathione reduced (GSH), glutathione oxidized (GSSG), and redox ratio (GSH/GSSG) were determined in the local crossbred cattle bull spermatozoa. Fresh semen was suspended in 2.9% sodium citrate and the suspension was divided into eight equal fractions. All fractions, i.e. control (containing 2.9% sodium citrate + spermatozoa) and experimental, i.e. treated / untreated with ferrous ascorbate (150 μM FeSO₄ : 750 μM ascorbic acid), supplemented / unsupplemented with three doses of vitamin E (1 mM, 2 mM, 2.5 mM) / Mn²⁺ (60 μM, 100 μM, 200 μM) were incubated for 2 h at 37°C. These fractions were used for thiol components assessment. By inducing oxidative stress, FeAA decreased the TSH and GSH levels and GSH / GSSG ratio, but increased the GSSG level. All doses of vitamin E and Mn²⁺ improved the TSH and GSH level and GSH / GSSG ratio, but decreased GSSG level under normal and oxidative stress conditions. It is concluded that oxidative stress treatment (FeAA) decreased (P<0.05) TSH and GSH contents but maintained GSSG concentration and GSH/GSSG ratio unchanged (P>0.05). However, supplementation with vitamin E increased (P<0.05) both the GSH content and GSH/GSSG ratio, but Mn²⁺ increased (P<0.05) the GSH content only.

Key Word :

cattle, Mn²⁺, spermatozoa, thiol, vitamin E

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