

# Effects of stabilising oxidative balance through dietary additives on growth performance, antioxidant metabolites and fertility factors in fast growing, tropically adapted bulls

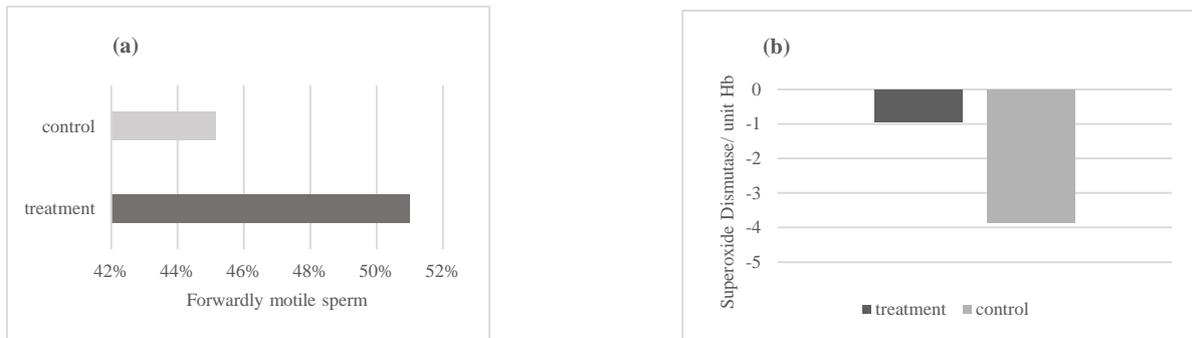
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There is competition among beef cattle seedstock producers to breed, develop and sell progressive genetics. Although performance is highly valued, sale price often reflects subjective purchasing on the superior appearance of the stock at sale. This need to present quality young breeding stock in forward (fat) condition often results in a high performance ration being fed up until point of sale. Energy availability in this growing phase will induce profound changes in sperm production (Martin *et al* 2010). This study aimed to introduce dietary antioxidant aids to fast-growing young breeding bulls and measure the response in antioxidant metabolites Superoxide Dismutase (SOD), Glutathione Peroxidase (GPX), semen quality, quantity and morphology and animal performance. Two hundred and one tropically adapted, breed stabilised Australian stud Droughtmaster bulls were tested for semen morphology 19 days pre-treatment and divided into pen groups. Pens were delineated and averaged by age, initial sperm morphology results and weight for apparent maturity. All bulls were fed a high energy silage-based ration to promote performance parameters and increase condition pre-sale for commercial breeding purposes. Ninety eight of the two hundred and one bulls were fed an additive containing a synthetic antioxidant blend (Agrado Plus<sup>TM</sup> Novus), trace minerals zinc, copper and manganese (as metal methionine hydroxy analogue chelate MMHAC) and selenium as selenised yeast AOX) to support oxidative balance for 59 days before final testing (AOX). Control animals were fed a ration containing standard mineral pre-mix. Results indicated no difference in sperm morphology between the treatments. The percentage of sperm that were forwardly motile under crush-side microscopy was significantly higher in the AOX fed group ( $P < 0.001$  Figure a). SOD per unit Haemoglobin (Hb) was reduced from the original measure in both AOX and control but only a significant ( $P = 0.001$ ) reduction of SOD in control Figure b). GPX per unit protein in semen was maintained in AOX while it tended to reduce ( $P = 0.065$ ) in the treatment group. Rectal temperature increased significantly ( $P = 0.001$ ) for control, and to a lesser degree ( $P = 0.014$ ) with AOX. However, the radiant temperature at the testicular surface increased significantly in control ( $P = 0.008$ ) compared to AOX after the feeding period. Scrotal circumference increased significantly in both groups with a tendency for greater growth in AOX over control ( $P = 0.09$ ).



**Figure 1. Percentage of forwardly motile sperm (a) and change in Superoxide dismutase in blood between control and treatment groups.**

The hypothesis that fast-growing young bulls would encounter oxidative stress was proved significant in both GPX and SOD markers. The dietary addition of exogenous antioxidant and co-factors for endogenous antioxidant activity reduced the magnitude of the oxidative stress. This study allowed further understanding to the likely impacts of feeding high performance rations to breeding stock. The addition of antioxidant agents was able to ameliorate the extent of oxidative stress, however care should be taken not to discount management and nutritional factors that also have a high impact. In a practical sense, the industry relevance might be seen in undesirable fertility outcomes as shown by difference in motility score of sperm under microscopy in bulls fed AOX.

## Reference

Martin GB, Blache D, Miller DW and Vercoe PE (2010) *Animal*. **4:7**, 1214–1226

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