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Effect of nano-encapsulated ginger on the physiological response, oxidative status and hormonal profile of rabbits reared in the tropics

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Application

The nano-encapsulation technology of phytogenic bio-components is a new technology employed to solve the unstability challenge associated with phytonutrients, when used as a phytogenic component generally and in animal studies.

Introduction

Incidence of global warming have resulted into heat stress, adversely affecting animal health and performance. Application of phytogenic bioactive components, such as the ones found in ginger has proven positive, this is because ginger (Zingiber officinale Roscoe) contains gingerols, specifically 6-gingerol, which is an active compound, noted to contain strong antioxidant activity. However, the instability of phytonutrients in the gut necessitated adoption of nanotechnology, incorporated into phytochemistry to ameliorate heat stress and improve animal performance.

Objective

This research was conducted to evaluate the effectiveness of nano-encapsulated ethanolic ginger extract on the physiological response, oxidative status and hormones of rabbit does in the tropics.

Materials and methods

Shade-dried sliced ginger root was blended and extracted with ethanol, following the method by Mounier et al. (2021). Nano-encapsulation was accomplished via El-Desoky et al. (2021) methodology. Sixty-four nulliparous (7-months-old) pure line breeders (New Zealand White Rabbit does), averagely weighing 23 kg, aged between four to six (4–6) months were used. Experimental does were randomly allocated to four treatment groups at 16 does per treatment. Experimental design is as follows; Group 1 received 3 mls of water, Group 2 - 50 mg/kg body weight of non-encapsulated ginger extract in 3 mls of water. Group 3- 10 mg/kg body weight of nano-encapsulated ginger extract in 3 mls of water. Group 4- 25 mg/kg body weight of nano-encapsulated ginger extract in 3 mls of water. Blood was collected via marginal ear vein, serum separated through centrifugation. triodothyronine, tetraiodothyronine and luteinizing hormone were analyzed using commercial solid-phase enzyme immuno-assay kits. All data collected were statistically analysed using One-way analysis of variance (ANOVA) and Descriptive statistical analysis method and mean were separated using Duncan Multiple Range Test.

Results

It was noted that at week 4, respiratory rate, ear temperature, heart rate and rectal temperature (100.25 ± 1.47, 100.44 ± 1.45, 24.66 ± 1.30, and 24.76 ± 1.37) were significantly ($P < 0.05$) lowered in treatment group 4, administered with 25 mg/kg nano-encapsulated ginger, in comparison to other treatment groups. All oxidative parameters evaluated were not significantly influenced by the experimental supplementation of nano-encapsulated ginger. However, 10 mg/kg body weight of nano-encapsulated ginger administration lmproved the luteinizing hormone concentration of test animals under treatment group 3.

Conclusions

10 mg/kg and or 25 mg/kg nano-encapsulated ginger could be administered to rabbits under heat-stress condition to improve performance.

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