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Novel nutritional approaches for reducing oxidative stress triggered by heat stress in dairy cattle

Andra-Sabina Neculai-Valeanu^{1*}, Adina-Mirela Ariton¹, Ioana Porosnicu^{1,3}, Catalina Sanduleanu^{1,2}, Ciprian Radu¹

1 Research and Development Station for Cattle Breeding Dancu, Iași - Ungheni Alley No. 9, 707252, Iași, Romania

2 Faculty of Food and Animal Sciences, Iasi University of Life Sciences, Mihail Sadoveanu Alley No. 3, 700490 Iasi, Romania

3 Faculty of Veterinary Medicine, Iasi University of Life Sciences, Mihail Sadoveanu Alley No. 3, 700490 Iasi, Romania

Abstract: As the Earth's climate keeps getting warmer, the agricultural sector confronts massive challenges in ensuring food security for the world's growing population. Consumer awareness and appetite for animal-origin products have steadily increased in recent years. This reality compels farmers to offer their animals the best possible welfare and breeding circumstances, making effective animal welfare practices in dairy farming a vital matter for animal sciences researchers. This synthesis explores the effects of climate change on dairy cow health and productivity, as well as the potential use of innovative nutritional management approaches, such as the use of nanotechnology-based supplements, in mitigating the oxidative stress triggered by heat stress.

Keywords: dairy cattle; heat stress; nutrition; nanotechnology.

• Introduction

- ❑ Heat stress has a deleterious effect on the animals' productivity, subsequently affecting the farming industry's profitability. Heat stress not only adversely affects the production of meat and milk but also increases mortality and decreases fertility (Nardone et al., 2010).
- ❑ There are three main management approaches that may be employed to mitigate the impact of heat stress: physical adjustment of the environment, optimization of nutritional management and genetic selection of heat resistant breeds

• OXIDATIVE STRESS IN CATTLE

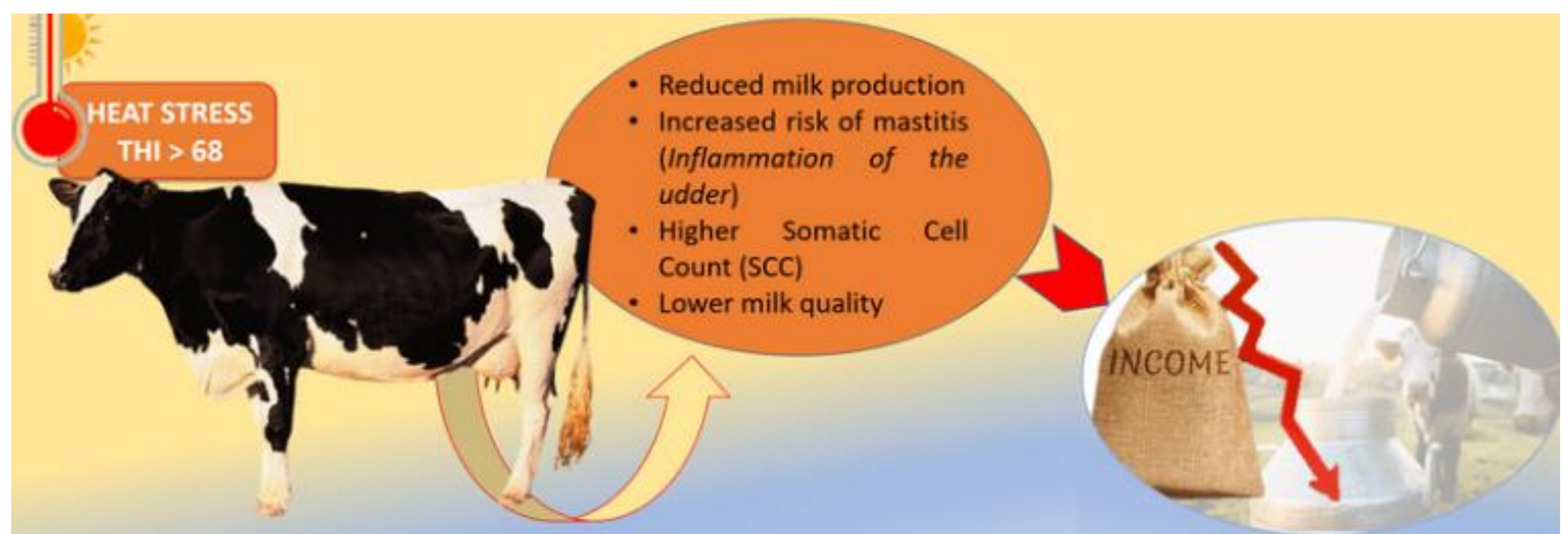
✓ Antioxidant supplements can minimize negative impacts of body condition loss score after calving, and supplementation with Se-vitamin E (SeE) can minimize mastitis, placenta retention, estrus days, and abortion in dairy cows.

• INNOVATIVE NUTRITIONAL MANAGEMENT APPROACHES

- ✓ Nanoparticles may be used for improving livestock digestion and absorption as for the development of novel ingredients or additives, for increased food health and increased quality control.

• Conclusions

- ✓ Dairy cows are more likely to experience an increased oxidative stress levels after parturition, most likely associated with hyperketonemia and higher plasma concentrations of non-esterified fatty acids.
- ✓ Special attention should be given to cows with a high body condition score (BCS), since they are more susceptible of suffering extensive oxidative stress.



Impact of heat stress on cow health