



## KEY WORDS

- ✓ Calf
- ✓ Heat Stress
- ✓ Grape Seed Extract
- ✓ Antioxidant
- ✓ Leptin

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## EFFECT OF GRAPE SEED EXTRACT ON GROWTH PERFORMANCE AND OXIDATIVE STRESS IN HOLSTEIN CALVES UNDER HEAT STRESS

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## THESIS ABSTRACT

The aim of this study was to investigate the effects of grape seed extract (GSE) supplementation on growth performance, antioxidant activity, inflammation, blood metabolites, fecal volatile fatty acids (VFA), hematological and physiological parameters in Holstein calves under heat stress. In the study, 60 Holstein female calves (3 days old) were divided into four similar groups according to live weight ( $40.6 \pm 2.17$  kg) and hair cover. GSE was given orally to the calves with milk daily at doses of 0 (CON, n=15), 25 (GSE1, n=15), 50 (GSE2, n=15) and 100 (GSE3, n=15) mg/kg body weight. Calves were weighed at 15-day intervals to determine weight gain. Blood samples were taken on days 3, 33 and 63, while fecal samples were taken on days 33 and 63 to assess fecal VFA. Rectal temperatures and respiratory rates were measured three days a week. Temperature humidity index (THI) values varied between 73.2 and 87.4 throughout the study, and the study was terminated on day 63. Calves were fed GSE2 had the highest average daily gain (ADG) between days 3-18 and 33-48 of the study, while the GSE3 group had the highest ADG between days 18-33 and 48-63 ( $P<0.01$ ). Moreover, calves were fed GSE3 had the highest feed intake over the entire study period ( $P<0.01$ ). Plasma malondialdehyde (MDA), tumor necrosis factor alpha (TNF- $\alpha$ ) concentrations and respiratory rate were decreased in all groups supplemented with GSE ( $P<0.01$ ). Plasma total antioxidant capacity (TAC) concentration increased ( $P=0.02$ ) in calves were fed GSE3 on day 33 compared to the CON group. Plasma superoxide dismutase (SOD) concentrations increased in calves were fed GSE2 and GSE3 compared to the CON group, while plasma leptin, insulin and cortisol concentrations decreased ( $P<0.01$ ). The hematocrit percentage, hemoglobin value and red blood cells (RBC) count increased in all groups supplemented with GSE ( $P<0.01$ ). In addition, fecal total VFA concentration increased in calves were fed GSE3 ( $P<0.01$ ).

It was concluded that supplementation with 50 mg/kg BW/d GSE could alleviate the effects of heat stress by creating beneficial effects on the health parameters and performances of calves under heat stress.

## APPLICATION AREAS OF THE THESIS RESULTS

Dairy cattle farms calf units  
Feed additive companies  
Companies producing herbal extracts

## COMPANIES PRODUCING HERBAL EXTRACTS ACADEMIC ACTIVITIES

Ürkmez, E., & Biricik, H. (2022). Grape Seed Extract Supplementation in Heat-stressed Prewaning Dairy Calves: I. Effects on Antioxidant Status, Inflammatory Response, Hematological and Physiological parameters. *Animal Feed Science and Technology*, 292, 115421. <https://doi.org/10.1016/j.anifeedsci.2022.115421>.

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