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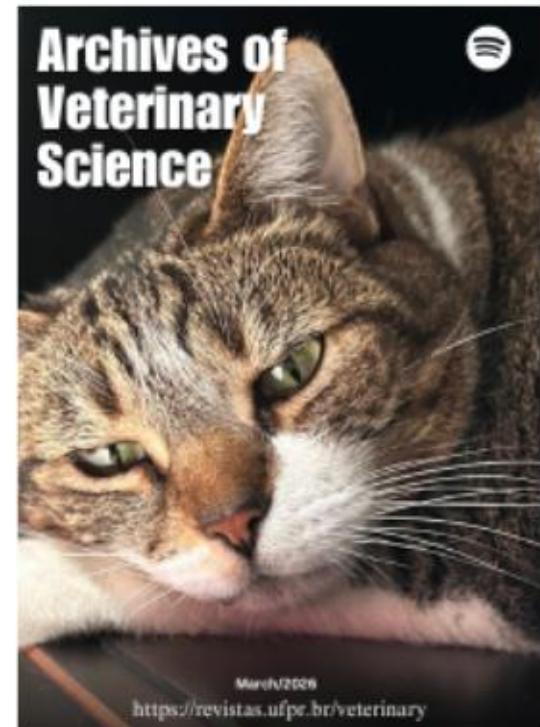
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Dietary supplementation of *Yucca schidigera* and *Gleditsia amorphoides* modulates gut fermentation metabolites, antioxidant status, and inflammatory markers in adult dogs

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Abstract: Saponins are bioactive compounds known for modulating potential inflammatory metabolites produced by the gut microbiome, including ammonia. This study evaluated the effects of the saponin sources, *Yucca schidigera* (7% saponins) and *Gleditsia amorphoides* (21% saponins), on intestinal functionality, antioxidant, and inflammatory markers in adult dogs. Eighteen Beagle dogs (10 males and eight females), with 12.20 ± 1.33 kg body weight were randomly divided into three groups: Control (no saponins), 200 g *Yucca schidigera*/ton of diet (Yucca), and 200 g *Gleditsia amorphoides*/ton of diet (Gleditsia), totaling six replications per treatment. Dogs were fed experimental diets for 20 days. Fresh fecal samples were collected on day 20 to analyze: dry matter, score, pH, ammonia, short-chain fatty acids (SCFA), branched-chain fatty acids (BCFA), and biogenic amines. Blood was also collected on day 20 to analyze inflammatory cytokines, antioxidant enzymes, and liver enzymes. Preliminary results showed that the Gleditsia group had higher fecal propionate concentrations and lower histamine concentrations ($P < 0.05$). Both the Yucca and Gleditsia groups presented lower fecal concentrations of ammonia and spermine than the Control group ($P < 0.05$). Additionally, the Yucca and Gleditsia groups showed lower lipid peroxidation and higher catalase activity, whereas only the Gleditsia group showed lower alkaline phosphatase activity than the Control group ($P < 0.05$). In conclusion, Yucca and Gleditsia can modulate fecal fermentative metabolites and improve the antioxidant status of dogs. These findings also showed the safety of using Yucca and Gleditsia during the experimental period.

Key-words: Ammonia, Propionate, Saponin extracts.

1. Introduction

Saponins, a class of bioactive compounds found in plants, are recognized for their emulsifying properties and modulatory effects on gut microbiome and its metabolites (Zhang et al., 2023). *Yucca schidigera* extract, the most common saponin source in pet food, has demonstrated efficacy in reducing fecal ammonia concentrations and odor in dogs (Dos Reis et al., 2016). However, *Gleditsia amorphoides* has emerged as a promising alternative to yucca due to its higher saponin concentrations (22% vs. 7–15% in yucca) and additional bioactive components, including galactomannans (with prebiotic functions) and polyphenols (with antioxidant activity) (Lu et al., 2024).

Gleditsia amorphoides (Fabaceae family) is a woody species native to temperate and subtropical regions, traditionally valued for its timber and industrial uses (Cerino et al., 2018). Despite its widespread availability and promising properties, only one in vitro study investigating the effects of gleditsia on the modulation of the human fecal microbiome was found (Wang et al., 2023). This study reported a beneficial shift in the fecal microbiome following gleditsia inoculation, characterized by an increase in bacteria with saccharolytic activity and a decrease in those with proteolytic activity. Additionally, functional analysis revealed elevated levels of metabolites linked to antioxidant and anti-inflammatory activities in feces inoculated with gleditsia (Wang et al., 2023). A study investigating the dietary inclusion of a saponin-rich extract (from *Quillaja saponaria*) also observed a significant reduction in fecal proteolytic bacterial populations in dogs (Zhang et al., 2023), thereby supporting the modulatory potential of saponins on the gut microbiome.

Although there is evidence supporting the potential physiological benefits of saponin sources, data on the effects of *Yucca schidigera* and *Gleditsia amorphoides* on gut function and systemic health parameters in dogs remain scarce. To address this knowledge gap, the present study aimed to evaluate the impact of dietary supplementation with *Yucca schidigera* and *Gleditsia amorphoides* on intestinal fermentation metabolites and systemic inflammatory and antioxidant biomarkers in adult dogs.

2. Materials and Methods

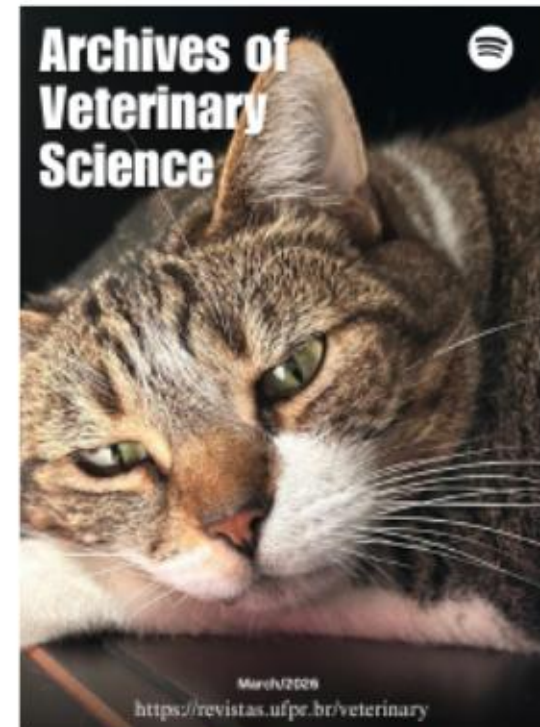
The use of animals for this study was approved by the Ethics Committee on Animal Use of the Agrarian Sciences Sector of the Federal University of Paraná, Curitiba, PR, Brazil, under protocol n°. 013/2024. The study was carried out at the Laboratory of Studies in Canine Nutrition (LENUCAN) in Curitiba, Paraná, Brazil (25° 25' 40" S, 49° 16' 23" W).

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