

Harnessing Alfalfa as a Functional Feed to Combat Fescue Toxicosis and Heat Stress^A

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Research Problem

Alfalfa is commonly used as a nutrient-dense forage in livestock production but also contains polyphenolic compounds that when consumed can confer additional health and production benefits.

Research has demonstrated that supplementation with flavonoid containing legumes (red clover, white clover, soybean) can increase feed efficiency, alleviate fescue toxicosis, and improve thermotolerance in ruminants.

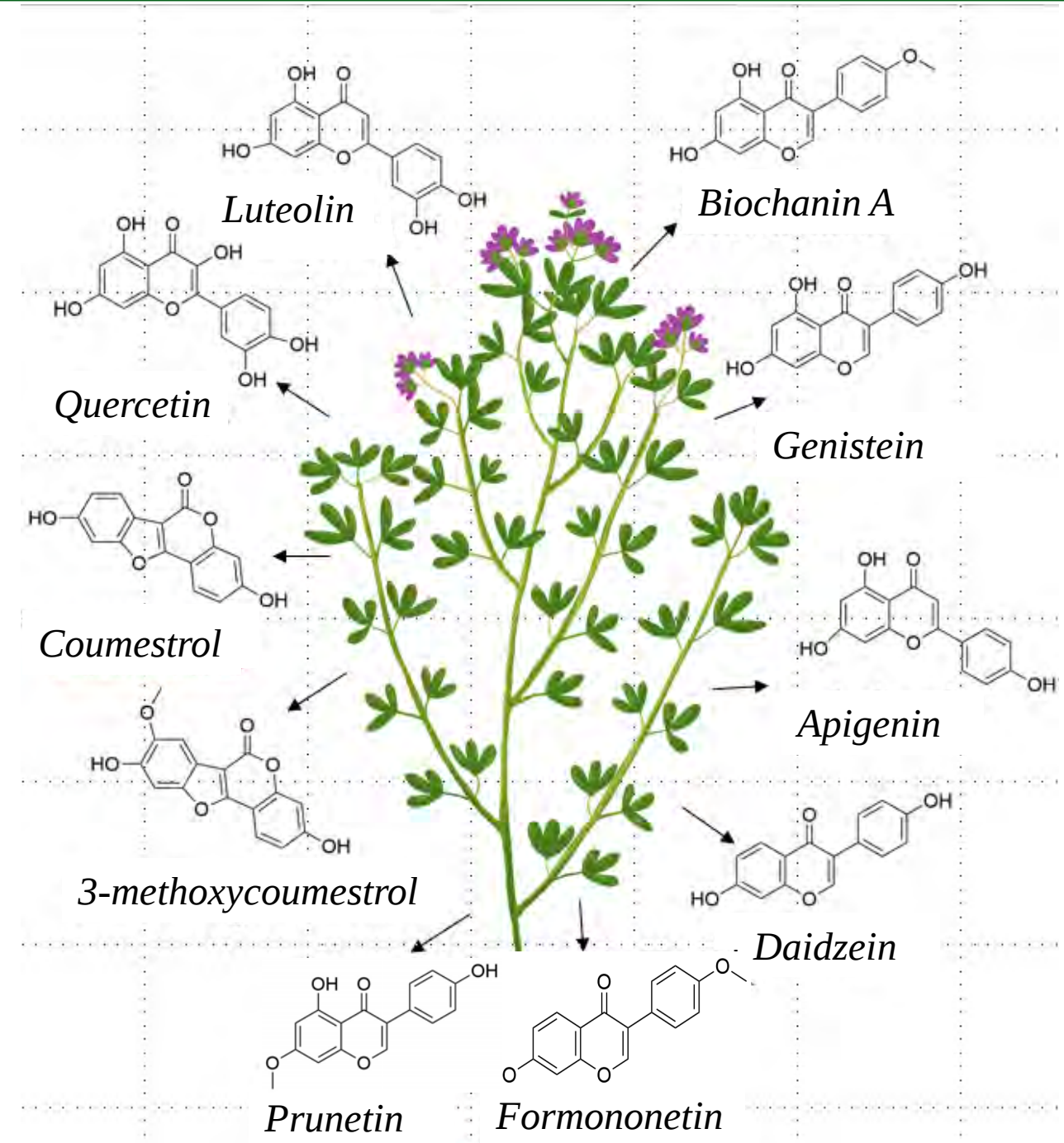
The bioactivity of alfalfa flavonoids and use of alfalfa forage as a functional feed has not been evaluated in beef cattle.

No research has quantified flavonoids and coumestans in United States adapted alfalfa cultivars, aside from a single survey of coumestrol in 1967.

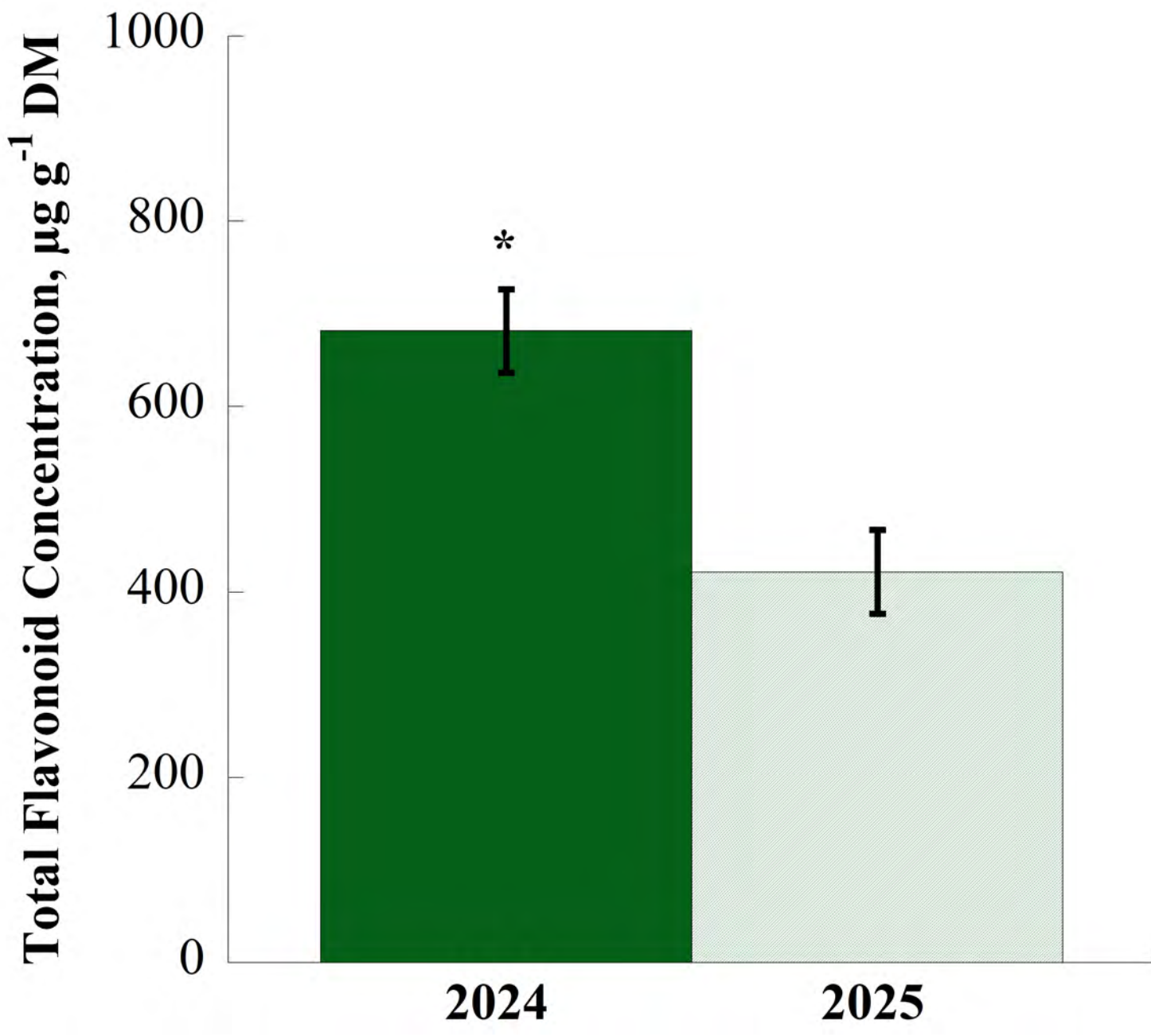
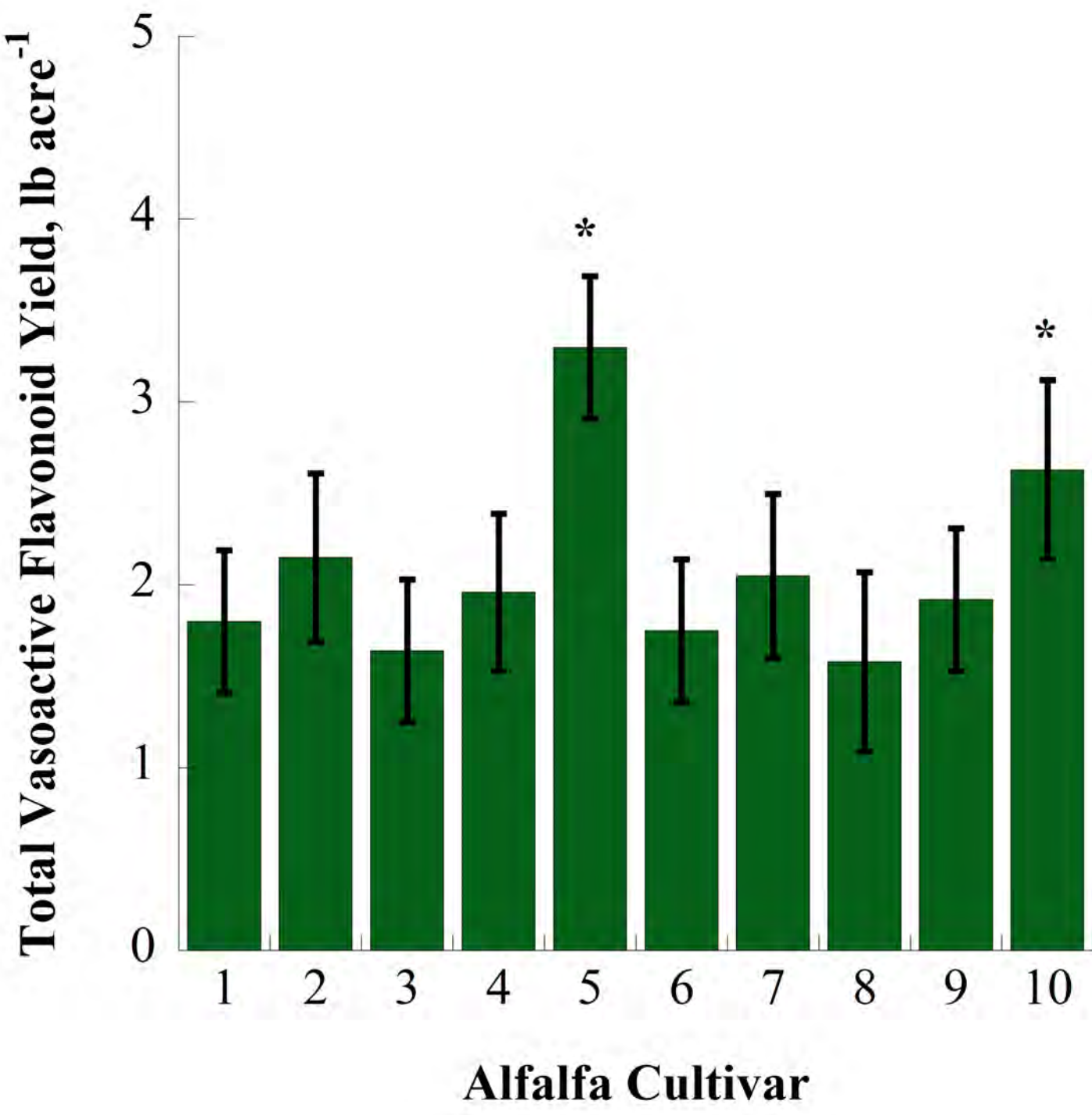
Grant Objectives

- 1) Determine the efficacy of alfalfa isoflavones and flavones in alleviating fescue toxicosis at supplementation levels relevant to alfalfa inclusion in beef feeding systems.
- 2) Characterizing isoflavones, flavones, flavonols, and coumestans in alfalfa varieties adapted to the southeastern United States as well as influences of factors such as stage of maturity and seasonal/environmental impacts on concentrations of these flavonoids.
- 3) Evaluate the application of supplementing alfalfa as a functional feed for prevention of fescue toxicosis and heat stress in beef cattle.
- 4) Conduct outreach to disseminate results of this research and, more generally, information related to the practical application of alfalfa in beef production systems to stakeholders.

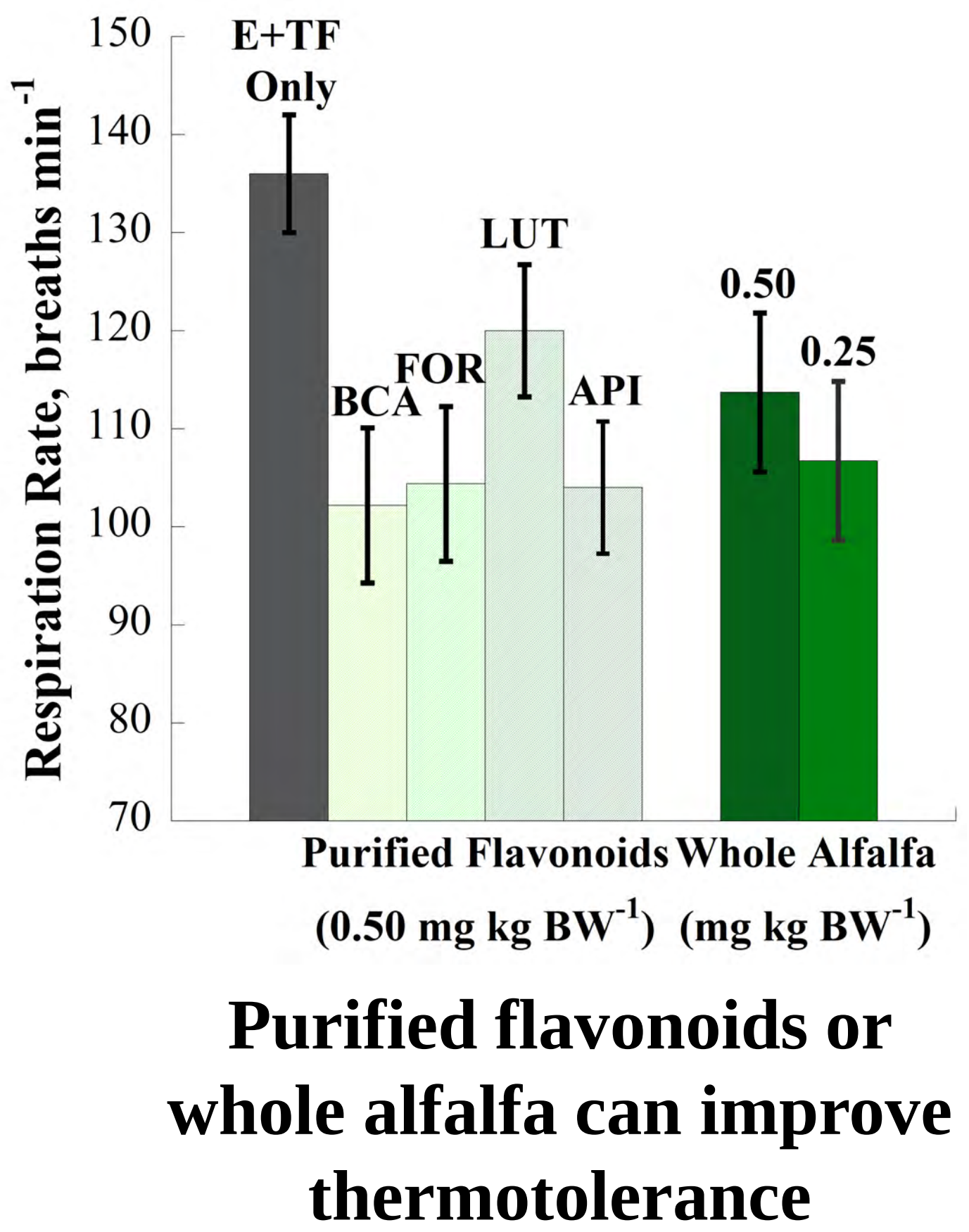
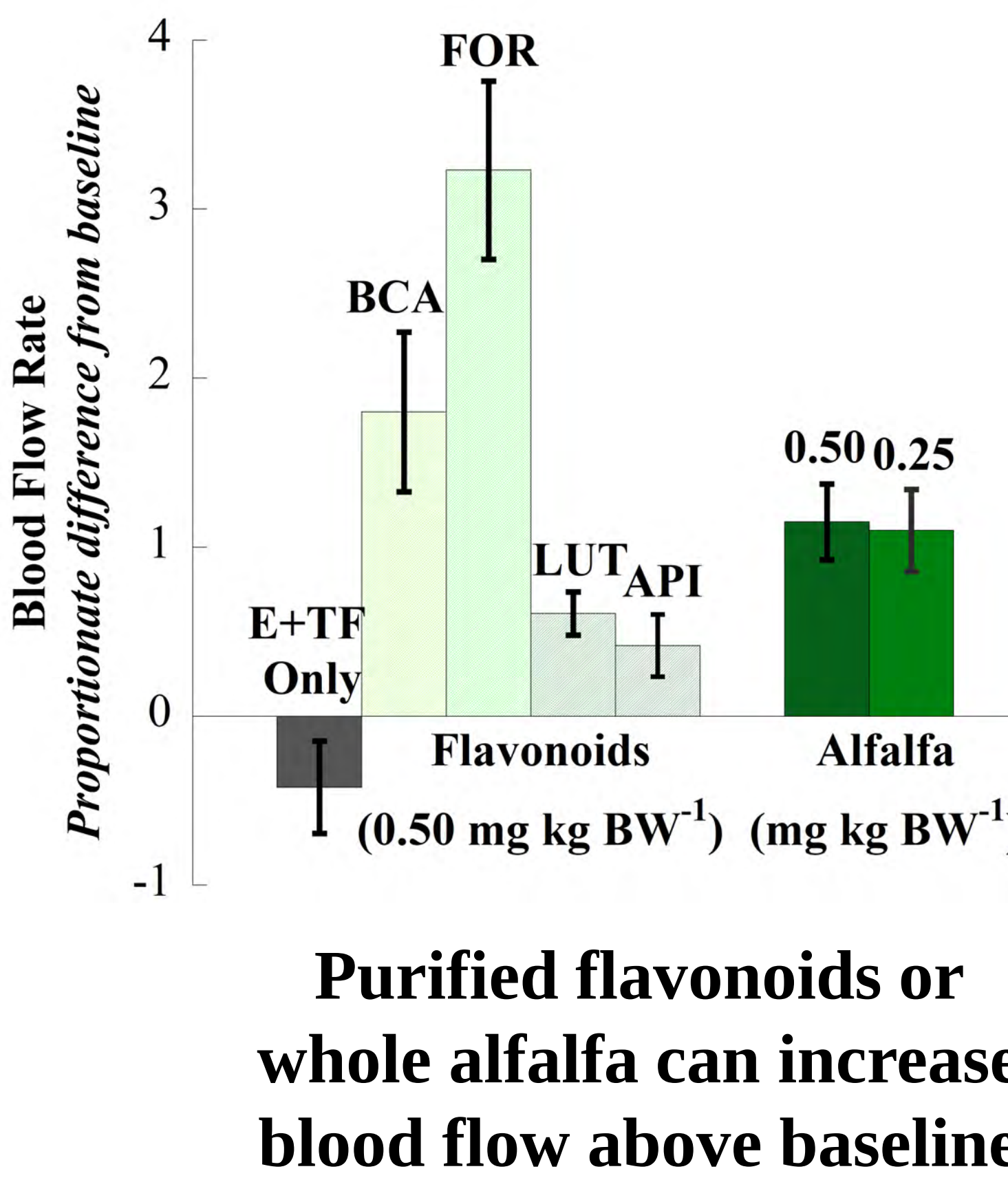
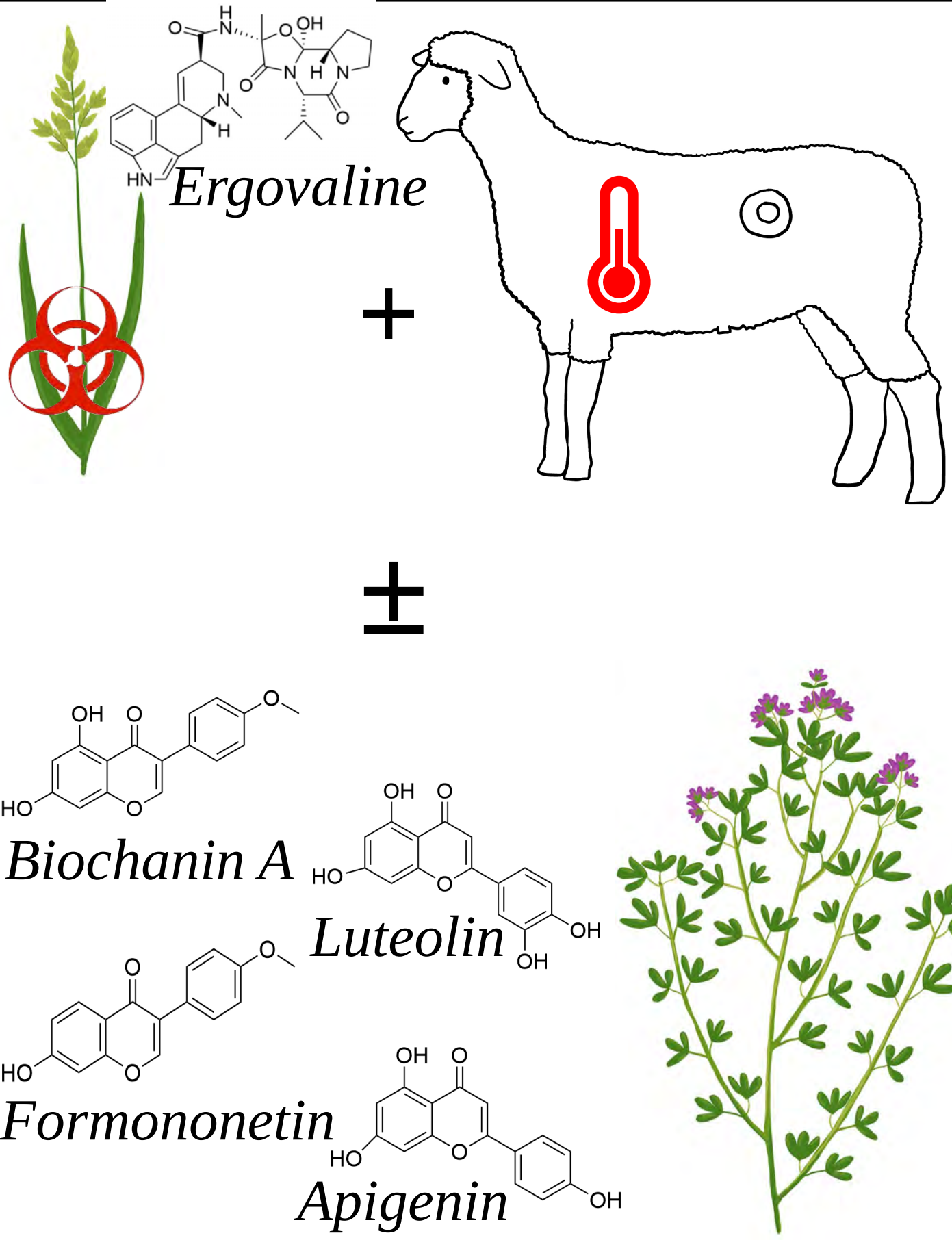
Preliminary Data (Farrell *et al.*^{a,b})



Alfalfa cultivars harvested at University of Kentucky, Spindletop Farm in May 2024 & 2025



Alfalfa Cultivars: 1, Alfabar; 2, Ameristand 428TQ; 3, FSG-527; 4, GA-409; 5, GA-497HD; 6, GA-535; 7, MVS4220Q; 8, Mariner V; 9, Saranac AR (certified); 10, WL3521HQ.



Potential Impact

Profiling flavonoids and coumestans in alfalfa in US adapted alfalfa cultivars will provide critical information necessary for optimizing the use of alfalfa as a source of bioactive flavonoids for both human health and animal health and production applications.

Combined, heat stress and fescue toxicosis represent an estimated \$3.5 billion annual loss to the United States beef industry. The novel use of alfalfa as a functional feed has the potential to benefit animal health and welfare as well as the profitability of livestock and forage production both in the United States and internationally.