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Abstract

Adsorbents for the Sequestration of the *Pimelea* Toxin, Simplexin †

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Abstract: *Pimelea* poisoning affects cattle grazing arid rangelands of Australia, has no known remedy and significant outbreaks can cost the industry $50 million per annum. Poisoning is attributable to consumption of native *Pimelea* plants containing the toxin simplexin. Charcoal, bentonite and other adsorbents are currently used by the livestock industry to mitigate the effects of mycotoxins. The efficacy of such adsorbents to mitigate *Pimelea* poisoning warrants investigation. Through a series of *in vitro* experiments, different adsorbents were evaluated for their effectiveness to bind simplexin using a simple single concentration, dispersive adsorbent rapid screening method. Initial experiments were conducted in a rumen fluid based medium, with increasing quantities of each adsorbent: sodium bentonite (Trufeed®, Sibelco Australia), biochar (Nutralick®Australia) and Elitox® (Impextraco, Belgium). Data showed the unbound concentration of simplexin decreased with increasing quantities of each adsorbent tested. Sodium bentonite performed best, removing ~95% simplexin at 12 mg/mL. A second experiment using a single amount of adsorbent included two additional adsorbents: calcium bentonite (Bentonite Resources, Australia) and a synthetic adsorbent (Waters, USA). The concentration of simplexin remaining in the solution after 1 h, the amount able to be desorbed off the adsorbent-toxin matrix with replacement fresh fluid, and the amount remaining bound to the adsorbent were measured. All samples containing an adsorbent were statistically different compared to the blank ($p < 0.05$), indicating some binding activity. Future work will explore the binding mechanisms and behaviour of the toxin-adsorbent complex in the lower gastrointestinal tract.

Keywords: *Pimelea* poisoning; adsorbents; *in vitro*; toxin sequestration

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