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Evaluating natural alternatives as hypothetical nutraceuticals against gastrointestinal parasites in lactating Goats

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Gastrointestinal parasite burden on goats translates into high production losses due to inadequate growth and poor milk production. These parasites are also responsible for higher mortality rates when facing high infestations levels or, more frequently, in kids. During the last decades, effective anti-helminthic compounds controlled such situations. However, the approach to such problem shifted and marked animal production systems from the eighties onwards. Drugs used for treatment of severe situations started to be administered as prophylaxis at frequent time intervals. Initially, such switch had an enormous success as it allowed an unforeseen growth and intensification of animal production at a relative low cost. Later, the onset of the first anti-helminthic resistance was bypassed by new molecule research and synthesis. Notwithstanding, presently, resistance to the most recent anti-helminthics, macrocyclic lactones and monepantel, are reported at distinct regions of the globe, even though some countries have not yet approved the latter, as the US. Clinicians are now facing a new threat as we are on the verge to lose the molecules we use to treat. Furthermore, resistance also poses as a public health threat not only for the risks implied specially for soil-transmitted helminthes subjected to the pharmaceutical compounds excreted by animal feces, but also by the environmental contamination only recently being consciously addressed.

In order to surpass such threats, new natural alternatives must be further investigated. At the present work, we evaluated the effect of two distinct condensed tannin (CT) plant extracts – *Cistus ladanifer* L. (Rockrose, Esteva in Portuguese) and *Schinopsis lorentzii* (Quebracho) on gastrointestinal parasites in lactating goats. Eighteen Serpentina goats were individually housed and randomly assigned to one of three diets (control – without CT; Ci – with *C. ladanifer* extract; Sc – with *S. lorentzii* extract). In both diets with CT extracts, 20 g/head of CT were supplied daily. Individual stool collections were sampled before dietary treatment application (day 0), at the end of the adaptation period of diets (day 14), and at days 21, 28 and 35 of the trial. Coprological analysis included concentration McMaster technique for egg count (Epg) and Willis fluctuation assay for microscopic observation.

Data was analyzed using a generalized linear mixed model procedure that identified a significant interaction of treatment groups over time regarding the strongylid Epg count ($Chi2 = 1355.6$, $p \leq 0.001$), through the Gauss-Hermite quadrature parameter estimation method. Pairwise contrast tests, with the Holm adjustment method, showed that both Ci ($Chi2 = 148.1$, $p < 0.0001$) and Sc ($Chi2 = 962.3$, $p < 0.0001$) treatments resulted in significantly lower Epg counts of strongylids over time when compared to the control group. The Sc group also presented a significantly lower Epg counts of strongylids over time when compared to the Ci group ($Chi2 = 1054.8$, $p < 0.0001$).

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