



THE USE OF POLYETHYLENOGLICOL TO REDUCE THE ANTI-NUTRITIONAL EFFECTS OF TANNINS IN *CISTUS LADANIFER* L.

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Abstract: *Cistus ladanifer* L., (rockrose) is one of the most abundant shrub species, occurring extreme in extensive and dense areas from north to south Portugal. Although widely available all the year *C. Ladanifer* is little grazed due to their low feed value attributed to the high tannin content. In order to use *C. Ladanifer* as ruminant feed an *in vitro* and an *in situ* study were carried out 1) to evaluate the impact of tannins on the ruminal degradability and fermentation characteristics and 2) to remove the anti-nutritional effects of tannins using polyethylenoglicol as additive. Aerial parts of *C. Ladanifer* plants (leaves and soft stems) were harvested in March, freeze dried and divided in 4 subsamples which were treated with 0 (R0), 25 (R25), 50 (R50) and 75g (R75) of PEG_{20,000}/kg of dry matter (DM). The mixtures were analyzed for dry matter, ash, total N, sugar and starch, neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL), minerals (Ca, Na, K and Mg), phenolic compounds (total phenols (TP), total tannins (TT), and condensed tannins (CT) and for *in vitro* organic matter digestibility (IVOMD). The four treatments were compared in terms of *in situ* organic matter and N rumen degradability using three rumen-cannulated rams and in terms of ruminal fermentation characteristics (volatile fatty acids (VFA) and gas production) using Rumen Simulation Technique (RUSITEC). With PEG inclusion the levels of TP, TT and CT decreased while the IVOMD increased. The effective degradability of the OM and N increased with PEG due to an increase of the rate of degradation "c" (P= 0.0002 and P= 0.0355, respectively for OM and N). The maximum degradability was obtained with 5% of PEG in DM. Also the gas production and the total and individual VFA improved with PEG inclusion. The obtained results confirm the negative effect of tannins on *C.Ladanifer* ruminal degradation and fermentation. The PEG treatment seems to be a good approach to neutralize *C.Ladanifer* tannins allowing a better utilization of this shrub by ruminants. The addition of 5% of PEG to *C.Ladanifer* appears to be adequate to prevent negative effects of rockrose tannins, however *in vivo* studies must be conducted to confirm the required amount of PEG to neutralize the adverse effects of tannins.

Keywords: *Cistus Ladanifer* L. tannins, polyethylene glycol (PEG), degradability, rumen fermentation.