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“Filling gaps and removing traps  
for sustainable resource management”

## Replacement of Egyptian Clover (*Trifolium alexandrinum*) Hay with Tanniniferous Legumes in Sheep Diets: Nutritional Assessment

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### Abstract

In Egypt, a large diversity of tanniniferous legumes are widely grown in abundance all year even during droughts. Thus, the objectives of this study were to assess the partial (50%) replacement of Egyptian clover (*Trifolium alexandrinum*) hay with tanniniferous legumes under *in vitro* and *in vivo* conditions. Dietary treatments were as follows: CTL: the experimental basal diet (clover hay and concentrate; 50:50 ratio) as control; AS, the basal diet with 50% *Acacia saligna* replaced clover hay; LL, the basal diet with 50% *Leucaena leucocephala* replaced clover hay; and AH, the basal diet with 50% *Atriplex halimus* replaced clover hay. An *in vitro* semi-automatic system was employed to evaluate gas production (GP), degradability and fermentation profile of diets. For the *in vivo* experiment, twelve Barki rams (43.29 kg of BW) were assigned to 1 of 3 treatments in a complete randomised design and housed in metabolic cages for total collection of faeces and urine (21 days as adaptation and 7 days for data collection). Enteric CH<sub>4</sub> emission was measured using 6 open-circuit respiration chambers with some modifications. The net GP was lower ( $p = 0.022$ ) with the AS diet than with CTL, LL and AH diets. Whereas, net CH<sub>4</sub>, truly degraded organic matter, ruminal NH<sub>3</sub>-N concentrations and total protozoa were decreased ( $p < 0.05$ ) with AS, LL and AH diets than for CTL diet. Acetate and acetate:propionate ratio were lower, while propionate and partitioning factor were increased with AS or LL than with CTL diet ( $p < 0.05$ ). Sheep fed with LL diet lowered digestibility of OM ( $p < 0.05$ ) compared with those fed with CTL or AS diets. Urinary-N was decreased, while faecal N and retained N was increased ( $p < 0.05$ ) for sheep fed with AS or LL compared to CTL diet. Methane emission was higher ( $p = 0.021$ ) from sheep fed with AS or LL than for those fed with CTL diet. Thus, use of such tanniniferous legumes provides a promising source of forages for sheep with positive impact on mitigation of methane emission without adverse effects on animal performance.

**Keywords:** Feed degradability, methane emission, nutrients digestibility