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# Effects of Tropical Legume Hays on Intake and Average Daily Gain of Ruminants: A Quantitative Review

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## Abstract

Several studies have been conducted to evaluate the effects of feeding tropical legume hays to ruminants, highlighting an advantage over feeding tropical grass hays. However, the results of most of these studies are confounded by an increased crude protein (CP) supply associated with replacing grasses by legumes. It is therefore difficult to assess the effects of feeding tropical legume hays exclusive from the changes in CP in the diet. Thus, a quantitative review was performed with the aim of collecting information concerning the nutritive value of diets containing tropical legume hays and the corresponding animal responses. The studies were attained through systematic web searches (i.e. Scopus, Google Scholar, Scielo), it had to be conducted under tropical or subtropical environments and had to include information on the proportion of legume in diets and the diet composition. A database with 233 studies (111 with sheep, 75 with goats, and 47 with cattle) consisted of 1083 dietary treatments including legumes and 207 diets without legumes were found reporting results on 97 legumes species. The most common tropical legume hays tested were *Leucaena leucocephala*, *Gliricidia sepium*, *Sesbania sesban*, *Calliandra calothyrsus*, and *Stylosanthes guianensis*. The most common ranges at which tropical legume hays were included in animal diets were 100–300 g $kg^{-1}$ dry matter (DM; 39 % of treatments), followed by 300–500 g $kg^{-1}$ DM (28 % of treatments).

Diets with legumes had higher CP concentration than diets without legumes for all ruminant species (average±standard deviation; 127±53.4, 139±48.1, and 171±152.5 g $kg^{-1}$DM vs. 97±63.1, 103±54.1, and 139±114.7 g $kg^{-1}$ DM for sheep, goats, and cattle, respectively). Daily DM intake was also greater in diets with legumes than diets without legumes (69±17.0, 115±164.1, and 93±30.0 g $kg^{-1}$ bodyweight$^{0.75}$ vs. 56±17.1, 54±18.1, and 86±33.6 g $kg^{-1}$ bodyweight$^{0.75}$ for sheep, goats, and cattle, respectively). Similarly, average daily gain (ADG) was higher in diets with legumes than diets without legumes (98±178.7, 53±32.4, and 358± 263 g $day^{-1}$ vs. 54±57.2 26±26.9, and 278±225.8 g $day^{-1}$ for sheep, goats, and cattle, respectively).

Substituting tropical grasses by tropical legume hays increases ADG in corresponding animals. However, this is associated with an increased DMI mediated by higher dietary CP concentration and therefore intakes.

**Keywords:** Chemical composition, ruminants, tropical grasses, tropical legume hays

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