

Screening of tropical plants possessing a low methane formation potential and high ruminal digestibility *in vitro*

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Abstract

The awareness of global warming due to accumulation of greenhouse gases, including methane, has increased in recent years. The livestock sector especially in the tropics is known for its high contribution in form of extensive methane emission. Ruminant husbandry in tropical regions depends on the availability and the quality of plant fodder especially during dry season. In the present study, an *in vitro* screening of various tropical plants was conducted in order to detect plants characterized by a low methane formation potential but a highly digestibility in the rumen. Therefore leaves from 27 tropical plant species, obtained from the area of Bogor, Indonesia, were incubated *in vitro* using the Hohenheim gas test. Approximately 200 mg dry matter of each plant was incubated with 30 ml of ruminal fluid/buffer mixture (1:2; v/v) for 24 h at a constant temperature of 39°C. Each plant was incubated four times, represented by two incubation units per experimental run. Variables measured were total fermentation gas production by reading of the scale on the syringes, and methane concentration by using gas chromatography. Organic matter digestibility was calculated from total gas production. The plants were analysed for their chemical composition i.e. crude protein, ether extract, neutral detergent fiber, acid detergent fiber, acid detergent lignin and total phenols. The results showed that most of the plants tested had contrasting profiles regarding their digestibility and methanogenic potential in the artificial rumen system; they had either high digestibility combined with a high methane formation or low digestibility with low methane formation. This pattern was shown to be correlated with the total phenol contents in the plant. Nevertheless, several plants revealed methane formation below average (12.7% of total gas) but a ruminal digestibility above average (39.9%). These plants were *Artocarpus heterophyllus*, *Leucaena diversifolia*, and *Leucaena leucocephala* and showed methane proportions in total fermentation gas of 11.3%, 11.5%, and 12.4%, respectively, and a ruminal digestibility of 45.1%, 43.1%, and 46.4%, respectively. Further research using larger collection of tropical plant species is needed to obtain more promising plants possessing a low methane formation potential combined with a high digestibility in the rumen.

Keywords: Methane, Digestibility, Tropical plants, *in vitro*