Occurrences of Linoleic Acid and α-linolenic Acid in Tropical Plants and their Disappearances when Incubated in Buffered Rumen Fluid *in vitro*

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Feeding forages rich in polyunsaturated fatty acids (PUFA) is only the first step towards increased PUFA contents in animal-source foods. The second is related to the extent of PUFA modification by ruminal microbes, respectively the ruminal bypass of intact plant PUFA. Studies so far have concentrated on temperate climate plants including mountainous plants. In the present study, a screening was conducted for the contents and ruminal disappearance of the two major PUFA, linoleic acid (LA) and α-linolenic acid (ALA) in tropical forage plants. Leaves from 27 tropical plant species were obtained from the area of Bogor, Indonesia. The plants were analysed for their chemical composition, including LA and ALA contents. Approximately 200 mg dry matter of each plant was incubated in duplicate *in vitro* with 30 ml of rumen fluid/buffer mixture (1:2; v/v) for 24 h at a constant temperature of 39oC using the Hohenheim Gas Test apparatus. After incubation, the fermentation fluid was analysed for the fatty acid composition using transesterification and subsequent gas chromatography. The disappearance of fatty acid was defined as the proportionate decline of the individual fatty acid in the lipids from feed to fermentation fluid. The results showed that PUFA contents in the plant samples varied widely, ranging (g/kg DM) from 0.3 (in Myristica fragrans) to 3.5 (in *Calliandra calothyrsus*) for LA and from 0.2 (in Hibiscus tiliaceus) to 11.1 (in *Carica papaya*) for ALA, respectively. Incubation of *C. calothyrsus* (a plant rich in condensed tannins) resulted in the highest LA (50 g/kg total FAME) and ALA (36 g/kg total FAME) proportions in fermentation fluid lipids. The proportionate disappearance of LA and ALA was comparably low with proportionately 0.69 and 0.90 of total, respectively, when incubating *C. calothyrsus* in relation to the other plants. For Paspalum dilatatum, a grass species, LA and ALA almost completely disappeared, leading to very low concentrations in the fermented rumen fluid. It was concluded that ruminal modification of PUFA from tropical plants varies largely, confirming previous studies suggesting that tannins partially inhibit biohydrogenation but also limiting the predictive information of plant PUFA concentrations for the lipid profile of ruminant-source foods.

Keywords: α-linolenic acid, biohydrogenation, *in vitro* screening, linoleic acid, livestock, polyunsaturated fatty acid, rumen, tropical plant

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