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Development of Microbes that Degrade Mimosine from the Rumen Fluid of German Steers

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Abstract

Leucaena leucocephala, a tropical leguminous plant, contains a toxic non-protein amino acid, mimosine. Successful utilisation of *Leucaena leucocephala* as a forage for ruminants depends on colonisation of the rumen by bacteria that degrade mimosine and di-hydroxy pyridine (2,3 DHP, 3,4 DHP), which are toxic intermediates in the metabolism of mimosine. The microflora in the rumen of animals in some parts of the world, however, do not include bacteria that are able to carry out this degradation. We thus describe a method to produce the microbes that can completely degrade mimosine from the rumen juice of German steers. Rumen juice of German steers was taken and frozen for one week. The fermentation was modified from Boever et al. (2000). Fermentation was started with 500 ml of rumen juice being treated with mimosine. The initial amount of mimosine to treat was 25 mg/day and increased by 25 mg every two days for two weeks until it became 200 mg/day. The medium (98–5) without mimosine was added continuously. The daily samples were taken to test the degradation of mimosine.

Samples (0.25 ml) of treated and untreated rumen fluid were inoculated in 10 ml of medium 98–5 with a mimosine concentration of 0.5 mg/L and incubated at 39 °C. The degradation of mimosine was determined daily with a colorimetric method daily by using a micro-colorimeter at A570 of FeCl₃ solutions of the different samples.

Only the samples treated with 200 mg/day of mimosine showed a degradation of mimosine at day 2 of the incubation period and the degradation was completed within one week. These findings showed that some ruminal microbes became adapted to mimosine when they were treated with mimosine and were able to carry out the degradation of mimosine.

The *in vivo* degradation of mimosine should be proved in an animal trial.

Keywords: *Leucaena leucocephala*, rumen microbes, mimosine, rumen juice