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***In vitro* Ensilability of Jack Bean (*Canavalia ensiformis*) and
Cowpea (*Vigna unguiculata*) Grains Sole or Mixed with Sorghum
(*Sorghum bicolor*) Grains: An Alternative for Low Input Pig
Feeding Systems**

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Abstract

Local food sources are an alternative to conventional feedstuffs for pig feeding in the tropics. Jack bean (*Canavalia ensiformis*), cowpea (*Vigna unguiculata*) and sorghum (*Sorghum bicolor*) grains are suitable, and ensilage of those grains is seen as an option for conservation.

Ripe grains were chemically analysed and ensilability was tested by the Rostock Fermentation Test (RFT). Cowpea showed a low content of water soluble carbohydrates (WSC) of 2.3 % DM, whereas in jack bean no WSC were found. Starch contents were similar (38.7 resp. 35.9 % DM). With a buffer capacity (BC) of 8.9 g lactic acid (LA)/100 g DM compared to 6.3 g LA/100 g DM in cowpea an inferior ensilability of jack bean was expected. Sorghum showed the lowest BC (3.1 g LA/100 g DM) and the highest starch content (73.9 % DM). RFT was performed in triplicate per treatment: control, molasses (4 % of fresh matter), *Lactobacillus plantarum* (LAB, 3×10^5 cfu g⁻¹ fresh matter), molasses+LAB. Also sorghum was mixed with legume grains. Hereby advantage should be taken of reducing BC and using the possibility to combine ensilage of two grains, forming a complete ration without the necessity to dry sorghum before feeding. Grains were milled (4 mm mesh size) and 50 g were mixed with 200 ml of distilled water and additives (30°C incubation temperature). At 0, 14, 18, 22, 26, and 38 h pH was measured and filtrates were analysed after 38 h.

In jack bean the application of LAB led to a fast pH decrease (at 14 h), but no significant differences were observed among all variants at 38 h. LAB variants of cowpea showed a significant pH decline ≤ 4.0 at 38 h. Cowpea+LAB and cowpea+LAB+molasses showed the highest LA production and the lowest levels of acetic and butyric acid as well as ammonia. Only in jack bean+LAB+molasses the LA production was similar to cowpea. According to RFT, LAB inoculation is necessary to achieve sufficient acidification. Furthermore, addition of molasses as a source of WSC is needed to expect a good ensilability of jack bean. Mixed silage is an option to be used.

Keywords: *Canavalia ensiformis*, cowpea, *in vitro* ensilability, jack bean, pig feeding, *Sorghum bicolor*, *Vigna unguiculata*

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