

## The Effect of Treatment of Cocoa-pods with *Aspergillus niger* on Intake and Liveweight Gain of Bali (*Bos sondaicus*) Cattle in South East Sulawesi<sup>†</sup>

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Cocoa-pods, a by-product of the cocoa industry, could potentially be used as a feed resource for ruminants in eastern Indonesia. The treatment of cocoa-pods with *Aspergillus niger* resulted in an increase in the crude protein content and a decrease in the neutral detergent fibre content of cocoa-pods (Marsetyo *et al.*, 2008). The objective of this experiment was to examine the effect of rate of inclusion (0 or 10 g DM/kg W.d<sup>-1</sup> or *ad libitum*) of *Aspergillus niger* treated or untreated cocoa-pods on intake and liveweight gain of Bali cattle.

Twenty five 12 month-old male Bali cattle (118 ± 3 kg (SEM) liveweight) were allocated to one of five treatments in a randomised block design, with five replicates per treatment. The five treatments were native grass *ad libitum* (C), untreated cocoa-pods (10 g DM/kg W.d<sup>-1</sup>) plus native grass *ad libitum* (UTNG), treated cocoa-pods (10 g DM/kg W.d<sup>-1</sup>) plus native grass *ad libitum* (TNG), untreated cocoa-pods *ad libitum* (UTAL) and treated cocoa-pods *ad libitum* (TAL). The animals were adjusted to their treatments over a 1 week preliminary period which was followed by an 8 week experimental period. Feed intake was determined daily and liveweight was measured once each week. Digestibility was measured by total faecal collection over 7 consecutive days on 3 separate occasions, during weeks 2, 4 and 6 of the experimental period. Data were analysed using the General Linear Model procedure in Statistical Analysis Software (SAS, version 9.2).

**Table 1. Feed intake, digestibility and daily liveweight gain of 12 month-old Bali cattle fed native grass *ad libitum* and increasing amounts of untreated and *Aspergillus niger* treated cocoa-pods**

Parameter	C	UTNG	TNG	UTAL	TAL	SEM
Native grass intake (g DM/kg W.d <sup>-1</sup> )	22.5 <sup>b</sup>	20.1 <sup>a</sup>	20.9 <sup>a</sup>	N/A	N/A	0.5
Cocoa-pod intake (g DM/kg W.d <sup>-1</sup> )	N/A	5.9 <sup>a</sup>	7.0 <sup>b</sup>	13.9 <sup>c</sup>	17.1 <sup>d</sup>	0.3
Total intake (g DM/kg W.d <sup>-1</sup> )	22.5 <sup>c</sup>	26.0 <sup>d</sup>	27.9 <sup>e</sup>	13.9 <sup>a</sup>	17.1 <sup>b</sup>	0.5
OM digestibility (g/kg)	539 <sup>b</sup>	532 <sup>b</sup>	556 <sup>b</sup>	439 <sup>a</sup>	474 <sup>a</sup>	13
DOMI (g/kg W.d <sup>-1</sup> )	10.9 <sup>d</sup>	12.7 <sup>c</sup>	14.0 <sup>d</sup>	5.6 <sup>a</sup>	7.5 <sup>b</sup>	0.5
Liveweight gain (kg/d)	0.173 <sup>cd</sup>	0.136 <sup>c</sup>	0.232 <sup>d</sup>	-0.282 <sup>a</sup>	-0.116 <sup>b</sup>	0.02

C, native grass *ad libitum*; UTNG, untreated cocoa-pods with native grass, TNG, *Aspergillus niger* treated cocoa-pods with native grass; UTAL, untreated cocoa-pods *ad libitum*; TAL, *Aspergillus niger* treated cocoa-pods *ad libitum*; N/A, not included in diet; W, liveweight; DM, dry matter; OM, organic matter; DOMI, digestible organic matter intake. Values are means and SEM is standard error of difference of means over an 8 week experimental period (intake and liveweight gain) or over 3 digestibility periods (OM digestibility and DOMI). Within a row, means without a common superscript are different ( $P < 0.05$ ).

Intake of cocoa-pods was greater when they were treated with *Aspergillus niger* compared to untreated cocoa-pods, when offered as the sole component of the diet. Organic matter digestibility of *Aspergillus niger* treated cocoa-pods was not different to untreated cocoa-pods when fed *ad libitum* which were lower than native grass. Animals offered *Aspergillus niger* treated cocoa-pods lost less liveweight than animals offered untreated cocoa-pods when offered *ad libitum* and grew faster when included in the diet at 10 g DM/kg W.d<sup>-1</sup>.

In conclusion, in areas where cocoa plantations exist, cocoa-pods may be a useful feed resource for ruminants when fed at low levels of inclusion in the diet. The treatment of cocoa-pods with *Aspergillus niger* resulted in a modest increase in liveweight gain of Bali cattle but will require increased time, labour and financial inputs to produce which may limit its adoption by small-holder farmers across eastern Indonesia.

This research was funded by the Australian Centre for International Agricultural Research.

Marsetyo, Quigley, S.P. and Poppi, D.P. (2008). *Proc. Aust. Soc. Anim. Prod.* **27**, 57.

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<sup>†</sup> From full paper to be published in *Animal Production Science*, **50**, (7) in press.