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Performance of Local Sheep Fed Cassava Waste Supplemented with Cobalt and Zinc

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ABSTRAK

Budidaya singkong menghasilkan limbah pertanian yang dapat dimanfaatkan sebagai pakan ternak. Namun demikian, pada jangka panjang, budidaya singkong secara intensif dapat menyebabkan rendahnya kandungan mineral esensial. Penelitian ini bertujuan untuk mempelajari suplementasi mineral kobalt (Co) dan seng (Zn) pada limbah singkong (cassava waste/CW) dan pengaruhnya pada performa domba. Perlakuan yang digunakan adalah R1) 100% rumput lapang (native grass/NG), R2) 50% NG + 50% konsentrat, R3) 50% NG + 50% concentrate + Co 5 ppm + Zn 30 ppm, R4) 50% NG + 50% CW, and R5) 50% NG + 50% CW + Co 5 ppm + Zn 30 ppm. Hasil penelitian mengindikasikan bahwa perlakuan nyata (P,0.05) mempengaruhi pertambahan bobot badan harian (ADG), konversi pakan (FC), kecernaan bahan kering dan bahan organik, namun tidak berpengaruh pada konsumsi bahan kering. Penggunaan limbah singkong dan konsentrat menghasilkan nilai ADG dan FC yang sama serta lebih baik dibandingkan ransum rumput lapang saja. Suplementasi Co dan Zn meningkatkan kecernaan (P<0.05), tetapi tidak mempengaruhi ADG dan FC. Dapat disimpulkan bahwa limbah singkong dapat digunakan sebagai bahan pakan domba lokal dan menghasilkan performa yang baik.

Kata kunci: singkong, kobalt, domba, seng

ABSTRACT

Cultivation of cassava produces residue that in land and the products can be used as feed. However, in the long term, intensive cassava cultivation may cause low level of essential mineral. This experiment was aimed to study supplementation of cobalt (Co) and zinc (Zn) in cassava waste (CW) and their effect on performance of local sheep. Twenty local sheep with body weight of 24.65±4.26 kg were allocated in a randomized block design. The treatments were: R1) 100% native grass (NG), R2) 50% NG + 50% concentrate, R3) 50% NG + 50% concentrate + Co 5 ppm + Zn 30 ppm, R4) 50% NG + 50% CW, and R5) 50% NG + 50% CW + Co 5 ppm + Zn 30 ppm. Results indicated that treatments had significant effect (P<0.05) on average daily gain (ADG), feed conversion (FC) and dry and organic matter digestibility, but not for dry matter intake. Cassava waste and concentrate gave the same ADG and FC values and better than NG only. Supplementation of Co and Zn increased the digestibility (P<0.05), but not the ADG and FC. As conclusions, CW could be used as a local sheep for feed component and resulted in a good performance.

Key words: cassava, cobalt, sheep, zinc

INTRODUCTION

Intensification of cassava cultivation would decrease many minerals, especially Cobalt (Co) and Zinc (Zn) until the land becomes marginal. Besides, those minerals were classified as trace elements that present in limited concentrations in ruminant feed (Little, 1986; Ahmed *et al.*, 2001).

Synthesis of vitamin B12 increases 20 times on sheep when given higher Co from 0.1 to 0.5 ppm (NRC, 2001). An *in vitro* study showed the improvement of cellulose digestibility on diet supplemented with Co (Allen, 1986; Kisidayova *et al.*, 2001).

Another mineral that plays an important role in ruminal fermentation process is Zn, where under normal circumstances could increase microbial protein synthesis (Arora, 1995). Zinc is a cofactor in enzyme system which is essential for growth, digestion, and exhalation (Pedrieri and Cinti, 2003). Hatfield *et al.* (1992) demonstrated a positive performance of supplementing Zn 5 times higher than the recommendation of NRC for male sheep. This aim of the present paper was to study performance of local sheep fed cassava waste supplemented Co and Zn.

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Table 1. Nutrient contents of native grass, concentrate and cassava waste

Nutrients	Native Grass	Concentrate	Casava Waste
Dry matter (%)	20.43	89.08	87.79
Crude protein (%)	8.42	14.65	14.5
Ether extract (%)	4.11	8.94	5.17
Crude fiber (%)	24.87	4.44	18.24
Nitrogen free extract (%)	47.6	51.20	56.68
Ash (%)	15.00	10.77	5.41

Table 2. Performance and digestibility of local sheep

Variables	R1	R2	R3	R4	R5
Average daily gain (g/day)	$63.50^{a} \pm 9.77$	$94.50^{ab} \pm 15.31$	$117.85^{b2} \pm 4.29$	$109.50^{b} \pm 30.47$	$94.05^{ab} \pm 9.77$
Feed intake (g/day)	813.83 ± 44.12	807.45 ± 117.31	822.50 ± 83.75	819.01 ± 101.03	816.32 ± 79.72
Feed conversion	$12.96^{b} \pm 1.83$	$8.80^{a} \pm 2.36$	$7.20^{a} \pm 1.40$	$7.93^{a} \pm 2.33$	$8.78^{a} \pm 1.79$
Dry matter digestibility (%)	$61.13^{a}b \pm 3.44$	$57.89^{ab} \pm 5.41$	$65.93^{b} \pm 5.78$	$51.49^{a} \pm 9.44$	$54.86^{a} \pm 4.88$
Organic matter digestibility (%)	$65.50^{bc} \pm 2.80$	$64.13^{ab}c \pm 4.73$	$71.65^{c} \pm 4.42$	$55.58^{a} \pm 8.59$	$58.42^{ab} \pm 5.36$

Means in the same row with different superscript differ significantly ($P<0.05$).

MATERIALS AND METHODS

Twenty local male sheep with weights of 24.65 ± 4.26 kg were divided into 5 diet treatments: R1) 100% NG, R2) NG 50% + 50% concentrate, R3) NG 50% + 50% concentrate + 5 ppm Co + 30 ppm Zn, R3) NG 50% + 50% CW, and R4) NG 50% + 50% CW + 5 ppm Co + 30 ppm Zn. Chemical composition of native grass, concentrate and cassava waste is presented in Table 1. They were allocated in individual cages and data collected were average daily gain, feed intake and feed conversion for 6 weeks. Two weeks prior to finish, dry and organic matter digestibility were assessed the experimental period. Diet was given twice a day The research was conducted in a randomized block design. Data obtained were analysed by analysis of variance (ANOVA), and subsequently analysed by Duncan's test (Steel and Torrie, 1993).

RESULTS AND DISCUSSION

After local sheep were given diet treatments for 6 weeks, data obtained on the performance of male sheep were presented in Table 2. Dry matter intake showed the same values in all treatments, but ADG and feed conversion at all feeding concentrate and cassava waste resulted better than the native grass treatment. Supplementation of Co and Zn did not improve digestibility compared to feeding concentrate and CW only.

No significant effect on dry matter intake was due to all treatments had the same palatability and sheep will ease to eat according to their rumen capacity. Average daily gain and feed conversion of sheep consuming native grass only were lower than other treatments, which was caused by lower nutrient quality. Adding concentrate and CW to native grass rised content of diet protein, each containing of 14.65 and 14.5% (Table 1). The equal protein level might result in the same performance. Protein is a nutrient that is required for multiplication of body cell, and thereby, it supports animal growth. Giving leaf and young stem of cassava mixture in diet was shown to improve body weight of Biglon goat (Kustantinah *et al.*, 2007).

As parallel with the same dry matter intake, but lower response of ADG resulted in high value of feed conversion at sheep fed native grass compared to other treatments. It was due to low quality nutrients in native grass (Table 1).

There were reductions in dry and organic matter digestibiliy on all treatments added with CW, but resulted in high ADG. It is known that high digestibility was the form of nutrient supply for animal growth. This condition might be caused by cassava waste containing of high hydrogen cyanide (HCN), that was 367.49 (Harianingsih, 2010). It was predicted to cause a negative effect on digestibility. On the other hand, cassava leaf contained of high essential amino

acid. Davendra (1978) demonstrated that cassava leaf was rich in branched-chain amino acid (BCAA) such as isoleucine (6.7 g/16 g N), leucine (10.9 g/16 g N), and valine (5.45 g/16 g N). They are needed for microbial protein synthesis on ruminant for growing and lactating (Huber and Kung, 1981; Zain, 1999).

Cobalt and zinc are minerals essential used to improve microbial fermentation in the rumen (Arelovich *et al.*, 2000; Kisidayova *et al.*, 2001). On the contrary, they did not influence dry matter digestibility, organic matter digestibility and ADG. This condition was probably due to that diet contained limited minerals and their suplementation was still low. According to Little, (1986) and Ahmed *et al.*, (2001), Zn and Co are limited minerals in ruminant feed.

CONCLUSION

Cassava waste could be used as feed and resulted good performance on local sheep but it did not improve the digestibility.

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