

Nutritional potential of bamboo leaves for feeding dairy cattle in Madagascar

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Introduction

In the Highlands of Madagascar, dairy farming is an important source of income for many farmers. It involves almost half of farmers in this region. Milk productivity is still low compared to the cow's genetic potential. The main constraint is the lack of fodder, essentially during the dry season. Natural pastures and crop residues are the main source of feed for ruminants during this period. They are usually rich in fibre and devoid of most essential nutrients. Bamboo produces a high amount of green leaves throughout the year. Bamboo leaves can be an alternative fodder for dairy cattle in order to maintain the milk production during the feed period shortage. However, the use of bamboo leaves as fodder has not been investigated in Madagascar. Information on their nutritive value is still limited. The aim of the present study is to determine the nutritive value of local bamboo leaves and to assess the impact of their use on the milk productivity.

Methods

The study was conducted in FIFAMANOR (Rural development and applied research centre in agriculture and livestock), Antsirabe, Madagascar, from May to November 2017. Nine available species of bamboo leaves from different regions of Madagascar were tested. The species were: *Bambusa balcooa*, *Bambusa bambos*, *Bambusa vulgaris*, *Bambusa tulda*, *Dendrocalamus asper*, *Dendrocalamus giganteus*, *Dendrocalamus strictus*, *Phyllostachys aureas* and *Pseudo arundinorea*. Fresh bamboo leaves were collected in the eastern region of Madagascar. They were transported weekly to the research centre. Samples of bamboo leaves were chopped and dried in a hot air oven at 60°C during 72 hours. Then, they were ground and analyzed to determine the contents of total ash, crude fibre, crude protein, NDF, ADF and ADL.

Animals: ten dairy cows with a mean body weight of 417±25 kg were divided in five groups.

Experimental design: 5*5 Latin square.

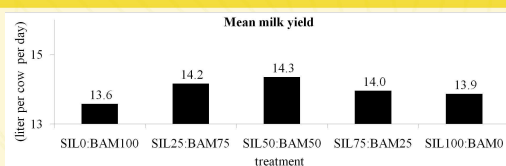
Diets: Maize silage, bamboo leaves and concentrate feed

Treatments: SIL100:BAM0; SIL75:BAM25; SIL50:BAM50; SIL25:BAM75; SIL0:BAM100, according to five different maize silage and bamboo leaves ratio in the diets (0, 25, 50, 75 and 100%).

Total duration: ten weeks, with two weeks per period

Parameters analyzed: DMI (dry matter intake), DMD (dry matter apparent digestibility), Milk production

Graphic



SIL0:BAM100= bamboo leaves 100%
SIL25:BAM75= maize silage 25% and bamboo leaves 75%
SIL50:BAM50= maize silage 50% and bamboo leaves 50%
SIL75:BAM25= maize silage 75% and bamboo leaves 25%
SIL100:BAM0 = maize silage 100%



Conclusions

Bamboo leaves in Madagascar have a good nutritional potential for animal feeding. Data and information about their nutritional values enable to establish balanced rations at a lower cost for the ruminants. Their use in animal feeding allows to maintain the milk production during the forage shortage period. Furthermore, this permits to decrease the cost of producing the milk and ensures a long-term viability and profitability of farms. Knowledge about the nutritional potential of bamboo leaves in animal feed promotes the adoption of this fodder resource by farmers.

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Results

Bamboo leaves were moderately rich in protein (from 7.7 to 15.4%) and total ash (from 6.7 to 18.5%). They are rich on fibre contents (from 25.9 to 32.6%). The mean values for NDF, ADF and ADL were 76.2, 51.5 and 12.1%, respectively. SIL50:BAM50 treatment showed both the higher DM intake (84.4%) and DM apparent digestibility (56.4%). Generally, intake and apparent digestibility of treatments with a combination of both fodder resources (SIL50:BAM50 and SIL25:BAM75) were higher than those of treatments with a sole source of fodder (SIL0:BAM100 and SIL100:BAM0). The high value CP of bamboo leaves species suggests that they are a good source of nitrogen supplements for ruminants, which were feeding on poor quality grasses and crop residues with low protein especially during the dry season. Milk production varied from 13.6 to 14.4 liters per cow per day but no significant difference was observed between treatments. The incorporation of bamboo leaves in the basal diet of dairy cattle did not affect their milk production.

Table: Chemical composition of bamboo leaves

Bamboo species	%DM	Ash	CF	CP	ADF	ADL	NDF
B. balcooa	58.5	17.1	28.0	7.7	53.9	11.5	77.9
B. bambos	57.2	6.68	26.3	15.4	49.1	14.4	75.7
B. tulda	57.1	10.9	31.8	13.4	53.9	15.2	76.6
B. vulgaris	57.1	16.1	27.0	15.0	54.3	12.3	76.6
D. asper	44.5	11.3	32.6	11.8	50.9	11.2	74.7
D. giganteus	52.7	12.2	29.2	14.3	50.5	10.6	72.4
D. strictus	59.8	18.5	25.9	10.7	51.6	10.4	74.3
P. aureas	64.6	11.0	28.9	11.6	43.8	10.6	79.3
P. arundinorea	61.9	17.5	32.0	12.9	55.1	12.8	78.5
Mean	57.1	13.5	29.1	12.5	51.5	12.1	76.2

CP: Crude protein; CF: Crude fibre; ADF: Acid detergent Fibre; ADL: Acid detergent lignin; NDF: Neutral detergent fibre