Cost Comparison Between Corn and Cassava Peel Silage In Diets for Feedlot Beef Cattle

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Introduction

The flour industries use about 80% of cassava, making its derivatives available in large quantities. The main residue is cassava peel, obtained by peeling the roots and consisting of peel, inner bark, cortex debris and root tips. Cassava peel is suitable for silage production, has low hygroscopic power, that is, it has difficulty retaining water, being a perishable food if not preserved properly (Prado, 2006; Faria et al., 2011; Vilhalva et al., 2012). However, studies demonstrate that cassava peel silage has the potential to be used as an energy source in the diet of ruminants (Lounglawan et al., 2011). The objective was to assess the impact of price on the feasibility of using cassava peel silage in feedlot systems under different economic scenarios.

Materials and methods

Samples of the diet components (ground corn (*Zea mays*), cassava peel silage (*Manihot esculenta*), guinea grass silage (*Megathyrsus maximus* cv. Mombaça), soybean meal (*Glycine max*)) were obtained from rural establishments in the northeast region of Para state. Analyses of dry matter (DM), mineral matter (MM), crude protein (CP), neutral detergent fiber (NDF) and non-fibrous carbohydrates (NFC) were performed according to the methodology described by Detmann et al., (2021). The total digestible nutrients were also calculated according to Weiss' equation, described by Medeiros et al., (2015). The chemical composition of food can be seen in Table 1.

Table 1 - Chemical composition of the ingredients

Ingredients	DM	OM	CP	EE	NDF	NFC	TDN
Ground corn	86,90	98,69	8,69	5,54	13,06	71,39	88,23
Cassava peel silage	33,57	97,32	2,36	0,60	12,81	81,55	76,42
Mombaça silage	33,09	92,33	5,14	1,43	74,25	11,51	48,91
Soybean meal	89,02	92,52	45,51	1,00	28,84	17,17	69,48

DM: Dry matter; OM: organic matter; CP: crude protein; EE: ether extract; NDF: neutral detergent fiber; NFC: non—fibrous carbohydrates; TDN: total digestible nutrients.

After the result of the chemical composition, a simulation was carried out with three scenarios (varying ingredients and costs), by simulating a feedlot diet for male Nelore cattle (500 kg of live weight) with an average daily gain of 1.3 kg.day. The roughage:concentrate ratio was 25:75 and the roughage source was guinea grass silage.The scenarios were: Scenario 1 (GC): reference diet containing ground corn; Scenario 2 (CPS-LowPrice): diet containing cassava peel silage purchased with a low price); Scenario 3 (CPS-HighPrice): diet containing cassava peel silage purchased with a high price.The purchase prices of the dietary ingredients were: CPS low-cost (0.74 BRL/kg DM; 0.13 USD/kg DM); CPS high-cost (1.49 BRL/kg DM; 0.26 USD/kg DM). ground corn (2.07 BRL/kg DM; 0.36 USD/kg DM) soybean meal (3.60 BRL/kg DM; 0.62 USD/kg) and guinea grass silage (0.91 BRL/kg DM; 0.16 USD/kg DM). The exchange rate from Brazilian Real (BRL) to US Dollar (USD) was 5.84, and the sale prices of the ingredients used were found in the region of northeast of Pará state. The nutritional requirements of DM, CP and TDN are shown in the Table 2.

Table 1 – Average daily gain (ADG) and utritional requirements for dry matter (DM), crude protein (CP) and TDN intake of a male Nellore cattle with 500 kg live weight, according to BR-Corte

ADG (kg/day)		DM (kg/day)	CP (kg/day)	TDN (kg/day)	CP (%)	TDN (%)
1,3	Requirements	10,21	1,08	6,85	10,59	67,09

Results

The results presented in Table 3 shows that the inclusion of CPS in the diet led to increase in the soybean meal inclusion, compared with the diet of Scenario 1. The inclusion of CPS in the diets decreased the dietary TDN compared with the reference diet of Scenario 1. The results also showed that the replacement of ground corn by CPS in the diets can meet the nutritional requirements of feedlot cattle.

Although Scenario 2 requires a higher quantity of soybean meal to meet the nutritional demands, it still presents a lower cost than Scenario 1. The inclusion of CPS in the Scenario 2 represents a reduction of 26.5% in the diet cost. However, when the CPS had a high price (Scenario 3), the reduction diet cost was only 6.9%. The daily cost, which is related to the DM intake, was also 26.5% lower in the Scenario 2 compared with Scenario 1.

Table 2 - centesimal composition of foods, chemical composition and the kg/DM cost of diets.

	Scenario 1 GC	**Scenario 2 CPS – Low price**	**Scenario 3 CPS – High price**
	Centesimal composition (%DM)		
Guinea grass silage	25	25	25
Ground corn	63	-	-
Cassava peel silage	-	52	52
Soybean meal	12	23	23
	Chemical composition (%)		
Crude protein	12.22	12.98	12.98
Total digestible nutrients	76.15	67.17	67.17
Neutral detergent fiber	30.25	31.86	31.86
	Feeding Costs		
Diet cost (BRL/kg DM)	1.96	1.44	1.83
Diet cost (USD/kg DM)	0.34	0.25	0.31
Daily dietary costBRL/animal.day)	20.01	14.70	18.86
Daily dietary costBRL/animal.day)	3.47	2.55	3.17

GC= ground corn; CPS= cassava peel silage

In Scenario 3, where cassava peel silage costs are slightly lower than Scenario 1. However, the costs associated with the logistics of storing cassava peel silage should be considered to prevent losses (Faria et al., 2011). The lack of standardization of the nutritional composition of these derivatives must be considered, as it can vary according to processing, climatic and seasonal conditions (Woiciechowski et al., 2013).

Conclusions

The nutritional analysis shows that cassava peel silage can meet the nutritional requirements of feedlot cattle. However, it is use is suitable when the prices are low (0.74 BRL/kg DM; 0.13 USD/kg DM).

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