



SIMPLE AND QUICK METHOD FOR RECYCLING CASHEW PULP INTO ANIMAL FEED

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Abstract

Cashew is one of the indigenous bioresources in Ogbomoso, Oyo State, Nigeria. The farmers majorly harvest the nuts for commercial purposes and exportation, while the pulp is left to waste during its season thereby increasing environmental pollution. Therefore, a study was conducted to develop a simple method for converting cashew pulp into animal feed using wheat offal as an absorbent. Increasing quantities of fresh cashew pulp (Cp) were mixed with wheat offal (WO) as absorbent at the following five blend ratios (Cp: WO) 1:1 (T1), 1.5:1 (T2), 2:1 (T3) and 2.5:1 (T4) and subsequently sun-dried for 4 hours. The sun-dried samples were analyzed for their nutrient compositions. Highest dry matter (DM) of 88.77%, 27.67% crude protein (CP), 4.95% crude fibre (CF), 3.71% ether extract (EE), 5.24% total ash, 65.66% nitrogen-free extract (NFE) and 84.22% organic matter (OM) were obtained in blend ratio (Cp:WO) 1:1 (T1), (Cp:WO) 1.5:1 (T2), (Cp:WO) 2.5:1 (T4), (Cp:WO) 1:1 (T1), (Cp:WO) 2.5:1 (T4), (Cp:WO) 1:1 (T1) and (Cp: WO) 1:1 (T1), respectively. The product (different blends of Cp:WO) showed potential for use as an alternative feed ingredient, and a means of reducing Cp pollution of the environment as well as the production of wealth from waste.

Keywords: Absorbent, cashew pulp, environment, nutrient composition, pollution, wheat offal

Introduction

Seasonal changes in the palatability and nutritive value of tropical grasses have been a major problem in livestock production, making the need for supplementary concentrate feeding inevitable. The high cost of conventional ingredients (e.g. maize) has necessitated investigations into utilization of alternative feedstuff, recent advances in animal nutrition and indigenous bioresources (agricultural products such as cashew (*Anacardium occidentale*) pulp as non-conventional feed sources) to improve the growth and reproduction performance of livestock, increase food security and nutrient intake of human, reduce cost of production and poverty, convert waste to wealth and create job opportunity thereby alleviating some of the global problems facing livestock production. These unconventional feed resources are good alternatives to maize and possibly other feed constituents that compete with humans for food (Wadhwa *et al.*, 2015).

Cashew is one of the indigenous bioresources in Ogbomoso. The farmers majorly harvest the nuts for commercial purposes and exportation, while the pulp is left to waste during its season thereby increasing environmental pollution (Honorato *et al.*, 2007; Okpanachi *et al.*, 2016a and 2016c). The problem of waste management due to huge amount of the by-products generated is more severe in developing countries because of undeveloped or non-existent processing methods for converting such by-products into useful products (Odeyinka *et al.*, 2003). As a result, getting rid of the waste poses a problem as most waste turn to pollutants due to improper disposal method and inadequate processing techniques and tools to convert them to useful end products. There is always difficulty in the conversion and processing of high-moisture agricultural products such as cashew pulp. This difficulty arises from the longer time it will take to sun-dry the product, the reduction in quality and quantity, the high cost of drying equipment and the lack of simple and appropriate alternatives

(Makinde and Sonaiya, 2010; Ahaotu and Ihekoronye, 2019).

Fresh cashew pulps are highly perishable and can take up to 1 week and above to sun-dry. They turn brown and hard due to the effect of heat on them. Thus, there's a need to develop a quick method to convert such wet by-products as cashew pulp into animal feed by combining it with wheat offal as an absorbent.

Materials and Methods

The study was conducted at the Bioresources Development Centre (BIODEC), Ogbomoso, Oyo State, Nigeria. Fresh cashew fruits were obtained from the cashew trees within the Centre. The nuts were removed and cashew pulps were washed to remove impurities and packed into 20-litre containers for grinding using a local milling machine (Plate 1-5). It was then thoroughly hand-mixed with wheat offal in increasing concentration.

Experimental design

Four combinations of cashew pulp with wheat offal (Cp: WO) 1:1 (T1), 1.5:1 (T2), 2:1 (T3) and 2.5:1 (T4) were prepared and subsequently sun-dried for 4 h using the method described by Makinde *et al.* (2011). Sun drying was done by spreading thinly on black polythene sheets (0.7 mm thickness) on a concrete floor. Each of the combinations was thoroughly mixed by hand until the fluid from Cp was not superfluous (Makinde and Sonaiya, 2007). Samples were analyzed after 4 h for the proximate composition according to laboratory standard methods of AOAC (2000).

Statistical Analysis

Data obtained were subjected to analysis of variance (ANOVA) using SAS Statistical Package, SAS2008. The means were separated using the Duncan Multiple Range Test (DNMRT) of the same package.



Plate 1: Cashew tree within BIODC Ogbomosho, Oyo State



Plate 4: Grinding of cashew pulps



Plate 2: Removal of nuts from cashew pulps



Plate 5: Sun-drying of the Cp:WO blends



Plate 3: Fresh cashew pulp in an empty 20 l bucket prior to grinding

Results and Discussion

Table 1 shows the chemical composition of the different blends of cashew pulp and wheat offal. There was a significant difference ($p < 0.05$) in the nutrient contents of the combinations. The DM increases with a reduction in Cp inclusion. The blends ratios were within 77-66-88.77% DM (dry matter), 22.18-27.67% CP (crude protein), 3.90-4.95% CF (crude fibre), 0.90-3.71% EE (ether extract), 4.55-5.28% ash, 59.17-65.55% NFE (nitrogen-free extract) and 72.37-84.22% OM (organic matter).

The blends (T1 and T2) had ≤ 10 to 12% moisture content (MC) in 4 hours. (Makinde *et al.*, 2011) stated that MC $> 12\%$ is not desirable for good keeping quality. T1 had the highest dry matter content but was not significantly different from T2. The values of the Ether extract (EE), Nitrogen-free extract (NFE) and Organic matter (OM) of T1 were significantly ($p < 0.05$) higher than that of others. None of the combinations had $\leq 20\%$ CP, and cannot be classified as forages or roughages. Feeds containing 20% or more crude protein (CP) are protein supplements (Gachiri and Lukuyu, 2021).

The values of crude protein, crude fibre, total ash and organic matter of the blends were higher than values for the dried cashew pulp (DCP) values for sun-dried cashew waste (CAW) and dried cashew pulp (DCP) reported by Fanimu *et al.* (2003) and Ahaotu and Ihekoronye, (2019),

Table 1: Chemical composition of different blends of cashew pulp and wheat offal

Parameter	T1	T2	T3	T4	SEM	PROB
Dry matter	88.77 ^a	88.66 ^a	83.34 ^b	77.66 ^c	1.73	0.001
Analysis % of DM						
Crude protein	22.18 ^d	27.67 ^a	23.10 ^c	25.59 ^b	0.81	<0.0001
Crude fibre	3.90 ^d	4.79 ^b	4.18 ^c	4.95 ^a	0.16	<0.0001
Ether extract	3.71 ^a	3.13 ^b	2.36 ^c	0.90 ^d	0.40	<0.0001
Total ash	4.55 ^d	5/24 ^b	4.96 ^c	5.28 ^a	0.11	<0.0001
Nitrogen free extract	65.66 ^a	59.17 ^d	65.41 ^b	63.28 ^c	0.98	<0.0001
Organic matter	84.22 ^a	83.31 ^a	78.38 ^b	72.37 ^c	1.79	0.0002

The means within each row with different superscripts are significantly different ($p < 0.05$)

T1: CpWO ratio 1:1

T2: CpWO ratio 1.5:1

T3: CpWO ratio 2:1

T4: CpWO ratio 2.5:1

SEM: Standard error of means

PROB: Probability

3.80% and 43.00%, respectively. Ahaotu and Ihekoronye (2019) reported that the contents of dry matter, crude protein, crude fibre, total ash and organic matter were 81.00%, 8.60%, 3.80%, 3.80% and 43.00%, respectively.

The crude fibre and ether extract values reported in this study were lower than the values obtained by Okpanachi *et al.*, (2016b). The authors reported 88.78% and 89.20 % DM, 13.82% and 16.96% CP, 6.71% and 7.08% CF, 10.62% and 10.41% EE, 2.85% and 2.48% total ash and 54.79% and 52.28% carbohydrate for sun-dried yellow and red varieties of cashew pulp, respectively. The different methods used in processing cashew pulp into feedstuff might have resulted in variability in chemical composition.

Conclusion

The results obtained from this study showed that using WO as an absorbent for Cp at different ratios is a quick method of converting fresh cashew pulp to high-quality products. The product (different blends of Cp:WO) showed potential for use as an alternative feed ingredient that could be incorporated into livestock feeds, reducing Cp pollution of the environment and producing wealth from waste.

Recommendation

The feedstuff developed as non-conventional feedstuff should be incorporated in the feed of livestock at graded levels to determine its effect on the performance of livestock.

Declaration of Interest

The authors have no relevant financial or non-financial interests to disclose.

Acknowledgement

We acknowledge Prof. Abdullahi Mustapha, CEO/DG of the National Biotechnology Development Agency (NABDA) Abuja.

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