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Nutritive Value of Coconut Grating Residue for Pigs

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ABSTRACT

Eighteen gestating sows were randomly grouped in to G1, G2 and G3 groups with six sows in each group received T1 (0%), T2 (10%) and T3 (15%) experimental rations with coconut grating residue for this digestibility trial. The apparent digestibility of experimental rations was determined 3 days prior to farrowing in gestation sows by total collection method. The coconut grating residue was analysed for its chemical composition as per AOAC (2016). Coconut grating residue have 37.48± 1.37 % of EE, 34.10± 1.37 % of CF and 11.55± 0.85% of CP content and all the nutrients except EE were have similar digestibility values compared to control. The EE digestibility was significantly (P<0.01) decreased as inclusion level of coconut grating residue increased in sows ration. The material coconut spent grating residue was by product of Ayurveda Medicine Company and nutritive value studies elucidated it could be considered as one of the feed ingredient for pigs.

Keywords: *Coconut grating residue, chemical composition, digestibility co-efficient, nutritive value.*

INTRODUCTION

Many alternative feed raw materials like kitchen waste, wastes from hotel or hostel and by-products of industries involved in grain milling, baking, brewing, distilling, packing, rendering, fruit and vegetable processing, vegetable oil refining, dairying, and egg and poultry processing may be cost effective and useful in swine diets. Inclusion rate of these by-products simply need not be considered them as cheapest source compared to other conventional feedstuffs. The factors decide inclusion rates are depending on palatability, nutrient availability, protein quality, nutrient interrelationship, and the method of processing and feeding. In Pigs, flavours or off- flavours affect the feed intake because they have comparatively more taste buds than humans. The presence of anti-nutritional factors is another limiting factor to consider alternate feedstuff's inclusion level because that interferes with nutrient digestibility and utilization. These include trypsin inhibitors, tannins, lectins, glucosinolates and others.

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The other important deciding factors are protein quality in terms of their digestible essential amino acids concentration, especially lysine is one of the limiting amino acid and digestibility levels of nutrients and energy.

In all practical feed ingredients, only a portion of the energy and nutrients are absorbed from the intestinal tract of the pig, whereas some of the energy and the nutrients are excreted in its faeces. Only the part that is absorbed from the intestinal tract is available for utilization by the pig. This part is called the digestible part of the feed and is described by digestibility values or digestibility coefficients for energy and each nutrient. Digestibility values for energy and nutrients can vary considerably among feed ingredients and should be taken into account when a feed ingredient is valued. In general, higher crude fibre concentration will lower the digestibility of energy and most nutrients of the feed ingredient. Nutrient digestibility is a measure of the availability of energy and nutrients in a feed ingredient and varies between species (Boggess et al., 2008)

The another important fact decides alternate feedstuffs inclusion level is their value or cost, where relative value of a feed ingredient is recommended to compare the value of that feed to the price of the industry's standard energy and protein-supplying ingredients. Many of the industrial by-products are subjected to different processing and might either increase or decrease their relative value as alternate feed ingredient in swine diets.

Depending on the different oil extraction procedures, the copra by-products can be classified into mechanically extracted copra meal (copra expellers, CE; IFN 5-01-572; AAFCO, 2016) or solvent extracted copra meal (CM; IFN 5-01-573; AAFCO, 2016). However, there is no standard criterion for classifying the copra by-products into copra meal and solvent extracted copra meal. Hence, this study was undertaken to estimate chemical composition and nutrient digestibility co-efficient values for pigs.

MATERIALS AND METHODS

Processing technology of coconut milk residue

The study material used in this study was collected from ayurvedic medicine producing company. In Ayurveda medicine companies, coconut milk was used for different product preparation and wet coconut white kernel with testa were subjected to grating and expeller machine was used to extract coconut milk. The residue collected after coconut milk extraction was sundried for 3-4 days. Sundried coconut residue was then mixed with ration at calculated level and fed to pregnant LWY sows for nutrient study digestibility studies. The representative sundried samples were stored for further analysis.

Estimation of chemical composition

The coconut grating residue was analysed for its moisture content (930.15, AOAC., 2016), crude protein by kjeldhal principle (2001.11, AOAC., 2016), ether extract (2003.06, AOAC., 2016), crude fibre (978.10, AOAC., 2016), total ash (942.05, AOAC., 2016), Acid Insoluble ash (IS:14826:2000), calcium and phosphorus (AOAC., 2016).

Digestibility Trail

Totally 18 gestating sows were randomly grouped in to G1, G2 and G3 groups with six sows in each group received T1, T2 and T3 experimental rations for this digestibility trial. Three experimental rations were prepared with coconut grating residue at 0, 10 and 15 % in T1, T2 and T3, respectively. The apparent digestibility of experimental rations was determined 3 days prior to farrowing in gestation sows by total collection method. Weighed quantity of feed was offered and residues were collected on 24 hour basis. Faeces of individual pigs were collected daily at 9.00 AM for a period of 3 days and stored at −20° C in double sealed containers. The samples of thoroughly mixed faeces were pooled and representative samples were taken for analysis to calculate digestibility coefficient of various nutrients separately for each animal.

$$\text{Digestibility co-efficient of nutrients} = \frac{\text{Nutrient content in eaten amount of feed} - \text{Nutrient content in faeces}}{\text{Nutrient content in eaten amount of feed}} \times 100$$

RESULTS AND DISCUSSION

The processing technology followed in this study to obtain spent coconut grating residue was similar to Prades et al. (2012). Whereas, Yalegama et al. (2013) explained different processing technology to obtain coconut milk residue from mechanically scraped fully matured white kernels and steamed for 20 minutes and thick milk was extracted using hydraulic press and the residue was dried at 80°C and named as dehydrated coconut milk residue. Different nomenclature are invariably used for products obtained from coconut like wet coconut processing like whole, wet coconut white kernel, wet coconut testa, copra whole, copra white kernel and copra testa based on their chemical composition (Appaiah et al., 2014). This coconut grating was differing from copra meal or coconut meat or de-oiled copra cake (Arumugam et al., 2015).

The sun dried spent coconut grating residue used in this study was estimated for its chemical composition and presented in Table - 1.The chemical composition of coconut meat residue collected after manual grating and extraction of milk had 4.8 per cent moisture, 5.1 per cent CP, 38.3 per cent of EE, 31.9 per cent of CF, 0.6 per cent calcium and 0.6 per cent phosphorus as reported by Agdeppa-Namoco et al. (2012). Similarly,

Yalegama et al. (2013) reported 42.6 ± 1.2 per cent of EE and 23.2 per cent CF content in coconut milk residue. While, it was compared with wet coconut white kernel, that spent coconut milk residue contained 1.06 and 2.52 times more EE and CF content, respectively. The wet coconut white kernel had 38.8 ± 0.46 per cent of EE and 11.7 ± 0.35 per cent of CF (Appaiah et al. 2014). On the other hand, Lamdande et al. (2018) reported coconut grating residue had chemical composition (per cent) as moisture, EE, CP and Ash as 49.40, 30.02, 5.59, and 1.06 respectively.

Table 1: Chemical Composition of Spent Coconut grating residue (on DM basis, %)

Parameters	Spent Coconut grating residue
Moisture	6.22 ±1.25
Organic Matter	96.2 ± 1.01
Crude protein	11.55 ± 0.85
Crude fat	37.48 ± 1.37
Crude fibre	34.10 ± 1.41
Total ash	3.80 ± 1.11
Nitrogen Free Extract	13.07 ± 1.22
Acid Insoluble Ash	1.72 ± 0.51
Calcium	1.12 ± 0.47
Phosphorus	0.75 ± 0.35

The variations in chemical composition of coconut grating residue might be due to coconut varieties used for processing and in India West coast tall variety is one of the major varieties cultivated (Ghosh et al., 2014). The stages of maturity of the coconut might be another factor decide the chemical composition because moisture, total carbohydrate, crude fibre and hardness content were significantly ($P \leq 0.05$) differ based on the stage of maturity, but CP crude fat press yield and pH were not affected (Chuntarat et al., 2015).

The digestibility of spent coconut grating residue included sow diet was studied and results were presented in Table - 2. The digestibility co-efficient values of dry matter, crude protein, crude fibre, Nitrogen free extract and organic matter digestibility were not differ significantly between experimental rations in this study. Similarly, digestibility of DM, CP, EE, Ash, NFE were not differ in incorporation of dried copra meal at 0, 5, 10 and 15 per cent (Rodgen et al., 2017) and unconventional feed stuffs like Japan hlo in growing pigs (Lalhuthangi and Buragohain, 2020). In contrary, digestibility all nutrients were significantly reduced pig ration with animal fat and wheat bran ration replacing maize group compared to control group and ether extract digestibility was similar in all groups (Elanchezhian & Ally, 2020).

Table 2: Nutrient digestibility co-efficient of experimental rations, %

Attributes	Groups			P Value
	GI	**GII**	**GIII**	
Dry matter [ns]	85.18±0.50	84.09±0.50	83.87±0.50	0.173
Crude Protein [ns]	82.71±0.70	82.28±0.70	82.32±0.70	0.123
Ether extract *	69.42±0.74[a]	67.68±0.74[b]	61.17±0.74[c]	0.00
Crude Fibre [ns]	65.83±1.73	62.56±1.73	62.89±1.73	0.172
Nitrogen Free Extract [ns]	77.48±0.52	76.03±0.52	75.85±0.52	0.085
Organic Matter [ns]	73.18±0.58	73.47±0.58	72.24±0.58	0.51

[a,b] Mean values with different superscripts with in a row differ significantly.
*P<0.01, [ns] Non-significant

The digestibility EE was significantly (P<0.01) reduced in this study and as inclusion levels coconut grating residue increases; lowest value of digestibility was recorded in G3 (61.17 ± 0.74) compared against G2 (67.68 ± 0.74) and G1 (69.42 ± 0.74) and consistent with present study Lalhuthangi and Buragohain (2020) reported digestibility co-efficient of nutrients decreased with increased inclusion of unconventional feed stuff *Mikania micrantha Kunth* (Japan hlo) in the pig ration might be due to presence of anti-nutritional factors. Like that, decreased CP digestibility was observed in Large white Yorkshire pigs fed with *Acacia Species* leaf meals by Halimani et al. (2007) and but DM digestibility was not differed. However, addition of cocktail enzymes increase CF digestibility of dried copra meal (Rodgen et al., 2017).

CONCLUSION

The nutritive value results of spent coconut grating residue of the present study proved that spent coconut grating residue could be considered as one of the raw material for pigs.

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