AMM -13

Dry Matter and Crude Protein Values of Selected Feedstuffs Used in the Nigerian Livestock Industry

U.E. Okata[1], A.U.C. Ohanaka[2], U. Uzohuo[1], E.C. Ogundu[3], M.C. Uchegbu[2] and I.C. Okoli[2]
[1]Department of Agricultural Technology, Federal Polytechnic Nekede, Owerri, Nigeria; [2]Department of Animal Science and Technology, Federal University of Technology Owerri, Nigeria; [3]Akwa Ibom State University, Akwalbom State, Nigeria
Corresponding author: U.E. Okata: E-mail: chmech2010@gmail.com

Abstract
This study was carried out to establish the dry matter (DM) and crude protein (CP) for dry brewers spent grain (DBSG), cassava meal (CAM), palm kernel cake(PKC) and groundnut cake(GNC) collected from five locations in Nigeria that could serve as reference values for their utilization in the Nigeria livestock industry. The mean dry matter values ranged from 89.304 ± 0.857% (CAM) to 93.006 ± 0.456% (PKC), with avery narrow coefficient of variation (CV) range of 0.41 – 0.96, indicating that the DM value could serve as reference for the industry. The crude protein (CP) values standardized to 88% ranged from 0.97 ± 0.23 (CAM) to 42.41 ± 6.31 (GNC), with mean values of DBSG and PKC being in between 23.34 ± 1.72 and 13.55 ± 0.62% respectively. The CV across sample values was relatively narrow for DBSG (7.67) and PKC (4.55) indicating that their mean values could serve as areference in the industry. The CV values of GNC (14.87) and CAM (23.31) were however wide indicating that their mean values may not be reled upon. It was concluded that the evaluated feedstuffs were in DM content,the mean CP values recorded for DBSG and PKC could serve as reference values for the Nigerian livestock industry.

Keywords: Palm kernel cake, spent grain, cassava, groundnut and crude protein.

Introduction

Inadequate nutrition is a major cause of poor performance poultry in Nigeria. The constraints that drive such inadequate nutrition include feedstuffs, (Okoli *et al*., 2009), anti-nutritional factors/growth inhibitors in locally available feedstuffs (Emenalom *et al*., 2004; Okoli *et al*., 2012), losses of quality in storage (Hossain *et al*., 2011) and wide variations in chemical composition of feedstuff among others (Omede, 2010). Expanding the utilization of locally available feedstuffs, including non-conventional feed resources, represents possibly, the most important method sustaining appropriate feeding of intensively farmed poultry.

The current challenge is to formulate diets that contain these feedstuffs in the appropriate proportion without compromising the nutritional requirements of the animal (Uchegbu *et al.,* 2009). This requires reliable nutrient composition data. However, several studies have reported wide variability in such data in Nigeria, especially those generated from non-conventional feedstuff.

There is therefore, the need for standardized nutrient composition data for the Nigerian livestock industry as reported in this study.

Materials and methods

The feed raw materials studied were dried brewers spent grain (DBSG), cassava meal (CAM), palm kernel cake (PKC) and groundnut cake (GNC). These were purposively selected as the commonest non-conventional feedstuff (NCF) used in the Nigeria feed industry. The materials were sampled according to the method described by Omede (2010).In each case, about five kilograms of the sample was collected and subjected to dry matter (DM) and crude protein (CP) composition analysis at the Evonik Industry Laboratory Germany according to the method of AOAC (1995).

Data generated were subjected to descriptive statistics such as means, standard deviation and coefficient of variation.

Results and Discussion

Dry matter (DM), Crude protein (CP) standardized to a dry matter content of 88%, Crude protein (CP) as iswere generated from the study.The dry matter content of DBSG, CAM, PKC and GNC sampled at different locations in Nigeria are shown in table 1. The mean DM values ranged from 89.304 ± 0.857% recorded for CAM to 93.006 ± 0.456% recorded for PKC, while the coefficient of variation (CV) between the different sample readings was less than 1%, indicating that the dry matter figures reported in this study could be used as referenced values for the Nigeria feed industry. PKC recorded the highest DM value of 93.006 ± 0.456 which

agrees with the value reported by Sundu *et al.*(2005) andMalaysian PKC. The CAM dry matter content recorded in this study is also similar to the figure report by Abd EL-Baki *et al.*(1993).

Tables 1: Dry matter content (%) of the feedstuff sample in Nigeria

Sample	DBSG	CAM	PKC	GNC
Sample 1	90.77	89.82	92.34	92.21
Sample 2	91.93	89.10	93.38	92.77
Sample 3	91.93	89.22	93.30	92.18
Sample 4	91.81	90.33	92.72	91.72
Sample 5	91.77	88.05	93.29	92.08
Mean± SD	91.642±0.493	89.304±0.857	93.006±0.456	92.192±0.377
CV	0.538	0.960	0.490	0.409

DBSG = dry brewers spent grain, CAM = cassava meal, PKC = palm kernel cake, GNC = groundnut cake, S D = standard deviation, CV = coefficient of variation, SEM = standard error of mean.

It has been shown that determining nutrient levels in different feeds on dry matter basis, rather than on as is basis makes a comparison easier because feeds contain different percentages of water. This also allows for comparison between the levels of a given nutrient in the dry matter content of the animal diet (Reiling, 2011). The crude protein content of feedstuffs standardized to DM content of 88% is shown in table 2. These values ranged from the 0.974 ± 0.227% recorded for CAM to 42.410 ± 6.306% recorded for GNC. The coefficient of variation between the different samples ranged from 4.544% recorded for PKC to 23.306% recorded for CAM. Thus, CAM recorded the highest coefficient of variation followed by 14.869 recorded for GNC. These high CVs could be attributed to differences in the variety of crops used in processing the products, the fertility of soils the crop was grownon, processing methods used to extract the primary products, blending of multiple by-products together by the manufacturing plant and storage conditions (Sauvant *et al*., 2004).

Table 2: Crude protein (%) content of feedstuff standardized to a dry matter content of 88%

Sample	DBSG	CAM	PKC	GNC
Sample 1	25.032	1.127	13.037	45.751
Sample 2	23.730	1.126	13.344	41.500
Sample 3	22.476	1.144	13.139	48.563
Sample 4	24.624	0.643	14.569	44.134
Sample 5	20.809	0.830	13.659	32.102
Mean ± SD	23.34±1.719	0.974±0.227	13.550±0.617	42.410±6.306
CV	7.665	23.306	4.554	14.869

DBSG = dry brewers spent grain, CAM = cassava meal, PKC = palm kernel cake, GNC = groundnut cake, S D = standard deviation, CV = coefficient of variation, SEM = standard error of mean.

The mean CP value of DBSG agrees with the value reported by (Santos *et al*., 2003), while Robertson *et al*., (2010) reported a range of 27 – 33 %, indicating that the present range of 20.81 – 25.03 % is much lower. The CP values of DBSG can be affected by heat applied during the brewing process.The range of CP recorded for CAM in this study (0.64 – 1.14) % is much lower than the 2.5 % reported by Ogunjobi and Ogunwolu (2010). Okoli *et al*. (2012) also obtained a CP range of 2.56 – 2.90 % similar to the report of Ogunjobi and Ogunwole (2010) indicating that the variations between the present results and earlier published ones may be due todifference in laboratory analyses and non-standardization of products processing methods. Earlier reports have shown that GNC could yield CP values as high as 45 – 60 % (Desai *et al*., 1999) with anaverage of 54 % (NRC, 2001). Thus, the CP results of samples2 and 5 at 41.50 % and 32.10 respectively are below the published rangeindicating the non-standardized nature of processing methods used in Nigeria. Usually, products derived from local oil extraction method would contain more oil and thus, lower CP of its GNC, while the industrially processed GNC contain less oil and therefore higherit'sCP.Our GNC mean value is however similar to that of India but slightly lower than that of Ecuador (Redshaw *et al.,* 2010).

Chin (2002) reported a CP range of 15 – 16 % PKC produced in Malaysia, while the values from the present at the range of 13.04 – 14.57 % were similar. Ezieshi and Olomu (2007) however, reported a CP range of 14.50 – 19.24 % for PKC samples produced in Nigeria indicating that our present results are low.Usually, PKC

are produced either by solvent extraction (Palm kernel meal) or by mechanical extrusion and this is in processing method determine the CP value of the end products (Olomu, 1995).

Table 3: Crude protein content (%) of feedstuff sample

Sample	DBSG	CAM	PKC	GNC
Sample 1	25.82	1.15	13.68	47.94
Sample 2	24.79	1.14	14.16	43.75
Sample 3	23.48	1.16	13.93	50.87
Sample 4	25.69	0.66	15.35	46.00
Sample 5	21.70	0.83	14.48	33.59
Mean ± SD	24.296±1.726	0.988±0.230	14.320±0.647	44.430±6.600
CV	7.104	23.279	4.518	14.855

DBSG = dry brewers spemt grain, CAM = cassava meal, PKC = palm kernel cake, GNC = groundnut cake, S D = standard deviation, CV = coefficient of variation, SEM = standard error of mean.

Conclusion

This study shows that all the local feedstuffs were high in dry matter content. The mean values obtained in this study could be used as reference values for the country since their coefficients of variation were less than 1.00%.However, wider variations were demonstrated for crude protein contents standardized to dry matter content of 88%.The mean CP values of 23.34±1.719 and 13.55±0.617 %, with relatively narrow CVs of 7.665 and 4.554 recorded for DBSG and PKC respectively, could serve as reference values for the Nigerian industry.

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