

Palm kernel Cake (PKC) utilization in Monogastric Animal Feeding - Implications for Sustainable livestock Development.

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Abstract

Conversion of agricultural by-products such as Palm Kernel Cake (PKC) to monogastric animal feed can provide added value to monogastric animal feeding as an energy resource and reduce competition with Man for feed resources. Maize is a major ingredient for compounding feed for this category of livestock and this has the associated problems of high cost and competition as Man also consumes maize. In the decade before year 2000, the livestock sector in Nigeria saw an unprecedented increase in feed cost to the extent of constituting over 90% of Poultry and Pig farm recurrent expenditure. This no doubt resulted in the closure of many Poultry and Pig farms. The animal protein intake of an adult human being in Nigeria is estimated at 15% of the total caput protein when compared with an average intake of 55% for a European, yet, Nigeria is blessed with enormous livestock resources. Palm Kernel Cake (PKC), which is one of the agro-industrial by-products is available in large quantities in Nigeria. Although, there is variability in the nutritional compositions, there exist great potentials for producing good quality meat from PKC because the product is cheap, readily available and with low cost of processing. Monogastric animal production plays an important role in providing Nigerians with the cheapest sources of animal protein. The search for sustainable solution to the major constraints hindering the adequate supply of this product (animal protein) is the focus of this paper. Animal Nutritionists have carried out quite a number of investigations as to the level of inclusion of PKC as replacement for maize and the effects of enzyme supplementation on Poultry and Pig diets, all with a view to reducing cost, enabling cheaper meat production and making available major crops for human consumption. The author observed that majority of these studies focused on Poultry nutrition and therefore suggested that more studies be carried out on the utilization of PKC on both Poultry and Pig nutrition so as to meet the required demand for animal products.

INTRODUCTION

Agro-industrial by-products have in recent years become important feed components in Poultry diets in Nigeria due to the increased competition for the conventional ingredients by humans and the food industries (Eustace et al, 2005). Nigeria, like most other countries of the World is witnessing a steady increase in human population, this has no doubt influence the demand for protein of animal origin. According to FAO (1989), the animal protein intake of an adult Nigerian is estimated at 15% of the total caput protein when compared with an average intake of 55% for a European. In the same vein, the United Nation's Food and Agricultural Organization (FAO) has also estimated that almost 200 million Africans were undernourished at the dawn of the millennium, compared with 133 million 20 years earlier (FAO, 2003).

According to literature and everyday breeding practice, the

monogastric animals, apart from their high rate of reproduction, are characterized by the best efficiency of nutrient transformation into high quality animal protein. Nevertheless, the costs of this transformation are very high (Szebiotko, 1981). According to the same study, feed conversion expressed in kilograms of feed per kilogram of body weight gain ranges from 2.0 to 2.8 and from 3.5 to 4.5 in broilers and Pigs respectively. This indicates that from 4.3 to 6.0 kg of plant protein is converted into one kilogram of animal protein only.

The need for Agriculture- led economic transformation and sustainable development in Africa, as a major solution to hunger, poverty and unemployment cannot be overemphasized. In Nigeria, the agricultural sector has continued to play a pivotal role in the rapid economic transformation of the Nation with the impressive performance accounting for 41% of the country's Gross

Domestic Product (GDP), 81% of the non-oil foreign exchange earnings and over 65% of active labour force. The sector is indisputably the sole provider of staple food consumed by Nigerians as well as export of substantial quantities of agricultural products within the west African sub-region, Africa and the entire world (Bello, 2006).

The search for alternative feed ingredients including those that contained high fibre content for livestock feeding especially non-ruminants, continues to attract the attention of researchers especially in the developing countries of the world for two main reasons. First is the stiff competition which exist between humans and the livestock industry for cereal grains, and secondly, the low production resulting in scarcity of cereal grains (Esonu, 1999). In the same vein, according to Oruseibio (1985), the search for least cost formulation has led animal nutritionists to investigate the nutritional potentials of non-conventional ingredients used for compounding animal rations, and to see the percentage of combination of such ingredient the could furnish satisfactory performance.

Maize constitutes the largest proportion of the feed ingredients for providing the energy component of compounded monogastric animal feeds in Nigeria. It has however continued to be in short supply and costly especially during the late dry and early raining seasons in Nigeria. Maize, which at the domestic markets in 2005 was sold for between N12, 000 and N18, 000 per ton continues to be expensive and in dry season 2006 costing between N40, 000 and N45, 000 per ton. Between February and March 2008, yellow maize was sold for N41, 000 around Benin and Asaba, but in the same markets, between June and July of the same year, a ton of maize was sold for between N81, 000 and N85, 000 per ton. This situation remains so because maize is on Nigeria's imports restriction list and so attracts very high import duty when imported and local production is still much below the country's domestic and industrial needs. These among other factors therefore make the use of maize as monogastric animal feed ingredient uneconomical. Hence, the need for economical feed ingredients such as Palm Kernel Cake.

Palm Kernel Cake (PKC) is the residue obtained after the extraction of palm kernel oil from the seed. Because of the industrial uses and export potentials of palm kernel oil, PKC is easily available in large quantities. According to Sundu et al (2006), Palm kernel meal (also called Palm kernel Cake) is aflatoxin free, palatable and has considerable potential as

carbohydrate and protein sources. Palm kernel cake can contain from 12 to 23 % crude protein depending upon the efficiency of the process used to extract the oil (PNI, 1990).

How can the best of science and technology be harnessed to help Africa increase its agricultural productivity, profitability and sustainability, thereby contributing to improved food security for all? (Anon, 2004). The focus of this paper therefore is to assess and highlight the potentials of Palm Kernel Cake as a major feed ingredient in monogastric animal feeding towards sustainable livestock development.

Current trend and emerging issues in PKC utilization in monogastric animal feeding.

Palm Kernel Cake (PKC) is a by-product after palm oil extraction from the fruits. The processing of the oil from palm fruit (*elaeis guinensis*) gives rise to the palm nut, which is cracked to produce palm kernel. The product is further crushed and its oil extracted by solvent or expeller method to produce a waste, Palm Kernel Cake (Akpodiete et al, 2006). The PKC does not form food for man or have other industrial uses for now. According to Mustaffa et al, 1989, it is easily available and Nutritionists have found it to be suitable for cattle in feedlot.

Earlier studies with pigs (Oyenuga, 1968 and Babatunde et al, 1975) did not highly recommend the use of PKM in non-ruminant (monogastric) feeding. Its crude protein content of 18% classified it as a protein source of medium grade (Chin, 2001). Prominent among its limitations in monogastric animal feeding is the high fibre content (13%) and low metabolizable energy value for poultry (Ariff Omer, et al, 1998). Further more, it is reported to contain 30% B-Mannan which is a powerful anti-nutritive factor which can cause depression in feed conversion ratio and reduce weight gains by 20-25% in poultry. According to the same report, PKC feed value is further reduced by the presence of high shell content that accompanies local processing. All of these factors have limited PKC inclusion rate in poultry ration to about 20%(AriffOmer et al, 1998).

However, later studies indicated that with proper balancing of dietary ingredients, monogastric animals could tolerate high levels of PKM (Fetuga, Babatunde and Oyenuga, 1977 and Yeong et al, 1981). In another study, Nwokolo et al (1977) indicated that up to 30% level of PKM could be incorporated into broiler starter ration without any adverse effects on growth rate, while Yeong et al, 1981 compared

levels from 0 to 30% PKM and recommended 15% level of inclusion in broiler ration.

As earlier stated, PKC has been reported to contain B-mannan which has anti-nutritional properties that hinders the full utilization of nutrients in PKC by monogastric animals. To address this problem, studies on the effect of enzyme supplementation of PKC in monogastric animal feeding has been carried out by many researchers. According to David et al (1997), the degradation of B-mannan in PKC by an appropriate enzyme to mannose will release the sugar and other digestible sugars that can be absorbed and metabolized by monogastric animals. Bedford (1997) also reported that addition of enzymes to the diets of chicks up to 42 days reduced the viscosity of the digesta with a resultant improvement in the feed conversion ratio and fat digestibility in birds. A similar study on the effect of enzyme supplementation on Palm Kernel Cake based diets on broiler performance was carried out by Akpodiete et al (2006), the result of which is in agreement with Nwokolo et al (1977) which suggested up to 30% level of PKM incorporation in broiler starter ratio.

It is expected that as the demand for animal protein increases with increasing population and improvements in living standards, conventional feedstuffs are likely to be insufficient to sustain monogastric animal production. Therefore, the need to carry out more research about how to incorporate unconventional feed ingredients such as PKC in monogastric animal feeding is necessary. This is an unavoidable pre-requisite for the much-needed expansion of the monogastric animal production sub-unit in Nigeria as well as in other developing countries towards sustainable livestock production and sustainable economic development generally.

CONCLUSION

The future developmental steps for efficient utilization of PKC in monogastric animal feeding require strategic planning and effective implementation. The last few years have witnessed a considerable breakthrough for PKC inclusion in monogastric animal feeding in Nigeria, consequently, the interest for PKC utilization among farmers, nutritionists and feed manufacturers in the monogastric animal production sector is also growing as a result of various studies on the benefit of this by-product. After a period of almost total collapse of the livestock industry especially the poultry industry caused by the uneconomical cost of production, an appreciable relief is

gradually in sight with the incorporation of PKC in monogastric animal feed formulation.

However, it should be noted that the development of PKC utilization for monogastric animal feeding involves large steps forward towards an economic and sustainable livestock development. The author therefore wishes to state the following steps as suggestion in this direction;

- - more research on the utilization of PKC in monogastric animal feeding should be carried out in pig production. A lot of studies on this topic in question have been carried out on different categories of poultry, the need for such study on pig production cannot be over emphasized as their contribution to the provision of protein of animal origin for Nigerians are enormous.
- the immediate and obvious benefit from PKC utilization is its nutrient composition (dry matter and crude protein). However, it has been severally reported that the availability of these nutrients for use by the animal depend on the method of oil extraction, yet, there are PKC in the market irrespective of the efficiency of oil extraction. Since most end users especially the livestock farmers are ignorant of this fact, appropriate measures should be put in place for proper monitoring and control of PKC processing either by the Federal Ministry of Agriculture or the various associations concerned with animal production issues. A high quality PKC is desirable if sustainable animal production development is to become a reality in Nigeria.
- exogenous enzymes are routinely used in poultry and swine feeds to improve the nutritive value of feed ingredients of plant origin. In order to sustain and improve upon this, more research needs to be carried out on the effectiveness of various exogenous enzymes in monogastric animal diets.
- the use of enzyme supplements in PKC based diets especially in swine nutrition should be properly investigated and given adequate publicity.

In conclusion, it is abundantly clear that PKC is an agro-industrial by-product that is being produced locally; it is easily available and affordable. Its potentials should

therefore be exploited fully for sustainable livestock production in Nigeria. Its limitations notwithstanding, its quality can be enhanced to make it more suitable for monogastric animal feeding.

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