

A REVIEW ON THE UTILIZATION OF PEARL MILLET AS FEED RESOURCE for BROILER CHICKENS

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ABSTRACT

The urgency of the world food problem has presented a challenge to nutritionist to investigate the possibilities of utilizing other potential energy sources like pearl millet, because, the major portion of the maize crop which is the conventional energy source is diverted for other purposes such as bio fuel, brewery and starch industries as well as human consumption. Pearl millet contains 11.5-12% crude protein, 8.0% crude fibre, 4.0% ether extract (EE), 8.9% ash and 2900 Kcal/kg metabolizable energy. Research findings have shown that pearl millet has been used in the diets of broilers with varying degrees of success. In a study with broilers, pearl millet has been successfully included at up to 10 - 20% level without any adverse effect and resulted to increase size of the gizzard. Also, pearl millet could completely replace maize at 100%inclusion level as a dietary energy source without detrimental effect on performance attributes and carcass yield with concomitant reduction in feed cost .Pearl millet is also very much available particularly in the arid and semi-arid zones of the country. It can be concluded that pearl millet is a very good substitute for maize in poultry diets.

Keywords: Review, Utilization, Pearl Millet, Feed Resource, Brioler Chickens

1.0 INTRODUCTION

Poultry industry is one of the major employer of Nigerian labour force in the agricultural sector and one of the fastest growing in the country. Adebayo and Adeola (2005), reported that importance of poultry to the national economy

cannot be over emphasized as it has become a popular industry for small holders that have great contribution to the economy of the country. The industry required adequate provision of balanced animal

feed at a very reasonable cost for the farmer to be able to make profit and stay in the production (Aduku and Olukosi,2000).

Abu *et al.*,(2009) observed that apart from the high and fluctuating costs,some of the ingredients used in compounding feeds, notably cereal grains are in high demand for human consumption and this exacerbated the feed situation .Ogbanna *et al.*,(2000)reported that feed cost is perhaps the most expensive single input in the livestock and poultry production and this is said to contribute about 80% of the real cost of the production for intensively reared stock. Esonu and Bamgbose (2000) reported that there is need to focus attention to the exploitation of non-conventional foodstuff that are available in appreciable quantity as it is obvious that there is a very stiff competition between human, livestock and breweries over maize and sorghum as such there is an ultimate need therefore, to search for an alternative for maize as source of energy in poultry production .One of the cheap energy source available for replacing maize in poultry ration is pearl millet (Tornerkar *et al.*, 2009). The protein value of pearl millet compares favourably with sorghum, wheat and are higher than maize (Oelke *et al.*, 1990). Pearl millet is higher than in methionine than maize, thus alleviating the need for synthetic supplements in poultry diets (NIFA. 2004)

This paper reviewed the utilization of millet as an alternative energy source that can or substitute maize as energy source for poultry production

2.0 MATERIALS AND METHODS

Literature materials on Pearl millet and its utilization in broiler chickens diets were assembled from Journals, Conference paper, books, bulletins, they were thereafter reviewed and discussed

3.0 REVIEW OF LITERATURE

3.1 Origin and Distribution of Millet

Millets are some of the oldest cultivated crops, the term millet is applied to various grass crops where foods are harvested for food or feed. Oelke *et al.*,(1990)reported that five millet species of commercial importance and proso ,anal foxtail,barnyard ,brown top and pearl. Records of culture for foxtail are proso Promillets extend back to 2000 to 100BC and foxtail millet (*Setaria itahria*)probably originated in southern Asia and is the oldest of the cultivated millets,it's known as Italian or German millet. Foxtail millet was rarely grown in the United States (US) during colonial times but it's acreage increased dramatically pncuctmin the great plans after 1950인어

Proso millet (*Paricum miliaceum L.*) was introduced into US from Europe during the 18th century,it was later introduced into Dakotas where later was grown on considerable acreage. In North Dakota acreage has ranged from 50,000 to 100,000 acres while in Minnesota, only a few thousand acres have been grown,proso millet is grown in Soviet Union, Main land,China, India and Western Europe while foxtail millet is grown primarily in Eastern Asia. In the United States, both millets are grown principally in the Dakotas,Colorado and Nebraska (Oelke *et al.*; 1990)

Barnyard or Japanese millet (*Echinochloa frumentacede L.*) is domesticated relative of the seeds barnyard grass. It is grown for grain in Australia, Japan and other Asian countries, in US it is grown primarily as forage while Browntop millet (*Panicum ramosum*) is a native of India and was introduced into United States in 1915, it is grown in south Eastern United States for hay or pasture and birds and quails feeds, plantings on game reserves, it does not compete well with weeds (Oelke *et al.*, 1990). Pearl millet (*Pennisetum glaucum*) is grown in the semi-arid low - input dry land agricultural regions of Africa and South East Asia because it is adapted to soils of low fertility and moisture content. These characteristics make pearl millet a possible alternative crop in the South Eastern United States, where cultivation of crops is inadequate to meet needs and shipping corn (maize) from other states which may increase food costs (Geidom *et al.*, 2005).

3.2 Millet Production in Nigeria

Pearl millet (*P. glaucum*) is the dominant food crop in Sahel zone of Nigeria and ranks second to sorghum in the Sudan savannah zone (Shall, 2004). This is probably because of the resistant characteristics to harsh weather condition of the Sahel Zone. David *et al.*, (1996) reported that pearl millet ranks as the world's fourth most important tropical food cereal with 26 million hectares (63million acres) being grown mostly in semi-arid West Africa and India. Millet has attribute of early maturity and can adopt well to droughty, sandy acid soils of low fertility, pearl millet is highly responsive to fertilizer and moisture and well drained soils.

3.3 Proximate Composition and Nutritional Profile of Millet

Davis *et al.*, (2003) Pearl millet grain could potentially be successfully incorporated into poultry diets, the protein content although variable is higher than maize and the essential amino acid profile is more balanced than maize too. Whole seed can be fed to poultry, the protein values compare favourably with sorghum and wheat and are higher than maize. Proso millet also has considerably higher fibre levels due to attached hulls (Oelke *et al.*, 1990). Thus the average composition of millet grain include 12.0% crude protein, 8.0% crude fibre, 4.0% ether extract, 2900 kcal/kg ME and a fairly good source of the B12-vitamins as reflected in Table 1. Table 2 shows the chemical composition of millet, maize and Sorghum (Seshaiah, 2000)

Table 1: Average Composition of Millet

Nutrient	Content	Nutrient	Content
Crude protein	12.0%	B -complex vitamin	-
Crude fibre	8.0%	Thiamine	3.0mg/kg
Ether extract(fat)	4.0%	Nicotine (nicotin acid)	24.0mg/kg
Total digestible nutrient	75%	Riboflavin	0.7mg/kg
Digestible energy	1500kcal/kg	Plantothenic acid	3.4mg/kg
Calcium	0.05%	Chlorine	258.0mg/동산
Phosphorus	0.30%	Critical amin acid	None
Carotene	None	Lysine	0.23%
Vitamin D	None	Methionine	0.23%
Vitamin B12	None kl.1990	Threonine	0.35%
		Thryptophan	0.35%

Source: Oelke *et al.*(1990)

Table 2: Chemical Composition of Millet, Sorghum and Maize in Comparism

Nutrient	Millet Content (A)	Sorghum Content (B)	Maize Content(C)
Crude protein (%)	11.5-12.00	10.00	9.00
Crude fibre (CF) (%)	8.00	4.00	3.00
Ether extract(EE)(%)	4.00	3.00	3.90
Metabolizable energy (Kcal/kg/ME)	2900	2650.00	3300.00
Lysine %	0.23	0.30	0.20
Methionine(%)	0.23 al. (1990)	0.30	0.20
B:Seshaiah (2000)			C: Seshaiah (2000)
Source: A: Oelke i. (1990)	B:Seshaiah (2000)		C: Seshaiah (2000)

3.4 Anti-Nutritional Factors in Millet

Abeke and Olu (2008) reported that anti-nutrients are certain factors or chemical compounds that may be present in the feed ingredients, which are inimical to the efficient utilization of such feeds; these may include anti trypsin factors, tannins, haemagglutinins, phytic acid, hydrocyanic acids, goiterogens and gossipol etc.

David *et al.* (1996) pearl millet has fewer anti-nutritional factors than most grains crop in contrast to rye and sorghum, pearl millet grain is low in tannins which limit palatability and inhibit digestion. There appears to be no need for heat treatment of pearl millet to destroy protease inhibitors or other harmful factors. However, pearl millet can contain saponin anti-metabolites at a certain level, saponins are known to damage membrane in the digestive tract so there was a suggestion that caution must be taken when feeding high level of pearl millet to fish species which may be especially sensitive to saponin toxicity (Sodipo and Arinze 1985, Burtle and Newton (1995) and David *et al.*, 1996).

3.5 Energy Sources in Poultry Diets

Energy sources is so great as is the portion that required the bulkiest in the monogastric feed more especially poultry. Shall (2004) reported that the principal energy sources used in poultry feed in Nigeria include maize, sorghum, millet and wheat. Palm oil or groundnut oil is sometimes used to

boost the energy content of poultry rations. The conventional and alternative protein sources also contribute some amount of energy to the total energy content in the diets.

3.6 Utilization of Pearl Millet by Poultry

According to Cisse *et al.*, (2017) pearl millet can replace maize at 14% and 28% in broiler diets and Layers the egg weight and production were the same. Pearl millet has been shown to be a suitable feed ingredients for poultry diets up to 50% , pearl millet can be added to broiler diets without adverse effects on performance. (NIFA , 2004) Davis *et al.*, (2003) reported that pearl millet has higher oil content than other common cereal grains and is better source of linolenic acid, based on the performance of broilers and laying hens fed pearl millet, it appears that pearl millet is equivalent or superior to maize as a grain source for poultry rations. They reported further that as a result of the protein content of millet, which is higher than maize, replacement of whole maize by millet in the diet had the benefit of reducing by over a quarter of soya bean meal that was needed as well. The conventional energy-source , maize can be replaced with millet without any detrimental effect up to a hundred percentage 100% level of inclusion(Shall, 2004). Oelke *et al.*(1990) reported that whole seed can be fed to poultry, protein values compared favourably with sorghum and wheat and higher with corn (maize).Broiler fed with graded level of diet in which maize is replaced with millet can perform better at 50% replacement level (Shall,2004).

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

·Millet has been successfully used as a substitute for maize and other cereals as dietary energy source for poultry at 100% level of replacement
Whole millet grain can be fed to poultry chicks at 5-40% level without any detrimental effects on performance.

4.2 Recommendations

Based on the review,the following recommendations were made:

·Research should be intensified on the utilization of different varieties of millet as feed ingredient for poultry production

Crop breeders should develop early maturing varieties that are also resistant to diseases and pests. Improved varieties of millet and other inputs should be provided to farmers at an affordable and subsidized rate to promote millet production.

Farmers should be enlightened on the benefits of using millet as alternative feed ingredient for poultry production.

References

- Abeke, O. and Olu M. (2008).** Anti-Nutrients in Poultry Feeds: Concerns and options, proceedings of the 13th Annual conference of the Animal Science association of Nigeria. September 15th - 19th 2008. Ahmadu Bello University, Zaria Pp 396-398.
- Abu, O.A. Anjuwon, I.A. Adetunji, V. A. and Tewo, O. O. (2009).** Response of broilers Fed Cassava Grift, Palm Kernel cake and De-oiled cake with or without B -mannanase. Proceeding of Animal Science Association of Nigeria. September, 14th-17th 2009. LAUTECH Ogbomoso, Nigeria Pp 145-146.
- Adebayo, O. O. and Adeola, R. G. (2005).** Socio-economic factors Affecting Poultry farmers in Ejigbo Local Government Area of Osun State J. Hum.Eco.18:39-49.
- Aduku, A.O. and Olukosi, J. O. (2000).** Animal Products Processing and Handling in the tropics. Living Books Series G.U. Publications, P.O.Box 2280, Abuja Federal Capital, Nigeria, Pp 105-120.
- Burtle, G.J. and Newton, G.L. (1990).** Catfish performance on pearl millet grain. In I.D. Teare (ed.), proceeding of 1st National Grain, pearl millet symposium. Pp 70-75.
- Cisse, R.S, Hamburg, J.D, Freeman, M.E, Davis, A.J, (2017)** Using Locally Produced Millet as a feed Ingredient for poultry Production in Subsaharan Africa. Journal of Applied Research. 26(1): 9 – 12.
- David, J. Andrew, B.K. Wayne, W.I., Hanna, E.U. John, F.C. Rejowski, C.N. and Collins, V. P. (1990).** Advanced in Grain pearl millet: Utilization and production Research in: Jamik, J. (ed.), progress in New Crops. ASHS Press Alexandria V.A. Pp 170-177.
- Davis, A. J., Dale, N.M. and Ferreira, F.J. (2003).** Pearl millet as an alternative food ingredient in Broiler diets. Journal of Applied Poultry Research. 12:137-144.
- Esonu, B. O. and Bamgbose, A. M. (2000).** Evaluation of the Nutrient value of Wild Draw Variiegated cocoyam corn meal (*caladium hortulanum*). Nigerian Poultry Science Journal. 1:134-140.
- NIFA (2024)** National Institute of Food and Agriculture
- Oelke, E. A. Oplinger, E. S. Putman, D.H. Durgan, B.R. Dol, J.O. and Under Sande, D.J. (1990).** Millet History and production. Alternative Field Crops Manual. University of Minnisota, St. Paul, USA. 40:55-108.
- Ogbonna, I.U. Oredein, A. O. and Adesehinwa, A. O. K. (2000).** Effect of Replacing Groundnut caley with Raw Soya bean residehts in diet on performance chicks: A preliminary study, Nigerian Poultry Science Journal. 1:23-31.
- Seshaaiah, M. P. (2000).** Sorghum Grain in poultry feed in: Technical and institutional options for sorghum grain and mold management. Proceeding of international consultation, 18th - 19th May, 2000 KRISAT, Pantanchaeru, India Chandrashekar, A., Bandyo Padhyay, R. and Hall, A.J. (eds) Pp 240-241.
- Shall, Shehu (2004):** The Replacement Values of Millet for Maize in Broiler Diets. Unpublished Master of Science in Animal Science, Thesis. Abubakar Tafawa Balewa University, Bauch, Nigeria.
- Sodipo, A.O. and Arinze, E.B. (1985).** Saponin content of some Nigeria foods. Journal of Science Food and Agriculture. 36:310-312.
- Tornerkar, A. P, Munde, V. K. and Kokane, S.S. (2009).** Effect of Replacing maize with Bajra (pearl millet) on the performance of *Broilers*. *Journal of Veterinary World*. 2 (8):310-312.