

# **Feed Resources For Boosting Theproduction Of Monogastric Animals In Africa– An Overview**

**Jonathan Nyarko Ocran**

*African Union Commission, Addis Ababa, Ethiopia*

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## **SUMMARY**

*Africa has enormous feed resources that can be used to boost the production of monogastric animals. These feed resources vary in terms of their cost, availability and their nutritive value. This paper has highlighted the various class of feed resources in Africa and their merits and demerits. With the demand of meat growing by the day, there is the need to know which feed resources to use in order to reduce the cost of production and maximize profits.*

**KEY WORDS:** *Feed Resources, Africa, Monogastric animals and Production*

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## **I. Introduction**

Monogastric animals occupy a unique place in Africa's ability to meet its animal-based protein requirements for its teeming population, both now and the future. This is because the through-put of monogastric animals is relatively shorter compared to ruminant animals. For example, boilers can reach market weight of 2kg within five weeks from day old. Furthermore, monogastrics provide high-quality 'white' meat to consumers who abhor red meat. With the positive association having been established between red meat and the cancer disease by notable institutions such as the World Health Organization (WHO, 2002; IARC, 2015), the importance of monogastrics has become even more evident. In Africa and other developing countries, feed accounts for more than 70 percent of the total cost of production of monogastric animals. Profitable production of monogastric animals, therefore depend among other factors on the availability of cheap sources of nutrients for sustaining their rapid growth to slaughter weight. Africa possess diverse sources of feeds that can be fed to monogastric animals. These feeds are capable of maintaining their body weight and for production purposes such as meat and eggs as well as for reproduction. These feed resources include cereal grains, leguminous grains, agro-industrial by-products, plantain and banana, fish and fish products, commercially compounded feeds, forage shrubs and leaves, animal by-products, Insects, concentrates, agro-industrial by-products, forages, leguminous crops, insects, fish and fish by-products, concentrates and enzymes. A great deal of work has been done on both conventional and non-conventional feed resources by way of determining their nutrient composition, digestibility and nutritive values (Ocran, 1993; Laswai, Ocran, Lekule and Sundstol, 1997; Morgan and Chocot, 2016 ). Majority of farmers in the production of monogastric animals are small-scaled ones, even though per volume output per farm, the commercial large-scale farmers put more meat on the market than the small-scaled farmers. The paper will thoroughly discuss the merits and demerits of each class of feed sources available for feeding monogastric animals in Africa.

## **II. Feed Resources For Monogastric Animals**

### **2.1 Cereal Grains**

Cereal grains used in the diets of monogastric animals in Africa include maize, sorghum, rice, millet and their by-products such as maize bran, rice bran hominy, rice polishing and wheat bran. These gains provide the bulk of energy supplied to monogastrics. However, their degree of digestibilities and as a provider of energy in the diets of pigs and poultry differ. For example, as a source of energy in the diets of monogastrics, maize has a superior energy level than sorghum. The snag with the use of cereal grains is that human beings also use as food and therefore there is competition between two species for these feed resources. So, in times of scarcity, the price of cereal grains rises and makes it unprofitable as feed resources for monogastric animals. Cereal grains are also deficient in essential amino acids such as lysine and tryptophan needed for growth and development by pigs and poultry. However, crop breeders are addressing this deficiency by breeding for protein-rich maize and rice through hybridization and fortification. (International Maize and Wheat Improvement Centre, 2015). Bidi and colleagues (2019) reviewed the prospects of quality protein maize in indigenous chickens in Zimbabwe and noted that it could boost the performance of these chickens. Yellow

maize is also a preferred feed ingredient in layers as it aids yellow coloration of the egg yolk desired by many consumers.

Sorghum is a drought-tolerant crop and readily available in Africa. Sorghum has been fed to pigs and chicken with consideration success. However, sorghum contains kafirin which causes incomplete digestion of the starch it contains, which leads to inferior growth rates when fed to pigs and chickens (Liu, Selle and Cowieson, 2013). Pearl Millet has also been used in diets of monogastric animals with good outcomes. Hafeni-Shihpo (2019) substituted maize for pearl millet in the diets of broiler chickens and found that it could replace maize up to 50 percent.

Another problem with grain cereals is that if they are not properly stored or the moisture content is too high, it predisposes them to mycotoxin infestations, which makes them dangerous when fed to humans.

The by-products of cereal grains such as wheat bran, maize bran, rice bran hominy and rice polishing have been used as feed ingredients in the diets of monogastrics for many years (Ocran, 1993). Wheat bran, for example is a preferred feed ingredient in the feeding of chicken in Africa. These by-products, however, provide lower energy when used in the diets of monogastrics compared to the grain itself and therefore need to be fortified.

## **2.2 Root and Tuber Crops**

Root and Tuber crops such as cassava, sweet potato, potato, yam and cocoyam as well as the vines of sweet potato, potato and cocoyam are fed to monogastrics either in the raw form or used as a component of their diets. Cassava has a rich store of energy and is readily available and cheaper as a source of feed to monogastrics (Lekule and Sarwatt, 1988; Morgan and Choct, 2016). Cassava is relished by pigs and has been fed to poultry as a feed ingredient. Cassava, however contains relatively high levels of dietary fiber and hydrocyanic acid. and therefore high proportions of it in the diets of monogastrics is not recommended. When fed at high levels, the cassava should be soaked in water overnight, grated and fermented to reduce its cyanide content (Lekule and Sarwatt, 1988; Keshab, Dipanjuli, Santanu and Swaraj, 2018). Cassava by-products such as its leaves and peelings can be fed to both pigs and poultry. Kiendrebeogo and co-workers (2019) recommended an inclusion rate of 30 percent of cassava leaves in the diets of pigs in Burkina Faso.

Sweet potato has been fed to both pigs and poultry in raw and cooked forms with considerable success. Sweet potato based-diets have been formulated for pigs and chicken and is comparable to maize as a source of energy in such diets. However, Afolayan et al., (2012) replaced maize-based diets with graded levels of sweet potato meal up to 60 percent of the diet and fed them to starter and finisher chickens. They recorded significant decreases in weight gain, feed intake and the total cost of raising these birds. These workers recommended that sweet potato meal should not be included beyond 20 percent when they are being substituted for maize in the diets of starter and finisher broiler chickens. Fortified orange sweet potato provides better results in monogastrics as it is enriched with vitamin C. The leaves of sweet potato have been fed to pigs in raw form or as a silage with good outcomes. In terms of calories produced per acre of land, sweet potato surpasses cereals such as maize, rice, sorghum and millet. Like sweet potato, Irish and French potato are grown in some parts of Africa and can be used as feed resources for both pigs and chickens.

Yam and cocoyam tubers are relatively expensive to feed to monogastric animals as it is also consumed by humans. However, the peels of yam and cocoyam have been successfully fed to pigs in Africa. In a flock of chicken experiencing pecking, the leaves of cocoyam can be used to divert their attention on themselves to feed on the leaves.

## **2.3 Leguminous Grains**

Leguminous grains such as soya beans, cowpeas, pigeon peas, peas, faba beans, jack beans, lentils, chick pea, groundnuts, and bambara groundnuts are grown in most parts of Africa and are readily available as feed resources for both monogastric animals and humans. They are rich sources of protein and have been incorporated in the diets of both pigs and chickens. In recent years, soybean is increasingly being used to replace fish meal as the main source of protein in the diets of chickens in Africa. This is as a result of rising cost of fish and fish meals. Soybean can replace fish meal in the diets of both broiler and layer chickens up to 20 to 25 percent. A key problem with some of the leguminous grains is the some of them contain toxins; which can have adverse effect on the performance of monogastrics when fed at higher levels.

## **2.4 Agro-industrial By-Products**

Agro-industry products such as brewers waste, sunflower cake, groundnut cake, sesame meal, coconut oil meal, cottonseed meal, Palm kernel cake and cocoa husk are waste products, which are available and can serve as feed resources either in the raw form or incorporated in the diets of monogastric animals. Agro-industrial by products can be obtained at no cost to the farmer or are relatively cheap on the market or agro-industrial complex. The problem with some of the agro-industrial products such as groundnut cake, palm kernel cake and coconut oil meal is their high content of oil or fatty acids which makes them rancid if not properly

dried or well processed to remove the high oil content. The high rancidity or pungent smell of these feed resources, sometimes make them unpalatable to monogastric animals. Another problem with some of these by-products such as cocoa husk, sunflower cake and brewers waste is their high fiber content, which reduces their digestibility and nutrient availability to monogastrics. These problems notwithstanding, agro-industrial by-products can be used to formulate economical and cost-effective diets for monogastric animals provided adjustments upward can be made to their energy and protein contents.

#### **2.4 Plantain and Banana**

Plantain and Banana either in the raw form or cooked can be fed to pigs as a source of energy to them. Plantain and banana as feed to pigs require strategic supplementation to balance the diet being given to them. It is therefore not advisable to feed them as sole diets for the pigs. It can also be incorporated into the diets of chickens as a partial source of energy to them. In parts of Africa, where plantain and banana are not grown, their high prices make them uneconomical as feed resources for monogastric animals. However, in countries of Africa where plantain and banana are readily available they can be obtained at a low cost to the farmer, especially during the bumper seasons.

#### **2.5 Fish and fish products**

Fish and fish products are important feed components in the diets of monogastric animals. They are rich in essential amino acids and therefore are used to complement cereal based diets of pigs and chickens. As they are also consumed by humans, their prices may be exorbitant to use as a feed resource, especially during the lean fishing seasons in Africa's coastal and landlocked countries. To cut the cost of production, fish is often times substituted either partially or even wholly by leguminous grains such as soybean or agro-industrial products such as sunflower, coconut oil cake and groundnut cake. Sometimes, multiple of these by-products are used to balance the diets of monogastric animals and prop them up.

#### **2.6 Commercially formulated feed**

Commercially formulated feeds are produced for all categories of pigs and chickens. As such, we have starter, grower, and finisher feeds for both broiler and layer chickens. In addition, we have feeds for starter, weaners, grower-finisher and pregnant and lactating pigs. Most of feeds have to meet pre-determined standards in the countries in which they are produced, so the quality of commercially compounded feeds tend to be superior than those formulated by the farmer himself. Since they are produced for profit, the prices of commercially formulated diets also tend to be higher. The companies manufacturing monogastrics feeds are located in the cities and towns and therefore the cost of transportation of such feeds to the small-scaled and local monogastrics farmer tend to be higher. In some seasons of the year, especially the dry ones, commercially produced feeds cannot be found on the market

#### **2.7 Forage shrubs and leaves**

Forage shrubs and leaves such as Leucaena Leaf meal, Sesbania leaf meal, Lucerne leaf and some tropical grass such as Penisetum have been fed successfully as a source of protein and energy in the diets of pigs. These leaf meals have been incorporated in the diets of chickens with some level of success. Ocran (1993) substituted fish meal for leucaena leaf meal in the diets of growing pigs up to the weight of 60 kg and found that they could be incorporated up to the level of 10 percent of the total diet. At higher levels such as 20 percent, the pigs' feet became deformed and they experienced other adverse effects as a result of the presence of mimosine. However, if the diets were supplemented with ferrous sulphate, these adverse effects were not manifested. because the effects of mimosine are blocked.

#### **2.8 Animal By-Products**

Animal by-products such as blood meal, offals, feather meal, hatchery by=products, animal hair, liver meal and meat and bone meal have been incorporated in the diets of pigs and chickens as a source of protein to them. As waste products they can be obtained at little or no cost, the monogastrics farmer. Also, as most of these by-products are prone to pathogenic infestation, they need to be treated properly so that they do not become a source of disease to the animals.

#### **2.9 Insects**

Insects such as housefly, termites, caterpillars, cockroaches, bees and earthworm can be incorporated in the diets of pigs and chicken to provide them with protein. They can be bred inexpensively and its protein contents harnessed as a protein source to these animals. For example, Pomalegni and colleagues (2017) successfully fed house fly to poultry as a source protein in their diets in the Republic of Benin. The key problem with these feed resources is that some of the insects has poisonous exoskeleton, which can be dangerous to monogastrics when fed at relatively high levels.

## 2.10 Mineral and Multi-Vitamin Concentrates

In many instances to formulate a balanced diet for monogastric animals, it may require the incorporation of artificially manufactured mineral and multi-vitamin concentrates. This is because the feed ingredients used in compounding the diet may contain very little of these essential nutrients. These concentrates include minerals such as Zinc, Iron, calcium, Phosphorus, magnesium and copper and vitamins such as Vitamin A, B group, C, D and E. These supplements are relatively expensive and can be added up 2.5 to 3 percent of the total diet.

## 2.11 Enzymes

The use of enzymes in the diets of monogastrics is attracting increased attention in recent times. This is especially so because of the use of antibiotics and growth hormones in the livestock industry are being discouraged. Furthermore, enzymes enhance nutrient utilization efficiency and reduce the excretion of wastes that contribute to climate change. Synthetic or artificially manufactured enzymes such as phytase, lactase, xylanase, etc. make available nutrients which under normal circumstances would be excreted as waste to contaminate the physical environment. For example, the addition of the enzyme, xylanase to sorghum-based diets of broiler chickens in South Africa boosted their production performance (Mabelebele, Gous, Siwela, O'Neil and Iji, 2017).

## III. Conclusion

There is a wide array and variety of feed resources in Africa that can be used to feed monogastric animals. Some of the feeds are relatively cheaper and available, whilst others are not. The monogastric farmer in Africa should therefore find from among the feed resources highlighted and discussed above those that are cheaper so that his or her cost of production can be reduced and profit maximized. The adverse effects of some of the feeds have also been mentioned to guide the monogastric farmer at what levels they should be incorporated in the diets. Meat production in Africa can be increased substantially to meet growing demand, if the afore-mentioned feed resources are judiciously used in the production of monogastric animals.

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