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## **POULTRY PRODUCTION FOR FOOD SECURITY: THE SOUTH AFRICAN PERSPECTIVE**



Dr. Thobela Nkukwana

### **Background**

Food security encompasses four dimensions: food availability, access, utilization and stability; and can quickly change in a region, suddenly putting countless people at risk. The animal feed industry is committed to feeding the world responsibly, by reducing environmental impact and improving consumer health through the production of high quality and safe animal products. According to the Food and Agriculture Organization (FAO) of the United Nations, the earth's population will increase by about nine billion in 2050, with a 60% increase in demand for production of animal products; and thus an increased demand for feeds. Poultry meat and egg production might be the fastest way of improving food security in the country; thus, correcting the shortage of animal protein supply and consumption in rural communities. Poultry production represents the most vertically integrated, rapidly growing and highly globalized animal production industry. In South Africa, broiler production has increased from 694 000 in April 2012 to 727 000 in June 2013, generating a 22% gross value. This may be attributed to a growing change in consumer dietary preferences, low cost of poultry meat and eggs, and very few cultural constraints compared to beef and pork. Most importantly, the efficiency in genetic modelling of poultry entails the ability to predict the bird's growth and development, consequently allowing prediction of its nutrient requirements. Albeit, in intensive poultry production systems, feed is the most important input, amounting to 70 percent of total production costs with significant impact on broiler and egg producer costs; consequently on food availability and access.

### **Poultry product quality, safety and production costs**

High cost of feed ingredients are a continuous threat to food security. They limit production by resource poor farmers, and impact significantly on the will to purchase poultry meat and eggs by consumers. In January 2014, the SA Poultry Association raised concerns about the rising cost of poultry after research indicated that some chicken prices had risen by 30 per cent, which will hit local consumers hard as the meat is the only source of affordable protein. Energy-yielding raw materials and protein supplements constitute the largest component of poultry diets; in combination maize and soybean meal make up almost 80% of the complete diet and of the total feed costs, respectively. With a change in the climate, agricultural production, prices and infrastructure will change, limiting food safety, which is directly linked to the amount and quality of food produced. Globally, the significant impact of climate change on agriculture, including reduced crop yields, predicted grain food price rises of 37% for rice, 55% for maize, and 11% for wheat by 2050.

are often adopted globally, and will definitely influence similar regulatory structures in SA, like the Act 36 of 1947 and the Codes of Conduct in the Animal Feed Industry. Another looming challenge on producers is consumer demand for use of natural additives in production of poultry products. For decades poultry productivity was enhanced successfully by in-feed inclusion of antibiotic growth promoters (AGPs). Currently, the use of AGPs in poultry production is under severe scientific and public scrutiny, to an extent that their availability in the SA market is getting limited gradually. This change was triggered by perceptions among many consumers that edible poultry tissues are contaminated with harmful concentrations of drug residues linked to the development of antibiotic-resistant pathogenic bacteria, which pose a threat to human health. A subsequent ban of AGPs was instituted in the European Union (EU) in January 2006, and the United State is



#### Possible alternatives to AGPs and conventional ingredients

Herbs, spices, and various plant extracts have received considerable attention as possible replacements for AGPs. The fiber provided by plant extracts is required to ensure gizzard and gastrointestinal function, and may be enough to enhance growth efficiency and meat yield. The modes of action of phyto-genic (plant) additives may be similar or different with respect to AGPs, but the effects are similar, they promote gut health and growth efficiency. They also have enzymatic effects, which may be enhanced by use of exogenous enzymes, implying that even grains such as sorghum, wheat, millet, etc., which are not popular in poultry diets are utilized efficiently. Following are some of the locally available plants with antibiotic, antioxidant, enzymatic and nutritional properties to enhance poultry productivity. I'm currently supervising MSc and PhD students working on these alternatives.

#### Moringa oleifera tree plant

Moringa oleifera Lam (Moringaceae), a highly valued plant, distributed in many countries of the tropics and subtropics has been commercialized in South Africa as a nutritional and health supplement for humans. Ground leaves of this plant are currently sold as medicinal tea, and have been used to produce soaps, body lotions and supplements. Different parts of this plant have an impressive range of medicinal uses, including growth promoting, antimicrobial and antioxidant effects. Moringa leaves contain a profile of important minerals, are a good source of protein, vitamins,  $\beta$ -carotene, amino acids and various phenolics. In recent studies here in SA, Moringa oleifera leaf meal has been proven to improve growth performance, digestibility, digestive organ size and carcass yield, fatty acid composition and oxidative stability, meat shelf-life attributes (colour, ultimate pH and drip loss), as well as bone breaking strength, ash content and mineral composition in broiler chickens. Inclusion of the leaf meal in water at placement of day old chicks performs the same function as a stress pack, giving prolonged vitality to the birds.

#### Aspalathus linearis (Rooibos)

Aspalathus linearis (Rooibos) also known as Red Bush is native to South Africa where its fermented form is normally used as a tea. Rooibos is higher in antioxidants and vitamins than any other type of tea. Aspalathin is known to be the major flavonoid antioxidant of unfermented Rooibos and constitutes approximately 15g/kg of dry plant material; and phenolic acids such as protocatechuic acid with antioxidant properties are also present in Rooibos, thus increasing its anti-oxidative potential. Similar health benefits as in Moringa tree have long been realized by consumers in SA and abroad. Nevertheless, studies to explore its efficacy as an antioxidant and antibiotic additive in poultry still need to be explored; and one is currently being conducted.

#### African baobab tree (Adansonia digitata L.)

The protein and energy levels in the baobab leaves, fruit pulp and seeds, respectively; suggest that parts of this plant can be used to an advantage at low inclusion levels to reduce the cost of broiler feeds. African baobab seeds are a superb source of protein, and most essential and non-essential amino acids. Previous studies show the baobab seed cake as a potential low-cost and locally available protein source for livestock feeding. The seeds have a protein value that ranges from 20-36 % CP and an energy level of 4.19 – 16.75 kJ/kg, which is comparable to sunflower meal (24.4-36.7 CP and 19.1 – 20.2 kJ/kg) and soybean hulls (10.5-19.2 CP and 17.5-18.7 kJ/kg). The seeds also provide some of the necessary fibre, vitamins and minerals for poultry growth and development. Baobab leaves contain about 13 – 15% CP and 60 – 70% carbohydrate, while the fruit contains 8.7% moisture, 2.7% CP and 73.7% carbohydrate. Fresh baobab leaves provide an edible vegetable similar to spinach which is also used medicinally to treat kidney and bladder disease, asthma, insect bites, and several other ailments. As with rooibos, no studies have been done to test its efficacy on animals. However, the nutritional analysis of baobab seeds is being done at the ARC, and diets for a study that will be conducted in the next month have already been formulated.

#### Conclusion

The gap between demand for poultry meat and its supply is anticipated to broaden more in the coming years, creating a compelling intention to explore the convenience of locally accessible, unconventional feedstuffs in poultry diet formulations. The exploitation of such feedstuffs demands having a good knowledge of the nutrient composition as well as appropriate inclusion levels. These developments in research do not only promise maximized production, but it will also ensure safety and quality of poultry products, increased utilization of unconventional grains and protein sources; and maybe reduce imports into the country.

This article is based on peer reviewed articles and references may be made available upon request.

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