



Growth performance and carcass characteristics of three chicken strains in response to incremental levels of dietary *Moringa oleifera* leaf meal



N.A. Sebola^{a,b,*}, V. Mlambo^{a,b,1}, H.K. Mokoboki^{a,b,2}, V. Muchenje^c

^a Department of Animal Science, School of Agricultural Sciences, Faculty of Agriculture, Science and Technology, North-West University, Mmabatho, Mafikeng 2735, South Africa

^b Food Security and Safety Niche Area, Faculty of Agriculture, Science and Technology, North-West University, Mmabatho, Mafikeng 2735, South Africa

^c Department of Livestock and Pasture Science, University of Fort Hare, Alice, Eastern Cape, South Africa

ARTICLE INFO

Article history:

Received 22 December 2014

Received in revised form

20 April 2015

Accepted 24 April 2015

Keywords:

Moringa oleifera leaf meal
Indigenous chickens
Feed conversion efficiency
Feed intake
Carcass weight

ABSTRACT

A 90-day feeding trial was conducted to determine the effect of *Moringa oleifera* leaf meal supplementation on growth performance and carcass characteristics of three chicken strains (male and female) that are normally reared under extensive production systems in South Africa. *Moringa* leaves were harvested by hand, air-dried and milled into *M. oleifera* leaf meal (MOLM). The MOLM was chemically analysed and used to dilute a commercial broiler finisher diet at 0 (MOLM0), 25 (MOLM25), 50 (MOLM50), and 100 (MOLM100) g/kg DM, producing four dietary treatments. Two hundred and sixteen (216) Potchefstroom Koekoek (PK), Ovambo (OV) and Black Australorp (BA) chickens were raised on a commercial starter mash for 4 weeks. On the fourth week, experimental diets were offered and growth performance data were collected over a period of 13 weeks. Carcass characteristics were measured upon slaughter at the end of the 13-week feeding period. Diet × strain interaction was significant ($P < 0.001$) for feed intake but not ($P > 0.05$) for growth rate and FCE. Feed intake responded to incremental levels of MOLM in an asymptotic fashion. Maximum feed intake was achieved at dietary MOLM inclusion levels between 50 and 70 g/kg DM. Black Australorp chickens had the highest feed conversion efficiency (FCE) of 2.35, while OV and PK chickens had lower FCE values of 2.09 and 2.05, respectively. Diet, strain and gender, all had significant effects on dressing percent ($P < 0.001$), leg and thigh weight ($P < 0.05$), and wing weight ($P < 0.05$). Male chickens attained higher ($P < 0.05$) carcass weight, leg and thigh weight, dressing percent, and breast mass than female chickens ($P < 0.001$). In female chickens, diets containing MOLM resulted in chickens with better carcass weight, leg and thigh weight, dressing percent, and breast mass compared to the control. In conclusion, Black Australorp chickens were better at utilizing diets with higher levels of MOLM compared to OV and PK strains. Inclusion of MOLM in chicken diets positively affected growth performance and carcass characteristics of the birds.

© 2015 Elsevier B.V. All rights reserved.

* Corresponding author at: Department of Animal Science, School of Agricultural Sciences, Faculty of Agriculture, Science and Technology, North-West University, Mmabatho, Mafikeng 2735, South Africa. Tel.: +27 18 389 2740; fax: +27 18 389 2748.

E-mail addresses: 22954457@nwu.ac.za (N.A. Sebola), Hilda.mokoboki@nwu.ac.za (H.K. Mokoboki).

¹ Tel.: +27 18 389 2729; fax: +27 18 389 2748; Mobile: +27 78 530 9362.

² Tel.: +18 389 2744; fax: +18 389 2748.

1. Introduction

Extensively-reared chickens play a major role in ensuring food security in rural communities of most developing countries (Tadelle et al., 2000). However, due to direct competition for food between man and simple non-ruminants, the cost of feeding chickens for optimum growth performance has become high. As a result, during the past few decades, developing countries have seen a decline in the contribution of indigenous poultry to food security (Bhatti et al., 1990). This is mainly attributed to their relatively poor productive performance (Bhatti et al., 1990) and an increase in poultry meat and eggs from commercially produced exotic poultry breeds (Gueye, 2000). Exotic poultry breeds have the distinct advantage of being highly productive and thus ensuring a quick return on investment. This increased productivity was achieved through improved intensive management strategies, improved genetics, and research into nutrition and growth of the exotic chicken breeds. The nutrient requirements of indigenous chickens differs from that of exotic breeds, with the latter requiring feed of such high quality that it can also be used directly as human food. As a result, farmers in resource-poor rural communities find rearing of broilers to be unsustainable and tend to keep indigenous chicken strains that are adapted to extensive rearing systems. These chicken strains are known to be products of their own environment and can be produced at a low cost. However, research to improve the productivity of indigenous chickens under intensive management systems is still limited. Thus, in order to contribute effectively to poverty alleviation, it is essential to improve and promote the production of local chickens. Due to high costs of poultry feed, formulating feed using cheap local resources is essential for sustainable production of indigenous chickens. Horsted (2006) reported that hens are capable of finding and utilizing a considerable amount of nutrients from forages. Abou-Elezz et al. (2011) and Kakengi et al. (2007) reported that inclusion of 5% *Moringa oleifera* leaf meal (MOLM) in the diet of Rhode Island Red hens improved egg mass production and egg laying rate. Leguminous leaves are important food resources because they provide additional nutrients as well as bioactive plant compounds with beneficial effects on animal health and productivity. *M. oleifera* is currently being produced on a large scale in South Africa. While there have been a few studies investigating the use of *M. oleifera* leaves in poultry diets (Abou-Elezz et al., 2011; Kakengi et al., 2007), most of these have been carried out with broilers. The practical application of this intervention in broiler production is very low since the broiler is an animal with very precise nutritional requirements. Dilution of broiler diets with plant material is most likely to result in sub-optimal productivity. On the other hand, extensively-reared chicken strains are likely to have some capacity to utilize plant material but this has not been investigated extensively. Therefore, the purpose of this study was to investigate the growth performance and carcass characteristics of three chicken strains (Potchefstroom Koekoek, Ovambo (indigenous) and Black Australorp (imported), which are normally reared extensively in South Africa, in response to incremental levels of dietary MOLM.

2. Materials and methods

2.1. Study sites

This study was conducted at the North-West University Experimental Farm (Molelwane), Mafikeng (25.8°S and 25.5°E), South Africa. *M. oleifera* leaves were obtained from Patience Wellness Centre in Limpopo Province (24.305°S 29.565°E). The ambient temperature in this area ranges from 27 to 37 °C during summer and between 11 and 17 °C during winter. The annual rainfall ranges between 500 mm and 800 mm. The leaves were air-dried at a room temperature and then milled to pass through a 2 mm sieve.

2.2. Chicken strains

Ovambo (OV), Potchefstroom Koekoek (PK) and Black Australorp (BA) eggs were purchased from the Agricultural Research Council (ARC), (Irene, Pretoria) and hatched in an incubator at North West University farm. Temperature and humidity were, respectively, set at 37.5 °C and 82.5% for incubation and 37 °C and 85% for hatching. The OV strain originates from Ovamboland district of Namibia. The strain was brought to the Poultry Breeding Section of the ARC, Irene, South Africa, for conservation. The body conformation (small to medium) and colour patterns are typical of chickens found in rural communities of Southern Africa. The Potchefstroom Koekoek strain was bred at the Potchefstroom Agricultural College, South Africa, during the 1950s. It is a composite of the White Leghorn, Black Australorp and Barred Plymouth Rock. This multipurpose strain is therefore recognized as locally developed. The Black Australorp, an Australian chicken breed, is the most commonly used imported strain of chickens in communal production systems of South Africa. It was developed from the English Orpington.

2.3. Chemical analysis of Moringa leaf meal

M. oleifera leaf meal samples were analyzed in duplicate for dry matter content (DM) (AOAC, 2005; method no 930.15), ash (AOAC, 2005; method no 924.05) and nitrogen (N) (AOAC, 2005; method no 984.13). Crude protein (CP) was then calculated as $N \times 6.25$. Neutral detergent fibre (NDF) and acid detergent fibre (ADF) were determined according to Van Soest et al. (1991) using the ANKOM2000 Fibre Analyzer (ANKOM Technology, New York). The NDF was analyzed with heat-stable α -amylase; both NDF and ADF were expressed inclusive of residual ash. Ether extract (EE) was determined using ANKOM XT10, Extractor (ANKOM Technology, New York).

2.4. Diet formulation

Four diets were constituted by diluting commercial broiler finisher diet with graded levels (0, 25, 50 and 100 g/kg) of air-dried and milled MOLM. The gross composition of experimental diets is presented in Table 1. The experimental diet formulation was done at a commercial feed manufacturing company, NutriFeed (Mafikeng). These

Download English Version:

<https://daneshyari.com/en/article/2447078>

Download Persian Version:

<https://daneshyari.com/article/2447078>

[Daneshyari.com](https://daneshyari.com)