

The effect of different diets on growth rate and meat quality of the indigenous chickens

Z. Nemavhola and L.R. Ndlovu[#]

Dept of Animal Production, University of The North, P Bag X 1106, Sovenga, 0727

[#]e-mail:Ndlovul@unin.unorth.ac.za

Introduction

In most rural village communities keeping of indigenous chickens in a free range system has been practised for many years. Although requiring minimal resource input and considered secondary to other agricultural activities by farmers, this type of production has an important role in supplying local populations with additional income and food supply. Unlike the exotics which are selected only for meat production and grow very fast, the growth rate of indigenous chickens is very slow and some of their limitations on performance can be reached only when feed management is improved. In most of these systems energy and protein are the major limiting nutrients. Energy is needed for the maintenance of all normal functions and any amounts supplied over and above these basic needs will be used for production, which for meat producing chickens will be for growth. Protein is required for the general body development of the growing birds. The aim of this research was to study the response of two breeds of indigenous chickens to varying levels of energy and protein fed after six weeks of growth.

Materials and Methods

The research was conducted at the University of the North Experimental farm. Ninety-eight Naked Neck and 98 Venda chickens at seven weeks of age were randomly allocated to four diets and housed in groups of six chickens per breed using a total of 32 pens. The four diets differed in energy and protein content. High energy diets contained 13.2 and 13.5 MJ ME/kg Dm for grower and finisher whilst the low energy diets had 11.3 and 11.6 MJ ME/kg DM for grower and finisher, respectively. The protein levels were 20 %, 16% and 17 %, 14 %, respectively, for high and low diets at starter and finisher. The diet combinations were: 1. High energy and high protein, 2. Low energy and low protein, 3. High protein and low energy and 4. Low protein and high energy. Chickens were raised for seven more weeks with the first five weeks used as grower phase and the last two weeks as finisher phase. Throughout the seven week period the chickens had access to water and feed was given ad-lib. Natural light was used there was no additional supply of light. Live weight and feed intake were measured every seven days. At the end of seven weeks one chicken per pen was randomly selected and slaughtered for sensory evaluations. The carcass was divided into the drumstick, thigh and breast meat. The meat was cooked for 30 minutes using a microwave set at maximum power. Meat was evaluated for tenderness, juiciness and taste preference using 32 untrained panellists to rank each part on a 5-point ranking scale (1 for best and 5 for poorest). All the data were subjected to analysis of variance using models that accounted for energy, protein, breed and their two- and three- way interactions.

Results and Discussion

A summary of the treatment effects on performance and carcass characteristics are shown in Table 1 and 2. One Naked Neck chicken diet on the second week of the experiment, and its data was discounted. Both the two- and the three- way interactions did not significantly affect any of the production responses.

Table 1 Production performance of the Venda and Naked neck breeds (B) fed diets with different levels of energy(E) and protein(P) during the last week of the experiment.

B	Venda				Naked necks				Significance	se	B	E
	Low		High		Low		High					
P	low	high	low	high	low	high	low	high				
FI	2604 ^b	2261 ^a	2278 ^a	2420 ^b	2704 ^b	2469 ^b	2577 ^b	2395 ^b	98.4			
Gain	475	514	520	524	522	451	491	421	33.6	NS	NS	
FCE	5.7 ^b	4.4 ^a	4.4 ^{ab}	4.6 ^{ab}	5.2 ^{ab}	5.6 ^{ba}	5.3 ^{ab}	5.8 ^b	0.45			
LW	1548	1537	1530	1506	1545	1549	1484	1374.	71.67	NS	NS	

The total intake was affected by both energy and breed; Naked Necks had higher intake than Vendas at low energy high protein and at high energy low protein. FCE was affected by breed ($P < 0.05$), Venda chickens had

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higher FCE than Necked Neck. Gain and live weight were not affected by any of the factors and their interactions. Breast tenderness was affected by breed ($P < 0.05$), with Venda more tender than the Necked Neck. Breed by energy interaction significantly ($P < 0.05$) affected drumstick' juiciness and tenderness. Thigh tenderness was significantly affected by breed ($P < 0.05$), with the Venda more tender than the Naked Neck.

In this experiment protein did not have an effect on growth rate, FCE, feed intake and live weight gain. However, Ramlah (1996) reported that indigenous chickens raised on high protein showed higher growth rate than those that were raised under low protein diets and Barua *et.al* (1998) reported that when both energy and protein content were increased growth rate of indigenous chickens of Bangladesh increased. When the energy content was 10.4 MJ ME/kg DM and protein was 17% the chickens took 89 days to reach live mass of 1.5 kg but when the energy was raised to 12.5 MJ ME/kg DM and protein to 21% it took them 77 days. In our experiment the chickens weighed 1.6 kg or more by 91 days. Possibly the Venda breed and Naked necks in South Africa (Northern province) do not require high nutritional feeds more especially energy and protein as they are used to striving for feed.

Table 2 Juiciness (j) and tenderness (t) of breast (b), drumstick (d) and thigh (T) from Venda and Naked Neck chicken.

B E P	Venda				Naked Neck				se	Significance		
	low		high		low		high			B	E	B*E
	low	high	low	high	low	high	low	high				
Bj	2.4	3.3	3.1	3.3	3.1	3.4	3.4	3.4	0.28	NS	NS	NS
Bt	2.6 ^a	3.3 ^{bc}	3.1 ^b	3.1 ^b	3.8 ^{cd}	4 ^c	3.4 ^{cd}	3.8 ^d	0.31		NS	NS
Dj	2.4 ^a	2.8 ^{ab}	3.9 ^e	3.6 ^e	3.1 ^{cd}	3.2 ^d	2.9 ^{cd}	2.6 ^{ba}	0.28		NS	
Dt	2.6 ^a	2.8 ^{ab}	3.25 ^c	3.1 ^{bc}	3.3 ^c	2.2 ^{ab}	2.8 ^{ab}	2.7 ^a	0.25	NS	NS	
Tj	3	3	2.9	2.9	2.7	3.3	3.5	3.1	0.28	NS	NS	NS
Tt	3.3 ^{ab}	3.2 ^{ab}	3.2 ^{ab}	3 ^a	3.5 ^b	4 ^c	4 ^c	3.5 ^b	0.27		NS	

Conclusion

Venda chickens had a better feed utilisation than the Naked Necks and their meat was more tender than that of Naked Necks. Protein and energy levels did not have much effect on the performance of the two breeds.

References

Barua, A. *et.al.*, 1998. *Wld Poult. Sci.* 54, 283.
 Ramlah A.H., 1996. *Wld Poult. Sci.* 52, 77.