RESPONSE OF BROILER BIRDS FED RICE HUSK IN PLACE OF WHEAT OFFALS: PHASE SUPPLEMENTATION OF XYLANASE ENZYME

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Abstract
The experiment was conducted to investigate the effect of dietary replacement of wheat offal with rice husk with or without enzyme supplementation on nutrient digestibility of broiler chickens at different phases. Two hundred and eighty-eight day old Marshall strain of broiler chicks were used for the experiment. The birds were randomly divided into 8 groups of 3 replicates of 12 birds each to make a total of 36 birds per treatment in a complete randomized design experiment (CRD). The diets were formulated as follows: Diet 1 was the control with wheat offal, Diet 2 – plus rice husk without enzyme supplementation), Diet 3 – Diet 2 + AG enzyme (1ml/litre of water) for eight weeks, Diet 4 – Diet 2 + Maxigrain (0.1 grammes/kilogramme of feed) for eight weeks, Diet 5 – Diet 2 + AG enzyme (1ml per litre of water) for the first four weeks of the experiment, Diet 6 – Diet 2 + Maxigrain (0.1 grammes/kilogramme of feed) for the first four weeks of the experiment, Diet 7 – Diet 2 + AG enzyme (1ml per litre of water) for the last four weeks of the experiment, Diet 8 – Diet 2 + Maxigrain (0.1 grammes/kilogramme of feed) for the last four weeks of the experiment. The experiment lasted for 8 weeks. Enzyme supplementation significantly ($P<0.05$) affected nutrient digestibility. The dry matter digestibility (DMD) had similar value in diets 7 and 8, but higher in diet 7 and lower in diet 2. Also, the crude protein digestibility (CPD) had similar value in diets 1-8, but higher in diet 1 and lower in diet 2. Hence, it was concluded that rice husk could be used as alternative to wheat offal in formulating broiler diet at 10% in the starter phase and 16% in the finisher phase.

Keywords: Wheat offal, Rice husk, nutrient digestibility, Maxigrain enzyme, Ag-enzyme

Introduction

Rice husks, the major part of rice milling waste contains about 3.66 kcal/g energy, 5.25% crude protein and as high as 33.1% fibre. The use of rice husk as an ingredient in animal feeds, especially ruminants and poultry has been well documented (Dafwang and Shwarmen, 1996; Awesu *et al.*, 2002). However, its use in the feeding of monogastric animals is limited by its high fibre content. In broilers, high fibre tends to limit the amount of intake of the available energy by the birds and also results to the secretion of excessive nutrients (Kung *et al.*, 2000). Agbede *et al.*, (2002) had shown that high fibre and lignin contents of rice husk are capable of reducing nutrient utilization and also precipitate metabolic dysfunction when digested by non-ruminants. Considering the fact that poultry cannot fully utilize high fibre diets because of the lack of the digestive framework that can elaborately digest large amount of fibre, it becomes necessary to incorporate exogenous enzymes into their diets in order to enhance the breakdown of the non-starch polysaccharides (NSPs) present in fibre. Addition of enzyme to monogastric animal feed reduces viscosity of ingesta in the intestine and shows a marked improvement on the various morphological effects of feeding fibrous materials (Allen *et al.*, 1997). Strategies for ensuring adequate nutrition of animals must be based on optimizing overall agricultural and livestock productivity from available resources, improving existing technologies and integrating technology that employs multipurpose crops and animals, and recycling of crop residues and by –products as feeding stuffs for animals (Njwe, 1990).

The aim of this study is to replace of wheat offals with rice husk with or without enzyme supplementation on nutrient digestibility of broiler chickens.

Materials and Methods

Experimental site: The experiment was carried out at the Poultry Unit of Teaching and Research farm, Ladoke Akintola University of Technology, Ogbomoso Oyo State.

Formulation of experimental diets: Eight (8) experimental diets was formulated for the study at the starter phase (1-4 weeks) and finisher phase (5-8 weeks) as indicated below:

Diet 1- control with wheat offal for 8 eights, Diet 2- control without wheat offal but rice husk for eight week, Diet 3- Diet 2 + AG enzyme for eight weeks, Diet 4 – Diet 2 + maxigrain for eight weeks, Diet 5 – Diet 2 + AG enzyme for the first four weeks of the experiment, Diet 6 – Diet 2 + maxigrain for the first four weeks of the experiment, Diet 7 – Diet 2 + AG

Table 1: Demographic Information of Respondents

Variable	Frequency (N)	Percentage
Sex		
Male	61	86.25
Female	11	13.75
Marital Status		
Single	06	07.50
Married	71	88.75
Divorced	00	00.00
Window/Widower	03	03.75
Religion		
Christainity	12	15.00
Islam	68	85.00
Traditional Religion	00	00.00
Age		
≥ 20	01	01.25
20-30	17	21.25
31-40	38	47.50
41-50	23	28.75
51-60	01	01.25
≤ 60	00	00.00
Educational Attainment		
Informal Education	10	12.50
FSLC	18	22.50
SSCE /WAEC	41	51.25
OND/NCE	07	08.75
HND/Degrees	04	05.00
Occupation		
Crop Farmers	11	13.75
Cattle Traders	49	61.25
Civil Servants	06	07.50
Agro- Pastoralist	12	15.00
Artisans'	02	02.50
YEARS OF EXPERIENCE		
1-5	14	17.50
5-10	36	45.00
11-15	21	26.25
16-20	05	06.25
21-30	04	05.00

Table 2: Challenges of Marketing and Transportation of Cattle at the Control Post.

Variables	Frequency (n)	Percentage(%)	Raking
Absence of permanent structures	13	16.25	2
Insecurity/ theft/ lost of animals	02	2.50	7
Inadequate grazing area	11	13.75	3
High cost of transportation	08	10.00	5
Low access to banking facilities	06	7.50	6
Inadequate market information	15	18.75	1
Inadequate handling facilities (e.g ramp)	06	7.50	6
Non govt intervention	09	11.25	4
Absence of bank within the premises	08	10.00	5
Outbreak of diseases/ health conditions	02	2.50	7

LIVESTOCK PRODUCTION AND ENVIRONMENTAL MANAGEMENT

ASSESSING EFFECTIVE POPULATION SIZE AND RATE OF INBREEDING IN BUNAJI CATTLE UNDER PASTORAL PRODUCTION SYSTEM

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Abstract
The present study was carried out to assess herd structure, effective population size and rate of inbreeding among white Fulani bunaji cattle herd managed by pastoralist in the benue basin of Nasarawa and Benue states. Forty three cattle herds belonging to three pastoralist group agro-pastoralist, pastoralist and transhumant nomads were considered for the study. Flock composition was evaluated for the total population under consideration while, effective population size and inbreeding rate of select herds were computed. Herd size recorded were between 41±4.12, 52±5.32 and 58±3.21 for the agro-pastoralist, transhumance and Pastoralist nomads respectively. Breeding male to female ratio were 0.22, 0.24 and 0.26 while the coefficient of inbreeding or inbreeding rate per generation was 0.022, 0.014 and 0.017 of selected population for the respective production system. This seemed to be less than the maximum acceptable level, however, the prevalence of inbreeding was inhabitable because of the uncontrolled mating practice. It can be concluded that low inbreeding rate indicate that the breed is not at risk and no difference existed in small population genetic parameter between the various pastoral systems.

Keyword: Herd composition; effective population size; inbreeding; extinction

Introduction

Among all the livestock that makes up the farm animals in Nigeria, ruminants, comprising cattle, sheep and goats, constitute the farm animals largely reared by farm families in the country's agricultural system. Nigeria has population of 34.5million goats, 22.1million sheep and 13.9million cattle (Lawal-Adebowale, 2012). Among the indigenous cattle the white Fulani bunaji constitute 51% of the total herd and are most widely distributed. The larger proportion of these animals' population are however largely concentrated in the northern region of the country. Pastoralism and agro-pastoralism are the dominant livestock production-based, land-use systems in Nigeria, covering many agro-ecological zones under which the indigenous animals are managed. Pastoral management systems commonly practiced by cattle herders in the country include the exclusive, transhumant and agro pastoral systems.. The cattle are run on herds and mate uncontrollable within the herd, though the herd sizes varies but they animal are at risk of depression resulting from continuous inbreeding.

Inbreeding refers to the mating together of individuals that are more closely related than would be the case if mating was at random (Falconer & Mackay, 1996). The consequence of the inbreeding process is the reduction in the genetic variability within a population and in performance mainly in traits that are associated with the fitness of an individual (e.g. fertility). While the impact of inbreeding in populations of large sizes is negligible, its effect in typical livestock population where selective breeding is practiced, cannot be ignored.

Breeders are becoming aware of the risks of inbreeding increase and parameters derived from probability of genes origin are been widely used to precisely monitor the genetic diversity within subpopulations after a small number of generations. Also, parameters derived from probabilities of gene origin may provide a better under- standing of the changes taking place in the genetic pool of a breed, especially when those are considered over a small number of generations (Boichard *et al.*, 1997). Population size has a major impact on the dynamics of a population, the smaller the population the higher the tendency to be depressed in its reproductive potentials due to inbreeding (Klemetsdal, 1998).

The effective population size is directly related to the genetic variation and inbreeding in populations. Therefore knowledge of it helps predict rate of loss of genetic variation and rate of increase in inbreeding and also provides useful information on the evolutionary history of populations. Small population genetic parameters such as effective population size (Ne) and rate of increase in inbreeding per generation had been generalized before under community-based management of animal genetic resources in Africa (Rege and Gibson, 2003; Wollny, 2003). These

parameters determine the strength of genetic drift in a population and have long been recognized as an important parameter for evaluating conservation status and threats to genetic health of populations (Nomura, 2005; Hare *et al.*, 2011). There is shortage of information on rates and level of inbreeding on cattle under traditional pastoral system in Nigeria, such information is crucial in designing breeding strategy and selection scheme for the improvement of the indigenous cattle breeds. This study was carried out with the objective of ascertaining the risk status class, herd structure and small population genetic parameters of the indigenous cattle breed white Fulani bunaji across pastoral herds.

Materials and Methods

Study location

The study was conducted in the Benue trough consisting two States of Benue and Nasarawa. These States lies within the north central zone of Nigeria, extending roughly from latitude 60 50'N to 90 30'N of the Equator and longitude 70 30'E to 100 00'E of the Prime The study was carried between November 2013 to March 2014. This area is largely located in the savannah of Nigeria with its northern edge lying on the border of the Sahel and its southern edge lying on the border of the rain forest of Nigeria. It is an ecological transition zone between the arid north and the moist south with temperature fluctuating between 18°C – 37°C in the year and rainfall of 1000mm to 1500mm annually . Nasarawa and Benue States are located in the Benue trough.

Forty three Pastoral nomads were the main respondent for the study, they were divided into fifteen agro-pastoralist who keep livestock and also cultivate crops, fourteen pastoralist who keep only livestock and always move to the area during dry season for grazing, and fourteen transhumant nomads who are permanent settlers and keep only livestock. They were selected based on the disposition to respond to questions using their local heads (Ardo) . The communities considered for the study include pastoralist settlement around Mbagwen communities in Guma and Makurdi Local government areas and while in Nasarawa state pastoralist settlements in Lafia, Obi, Keana and Doma Local government areas were used. The forty three cattle farmers selected only keep bunaji cattle and other small ruminants and were considered for the calculation of the herd distribution, while only two herds each were used to estimate inbreeding parameter.Effective population size (*Ne*) and increase in inbreeding per generation (ΔF) were calculated using the formulas by Wright (1931; 1977)

Results and Discussion

Population size of a livestock species is an important factor in determining its risk status (FAO 2007). Herd structure distribution of the various pastoralist system is presented in Table1. With the exclusive pastoralist nomads who concentrate on livestock farming and are always moving about with their cattle having higher number of herd size 58±3.21 compared to 52±5.32 and 41±4.12 for the transhumance and agro-pastoralist. The herd size obtained is within same range as reported by Akpa *et al.* (2012) of cattle herds around Zaria a sub-humid guinea savanna zone, lower than what Iro (2009) reported. Numerically, the current population size of breeding females 18, 32 and 24 and breeding males 4, 6 and 5 of the bunaji cattle in the herds obtained in the various pastoral systems in the present study does not classify the breed under the endangered category based on the classification used by FAO (2000). Generally the herd structure are similar but varies with size of the ageing. Klemetsdal (1998) reported that herd structure varies considerably with the size of the herd, season of the year, the availability of the pasture as affected by rainfall and location.

Table 1. Mean± SE herd distribution of cattle according to production system

	Agropastoral	Pastoralist	Transhumance
Bulls	4±012	6±1.31	5±1.23
Cows	18 ± 3.14^{c}	32 ± 5.23^{a}	24 ± 2.61^{b}
Female calves	3±0.16	4±0.31	3±0.10
Males calves	2±0.10	3±0.12	3±0.11
Bullock	2±0.10	3±1.10	4±1.12
Heifers	6 ± 1.23^{b}	12 ± 2.14^{a}	11 ± 3.13^{ab}
Average herd size	41±4.12	58±3.21	52±5.32

Values with different superscript letter in each row t significantly different (P <0.05).