EFFECT OF PHENOTYPE ON BROODING, REARING AND LAYING MORTALITY OF NIGERIA INDIGENOUS TURKEYS

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ABSTRACT

A total of 78 day-old random-bred Nigerian local turkey poults were used to generate another 232 day-old poults in two planned experiments to determine phenotypic effect on mortality of Nigerian local turkey. Three phenotypic classes (black, white and spotted) were obtained as base population and used to generate F_1 progeny in Experiments 1 and 2, respectively. Experimental design in both experiments was a randomized complete block (RCBD) with phenotypic class as major factor of interest and hatches as block. Results showed that there was significant difference ($P<0.05$) in the mortality of the three phenotypic classes. Brooding mortality was highest in the white phenotype in both main population and F_1, except rearing phase of F_1, whereas rearing and laying mortalities were highest in the spotted and white phenotypes, respectively. Highest brooding and laying mortality was found in the white variety.It was therefore, concluded that for rapid improvement of these traits, the black variety could be used toenhance production of Nigerian local turkeys in the study area while the spotted variety should be carefully selected based on its high mortality during rearing.**Keywords:** local turkey, brooding, rearing, laying, mortality.

INTRODUCTION.The problem of protein shortage especially that of animal origin is a perennial one which is common throughout the country.Currently, total poultry population in Nigeria is estimated to be about 172 million out of which chicken is estimated at 160 million, guinea fowl (8.3 million), ducks (1.7 million) and local turkeys (1.05 million) (FAOSTAT, 2011). Village poultry production systems can be improved and transformed from subsistence to semi-commercial production systems.The local turkey production has remained very low compared to other poultry species.The main purpose of animal breeding practices is to improve traits of economic value and survivability is one of those important economic traits in the selection of animals. Stress factors, such as transportation and confinement which these birds are exposed to are known to depress the immune system of birds, thereby increasing their susceptibility to disease, particularly salmonellosis, colbacillosis and mycoplasmosis (Ayo *et al.,* 1996). Scarcity of turkey and high mortality of poults are the major problems that may hinder large scale commercial production.

The objective of the study was therefore to determine the effect of phenotype on mortality during brooding, rearing and laying phases of the local turkey.

MATERIALS AND METHODS

The study was conducted at the Poultry Unit of the Teaching and Research Farm of the Michael Okpara University of Agriculture, Umudike, Abia State.

Management of the Based Population and Production of F_1 Birds

A total of 78 day-old local turkeys of three phenotypic classes based on plumage colour (black, white and spotted) were obtained and raised to generate F_1birds. The number of progeny (F_1) poults produced were 86, 72 and 74 for black, white and spotted respectively. The poults were properly identified on hatching. Distribution and number of poults hatched per phenotypic class is shown in Table 1.

They were subjected to brooding in a deep litter system for proper physical development for 6 weeks after which they were transferred to small compartments. The birds were kept in an open sided poultry house. Dry wood shaving was used as litter material. The experimental house was divided into three, one for each genetic group namely black, white and spotted. Routine

management operations such as washing of the water and feed troughs were carried out on daily basis. The birds were given routine vaccination. Prophylactic antibiotics and anticoccidial drugs were administered to the birds periodically via drinking water. The birds were also dewormed and acaricide sprayed to check worms and ectoparasites.

The respective hatches were brooded separately on floor pens. The brooding period lasted for 6 weeks. From brooding through rearing, maximum comfort for the poults was ensured. Feed was provided in adequate quantity to the poults twice a day, namely 8.30am and 2.30pm and drinking water was given *ad libitum*.Poults (0-6 weeks) were fed *ad libitum* with starter mash containing 28% crude protein and 2800kcal ME/kg. Growing turkeys (7-24 weeks) were fed growers mash (20% crude protein and 3000 kcal ME/kg). Laying hens (25-30 weeks) were on growers mash until 5% egg production was attained. During egg production hens were fed with 18% crude protein and 3200kcal ME/kg.

Rearing was between 7 and 24 weeks. Sexing was done at 16 weeks of age by observing the growth of wattle on the males only.

Parameters measured: Brooding mortality (%),Rearing mortality (%) and Laying mortality%.

Brooding mortality (%): $\frac{\text{Number of poults dead}}{\text{Number of poults brooded}} \times \frac{100}{1}$

Rearing mortality (%): $\frac{\text{Number of poults dead}}{\text{Number of poults reared}} \times \frac{100}{1}$

Laying mortality (%): $\frac{\text{Number of hens dead}}{\text{Number of hens in lay}} \times \frac{100}{1}$

ExperimentalDesign

The experiment was designed as a randomized complete block (RCBD) with phenotypic class as factor of interest and hatch as block. The statistical model is given in Expression (1)

$$Y_{ijk} = \mu + H_i + P_j + e_{ijk} \quad ...(1)$$

Where: Y_{ijk}= k^{th} observation in the i^{th} block and in the j^{th} phenotypic class, μ = Overall mean, H_i = effect of the i^{th} hatch (Block) ($i = 1,\ldots,5$), P_j = effect of j^{th} phenotypic class ($j=1,\ldots3$), e_{ijk} = Random error, assumed to be independently, identically andnormally distributed with zero mean and constant variance [iind $(0,\sigma^2)$].

Statistical Analysis

Data obtained were statistically analyzed with SPSS, 2011 version 16. Duncan's Multiple Range Test (Duncan, 1955) was used to separate significant means.

Brooding, Rearing and Laying Of F_1Poults

A total of 210 day-old F_1poults hatched in different batches were used in the study. The three phenotypic groups of local turkey contributed 70 straight-bred poults each for the study.

They were brooded in same way as in base population.The birds were given the same routine management operations of feeding, vaccination and healthcare as stated above in base population.

Parameters measured Mortality of turkeys were calculated with the same formula as above for: Brooding phase (0-6weeks), Rearing phase (7-24 weeks) and Laying phase (25-30 weeks)

Experimental Design: The experiment was designed as a randomized complete block (RCBD), with phenotypic class as factor of interest and hatch as block. The statistical model is same as in Expression (1)

Statistical Analysis: Same as state in base population above.

RESULTS AND DISCUSSION

The brooding, rearing and laying mortality in the base population of local turkeys is presented in Table 2. There were significant differences ($P<0.05$) in the brooding, rearing and laying mortalities of the phenotypic classes, with the black and spotted varieties having the lowest mortality values at brooding and rearing phases respectively. However, during rearing and laying phases, the white turkey had the highest mortality of 8.60±1.59 and 7.08±0.91. There was significant difference ($P<0.05$) in laying mortality of the phenotypic classes, with black and spotted varieties having the lowest values. There was a trend of higher mortality in the white turkey, which may be attributable to inability to withstand stress. Also the black variety may possess some adaptive and survivability traits that help resist stress leading to mortality. This may be the reason for black variety being the most abundant in our local environment. The black phenotype has been observed for improved production (Nosike, *et al.*, 2016).

Brooding, Rearing and laying mortality in F_1 black, white and spotted local turkeys

Brooding, rearing and laying mortality of local turkey is presented in Table 3. There were significant differences ($P<0.05$) in the brooding and laying mortality of the various phenotypes, with spotted turkey having the lowest mortality in both phases. The difference may be due to differential adaptability and survivability of different strains of local turkey.

During rearing the white turkey significantly ($P<0.05$) had the lowest mortality, whereas the spotted turkey had highest mortality. However, during brooding and laying, the White had significantly ($p<0.05$) higher mortality than both Black and Spotted. This could be attributed to the observed reduced livability (hatchability) and fitness in White turkeys. Brooding mortality was highest in the white phenotype in both main population and F_1 progeny. The high mortality (>10%) observed in white turkey during brooding, in Black and Spotted during rearing phases may be attributed to heat stress which is a common feature in the tropical environment. An increase in body temperature above the regulated range, because of exposure to hot environmental conditions may lead to a cascade of irreversible thermo-regulatory events that may be lethal for the birds (Yahav, 2000).

CONCLUSION

Reduced livability may have caused the higher mortality in white turkey phenotype. It is recommended that the black turkey be selected for increased survivability. Also for survival of local turkey poults especially during brooding, there is need for farmers to use best practice husbandry and management.

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