

## Egg production performance of native and exotic chickens under semi-intensive management conditions in Lesotho

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### Abstract

Egg production performance of the Lesotho native chickens was compared with that of South African native (Ovambo, Lebowa-Venda, Naked Neck and Potchefstroom) and exotic (Rhode Island Red and New Hampshire) chicken lines under semi-intensive conditions in Lesotho. Traits that were studied included age at first lay, average egg production per hen, average egg weight and age at moulting. Data for average egg production and average egg weight were collected over a period of 45 weeks. Age at first lay was similar among lines (between 25 and 26 weeks for all lines). Significant differences in egg production/hen and average egg weight were recorded among the different lines. The LES hens performed fairly well (0.35 g of eggs/week and 0.04 eggs/hen/week). The Lebowa-Venda and Ovambo lines were the first to show signs of moulting. It is suggested that there is a possibility to improve egg production performance in the Lesotho native chicken lines under semi-intensive management conditions if selection and planned breeding programs are implemented.

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**Keywords:** Egg production, moulting, age at first lay, Lesotho native chickens

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### Introduction

Native chickens are very common in most rural areas of developing countries (Sonaiya *et al.*, 1999) and remain an important source of high-quality protein food in Lesotho (Bayley & Phororo, 1992). Furthermore, local chickens perform other socio-economic and cultural roles in the form of savings and financial insurance, allowing low-income farmers to meet their social and cultural obligations (Bureau of Statistics, 2001). However, the Lesotho chickens have varied levels of egg production and their specific egg characteristics are not known. The objectives of this study were therefore, to evaluate the egg production performance (production and weight) of the Lesotho native chickens under semi-intensive management conditions in Lesotho and compare it with that of other breeds or lines commonly farmed in southern Africa at small to medium scale, under extensive and semi-intensive management conditions.

### Materials and Methods

Five hundred and twenty five day-old chicks comprising seven lines, namely indigenous Lesotho (LES), New Hampshire (NH), Rhode Island Red (RIR), Ovambo (OV), Lebowa-Venda (VEN), Naked Neck (NN) and Potchefstroom Koekoek (PK) were raised for 10 weeks (from day 1) in three replicates of 25 birds per line at the University of the Free State Campus in South Africa. Eggs for the LES were collected from farmers in the two mountainous districts in Lesotho, Thaba-Tseka and Mokhotlong. Four indigenous South African lines (PK, OV, VEN and NN) as well as two exotic lines (RIR and NH) were used for comparison. After 10 weeks, all birds were transferred to the National University of Lesotho, where they were raised under a semi-intensive production system. In this system the chickens had free access to feed and watered indoors, and given freedom to roam about in adjoining paddocks. Once the first eggs were laid within a line, the birds were sexed. All females were retained and only the best cocks were selected (those with the highest body weights and average daily gains) and kept with the hens for a laying period of 45 weeks at a ratio of one cock to five hens. Eggs were collected three times a day and kept at room temperature.

The recording of egg production (number and weight) was done daily during a period of 45 weeks in the laying phase up to 70 weeks of age. The number of eggs laid was calculated per hen per week, while the

average egg weight was calculated based on the data available for the entire production period of 45 weeks. Recording ended when the birds showed signs of moulting; this was accompanied by very low egg production. After editing, 149 records on egg production were available. General Linear Model (GLM) procedures of the Statistical Analysis Systems (SAS, 1996) were applied for the analysis of the data on age at first lay, egg production per hen per week and average egg weight. Means for each variable were compared using the Least Squares Analysis of Variance and Tukey's test for multiple comparisons between means at a 95% probability level. The following model was fitted:

$$Y_{ij} = \mu + a_i + l_j + e_{ij}$$

Where:

$Y_{ij}$  = an observation of a trait on the  $i^{\text{th}}$  chicken of the  $j^{\text{th}}$  chicken line

$\mu$  = Least square mean

$a_i$  = random effect of the  $i^{\text{th}}$  chicken

$l_j$  = fixed effect of the  $j^{\text{th}}$  chicken line (1-7)

$e_{ij}$  = random error of the environment

Chicken lines: 1. Lesotho, 2; Lebowa-Venda; 3. Naked Neck; 4. New Hampshire; 5. Ovambo; 6. Potchefstroom Koekoek and 7. Rhode Island Red.

## Results and Discussion

There were no significant differences between the lines for age at first lay. Egg laying commenced when chickens were between 25 and 26 weeks old. The delay in egg laying could possibly be attributed to the stress imposed by the change in environment (from the Free State University to Lesotho). Horst (1997) indicated that Nigerian and Korean native fowls reach sexual maturity at 23 and 24 weeks of age, respectively. Aganga *et al.* (2003) also reported sexual maturity of 24 weeks in Tswana chickens while Gunaratne (1999) reported a considerable delay (28 weeks) in sexual maturity in Sri Lankan chickens.

The egg production performance of hens for all the lines under semi-intensive management conditions is outlined in Table 1. Egg production differed significantly ( $P < 0.05$ ) among the different lines.

**Table 1** Least square means ( $\pm$  s.e.) for egg production/hen and egg weight (g) for the 45 weeks laying phase for indigenous: Lesotho (LES), Ovambo (OVB), Lebowa-Venda (VEN), Naked Neck (NN) and Potchefstroom Koekoek (PK) and exotic breeds: New Hampshire (NH) and Rhode Island Red (RIR)

Line	Egg production	
	Egg/hen at 45 weeks	Egg weight (g)
LES	64 <sup>b</sup> $\pm$ 2.1	48.5 <sup>b</sup> $\pm$ 2.1
OVB	65 <sup>b</sup> $\pm$ 4.9	51.5 <sup>a</sup> $\pm$ 0.9
VEN	65 <sup>b</sup> $\pm$ 3.4	46.6 <sup>c</sup> $\pm$ 1.1
NN	43 <sup>c</sup> $\pm$ 4.1	50.6 <sup>b</sup> $\pm$ 1.1
PK	86 <sup>a</sup> $\pm$ 6.3	50.8 <sup>b</sup> $\pm$ 1.3
NH	85 <sup>a</sup> $\pm$ 8.1	52.0 <sup>a</sup> $\pm$ 1.0
RIR	66 <sup>b</sup> $\pm$ 2.3	52.2 <sup>a</sup> $\pm$ 0.9

<sup>a,b,c</sup> Means in the same column with different superscripts are significantly different at  $P < 0.05$

Although the NN hens produced the least number of eggs ( $43 \pm 4.1$ ), the gain in number of eggs laid per week was similar to the gain obtained in the LES and VEN (0.04/week) hens. The NN hens also had a

higher egg weight gain (0.48 g/week). Only the PK managed a higher gain (0.54 g/week). The LES hens performed fairly well (0.35 g/week; 0.04 eggs/week). There were no significant differences among the different lines with the exception of the NH and PK that produced the highest number of eggs/hen/week and the NN that produced the least number of eggs/hen/week.

Adenokun & Sonaiya (2001) reported an mean egg weight of  $34.5 \pm 0.7$  g for Nigerian chickens reared under semi-intensive systems, which is about 29% lower than that recorded for the LES ( $48.5 \pm 2.1$  g). Gunaratne (1999) reported an average egg weight of  $48.0 \pm 0.03$  g for Sri Lankan chickens, while a mean egg weight of 44.5 g in Tswana chickens was reported by Aganga *et al.* (2003). A very low egg weight range of 30.0 to 40.0 g was reported by Bourzat & Sounders (1990) in Burkina Faso chickens. Missohou *et al.* (2002) also reported a low average egg weight of  $37.5 \pm 2.9$  g in Senegalese chickens. According to Gueye (1998) annual egg production per village hen ranges from 20 to 100 eggs with an average egg weight ranging from 30.0 to 50.0 g. In the present study the average egg weight ranged from  $50.6 \pm 0.9$  g to  $52.2 \pm 0.7$  g (Table 1). These results are in agreement with Kumar *et al.* (2002) who reported an average egg weight of  $46.6 \pm 1.1$  to  $53.6 \pm 1.3$  g for slow and fast feathering indigenous chicken lines, respectively. According to Van Marle-Köster & Webb (2001), the Ovambo had the lowest egg weight in a battery cage system in comparison to other indigenous southern African breeds.

## Conclusions

The indigenous Lesotho chicken (LES) performed fairly well in terms of egg production traits under semi-intensive management conditions. These results combined with growth results obtained in a previous study (Ntimo *et al.*, 2006) indicate the potential of LES hens as a dual-purpose breed. The line has the added advantage of delayed moulting, which implies that these hens can stay in production for longer periods. This proves that there is a possibility for even better performance if selection and a planned breeding program are introduced. In addition, the phenotypic variation observed amongst different populations indicates that the LES is not inferior to other native lines in the region and warrants its preservation in the indigenous fowl population of Africa.

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