ID: 919

Effect of crossbreeding on production performances and egg quality traits between commercial ISA Brown, Blue Holland hybrid cocks, and local hens

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Abstract

In Niger, poultry farming has not yet developed to the same extent as in other countries of the sub-region. Local breeds constitute 54.7% of the flock. However, the yield of local chickens remains low due to their limited genetic potential and challenging conditions; local hens have lower productivity than commercial breeds. Therefore, this study aimed to investigate the production performances and egg quality characteristics of local improved ISA Brown hens (obtained by crossbreeding between the local hens and commercial ISA Brown hybrid cocks) and improved local Blue Holland hens (obtained by crossbreeding between the local hens and commercial Blue Holland hybrid cocks) in comparison with local hens (parents and young hens). The experiment was arranged in a completely randomized design with three-layer genotypes (40 hens per genotype) used in this study. These three genotypes were monitored under the same rearing conditions for 51 weeks. Feed was measured and distributed to the birds twice daily, and the collected eggs were used to assess internal and external quality for four weeks. The results revealed a significant difference ($P < 0.05$) between genotypes in laying rate, with 33.73% in improved local ISA Brown hens, 25.53% in improved local Blue Holland hens, 25.43% in local parent hens, and 11.37% in young local hens. The feed conversion ratio was lower in improved local ISA Brown (6.40) and Blue Holland (8.25) hens compared to local parent hens (9.16) and young local hens (14.01). The average egg weight was higher in improved local Blue Holland (49.65 g) and ISA Brown (49.22 g) hens than in local parent hens (40.94 g) and young local hens (39.66 g). The eggs from improved local ISA Brown hens also showed higher values ($P<0.05$) in egg index (77.00%), albumen height (4.06 mm), yolk height (7.74 mm), albumen proportion (55.71%), yolk diameter (39.07 mm), albumen length (70.91 mm), and albumen index (5.87) compared to the eggs of young local hens. Haugh units and yolk index did not show a significant difference between all genotypes ($P > 0.05$). The local improved ISA Brown hens exhibited the best zootechnical performance and laid better-quality eggs. These results indicate that genetic improvement of local hens is most effective with ISA Brown hybrid cocks. In conclusion, this study showed that crossbreeding between ISA Brown and Blue Holland cocks and local hens might be an alternative method for improving Niger's local chickens.

Keywords: *improved local hens, zootechnical performance, hybrid Cocks, genetic improvement, ISA Brown, Blue Holland, egg quality*