Comparison of Productive Performance of Frizzle and Cross-Bred Frizzle - Naked Neck Chicken Reared Under Different Farm Management Systems

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Abstract

A study was carried out to analyse the performance of frizzle and cross bred naked-neck frizzle chicken population under various farm management systems. The results of the study revealed that the mean body weights of both sexes of both chicken populations were not significantly different (P<0.05) in all management systems. The age at first laying was significantly early (P>0.05) in frizzle (7.02±0.04months) and naked-neck frizzle (6.93±0.11 months) in extensive system. The mean monthly egg production was significantly higher (P>0.05) for both genotypes under intensive system. The average egg weight (46-47g) and hatchability (76-79%) were significantly higher (P>0.05) in the semi-intensive system. The productive period and life time were significantly longer (P>0.05) under the extensive system for both populations. It was concluded that, both the populations performed well in intensive and semi-intensive management systems with respect to different productive traits.

Keywords: Frizzle, Naked-neck, Hatchability, Farm Management Systems, Animal Production

Introduction

In Sri Lanka, the poultry industry is characterized by free range scavenging system which is dominated by local chicken populations. The productivity levels of local chicken are low because of poor nutrition and low genetic potential. In an effort to address the low productivity in local chickens, high yielding exotic breeds have been introduced and grown in many farming systems. However, high environmental temperatures constrain the exotic chickens' performance in extensive and even in intensive production systems. High ambient temperature has a negative effect on the growth rate and production of commercial chickens due to the difficulty of dissipating metabolic heat, which leads to an increase in body temperature that can be lethal in extreme cases (Cowan and Michie, 1988).

The reduction in feather coverage has proved to increase heat dissipation, allowing a greater rate of radiation of body heat and a better thermoregulation (Eberhart and Washburn, 1993). Some major genes have been described as affecting feather mass. The naked-neck gene (*Na*) reduces the number of feathers by limiting the feathered body surface in chicken and the frizzle gene (*F*) has a feather curling effect and causing feather mass reduction (Horst and Mathur, 1992). The breeding programme aimed at producing locally adaptable highly productive chicken population using the frizzle and naked-neck frizzle chicken is underway in some countries (Hagan, 2010). In Sri Lanka similar attempts can be made to improve the chicken using the specific genotypes such as frizzle and naked-neck frizzle to incorporate the adaptable traits to the exotics. Further, while planning a breeding programme to incorporate frizzle and naked-neck genes in a population, proper information about the productive and reproductive performance of frizzle and naked-neck frizzle is necessary. In this context, a study was planned with the objective to analyse the productive and reproductive performance of frizzle and naked-neck frizzle population under different management systems.

Methodology

The study was conducted at different locations in Batticaloa, Trincomalee and Ampara districts of Sri Lanka during the period from January, 2012 to January, 2013. A total of 150 poultry farms were randomly selected for this study. Equal numbers of extensive, semi intensive and intensively operated farms were considered in gathering data. From each farming system a total of 60 adult birds of each type were randomly selected to obtain data. The parameters measured were live weight of both cockerel and hen at 9 months age, age at first lay, monthly egg production, egg weight, and hatchability productive period and life time. The data were analyzed using Statistical Analysis Software (Version 9.1).

Results and discussion

Body weight

According to the Table 1 the mean body weight of cockerels and hens of both population was not significantly differed (P<0.05) in all three management systems. In other Asian countries like Bangladesh and India these genetic groups of chicken in the existing scavenging operations had the lowest body weight (1.04 kg for hen and 1.52 kg for cockerel; Ahmed and Hasnath, 1983 and 1.01 kg for hen and 1.38 kg for cockerel; Kalita *et al.* 2009) than the value recorded in the present study under all management systems.

Table 1: Mean body weight of frizzle and naked-neck frizzle chicken under different management systems (± Standard Error)

Management system	Mean body weight (kg)			
	Frizzle		Naked-neck frizzle	
	Cockerel	Hen	Cockerel	Hen
Extensive system	1.79±0.12[a]	1.09±0.12[a]	2.52±0.14[a]	1.78±0.14[a]
Semi-intensive system	1.67±0.11[a]	1.14±0.23[a]	2.49±0.17[a]	1.76±0.11[a]
Intensive system	1.78±0.44[a]	1.22±0.19[a]	2.51±0.18[a]	1.80±0.18[a]

*Means with the same letters within the column are not significantly different.

Age at first laying

The average age at first laying was significantly later (P>0.05) for both populations under the intensive system while it was significantly earlier (P<0.05) under the extensive system for both genotypes (Table 2).

Table 2: Average age at first laying in village and naked-neck chicken under different management systems (± Standard Error)

Management system	Average age at first laying (months)	
	Frizzle	Naked-neck frizzle
Extensive system	7.02±0.04[a]	6.93±0.11[a]
Semi-intensive system	7.26±0.17[b]	7.09±0.14[b]
Intensive system	8.98±0.14[c]	8.78±0.02[c]

*Means with the same letters within the column are not significantly different.

The exposure of birds at grower stage to sunlight stimulates the reproductive activity and starts egg production comparatively earlier under the extensive system. However, under the intensive system the degree of exposure to sunlight is very low as the houses are not constructed in a proper way to facilitate penetration of sunlight in the study areas.

Monthly egg production

According to Table 3 the mean monthly egg production was significantly higher (P>0.05) for both genotypes under intensive system than the other management systems. The higher egg production under intensive system may be attributable to availability of more feed, water and health facilities compared to other systems of management in the study area. Under the extensive system the birds are actively moving around the farm sheds as they need to search their feed. Therefore, the energy loss is high though the availability of diverse nutrition is high.

Table 3: Average monthly egg production in frizzle and naked-neck frizzle chicken under different management systems (± Standard Error)

Management system	Average egg production (number)	
	Frizzle	Naked-neck frizzle
Extensive system	11.27±1.47[a]	13.24±1.99[a]
Semi-intensive system	13.64±2.31[b]	15.52±0.99[b]
Intensive system	14.90±2.11[b]	17.64±2.66[c]

*Means with the same letters within the column are not significantly different.

Egg weight

Table 4: Average egg weight of frizzle and naked-neck frizzle chicken under different management systems (± Standard Error)

Management system	Average egg weight (g)	
	Frizzle	Naked-neck frizzle

Extensive system	41.23±0.45[a]	47.16±1.75[a]
Semi-intensive system	46.44±1.09[b]	48.23±1.67[a]
Intensive system	47.11±0.11[b]	48.64±1.43[a]

*Means with the same letters within the column are not significantly different

The average egg weight was significantly higher (P>0.05) in the semi-intensive and intensive systems for frizzle population while no significant difference (P<0.05) was observed in naked-neck frizzle population under three management systems (Table 4). In general the heat dissipation from the body is highly affected the productive performance of chicken. In frizzle population, under intensive system the energy expenditure to dissipate heat from the body is low.

However, in naked-neck frizzle population the heat loss from the body can be through naked-neck and frizzled space of the body. This might be the reason for significantly similar performance of this population in three management systems.

Hatchability

Table 5: Average hatchability of eggs in of frizzle and naked-neck frizzle chicken under different management systems (± Standard Error)

Management system	Average hatchability (%)	
	Frizzle	Naked-neck frizzle
Extensive system	69.45±2.78[a]	74.12±3.56[a]
Semi-intensive system	76.13±3.11[b]	79.14±3.12[b]
Intensive system	72.23±2.76[c]	71.87±2.45[c]

*Means with the same letters within the column are not significantly different

Hatchability was significantly differed (P>0.05) among different management systems for both populations in all management systems (Table 5). The hatchability of eggs was significantly higher (P>0.05) under the semi-intensive system because the availability of diverse nutritious feed is higher than other systems and the birds are partially allowed for scavenging and supplemented with commercial feed and additives when housed in a day. Similar to fertility the hatchability percent more than 75 is acceptable to the point of fertility in all poultry production systems.

Productive period

The productive period was significantly longer (P>0.05) under the extensive system for both populations (Table 6). Significantly lower productive (P<0.05) period was observed in intensive management system for both populations. The limited movement under the intensive system can cause excess fat deposition on body which might shorten the productive period (Kalita, 2009). Further, continuous exposure to sun light and diverse nutrition might extend the productive period of birds under extensive system.

Table 6: Average productive period of frizzle and naked-neck frizzle chicken under different management systems (± Standard Error)

Management system	Average productive period (months)	
	Frizzle	Naked-neck frizzle
Extensive system	23.99±0.04[a]	26.11±1.01[a]
Semi intensive system	21.11±0.56[b]	23.67±1.21[b]
Intensive system	16.45±1.34[c]	21.77±1.45[c]

*Means with the same letters within the column are not significantly different

Life time

The life time was significantly longer (P>0.05) under the extensive system in both chicken population while no significant difference was observed (P<0.05) between the frizzle and naked-neck frizzle population growing in intensive and extensive management systems (Table 7). This is because of the faster rate of disease spreading when birds are in the confinement. Further the birds under scavenging system might get natural body immunity when expose to adverse environmental conditions and diseases. This is agreed with the observation made in this study.

Table 7: Average life time of frizzle and naked-neck frizzle chicken under different management systems (± Standard Error)

Management system	Average life time (years)	
	Frizzle	Naked-neck frizzle

Extensive system	2.56±0.02[a]	2.23±0.01[a]
Semi-intensive system	2.12±0.02[b]	1.97±0.02[b]
Intensive system	2.09±0.02[b]	1.95±0.01[b]

*Means with the same letters within the column are not significantly different

Conclusion

The frizzle and naked-neck frizzle population performed well in extensive system in terms of some productive traits such as age at first lay, productive and life time. These genetic groups performed well in semi-intensive management system in terms of hatchability and egg weight. Therefore, performance of frizzle and naked-neck frizzle population could be further improved under semi intensive and extensive system of management with improved management practices and breeding programs.

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