

Comparism Of Growth Performance Of Local, Hybrid And Exotic Chickens On Different Management Systems At Njala University Sierra Leone West Africa

Sanpha Kallon, Abdul Rahman Sesay, Saidu Kanu, Foday .Y. Koroma

Department of Animal Science, School of Agriculture,
Njala University, Sierra Leone Phone; +23276416718
kallonsanpha73@gmail.com

Department of Animal Science, School of Agriculture,
Njala University, Sierra Leone +23276441208
arsesay@njala.edu.sl

Faculty of Agriculture University of Makeni Sierra
Leone West Africa +23278209919
Saidukanu440@gmail.com

Department of Animal Science, School of Agriculture,
Njala University, Sierra Leone +23276817561
fpdayykoroma@yahoo.com

ABSTRACT: This research was conducted using local breed of chickens, exotic breed (Bovan gold line) and hybrid. These breeds reared under traditional and modern husbandry systems. The research focused on attributes such as mortality, weight gain and feed conversion efficiency. The result of the experiment revealed that in the first week of free range management, the hybrid cross out-performed (930.10g) the exotic breed (900.10g) in weight gain. However, on the 20th day under the caged management system, the Exotic out-performed the Hybrid cross with weight gains of 2190g (Exotic) and 1955g (Hybrid), and under the deep Litter system of management with weight gains of 2155g (Exotic) and 1950g (Hybrid), respectively. During the first week of management under the caged management system the FCR of the local breed (1.93) was better than that of Exotic breed (2.0) and the hybrid cross (2.29). However, at the end of the third week, the FCR of the Exotic (4.8) was far better than the Local breed (6.83) and the hybrid Cross (5.24). Under the deep Litter system of management, the FCR of the Exotic Breed (4.87) at the end of the experiment was better than that of Hybrid cross (5.39) and Local breed (6.89). The higher the FCR the poorer the performance of the birds. The mortality for the Exotic breed under the free range management system was 48% compared with 16% for Local breeds except in the deep litter management where a similar (4%) mortality rate was experienced for each breed. It was therefore concluded that a hybrid F1 (Local x Bovan Gold line) was developed with promising performance characteristics with respect to improve weight gain as demonstrated by improved FCR and mortality especially under the caged and deep litter systems of management.

Key Words: Exotic breed, FCR, Hybrid, Local breed

INTRODUCTION

1. Background

For several generations, breeds of chickens have been selected in developed countries from the jungle fowls by selective breeding programs, principally geared towards improving production performance for meat or eggs or a combination of both. Along this line selective breeding programs, in developed countries have engineered breeds of superior production characteristics that can now provide for the needs of nations and commercial interests ([1],[2]).

In Sierra Leone over the years there have been Poor genetic potential and inappropriate breeding methods such as negative selection and inbreeding in local chickens. A number of initiatives have been attempted to improve rural poultry in Sierra Leone but that resulted in limited sustainable success, because they depend on highly demanding genotypes without commensurate improvement in the production environment.

In this regard there is an urgent need to evaluate the growth performance of selected local chickens, under free range and intensive management systems. Increase investment in local chickens' production must include improvement in breeding methods. Productivity of rural chickens is based on the mature body weight which directly reflects meat production potential and also related to the quality of the meat. Meat quality is a trait which is expressed differently in different chicken genotypes and is controlled by environmental factors, including the management systems [3], [4]

In Sierra Leone like most West African countries, chickens have received only little improvement that maximizes their production performance for meat or eggs. Indigenous chickens are reared by small holders, mainly in the rural areas by native women, children and youths. Poultry keeping is traditionally the role of women in rural Sierra Leone. [5]

In sub-Saharan Africa, 85% of all householders keep poultry, with women owning 70% of the poultry.[6].

Local chickens are reared primarily for meat and eggs. When cocks are amongst hens fertile eggs are laid and hens incubate the eggs by natural means until they hatch.

Family poultry, also known as local, rural or scavenging poultry is a small-scale poultry keeping by households using family labor and, locally available feed resources. The birds may range freely in the household vicinities and fend much of their own food, getting supplementary amounts from the householder.

Rural poultry flock of less than 50 birds, of unimproved or improved breeds, raised in either extensive or intensive farming systems is usually labor free without remuneration but rather labor is obtained from the family household[7]. Family poultry is quite distinct from medium to large-scale commercial poultry farming. Family poultry was additionally clarified as small flocks managed by individual farm families in order to obtain food security, income and gainful employment for women and children”[8];[6], [9]

Local poultry is rarely the sole means of livelihood for the family but is one of a number of integrated and complementary farming activities contributing to the overall well-being of the household. Sixty percent (60%) of the poultry industry in Sierra Leone comprises of local chickens which are reared mainly in rural areas.

Local chickens are preferred by local consumers because their meat is tasty and their production is not crucial and financially demanding compared with the exotic breeds. This makes them the preferred choice for production by local farmers.[10]

The object of this study is to compare the growth performance of local, hybrid and exotic chickens on different management systems

2. METHODOLOGY

2.1 Research Area

The research was carried out in the Animal Production Division (APD) premises at Njala University which is located in the southern region of Sierra Leone, about 120 miles from Freetown, the capital city of Sierra Leone.

2.2 Research Materials

The research materials were provided by the Animal Production Division, Njala University. The materials used include feeds, chemo-prophylaxes, immune-prophylaxes, feeding and drinking troughs, weighing scales, housing with rearing rooms, and rearing cages with communal wire floor, local chicks, hybrid chicks as well as exotic layer chicks.

2.3. Animal Experiment

Three production systems; which include scavenging (free range), battery caged and deep litter were used in this experiment. In each system a sample size of 75 chicks was used. They were distributed in three groups 1, 2, and 3. Group 1 consisted of Local or native chicks (Starting day old to 20 weeks old), Group 2 consisted of Exotic chickens (Starting day old to 20 weeks old), and Group 3

comprised of cross-breed or upgraded F1 hybrid progeny, a crossing resulting from mating local hens with exotic cockerels and cocks (Brown Golden Line), which were observed from day old to twenty weeks old. Animals in each group were subjected to different production management carried out in both dry and rainy seasons. Birds in each group were observed on their performance with respect to mortality, average weight gained, per week, weekly feed consumed and weekly feed conversion ratio (FCR) were calculated thereafter.

2.4. Data collection, Analysis and Presentation of Results

Data collection forms were prepared for data collection on daily feed intake, weekly weight gain, daily and diurnal temperature, of the building for Free range, battery caged and deep litter systems. Daily feed consumption was recorded from daily feed placed into the feeders and the daily leftovers. The birds were however weighed individually on a daily and weekly basis. From the feed consumed and weight data, the feed conversion ratios (FCRs) and feed efficiencies (FEs) of each group vis-à-vis system were determined and compared on a weekly basis and per overall group and system. Data collected were analyzed using SPSS (released version 16) or statistical package or software and mean were separated using DUNCAN multiple range tests (DMRT)

3. RESULT AND DISCUSSION

Table 4.1 shows the average weight gained by different breeds of chickens under different management systems. It is observed that the starting weight of the three breeds; local, exotic (Bovan Gold Line breed) and the hybrid cross were different; 34g, 81.8g and 65.4g, respectively. Their average weight is 60.4, and standard deviation (SD) of 24.29. This observation was made in the free Range system on day 1. The local breed being the smallest and the exotic breed, which is genetically selected for fast growth, weighed the highest. In week 1, under the free range system of management, the hybrid cross had the highest weight gain (930.1g) followed by the exotic (Bovan Gold Line breed) with 900.1g. It was expected that the exotic would have out-weighed the hybrid cross and the local breeds. This was not the case, but was probably due to the fact that the exotic Bovan Gold Line breed could not adequately acclimatize to the free range management system. In addition it is also possible that for such high quality selected breed requiring high quality nutritive feeds were not available under the free Range management System at that particular time. However, on day 14 under the same free Range System the trend changed with weight gain of the exotic gold Line breed outweighing the hybrid cross and local breeds, 1770.2g, 1375g and 705g, respectively. During this period, total weight gained of all breeds of chicken is 3850.2g, with an average of 1283.4g and Standard deviation of 538.4g. Also on day 20, the exotic appreciated more weight gain (1930.1g) and the hybrid cross had 1660g while that for the local breed lagged behind (910g). This probably could be attributed to early maturing characteristic of the exotic breed over those of the hybrid cross and the local breeds.

In the cage system, it is observed that on day 1 of the experiment, the local breed gained 42g of body weight,

the exotic with 81.8g and 65.4g of weight gained by the hybrid cross. On day 7, weight gained ranking recorded as follows: exotic 1005g, hybrid cross 870.1g and 730g for local breed. Similar trend followed on day 14 for exotic breed with 1770g, 1640g for hybrid cross and 1090g local breed. Significant weight gain was observed for all breeds in cage system compared to those weights gained in the free range system. This could be due to feed, water, medication and accommodation being adequately provided for the chickens.

In the deep litter system a gradual increase in weight gain is also observed as the days went by for the different breeds. The weight gain for exotic Bovan Gold Line breed is 81.8g, 1090.1g, 1810.5g and 2155g on day 1,7,14 and 20 respectively, for hybrid cross, 65.4g, 870g, 1640g and 1950g on day 1,7,14, and 20 respectively. Overall, the Exotic Bovan Gold Line breed out-performed the other breeds with a live average weight gain of 1238.8g, followed by the hybrid (1090.53) and the least average weight gained (684.3g) recorded for the local breed when subjected to all three production management systems. The average standard deviation for the three breeds is 269.69, which clearly depicts a wide variation among the different breeds.

During the first week of management under the caged management system the FCR of the local breed (1.93) was better than that of Exotic breed (2.0) and the hybrid cross (2.29). However, at the end of the third week, the FCR of the Exotic (4.80) was far better than the Local breed (6.83) and the hybrid Cross (5.24). Under the deep Litter system of management, the FCR of the Exotic Breed (4.87) at the end of the experiment was better than that of Hybrid cross (5.39) and Local breed (6.89)(Table 3). The higher the FCR, the poorer the performance of the birds.[11]

The essence of the FCR in this regard gives economic indication of feed for best or better result from their breed type and also gives guidance to estimating cost/benefit analysis of production cost of any poultry enterprise [11]

The FCR is a production co-efficient parameter that indicate the progress in production feeding along which may account between 70-80% costs of production. This makes FCR an important parameter in determining the quality of feed and breeds of chickens produced. When the FCR is high, it is a clear indication that the production system is not good and; on the contrary lower FCR may indicate best performance as the birds may be converting more feed to flesh Farina [12]

Table 4.2 shows percentage mortality rate of different breeds of chickens reared under different management system. In the free range it could be observed that with prolonged rearing period, that is, from weeks 1, 2, and 3, total mortality, average mortality and standard deviation (SD) for the different breeds declined. In week 1, average mortality recorded is 68% with a Standard Deviation of 5.6. The highest mortality rate (48%) is recorded for the Exotic breed, followed by 16% for the local breed and the least (4%) recorded for the hybrid cross for the different management systems and during their rearing periods.

The high mortality rate for the Exotic breed is probably due to the fact that the breed is not suited for free range management system, could probably might have succumbed to many endemic diseases which may be exacerbated by poor nutrition and inclement weather.

4. CONCLUSION

In this research, we were able to develop a first filial generation hybrid cross between the local breed and the Bovan Golden Line breed. The performance of this hybrid was satisfactory compared with both the local and the pure exotic breed. It was also observed that the performance of local breeds increased slightly under cage or deep litter management. This is in agreement with findings of El Sadig Hasssn El Hussein et al, 2020[13] but, because the generic potential for egg production (or meat production) of local breeds is lower than that of commercial hybrids, the same investment in intensive management will achieve a much higher production result by using commercial hybrids. If balanced feed, good health –care supplies and day-old chicks of hybrid varieties are locally available, then intensive poultry management is an option. If these are not available raising breeds under scavenger free-range systems is still the best choice.

Further observation of this research have brought out interesting results about the local chickens versus the exotic breed (Bovan Gold Line) and their hybrid F₁ (progeny of local hens mated by exotic cocks). From this research feed consumption efficiency based on their feed conversion Ratios has been shown most favored by the improved exotic breed, even though this breed under our traditional free range rearing system performed poorly with respect to mortality. The local chickens continue to show poor performance with respect to efficiency of feed consumption and weight gained in caged and deep litter system. On the whole the research revealed that the up-graded F1 hybrid shows better performance under the different rearing systems, therefore precedes those of the local and exotic breeds. This research revealed that under the different management systems, the exotic breed performed best in weight gained followed by the hybrid cross with the local breed trailing behind. This research further showed that improvement in performance for a desired product of these breeds could be better realized in the caged and deep litter system.

Investigations in this research will contribute to achieving better production performance for local or native chickens in Sierra Leone for meat and the like. Also, this research will give added value to and an appreciation for native chickens kept by our rural communities either for food security and or for poverty alleviation measure.

5. RECOMMENDATIONS

- 1) For enhanced improved production of the local chicken, the research findings recommend that good and proper management could increase breed complementarity to environmental stress, diseases, predators and, persistence under traditional management system.

- 2) The use of proven exotic germ-plasm to improve the native chicken is recommended for average eggs and meat production performance.
- 3) Production communities of poultry, especially chickens, should be in touch with latest information about how they could care for their chickens, acquisition of feeds, drugs, vaccines and veterinary services.
- 4) Feed supplementation in free ranging system for native as well as crossbreds should be encouraged.
- 5) More extension services and research work should be undertaken on improving local chicken, and livestock production using good management practices including provision of better health facilities using both chemo and immune-prophylaxes
- 6) Local chicken production enterprise should be encouraged and measures should be adopted that gear towards increasing the performance of local chickens by upgrading and rearing them in better management environment.

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Author 1 Profile



Dr. Sanpha Kallon received his B.Sc. and MSc. degrees in Agriculture Education and Animal Science in 1988 and 2005, respectively. During 2009-2013, he obtained a Doctor of Philosophy Degree in Animal Nutrition and feed Science.

Author 2 Profile



Dr. AbdulRaham Sesay received his B.Sc. and M.Sc. Degrees in Biological Sciences and Animal Reproduction Science in 1991 and 1996, respectively. During 2000-2004, he obtained his PhD in Animal Genetics, Breeding and Reproduction Science from

South China Agriculture University. Now, he is the Dean of Post Graduate Studies in Njala University

Author 3 Profile



Dr. Saidu Kanu received his B.Sc. and M.Sc. degrees in Agriculture General and Animal infectious diseases and Prophylaxes Veterinary Medicine in 1988 and 1996, respectively. During 2000-2003, he obtained a PhD in Preventive Veterinary Medicine from South China Agricultural University.

Now, he is the Dean in the Faculty of Agriculture and Food Sciences in the University of Makeni

Author 4 Profile



Mr. Foday Y. Koroma received his B.Sc. in Agriculture Education in 1988 and M.Sc. in Animal Science in 2011 from Njala University Sierra Leone. Couple of years ago, he served as lab assistant and now, he is the Farm Manager in the Animal Science Department Njala University

Table 1: Average weight Gained by Different Breeds of Chickens under Different Management System.

Day Breed	Management System														
	Free Range				Caged System				Deep Litter				Total	Average	SD
	Days														
	1	7	14	20	1	7	14	20	1	7	14	20	-	-	-
Local	34	425	705	910	42	730	1090	1235	45	780	985	1230	8211	684.3	450.3
Exotic	81.8	900.1	1770.2	1930.1	81.8	1005	1770	2190	81.8	1090.1	1810.5	2155	14866.4	1238.86	815.80
Hybrid	65.4	930.1	1375	1660	65.4	870.1	1640	1955	65.4	870	1640	1950	13086.4	1090.53	724.29
Total	181.20	2255.2	3850.2	4500.1	189.2	2605.1	4500	5380	192.2	2740.1	2835.5	5335	35563.8	2658.8	2007.5
Average	60.4	751.73	1283.4	1500.03	63.07	868.3	1500	1793.3	64.06	913.36	995.2	1778.3	9742.85	885.71	615.80
SD	24.29	283.35	538.48	528.53	20.00	137.5	360.9	497.6	18.43	159.53	885.9	485.8	3940.31	328.35	269.69

Table 2 Mortality Rate (%) of Different Breeds of Chickens Reared Under Different Management Systems

Breed	Free Range			Caged System			Deep Litter			Total	(%)	SD		
	Wk1	Wk2	Wk3	Wk1	Wk2	Wk3	Wk1	Wk2	Wk3					
Local	4(16%)			6(24%)			0(0%)			0	0	11	44	2.2
exotic	12(48%)			5(20%)			2(8%)			0	0	20	80	4.02
Hybrid	1(4%)			2(8%)			2(8%)			0	0	6	24	0.86
Total	17			13			4			0	0	37	4.11	6.43
Percentage (%)	68			52			16			0	0	12.23	1.35	2.12
SD	5.6			2.08			1.15			-	-	8.83	0.98	1.88

Note: Figures in parenthesis denote percentage mortality

Table 3 Freed Conversion Ratios (FCR) for Different Breeds of Chickens under Different Management Systems

Breed	Free Range			Caged System			Deep Litter			Total	Average	SD
	Week											
	Wk1	Wk2	Wk3	Wk1	Wk2	Wk3	Wk1	Wk2	Wk3	-	-	-
Local	-	-	-	1.93	4.37	6.83	1.93	4.40	6.89	26.35	2.92	2.80
exotic	-	-	-	2.00	3.90	4.80	1.85	3.25	4.87	20.67	3.44	1.32
Hybrid	-	-	-	2.29	3.97	5.24	2.32	3.59	5.39	22.8	3.8	1.32
Total	-	-	-	6.22	12.24	16.87	6.1	11.24	17.15	53.82	8.97	5.57
Average	-	-	-	2.07	4.08	5.62	2.03	3.74	5.71	23.25	3.87	1.62
SD	-	-	-	0.19	0.25	1.06	0.25	0.59	1.04	3.38	0.56	0.40