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Feed intake and Growth Performance of Different Types of Coloured Chickens Reared under Intensive System in Tropical Humid Climate

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ABSTRACT

The study was carried out to evaluate the feed consumption and performance of five coloured types of chickens reared under intensive system in the hot and humid climate conditions. The growth parameters like body weight, feed consumption, and feed conversion ratio of the coloured birds like Aseel, Dahlem Red, Kaveri, Kadaknath and Rhode Island Red were studied in the intensive conditions. Carcass characteristics, incidence of mortality and cost of production of different types of coloured chicken were measured. Kaveri showed the highest body weight gain and Kadaknath the lowest (P≤0.05) among the five types and the sequence found was: Kaveri>Dahlem Red>RIR>Assel and Kadaknath. Feed conversion ratio followed the order: Kadaknath/RIR/Dahlem Red> Aseel>Kaveri, the differences being significant (P≤0.05). The mortality rate was highest for Rhode Island Red (20%) followed by Dahlem Red (10%), Kaveri/Kadaknath (8%) and Aseel (2%). The dressing percentage was higher in Rhode Island Red, Kaveri and Dalhem Red than Assel and Kadaknath. Some other carcass parameters like back, thigh and drum stick yield percentage also differed significantly among the types of chicken. The cost of production per kg live weight or per kg dressed weight was the lowest for Kaveri and highest for Kadaknath. From the above experiment it was concluded that Kaveri excelled the other colored chicken type in respect to the body weight gain, feed efficiency followed by RIR, Dahlem Red and Aseel.

Key words: Coloured chicken, Feed conversion ratio, Growth, Economics, Humid climate

INTRODUCTION

Indian poultry industry is one of the fastest growing sectors. Total poultry population in the country is 851.81 million which is increased by 16.8% over previous census (20th Livestock Census, 2019). The back yard poultry population increased by 45.80 % whereas the intensive commercial poultry production was increased 4.50 % over the previous census. Intensive method of poultry farming is a highly efficient system which saves land, feed, labour and other resources and also helps in increasing production. So it ensures continuous production throughout the year in any environment and seasons. Indigenous/native breeds of chickens are playing an important role in rural economies in most of the developing and under developed countries. Performance of native fowl can be improved by change in husbandry and feeding practices and by providing better health cover.

In the present study efforts have been made to present the importance of native fowl to rural economy and their improvement for higher production performance (Padhi, 2016). Aseel is an important native chicken breed of India. Home tract of Aseel chicken is Andhra Pradesh. But now they are also reared in Odisha, Madhya Pradesh and Rajasthan. These birds are known for their martial qualities *i.e.,* aggressive fighting abilities, pugnacity and majestic gait (Panda and Mahapatra, 1989). Kadaknath is an important indigenous breed of poultry distributed in the vast areas of western Madhya Pradesh mainly in Jhabua and Dhar Districts and adjoining areas of Gujarat and Rajasthan. Rhode Island Red (RIR) is a single comb, prolific brown egg layer and an efficient feed converter. It has been popularized in most of the states of the country under government schemes. Dahlem Red (DR), is an exotic brown egg-laying bird which was donated to India (under the International Collaborative EEC Project) for production of tropical layers. Kaveri is a new poultry strain developed by Central Poultry Development Organization in 2015. The colour pattern of these birds

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are multi-colour with single comb and yellow coloured shank and skin. These birds have characteristic features like low early chick mortality, excellent flock uniformity, early sexual maturity, withstanding predators and brown coloured eggs which are widely accepted by consumers. (CPDO, Eastern Region). Very little literature is available on the performance of coloured birds in the hot humid climate. The present experiement was planned to see the feed consumption and growth performance of these five coloured type birds under intensive condition in the hot and humid climate.

MATERIALS AND METHODS

The experiment was carried out at Central Poultry Development Organization (CPDO), Eastern Region, Bhubaneswar. Two hundred and fifty day-old straight run chicks of 5 coloured type of chicken *viz.* Aseel, Dahlem Red, Kaveri, Kadaknath and Rhode Island Red, each 50 in numbers were divided into 5 replicates, and each replicate consisting of 10 birds were used. Each pen was provided with a clean and disinfected floor brooder maintained at a temperature of 100°F and gradually reduced to 70°F by 3rd week of age. During the experiment, the birds were offered weighed quantities of feed starting from day-old till the end of the experiment as per the feeding practices carried out at CPDO, Bhubaneswar that was formulated using standard specifications (BIS, 2007). All the birds were fed chick mash (0-8 week of age) and grower mash (9-16 weeks of age) as detailed in Table-1. Weighed quantity of feed was offered daily in the morning and in the afternoon while fresh *ad lib* drinking water was supplied round the clock. After completion of each week feed residues were measured and weekly consumption of feeds was recorded accordingly.

The minimum and maximum temperature during the 16 weeks experimental period ranged from 13.17°C to 39.17°C, relative humidity ranged from 22.57 to 95.14% and temperature humidity index (THI) ranged from 69.77 to 84.5. (Crop Weather Observatory, OUAT, Bhubaneswar, 2018). THI was calculated by taking the dry bulb and wet bulb reading, using the formula of Campbell and Norman (2000) *i.e.* $THI=0.72(T_{DB}+T_{WB}) + 40.6$.

The body weight of the birds was recorded

Table 1. Composition and nutritive value of experimental ration

Name of the feed ingredients	Chick mash (0-8weeks)	Grower mash (9-16 weeks)
	Ingredients (%)	
Crushed yellow maize	44.35	44.35
Rice Polish	21.60	24.60
Soya bean meal	30.00	19.00
De-Oiled rice bran	-	8.00
Mineral mixture	3.50	3.50
Common salt	0.50	0.50
Feed additives	0.05	0.05
	Nutrient composition	
Crude protein (%)	20.00	16.00
Metabolizable energy (kcal/kg)*	2608.00	2495.00
Ether extract (%)	2.33	2.52
Crude fibre	4.17	6.95
Total ash	9.06	9.74
Nitrogen-free extract*	61.01	60.74
Calcium	1.08	0.92
Available phosphorus*	0.65	0.57

*Calculated value

individually at day 1, 28, 56, 84 and 112 of age by using a digital electronic balance. The birds were weighed in the morning before supplying the feed. The feed consumption was calculated by subtracting the residual feed at the end of each week from the total feed provided during that week. The cumulative feed conversion ratio (FCR) was calculated by dividing feed consumption to that of weight gain. Mortality of chicks was recorded daily. The mortality percentage was calculated by taking total chicks died at the end of experiment period as a proportion to number of birds taken for experiment at the beginning of the study.

The evaluation of carcass traits was done in the male and female birds separately at the end of 16th weeks. Four birds, 2 males and 2 females from each breed were sacrificed for the evaluation of carcass parameters. The birds were slaughtered by severing the jugular vein and carotid artery below the left ear lobe by a single incision and they were allowed to bleed for a period of five minutes by holding the birds' heads down. After complete bleeding and cessation of movement the carcass weight was recorded. The carcass was then scalded at 55-58°C for 30 seconds and defeathered. The eviscerated carcass was cut into different parts such as wings, neck, breast, back and legs (thigh and drumstick), the weights of the parts were recorded separately and percentage yield of different cut were calculated. The feed cost per kg live weight gain and per kg dressed weight were calculated based on feed cost and quantity of feed consumed during the experimental period. Cost of feed was taken as ₹ 25/- per kg feed.

The data obtained from the study were statistically analyzed according to Snedecor and Cochran (1980). The data were analyzed for analysis of variance (ANOVA) and Duncans's multiple range test (Duncan 1955) was used to test the difference among treatment means wherever necessary.

RESULTS AND DISCUSSION

Data pertaining to body weight gain from day-old to 16 weeks of age for different types of birds are presented in Table 2. At all stages from 0-16 weeks, the highest weight gain was for Kaveri and the lowest for

Table 2. Body weight (g), feed consumption (g) and feed conversion ratio (FCR) of different types of coloured chicken of chickens

Week	Aseel			Delham Red			Kadaknath			Kaveri			RIR		
	Body weight	Feed intake	FCR	Body weight	Feed intake	FCR	Body weight	Feed intake	FCR	Body weight	Feed intake	FCR	Body weight	Feed intake	FCR
4th	368.88^{b}	714.00^{b}	2.12^{bc}	369.51^{b}	774.00^{c}	2.31^{c}	188.90^{a}	646.00^{a}	3.93^{d}	555.17^{c}	817.64^{d}	1.64^{a}	377.53^{b}	774.00^{e}	2.24^{bc}
	±6.5	±1.44	±0.71	±6.5	±0.34	±0.71	±6.5	±0.19	±0.71	±6.6	±0.27	±0.71	±6.5	±0.17	±0.71
8th	653.39^{b}	2111.00^{b}	3.55^{ab}	660.35^{b}	2248.00^{c}	3.61^{ab}	465.03^{a}	1694.00^{a}	4.30^{c}	919.69^{c}	2560.00^{f}	3.09^{a}	658.66^{b}	2435.00^{d}	4.02^{bc}
	±12.15	±1.91	±0.22	±12.26	±0.45	±0.22	±12.54	±0.25	±0.22	±12.49	±0.48	±0.22	±12.38	±0.27	±0.22
12th	908.52^{b}	3920.50^{b}	4.61^{ab}	1072^{d}	4166.20^{c}	4.05^{a}	716.96^{a}	3076.36^{a}	4.94^{b}	1168^{e}	4092.18^{b}	4.47^{ab}	981.23^{c}	4365.00^{d}	4.87^{b}
	±16.71	±1.55	±0.23	±16.87	±0.58	±0.23	±17.25	±±0.42	±0.23	±17.36	±0.46	±0.23	±17.20	±0.43	±0.23
16th	1293.00^{b}	5928.00^{b}	4.90^{b}	1416^{d}	6332.00^{c}	5.04^{bc}	950.54^{a}	4716.00^{a}	5.70^{d}	1665^{e}	5926.40^{b}	4.14^{a}	1352^{c}	6464.00^{d}	5.63^{cd}
	±18.85	±1.54	±0.21	±19.44	±0.54	±0.21	±19.44	^{a}±0.45	±0.21	±19.17	±0.56	±0.21	±20.10	±0.46	±0.21

Kadaknath, the differences between Kadaknath and other types of bird being significant (P≤0.05) at 4th and 8th week, while there was no significant (P≥0.05) difference between Dahlem Red, RIR and Aseel. Pathak *et al.* (2015) did not notice any significant difference (P≥0.05) between Aseel and Kadaknath at day-old stage. The body weight gain during the 4-8 week period, in the present study revealed no significant (P≥0.05) differences between Aseel and Kadaknath. This is not in agreement with Chatterjee *et al.* (2007) who reported significant (P≤0.05) differences between Aseel and Kadaknath. The variation in findings might be due to effect of environment and plane of nutrition.

Feed consumption increased in successive weeks for each of the bird type and differed significantly (P≤0.05) (Table 2). The results revealed the lowest cumulative FCR for Kaveri and highest for Kadaknath at all ages which implies good growth in case of Kaveri and lowest for Kadakanath. In the present experiment, feed consumption in RIR during 0-8 weeks was found to be lower than that reported by Khawaja *et al.* (2012) for the same age period. The differences might be due to variations in the environment, body weight and plane of nutrition.

Data pertaining to carcass characteristics of different types of bird, slaughtered at 16th week of age, are presented in Table 3. The dressed yield ranged from 57.95 to 73.98 percent across the types. There was no significant (P≥0.05) difference between Aseel, Dahlem Red and Kaveri. Kadaknath showed significantly (P≤0.05) lower dressed yield than each of the other type of colored birds. The order of dressed yield was: RIR/Kaveri/Dahlem Red>Aseel >Kadaknath. The eviscerated yield ranged from 53.89 to 69.54 percent across the types of colored birds. Kadaknath showed a significantly (P≤0.05) lower yield than any of the others, there being no significant (P≥0.05) differences among the other four colored type of birds.

The giblet yield ranged from 3.06 to 4.59 percent across the breeds. Kadaknath showed the lowest giblet percent than any other type of birds. The order of giblet percent was: Aseel/ RIR>Kaveri/ Dahlem Red>Kadaknath, the differences being significant (P≤0.05).The neck yield ranged from 6.55 to 9.39 percent across the type of birds. There was no significant (P≥0.05) difference between Aseel, Dahlem Red, Kaveri and RIR, but Kadaknath showed a significantly (P≤0.05) lower neck yield than others. The wing yield ranged from 11.1 1to 13.79 percent, there was no significant (P≥0.05) difference between the type of birds except that Kaveri showing a significantly (P≤0.05) lower value than Aseel.

The breast yield ranged from 20.88 to 25.77 percent among different types of colored bird. No significant (P≥0.05) difference was noticed between Aseel, Dahlem Red and RIR. Kaveri showed the

Table 3. Carcass characteristics of different types of coloured chicken

Parameters	Breed				
	Aseel	Delham Red	Kadaknath	Kaveri	RIR
Live weight (g)	1295.00^{b}±18.80	1365.00^{d}±37.76	922.00^{a}±24.02	1595.00^{e}±25.7	1296.00^{c}±35.14
Dressing percent	69.15^{b}±0.95	72.60^{bc}±1.73	57.95^{a}±0.64	73.02^{bc}±1.19	73.98^{c}±2.27
Eviscerated percent	64.34^{b}±1.74	68.56^{b}±1.74	53.89^{a}±1.74	68.69^{b}±1.74	69.54^{b}±1.74
Giblet percent	4.59^{c}±0.4	3.97^{b}±0.16	3.06^{a}±0.31	4.03^{b}±0.19	4.34^{bc}±0.14
Neck percent	8.71^{b}±0.32	9.39^{b}±0.56	6.55^{a}±0.32	9.17^{b}±0.67	8.99^{b}±0.66
Wing percent	13.79^{b}±0.61	12.15^{ab}±0.4	12.47^{ab}±0.71	11.11^{a}±0.73	12.54^{ab}±0.56
Breast percent	23.42^{b}±0.53	22.46^{ab}±1.02	20.88^{a}±0.39	25.77^{c}±1.03	22.53^{ab}±1.15
Back percent	20.05^{b}±0.29	13.68^{a}±2.72	18.91^{b}±0.28	20.66^{b}±0.45	19.78^{b}±0.07
Thigh percent	18.94^{c}±0.5	15.60^{ab}±0.55	14.23^{a}±0.08	16.75^{b}±1.19	16.18^{b}±0.36
Drumstick percent	16.31^{c}±0.19	14.25^{ab}±1.14	13.73^{a}±0.26	13.98^{a}±1.33	16.02^{b}±1.11

^{a,b,c}Means showing different superscripts in a row differ significantly (P≤0.05)

Table 4. Economics of production

Breed	FI (kg)	Feed cost	LW (g)	DP (%)	DW (g)	FCLW (₹)	FCDW (₹)
Aseel	5.9	147.50	1302.00	69.15	900.33	113.28	164.00
Delham Red	6.3	157.50	1416.00	72.60	1028.00	111.22	153.21
Kadaknath	4.7	117.50	950.54	57.95	550.83	123.61	213.31
Kaveri	6.3	157.50	1665.00	73.02	1215.78	94.59	129.54
RIR	6.4	160.00	1352.00	73.98	1000.20	118.34	159.96

FI, feed intake; LW, live weight (at 16th week); DP, dressing percentage, DW, dressed weight, FCLW, feed cost/ kg live weight, FCDW, feed cost/kg dressed weight

highest and Kadaknath showed the lowest (P≤0.05) proportionate breast yield. The thigh yield ranged from 14.23 to 18.94 percent across the type of colored chicken, significantly higher value (P<0.05) was observed in Aseel than other types. Highest (P<0.05) drumstick yield was recorded for Aseel whilst lowest value was observed in Kadaknath and Kaveri. The lowest mortality was observed in Aseel and the maximum mortality was observed in RIR during 16th week of age. This might be due to the fact that Aseel is an indigenous breed, while RIR is an exotic breed. Data pertaining to the cost of production in terms of live weight or dressed weight yield are presented in Table 4. It was found that the cost of production was the lowest for Kaveri followed by Dalham Red, Aseel, RIR and was highest for Kadaknath.

CONCLUSION

From the above experiment it was found that Kaveri excelled the other four types of coloured chicken with respect to the body weight gain and feed efficiency, closely followed by RIR, Dahlem Red and Aseel. Cost of production was lowest for Kaveri and highest for Kadaknath. Thus, Kaveri seems to be suitable strain under intensive system of rearing in tropical hot and humid climate.

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REFERENCES

Bureau of Indian standards. 2007. *Indian Standard Poultry Feeds Specification*. 5th Edition; 1-7.

BAHS. 2019. *Basic Animal Husbandry Statistics*, Department of Animal Husbandry & Dairying, Government of India.

Campbell, G.S and Norman, J.M.2000. *An Introduction to Environmental Biophysics,* 2nd edn. Springer.

Chatterjee, R.N., Sharma, R.P., Reddy, M.R., Niranjan, M. and Reddy, B.L.N. 2007. Growth, body conformation and immune responsiveness in two Indian native chicken breeds. *Livest. Res. Rural Dev.*19: http://www.lrrd.org/lrrd19/10/chat19151.htm

Duncan, D.B. 1955. Multiple ranges and multiple F test. *Biometric.*11: 1-42.

Khawaja, T., Khan, S.H., Mukhtar, A. and Parveen, A. 2012. Comparative study on growth performance, meat quality and haematological parameters of Fayoumi, Rhode Island Red and their reciprocal crossbred chickens. *Ital. J. Anim. Sci.* 11: 211-216.

Livestock Census. 2019. *20th Livestock Census*. Department of Animal Husbandry & Dairying, Government of India.

Panda, B. and Mahapatra, S.C. 1989. Common breeds of poultry. *Poultry Production*. ICAR, New Delhi, India: 6-18.

Pathak, P., Dubey, P., Dash, S.K. and Chaudhury, M.L. 2015. Studies on growth and carcass traits of Aseel and Kadaknath chicken. *Indian J. Poult. Sci.* 50: 327-328.

Padhi, M.K. 2016. Importance of indigenous breeds of chicken for rural economy and their improvements for higher production performance. *Scientifica,* http://dx.doi.org/10.1155/ 2016/2604685.

Snedecor, G.W. and Cochran, W.G.1994. *Statistical Methods*. 8th edn. Iowa State University Press, Ames, lowa, USA.

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