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NUTRIENT AVAILABILITY AND BODY COMPOSITION OF SEMI SCAVENGING GIRIBAZ PIGEON (*COLUMBA LIVIA*)

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ABSTRACT

Two experiments were conducted to evaluate nutrient availability and body composition of semi scavenging Giribaz pigeon. The average DM, CP, CF, EE, ash, NFE, Ca and Av. P in crop and gizzard contents of male and female pigeon were 716.75, 108.50, 50.55, 15.90, 49.60, 574.25, 0.54 and 0.22 g/kg, respectively. The ME contents was 14.20 MJ/kg DM. The average live weight was 297.30g for male pigeon and 267.70g for female pigeon. Dressing percentage, total meat, breast meat, head and gizzard were 62.60, 34.52, 23.63, 3.09 and 1.91% for male pigeon and 56.80, 28.22, 19.45, 4.24 and 2.63% for female pigeon respectively. Live weight, dressing percentage, total meat and breast meat were (11.06, 5.80, 6.30 and 4.18%) higher ($P<0.01$) in males than females. While, females had heavier ($P<0.01$) head and gizzard (1.15 and 0.72 %) than males. It is concluded that feeds in crop and gizzard of pigeon were low in CP, EE, NFE, Ash, Ca and Av. P but higher in CF and ME. Supplemental diet like CP, EE, NFE, Ash, Ca and Av. P were rich, whereas low in CF that could increase the production of semi scavenging pigeon. Nutrient availability and body composition between male and female pigeon is apparently negligible difference.

INTRODUCATION

Bangladesh has a long historical record of raising poultry under backyard system. The weather and vast areas of crop field along with housing premises of Bangladesh are suitable for pigeon farming. In Bangladesh, livestock plays an important role in the agricultural economy. The current contribution of livestock sub-sector to overall GDP is about 2.73% (Draft Sixth Five Year Plan, 2010). About 78% of the total egg production and 86% of the meat production of the country come from scavenging poultry and the rest from farm poultry (Alam, 1995). In developing country like Bangladesh pigeon production in rural areas is of great importance as supply of meat and as source of income especially to young people and widow. Pigeon rearing has many advantages over other poultry. Some of these are- comparatively lowest keeping cost; short generation cycle; rapid juvenile growth; early sexual maturity i.e. 5-6 months of age; less feed and housing cost required; create employment opportunities; supplies animal protein; environment friendly, associated with ecological balance, natural beautification and ornamental keeping as a good source of recreation. People of all religions like squab meat. There is no doubt that squabs are both nourishing and pleasing to the palate. Squab meat is very lean, easily digestible and rich in proteins, minerals and vitamins. It is also used as tasty, delicate and fancy meat (Aliza, 2005; Jane, 2005; Richard, 2006; Morgan, 2006). Pigeons are used for meat production, ornamentals, sports and experimental animals (Rahman, 1999). Chinese people consider the meat of pigeons as having medicinal value and squab is a part of celebratory banquets for holiday such as Chinese New Year (Hsiung *et al.,* 2005). Egyptians raised pigeon for food (Levi, 1972). Pigeons were popular in Romans, France and England as a means of livelihood to produce squab (Goodwin, 1967). Giribaz is one of the oldest of the known varieties of pigeon in Indo-Bangladesh subcontinent. Giribaz is slightly larger than dove, short beak and small head without comb and usually clean legged. There are small and of diverse colours, they have stange motions, turning themselves backwards over their heads and show like footballs in the air. Pigeon which flew so high in the air that they were lost to view but returned to their

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house without separating. The colour of Giribaz is black, blues etc with white head, white flights and white tail. Giribaz pigeons are available in old Dhaka, Gingira and Rajshahi. Among the farmers 50% liked Gola, 37.5% Giribaz, 5% Siraji, 5% Serting and 5% Mayouri/Locca breed of pigeon (Islam, 2010). In Bangladesh, pigeons are generally scavenger surviving traditionally on the scavenging feeds like fallen grain at farm field, railway yards, grain elevators, fruits, leaves, insects and weed seeds. In most cases, additional feed is not supplied to the pigeon. Some farmer supply mixed feed such as paddy and rice grain to their pigeon. This mixed feed required for better performance of reproduction. However, there is limited information of feed requirement of local pigeons. Feeds that are suitable with the pigeon needs in semi intensive rearing are necessary to obtain their productivity as expected.

In developing countries like Bangladesh, pigeons are reared under semi scavenging system mainly for squab production. In villages, people supply supplementary feed in the morning, then allow the pigeon to collect some feed whole day through scavenging and come back home at evening and given some supplementary feed. The quantity of feed supplied to semi scavenging pigeon from 32.5-42.5g/day, with an average of 38.1g/day (Islam, 2010). Balance ration is one of the fundamental requirements to successful pigeon farming. Optimum nutrition promotes proper growth, production and disease resistance (Levi, 1977). The actual nutritional status or availability of nutrients to semi scavenging pigeons in Bangladesh is yet to be determined. Whether, nutrient available to them is sufficient to support optimum performance or deficient enough to limit performance is not known. Moreover, it is unknown whether choice of feed or nutrient differs between males and females. Considering the above facts and circumstances, the present study was conducted to know the available feed nutrients in crop and gizzard contents of Giribaz pigeon reared under semi scavenging system and to determine the body composition of Giribaz pigeon reared under semi scavenging system.

MATERIALS AND METHODS

The research was conducted at Sylhet Agricultural University, Sylhet and chemical analysis of collected feeds were done in the Animal Nutrition, Genetics and Breeding laboratory and Soil Science laboratory at Sher-e-Bangla Agricultural University, Dhaka, Bangladesh from January to December, 2013. Two experiments have been conducted.

Experiment 1: Nutrient availability to semi scavenging pigeon in Bangladesh.

Experiment 2: Body composition of adult male and female pigeon.

Experiment 1: Nutrient availability to semi scavenging pigeon in Bangladesh.

A total of 20 adult Giribaz pigeons (10 males and 10 females) were purchased in afternoon 5.00-6.00 pm from farmer's premises, immediately after completing their scavenging and afternoon supplementary feeding. Pigeons were immediately weight and slaughtered with an intention to get their ingested feed intact in crop and gizzard for proximate analysis. Slaughtered pigeons were stored at -20^0C over night. In the next morning pigeons were kept at room temperature for an hour. Then the feed contents in their gizzard were individually collected and stored separately. Then each individual crop and gizzard content was dried (oven dry) and then visually observed the selection of proportionate feed ingredient. Afterward, dried feed in gizzard and crop were mixed together and grinded. The feed samples were kept in polythene bag individually and preserved in air tight glass sample jars for chemical analysis. The analytical work was performed in the Animal Nutrition laboratory, Department of Animal Nutrition, Genetics and Breeding at Sher-e-Bangla Agricultural University, Dhaka, Bangladesh. The feed samples were analyzed for the determination of Dry Matter (DM), Crude Protein (CP), Crude Fibre (CF), Ether Extract (EE), Nitrogen Free Extract (NFE) and Ash. Dry matter was determined by drying the samples within an oven up to a constant weight at 105^0C. Other proximate components (crude protein, crude fibre, ether extract, nitrogen free extract and ash) were determined using the method of AOAC (1990). Each sample was replicated twice to get accurate results. The calcium and available phosphorus contents of the ground feed samples were determined using the method of Chapman and Pratt (1961) in the laboratory, Department of Soil Science, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh. The metabolizable energy (ME) contents were calculated by the formula of Wiseman (1987).

True ME (kcal/kg DM) = 3951 + 54.4 EE – 88.7 CF – 40.8

Ash

All collected and calculated data were analyzed for a completely randomized design. A paired't' Test was performed to compare the nutrient availability between male and female pigeon.

Experiment 2: Body composition of adult male and female pigeon

A total of 20 adult Giribaz (10 males and 10 female) were purchased in afternoon 5.00-6.00 pm from the farmer's premises. After purchase they were kept for over night. In the next morning, pigeons were individually weight and slaughtered. They were allowed to bleed properly. Each slaughtered pigeon scalded and eviscerated. Afterwards, they were dissected following the procedure of Jones (1984). Records were kept on weight of carcass, head, breast meat, wing meat, wing bone, heart, gizzard, heart, liver, spleen, abdominal fat, back, thigh meat, thigh bone, drumstick meat, drumstick bone, dressed skin, shank and the length of neck, wing bone, drumstick bone, thigh bone and alimentary tract. Dressing percentage of the birds was determined by dividing the carcass weight with its live weight, multiplied by 100 and expressed as percentage. Weight of dark meat as calculated by summation of different meat weight (weight of thigh meat + drumstick meat + wing meat). Breast and dark meat ratio (Breast: Dark meat) calculated as breast meat weight divided by dark meat weight. Weight of total bone is calculated by summation of different bone weight (weight of neck weight+

wing bone+ vertebral column weight+ thigh bone + drumstick bone). Before statistical analysis, data on meat yield parameters were converted into percentage of respective live weight. All meat yield characteristics were analyzed by the statistical package GENSTAT (Genstat statistical package, 5th edition, 1997). A paired't' Test was performed to compare the body composition between male and female.

RESULTS

Experiment 1: Nutrient in crop and gizzard contents of male and female pigeon

The average CP, CF, EE, Ash, NFE, DM, Ca and Av. P in crop and gizzard contents of male and female pigeon were 108.50, 50.55, 15.90, 49.60, 574.25, 716.75, 0.54 and 0.22g/kg, respectively (Table 1). The average ME content was 14.20 MJ/kg. But nutrient availability in crop and gizzard to semi scavenging pigeons did not differ (P>0.05) between sexes.

Table 1. Nutrient availability in crop and gizzard contents of male and female pigeon

Variable (g/kg)	Sex		Mean	SED and Significance
	Male	Female		
Crude Protein	113	104	108.50	0.537^{NS}
Crude Fibre	51.60	49.50	50.55	0.296^{NS}
Ether Extract	16.30	15.50	15.90	0.498^{NS}
Ash	50.50	48.70	49.60	0.312^{NS}
Nitrogen Free Extract	556	592.50	574.25	3.05^{NS}
Dry Matter	716.40	717.10	716.75	1.009^{NS}
TME (MJ/kg DM)	13.90	14.50	14.20	110.6^{NS}
Calcium	0.32	0.75	0.54	0.0047^{NS}
Av. Phosphorus	0.23	0.20	0.22	0.00025^{NS}

(NS, P>0.05)

Experiment 2: Body composition of adult male and female pigeon

Table 2 shows that average live weight was 297.30g for male pigeon and 267.70g for female pigeon. Dressing percentage, total meat, breast meat, dark meat, wing meat, thigh meat and drumstick meat were 62.60, 34.52, 23.63, 10.89, 5.38, 2.98 and 2.53% for male and 56.80, 28.22, 19.45, 8.77, 4.81, 2.18 and 1.78% for female respectively. Weight of total bone, wing bone, thigh bone and drumstick bone were 10.14, 3.25, 0.80 and 0.89% for male and 10.12, 3.60, 0.78 and 0.92% for female respectively. Weight of head, neck, heart, gizzard, liver, abdominal fat, back, skin and shank were 3.09, 2.13, 1.02, 1.91, 2.38, 0.34, 3.07, 7.25 and 1.72% for male and 4.24, 1.95, 1.03, 2.63, 2.56, 0.36, 2.87, 6.79 and 1.90% for female pigeon respectively. The ratio of breast and dark meat (breast: dark meat) was 2.17 for male and 2.22 for female pigeon. Neck length, wing bone length, thigh bone length, drumstick bone length, elementary tract length and shank length were 5.72, 13.50, 3.73, 5.38, 76.65 and 3.50cm for male pigeon and 5.68, 13.36, 3.62, 5.33, 77.23 and 3.30cm for female pigeon respectively. Dressing percentage, total meat, neck, breast meat, dark meat, wing meat, thigh meat, drumstick meat and back were 5.80, 6.30, 0.18 4.18, 2.12, 0.57, 0.80, 0.75 and 0.20%, respectively higher (P<0.01) in males than females. Skin was 0.46% higher (P<0.05) in males than females. The average weight of head, wing bone, gizzard and shank were 1.15, 0.35, 0.72 and 0.19% higher (P<0.01) in females than males. Average weight of total bone, thigh bone, drumstick bone, heart, liver, abdominal fat and the length of neck, wing bone, thigh bone, drumstick bone, elementary tract, shank and the ratio of breast and dark meat (breast: dark meat) did not differ (P>0.05) between sexes.

Table 2. Body composition of adult male and female pigeon

Variable (% of live weight)	Sex		Difference	Mean	SED and Significance
	Male	Female			
Live weight (g)	297.30	267.70	29.60	282.50	3.06^{**}
Dressing percentage (%)	62.60	56.80	5.80	59.70	0.831^{**}
Total meat (%)	34.52	28.22	6.30	31.37	0.811^{**}
Breast meat (%)	23.63	19.45	4.18	21.55	0.734^{**}
Dark meat (%)	10.89	8.77	2.12	9.83	0.160^{**}
Wing meat (%)	5.38	4.81	0.57	5.09	0.091^{**}
Thigh meat (%)	2.98	2.18	0.80	2.58	0.066^{**}
Drumstick meat (%)	2.53	1.78	0.75	2.16	0.077^{**}
Breast: Dark meat	2.17	2.22	0.05	2.10	0.065^{NS}
Total bone (%)	10.14	10.12	0.02	10.13	0.119^{NS}
Wing bone (%)	3.25	3.60	0.35	3.43	0.061^{**}
Thigh bone (%)	0.80	0.78	0.02	0.79	0.014^{NS}
Drumstick bone (%)	0.89	0.92	0.03	0.91	0.026^{NS}
Neck (%)	2.13	1.95	0.18	2.04	0.054^{**}
Back (%)	3.07	2.87	0.20	2.97	0.047^{**}
Neck length (cm)	5.72	5.68	0.04	5.70	0.124^{NS}
Wing bone length (cm)	13.50	13.36	0.14	13.43	0.544^{NS}
Thigh bone length (cm)	3.73	3.62	0.11	3.68	0.114^{NS}
Drumstick bone length (cm)	5.38	5.33	0.05	5.36	0.141^{NS}
Elementary tract length (cm)	76.65	77.23	0.58	76.94	1.185^{NS}
Shank length (cm)	3.50	3.30	0.20	3.40	0.307^{NS}
Head (%)	3.09	4.24	1.15	3.67	0.211^{**}
Gizzard (%)	1.91	2.63	0.72	2.27	0.098^{**}
Liver (%)	2.38	2.56	0.18	2.47	0.166^{NS}
Abdominal fat (%)	0.34	0.36	0.02	0.35	0.021^{NS}
Skin (%)	7.25	6.79	0.46	7.02	0.193^{*}
Shank (%)	1.72	1.90	0.18	1.81	0.039^{**}

(NS, P>0.05; *, P<0.05; **, P<0.01)

DISCUSSION

Experiment 1: Nutrient availability to semi scavenging pigeon in Bangladesh.

The nutrients availability of semi scavenging pigeon recorded in this study appeared to be much lower in comparison with the recommended ration as reported by Darwati *et al*. (2009), Bolla (2007) and Poma (1980), except energy content. The crude protein (CP) content of semi scavenging feeds of pigeon is lower in comparison with the recommended ration of Abd El-Calil (2013), Darwati *et al.* (2009), Mire *et al*. (2009), Bolla (2007), Sales *et al*. (2003), Poma (1980) and Morison feeding standard (1936). The metabolizable energy (ME) found in crop and gizzard contents of semi scavenging pigeon is slightly higher in comparison with the observation of Abd El-Calil (2013), Bolla (2007), Sales *et al*. (2003) and Poma (1980). This may be due to the choice of pigeon that they eat fresh grain and they do not like mesh and fibrous feed (Rizmayer, 1969). The metabolizable energy varies for season because the scavenging pigeon get more feed during crop harvesting season and they have a chance to select good quality grain.

The ether extract or crude fat (EE) content of semi scavenging feeds of pigeon is lower in comparison with the findings of Darwati *et al*. (2009), Bolla (2007) and Poma (1980). The nitrogen free extract (NFE) content of semi scavenging feeds of pigeon is lower in comparison with Morison feeding standard (1936). Generally, it is assumed that feeds of scavenging pigeon are different from that of chicken and duck in composition because of their difference in scavenging area, choice of ingredients, availability of feeds, feeding habit and nutrients requirement. Generally pigeon prefers fresh, good quality grain and they have more scavenging area. Besides, they have better flying ability to collect feed from long distance. Irrespective of sex, the crude fibre (CF) content were higher in scavenging feed of pigeon than those of Darwati *et al*. (2009), Bolla (2007) and Morison feeding standard (1936). Calcium (Ca) and available Phosphorus (P) in crop and gizzard contents were much lower because of ingested grain contain very lower amount of calcium and available phosphorus recommended by Platt (1951) and USDA (1955).

Experiment 2: Body composition of adult male and female pigeon.

Total meat, breast meat, dark meat, thigh meat, drumstick meat and dressing percentage increased (Table 2) with increased live weight that was similar as reported by Azad (2009) for Gola pigeon. Neck, wing meat and back weight increased with increased live weight that differed with the observation of Azad (2009) for Gola pigeon. In both sexes, the proportionate yield of total bone, thigh bone, drumstick bone, heart, liver and abdominal fat had no relation with sex which was consistent with the findings of Azad (2009) in case of Gola pigeon. The length of neck, wing bone, thigh bone, drumstick bone, elementary tract, shank and the ratio of breast meat and dark meat (breast: dark meat) had no relation with sex which was consistent with the findings of Azad (2009) in case of Gola pigeon. This is due to the fact that these organs develop at an early life. Higher ratio of breast and dark meat (breast: dark meat) recorded in pigeon may be related to their physiological need to fly. The growth of pectoral muscle (flying muscle) appeared to be very fast growing in early life of pigeon. The weight of gizzard and head were higher in females than males which was similar with the findings of Azad (2009) in case of Gola pigeon, but the weight of wing bone and shank were higher in females than males which were not supported by the findings of Azad (2009) in case of Gola pigeon. Body composition of male and female is expected to be different (Brake *et al*., 1993). Despite of remarkable differences in major body composition, proportionate nutrient intake did not vary between males and females (Table 1). This might have arisen for the inability of male and female pigeons to adjust nutrient intake for their differential body composition. It was assumed that the effect of sex on ingredients selection and thus difference of nutrient may be variable in different species.

Conclusion

From this study we observed that crop and gizzard contents of pigeon were deficient in CP, EE, NFE, Ash, Ca and Av. P, but CF and ME content were slightly higher than required. It may be little difference in nutritional need in between the sexes. Proper supplementation slightly improves the productivity of pigeon. Males are heavier than female Giribaz pigeons that are found in this study. In semi scavenging pigeon ME content was higher for that reason we may prefer low energy supplementary feed. We can supply protein rich feed and grit as a supplementary feed which helps to fulfill the required CP and mineral for better production. Further study is needed for comparative performance and meat yield investigation among the breeds and varieties of pigeon available in Bangladesh for better performance. A survey on pigeon population and their economic feasibility in Bangladesh should be done.

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