Replacement Value of Two Bangladeshi Varieties of Yellow Corn for Wheat in the Diet of Laying Chicken

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ABSTRACT : Two Bangladeshi varieties of yellow corn-'*Barnali*' and '*Khaibhutta*' were chemically analysed and used in the diet of laying chicken to determine their replacement value for wheat. Both the new varieties of yellow corn were found to be good sources of energy and the CP contents were comparable to wheat. Forty two, 29-week old randomly selected Starcross Brown commercial pullets were assigned to 7 dietary treatments with 6 replicates, each being an experimental unit. Diets were formulated replacing wheat quantitatively by two varieties of yellow corn either 0, 50, 75 or 100 per cent from a wheat based control diet. The production performance of laying hens fed diets formulated with *Barnali* or *Khaibhutta* at different dietary levels during an experimental period of 16 weeks was satisfactory and comparable to wheat based diet. Except egg yolk colour, the other internal arid external egg quality characteristics at 8th and 16th weeks of the experiment did not differ significantly. The egg yolk colour improved significantly ($p<0.01$) by feeding both the new varieties of corn and the degree of pigmentation of yolk increased as the dietary levels of corn increased at the expense of wheat. Considering laying performance, the new varieties of yellow corn, *Barnali* or *Khaibhutta* can be used in layer diet as replacement of wheat. Such a replacement would better than wheat-based diet in terms of egg yolk pigmentation. (*Asian-Aus. J. Anim. Sci. 1999. Vol. 12, No. 5 : 776-782*)

Key Words : Varieties, Yellow Corn, Replacement, Laying Performance, Yolk Pigmentation, Egg Quality

INTRODUCTION

Among the various types of grains considered for feeding poultry, corn ranks first with respect to food value. In addition to its palatability and high energy content, yellow corn is a good source of beta-carotene and xanthophyll pigment. Following ingestion, beta-carotene is converted into vitamin A while xanthophyll contributes yellow colour to skins, shanks, beaks and egg yolks in almost all breeds and commercial strains of chicken. Corn contains 4 per cent fat, half of which is an essential fatty acid, linoleic acid (Austic and Nesheim, 1990). Diets containing grains other than yellow corn although can serve the purpose of supplying energy, usually fail to provide sufficient xanthophyll pigment and essential fatty acid if not derived from other sources particularly of synthetic origin.

Woodward et al. (1987) substituted Florida 301 wheat for corn and they did not incurr any problem in the quality of the yolk. Hsun and Maurice (1992) used naked oats partly replacing maize and soyabean oil meal and detected differences between diets relative to yolk colour. Korane et al. (1992) reported that replacement of maize produced pale yolk, though it did not affect any of the internal (albumen index, yolk index, Haugh unit) and external (shell thickness and shape index) qualities of eggs. According to Britzman (1985) barley and wheat contain no xanthophyll and consequently, will produce very pale lemon-coloured yolks if additional pigment is not added to diets.

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Bangladesh Agricultural Research Institute (BARI) developed a few varieties of corn. Replacement value of two of them (*Barnali* and *Khaibhutta*) for wheat was examined for layer birds in this study. BARI developed *Barnali* in 1974 from a composit Pakistani variety 'Sadaf' through half-sib selection whereas *Khaibhutta* was developed in 1970 from an Indian variety 'Amber pop'(Chowdhury, 1993). Figure 1 shows two new varieties of corn developed by BARI. The chemical composition of these two varieties was determined in this study. The production performance and egg quality characteristics of layers were investigated following feeding diets formulated with new varieties of yellow corn by quantitative replacement of wheat.

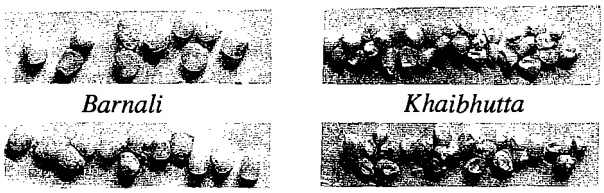


Figure 1. Two new varieties of corn (*Barnali* and *Khaibhutta*) developed by Bangladesh Agricultural Research Institute

MATERIALS AND METHODS

Varieties of yellow corn

Two varieties of yellow corn namely *Barnali* and *Khaibhutta* were considered in this study. They were procured from Plant Breeding Division of BARI, Gazipur, Bangladesh.

Table 1. Composition of experimental diets

Ingredients	Experimental diets (Amount g/kg)						
	T1 500 g wheat kg^{-1}	T2 250 g wheat+ 250g *Barnali* kg^{-1}	T3 125 g wheat+ 375 g *Barnali* kg^{-1}	T4 500 g *Barnali* kg^{-1}	T5 250 g wheat+ 250 g *Khaibhutta* kg^{-1}	T6 125 g wheat+ 375 g *Khaitabhuta* kg^{-1}	T7 500 g *Khaibhutta* kg^{-1}
Wheat	500	250	125	0	250	125	0
Barnali	0	250	375	500	0	0	0
Khaibhutta	0	0	0	0	250	375	500
Rice polish	240	240	240	240	240	240	240
Sesame oil cake	110	110	110	110	110	110	110
Fish meal	85	85	85	85	85	85	85
Oyster shell	50	50	50	50	50	50	50
Bone meal	10	10	10	10	10	10	10
Common salt	5	5	5	5	5	5	5
Vit.-min. premix*	+	+	+	+	+	+	+
Vitamin C**	+	+	+	+	+	+	+
Chemical composition (kg^{-1} DM)							
DM (g)	923.8	914.2	909.4	904.6	913.3	908.1	903.0
CP (g)	158.6	162.6	164.8	166.8	159.3	159.7	159.9
ME (MJ)	10.6	11.4	11.6	11.9	11.4	11.7	11.9
Ca (g)	31.5	32.1	31.9	32.0	31.8	31.9	32.1
Total P (g)	7.46	7.43	7.36	7.40	7.44	7.37	7.41
CF (g)	44.6	45.1	44.4	45.5	45.1	45.5	45.6
EE (g)	38.3	44.1	47.1	49.6	43.9	46.8	49.7
Lys (g)	6.49	6.12	5.93	5.85	6.13	5.94	5.86
Meth (g)	2.81	2.95	2.96	2.98	2.95	2.97	2.99
Tryp (g)	2.05	1.96	1.97	1.98	1.97	1.98	1.99

* Added Embavit-L (Rhone Poulenc Agrovet Bangladesh Ltd.) @ 250 g per 100 kg mixed feed. Each 2.5 g premix contained Vitamin A, 1200 IU; Vitamin D_3, 250 IU; Vitamin E, 20 IU; Vitamin K, 4.0 mg; Vitamin B_1, 1.5 mg; Vitamin B_2, 50 mg; vitamin B_6, 4.0 mg; Nicotinic acid, 30.0 mg; Pantothenic acid, 10.0 mg; Vitamin B_{12}, 0.01 mg; Folic acid, 0.5 mg; Cobalt, 0.3 mg; Copper, 16.0 mg; Iron, 24.0 mg; Iodine, 0.6 mg; Manganese, 48.0 mg; Zinc, 40.0 mg; Selenium, 0.12 mg; DL-Methionine, 50.0 mg; Choline cloride, 250.0 mg; BHT, 250.0 mg.

** Added L-Ascorbic acid (F. Hoffman-La Roche Co. Switzerland) @ 200 mg kg^{-1} mixed feed.

Chemical analysis

Samples of the varieties of yellow corn were subjected to chemical analysis along with other feed ingredients. Standard procedures were followed for proximate components (AOAC, 1990). For the determination of starch, sample was seived through 100 mesh seive. One gram of sample was hydrolysed under reflux for 2.5 hours with 75 ml dilute HCl (1:10) in a 250 ml Erlenmeyer flask. It was cooled and neutralized with NaOH and the content was transferred to 100 ml volumetric flask and made up to volume. The hydrolysed sample was then titrated against standardized Fehlings solution to determine the reducing sugar according to the method suggested by Lane and Eynon (1923). The values obtained for reducing sugar were converted into starch multiplying by 0.90. Free sugar was estimated by colorimetric method (Dubois et al., 1951). The extraction was done with 80% ethanol. The sample was suspended in ethanol for 16 hours with occasional stirring. It was then filtered and the filtrate was evaporated in vacuum rotary evaporator. The residue was collected in 40 ml distilled water and filtered to remove fats. The water soluble proteins were removed by adding 2% of 5 ml lead acetate solution followed by filtration. After removal of excess lead acetate by passing H_2S through the solution and filtering, the sample was made up to 100 ml volume. The colour was developed by adding 4 ml of Anthrone reagent to 0.1 ml of sample in 0.9 ml of distilled water. The results were calculated from a standard curve made by plotting optical density against graded concentration of standard glucose solution in a spectrophotometer at 620 nm.

Determination of ME

The ME of feed ingredients were determined by substituting values of chemical composition in a formula suggested by Leclercq et al. (1987). ME (kcal/kg)=36.1 CP+76.9 EE +40.6S-26.1 Su; where CP, EE, S and Su represented per cent crude protein, ether

extract, starch and sugar respectively.

Birds and diets

Forty two, 29 weeks old Starcross Brown commercial pullets were randomly assigned to 7 dietary treatments of 6 replicates each. The birds were housed in cages. All diets were isocaloric and isonitrogenous and the nutrient requirements (DM, CP, ME, Ca, P, CF, EE, lysine, methionine, tryptophan) were satisfied close to the International Nutrition Standards for Poultry (Blair et al., 1983). The control diet (500 g kg^{-1} wheat-based) was fed to all treatment groups for two weeks before commencement of the experiment to eliminate residual effects of previous diets. Then each experimental diet was applied to 6 replicates, each bird was considered as an experimental unit. The vitamin-mineral premix and vitamin C were incorporated as per recommendation of the manufacturers and thorough mixing of diets was ensured. Composition of the experimental diets is shown in table 1.

Management

All mash dry feed was supplied to birds *ad libitum* throughout the experimental period. Drinking water was made available at all times. Feeders were cleaned weekly while waterers were cleaned every morning. The birds were reared during a photoperiod of 12 hours and an additional lighting was carried out for 4 hours to make total lighting period to 16 hours/day. Identical care and management were provided to all treatment groups during the entire trial period.

Measurement of egg duality characteristics

The eggs were collected from each replicate during 8 weeks and 16 weeks of the experimental period. Separation of egg components following breakage of eggs and their weight measurements were in accordance with Chowdhury (1988). Yolk colour was determined by comparing with the Roche Yolk Colour Fan (F. Hoffmann-La Roche and Co. Ltd., Basle, Switzerland). Haugh unit was measured by an Egg Quality Scale (Ogawa Seiki Co. Ltd., Tokyo, Japan) using the data obtained for the height of thick albumen and egg weight. After oven drying, shell thickness was measured in mm by means of an Egg Shell Thickness Meter (Ogawa Seiki Co. Ltd., Tokyo, Japan).

Record keeping

Egg production was recorded daily while body weight was kept weekly. Egg weight was taken daily by an Egg Scale (Ogawa Seiki Co. Ltd. Tokyo, Japan). Feed record was kept on weekly basis. Change in body weight, hen-day egg production, feed consumption, feed efficiency and survivability were obtained by calculations.

Statistical analysis

Data collected for laying performance and egg quality characteristics were subjected to statistical analysis by a computer using statistical computer Packaged Programme (MSTAT) in accordance with the principles of Completely Randomized Design (CRD). Multiple comparison was made where ANOVA showed a significant difference.

RESULTS AND DISCUSSION

Chemical composition

The chemical composition of wheat and two new varieties of yellow corn is shown in table 2. The values obtained for moisture, DM, EE, sugar and starch were found to be close to those of foreign varieties of corn previously reported by Schiable (1976), Austic and Nesheim (1990) and Douglas et al. (1990). The CP contents of *Khaibhutta* and *Barnali* were 102.1 and 116.6 g/kg respectively which were higher as compared to CP contents reported earlier (Schiable, 1976; Austic and Nesheim, 1990; Douglas et al., 1990).

Table 2. Chemical composition of wheat and two new varieties of yellow corn (*Barnali* and *Khaibhutta*)

Composition	Wheat	Varieties of yellow corn	
		Barnali	*Khaibutta*
Moisture (g kg^{-1})	86.3	124.6	117.9
Dry matter (g kg^{-1})	913.7	875.4	882.1
ME* (kcal kg^{-1})	3176	3650	3655
Crude protein (g kg^{-1})	102.1	116.6	102.1
Ether Extract (g kg^{-1})	22.0	45.3	44.7
Starch (g kg^{-1})	648.3	709.4	724.6

* Estimated in accordance with Leclercq et al. (1987).

Laying performance

The performance data of layers fed different dietary levels of *Barnali* or *Khaibhutta* as replacement for wheat is shown in table 3. The body weight gain, feed consumption, hen-day egg production, egg weight, food conversion ratio (FCR) and egg mass output data for all treatments were close to each other during 16-week trial period and found to be statistically non-significant. The non-significant result of body weight gain agreed well with the result of Lillie and Danton (1968) and Kim et al. (1976) who worked with layers and compared between wheat and corn based rations. Virk (1979) fed maize and wheat based rations to WLH pullets and Golian (1990) fed

Table 3. Replacement value of two new varieties of yellow corn for wheat in layer diets

Variables	Different dietary treatments						
	500 g wheat kg^{-1}	250 g wheat+ 250 g *Barnali* kg^{-1}	125 g wheat+ 375 g *Barnali* kg^{-1}	500 g *Barnali* kg^{-1}	250 g wheat +250 g *Khaibhutta* kg^{-1}	125 g wheat +375 g *Khaibhutta* kg^{-1}	500 g *Khaibhutta* kg^{-1}
Body weight gain (g $bird^{-1}$)	235.0±137.37	306.7±178.06	240.0±164.44	268.0±73.62	306.7±88.92	273.3±129.10	256.7±70.05
Feed consumption (g egg^{-1})	128.1±5.88	125.6±4.03	124.3±4.25	119.9±5.37	124.0±7.43	124.4±3.85	121.7±4.17
Hen-day egg production (%)	75.0±5.65	73.8±8.26	76.0±7.79	75.4±7.57	72.9±4.06	68.3±3.03	75.7±5.03
Egg weight (g egg^{-1})	60.1±3.89	59.0±2.89	59.0±5.60	59.0±3.02	60.0±2.97	62.0±2.55	58.0±0.94
Feed conversion ratio (FCR)	2.9±0.14	2.9±0.29	2.8±0.21	2.8±0.40	2.9±0.21	2.9±0.17	2.8±0.14
Egg mass output (g egg hen-day^{-1})	45.0±2.30	43.2±4.03	44.6±4.71	44.3±6.55	43.5±1.05	42.4±1.65	43.5±2.45

Values indicate mean±SD. All variables showed non-significant differences ($p>0.05$).

Table 4. External egg quality characteristics in response to replacement of wheat by new varieties of yellow corn

Variables	Weeks of feeding	Different dietary treatments						
		500 g wheat kg^{-1}	250 g wheat+ 250 g *Barnali* kg^{-1}	125 g wheat+ 375 g *Barnali* kg^{-1}	500 g *Barnali* kg^{-1}	250 g wheat +250 g *Khaibhutta* kg^{-1}	125 g wheat +375 g *Khaibhutta* kg^{-1}	500 g *Khaibhutta* kg^{-1}
Egg weight	8th	61.00±6.18	59.47±3.61	58.07±4.95	57.16±3.07	59.22±3.67	62.50±2.20	58.10±2.02
(g)	16th	62.735.45	61.43±4.71	62.73±6.44	61.10±6.40	62.32±3.89	65.63±3.90	60.80±3.51
Shape index	8th	73.55±4.92	73.37±3.18	74.35±2.96	74.69±3.64	73.82±2.98	73.94±2.17	74.07±2.83
	16th	71.98±4.14	70.28±5.79	73.66±3.41	73.61±2.21	72.82±1.76	73.18±2.49	73.05±4.60
Shell dry wt	8th	5.41±0.63	5.40±0.47	5.27±0.30	5.02±0.22	5.32±0.78	5.33±0.38	5.01±0.37
(g)	16th	5.26±0.58	4.99±0.73	5.44±0.56	5.12±0.51	5.33±0.42	5.47±0.46	5.13±0.40
Percent shell	8th	8.86±0.32	9.09±0.76	9.12±0.89	8.80±0.22	8.98±1.22	8.84±0.44	8.63±0.71
(%)	16th	8.41±0.91	7.96±0.73	8.68±0.37	8.41±0.72	8.59±1.06	8.33±0.43	8.44±0.71
Shell thickness	8th	0.365±0.03	0.378±0.03	0.367±0.02	0.354±0.03	0.375±0.06	0.362±0.02	0.348±0.02
(mm)	16th	0.356±0.03	0.329±0.03	0.357±0.02	0.343±0.03	0.351±0.04	0.347±0.02	0.339±0.03

Values indicate mean±SD. All variables showed non-significant differences ($p>0.05$).

corn-soy or wheat-soy diet to pullets and hens and found non-significant results for feed consumption which agreed well with the results of the present study. The non-significant result ($p>0.05$) on hen-day egg production agreed well with the results previously reported for layers fed corn and wheat based rations (Tomova and Merdzhev, 1977; Castro and Costa, 1993). The average egg weight data in different dietary groups were close to each other except for 500 g/kg *Khaibhutta* which was slightly lower but the result did not differ significantly ($p>0.05$). This non-significant result was in consistence with the previous studies of feeding corn, jower and corn+jower diets and different levels of maize and triticale. The non-significant results of feed conversion ratios were probably a reflection of non-significant results obtained for egg weight and feed consumption. However, this result agreed well with the results of previous study (Virk, 1979; Mehtal et al., 1985). Non-significant results of performance characteristics of layers indicate that the use of *Barnali* or *Khaibutta* as replacement for wheat in the diet up to 500 g/kg dietary level is feasible. Only one bird died during the 5th week of the experiment. Post-mortem report indicated that the reasons for death was not attributable to treatment effect. The remaining birds were healthy during the experimental period. The result clearly indicated that use of two new varieties of corn had no detrimental effect on the health of laying birds.

Egg quality characteristics

External quality of eggs: The results of external quality of eggs are shown in table 4. It appears from the table that egg weight, shape index, shell dry weight, per cent shell, shell thickness of eggs laid by birds during 8th and 16th weeks of the experiment did not vary significantly. Krishnappa et al. (1986) found

Table 5. Internal egg quality characteristics of layers in response to replacement of wheat by new varieties of yellow corn

Variables	Weeks of feeding	Different dietary treatments							
		500 g wheat kg^{-1}	250 g wheat +250 g Barnali kg^{-1}	125 g wheat +375 g Barnali kg^{-1}	500 g Barnali kg^{-1}	250 g wheat +250 g Khaibhutta kg^{-1}	125 g wheat +375 g Khaibhutta kg^{-1}	500 g Khaibhutta kg^{-1}	Level of significance
Albumen	8th	0.073 ±0.01	0.076 ±0.01	0.075 ±0.02	0.094 ±0.04	0.082 ±0.02	0.077 ±0.01	0.082 ±0.01	NS
index	16th	0.081 ±0.01	0.074 ±0.02	0.081 ±0.02	0.084 ±0.02	0.079 ±0.03	0.080 ±0.01	0.075 ±0.02	
Yolk index	8th	0.411 ±0.02	0.417 ±0.03	0.408 ±0.02	0.406 ±0.04	0.414 ±0.02	0.406 ±0.01	0.407 ±0.02	NS
	16th	0.419 ±0.01	0.424 ±0.03	0.414 ±0.02	0.417 ±0.01	0.415 ±0.02	0.414 ±0.02	0.400 ±0.02	
Haugh unit	8th	78.48 ±2.79	72.68 ±26.14	77.77 ±13.52	85.22 ±14.69	82.78 ±8.99	81.25 ±5.37	83.33 ±4.73	NS
	16th	82.18 ±5.43	81.65 ±12.04	81.82 ±6.62	83.30 ±8.16	80.05 ±8.81	83.98 ±4.07	79.58 ±8.15	
Fresh albumen	8th	40.55 ±3.67	39.63 ±3.26	37.95 ±4.53	37.47 ±3.35	38.63 ±2.89	41.95 ±1.85	38.10 ±2.85	NS
weight (g)	16th	41.03 ±4.21	41.94 ±5.21	41.20 ±5.15	40.20 ±5.58	40.42 ±3.71	43.53 ±3.50	39.42 ±3.48	
Dry albumen	8th	4.58 ±0.89	4.75 ±0.50	4.43 ±0.96	4.46 ±0.50	4.63 ±0.52	5.02 ±0.58	4.78 ±0.50	NS
weight (g)	16th	4.87 ±0.56	4.63 ±0.51	4.78 ±0.87	4.54 ±0.62	4.78 ±0.63	5.03 ±0.82	4.68 ±0.79	
Albumen dry	8th	11.25 ±1.57	11.97 ±0.46	11.58 ±1.34	11.96 ±0.42	11.98 ±0.65	11.92 ±1.01	12.55 ±0.71	NS
matter (%)	16th	11.86 ±0.82	11.10 ±1.02	11.56 ±0.92	11.32 ±0.76	11.80 ±0.68	11.50 ±1.09	11.81 ±1.02	
Fresh yolk	8th	14.97 ±2.06	14.28 ±1.26	14.73 ±0.90	14.56 ±0.90	15.17 ±1.24	14.92 ±0.44	14.88 ±1.34	NS
weight (g)	16th	16.33 ±1.22	16.15 ±1.05	16.10 ±1.36	15.68 ±0.54	16.45 ±0.97	16.52 ±0.51	16.12 ±1.39	
Dry yolk	8th	7.58 ±0.92	7.40 ±0.76	7.43 ±0.48	7.40 ±0.42	7.73 ±0.63	7.53 ±0.15	7.70 ±0.79	NS
weight (g)	16th	8.33 ±0.85	8.40 ±0.52	8.18 ±0.82	8.14 ±0.34	8.40 ±0.41	8.50 ±0.36	8.34 ±0.79	
Yolk dry	8th	50.78 ±1.23	51.76 ±1.27	50.45 ±0.79	50.87 ±2.05	51.02 ±1.56	50.53 ±1.17	51.67 ±1.03	NS
matter (%)	16th	50.94 ±3.35	52.02 ±0.76	50.78 ±1.26	51.91 ±1.05	51.10 ±1.33	51.51 ±2.85	51.71 ±0.63	
York colour	8th	1.50^{d} ±0.45	4.50^{c} ±0.32	4.83^{bc} ±0.41	6.10^{a} ±0.55	4.33^{c} ±0.61	5.33^{ab} ±0.41	6.08^{a} ±0.49	**
score	16th	1.17^{d} ±0.26	4.00^{bc} ±0.45	4.50^{b} ±0.32	5.60^{a} ±0.65	3.67^{c} ±0.61	4.33^{bc} ±0.26	5.40^{a} ±0.42	**

The values for yolk colour dissimilar superscripts differ significantly. **($p<0.01$); NS=Non-significant.

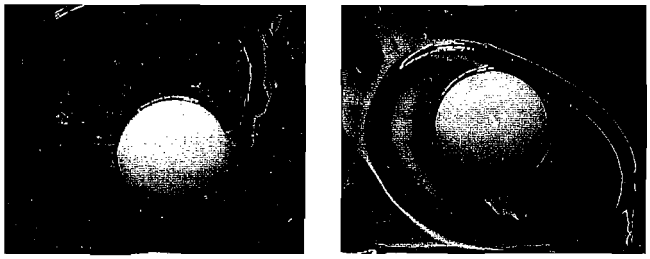
that shell weight was not significantly affected by feeding yellow corn and hominy feed in layer experiment. In agreement with the result of present study, Korane et al. (1992) also found no difference with respect to shell thickness and shape index of eggs from birds fed various dietary levels of corn. These results indicated that different levels of both the Bangladeshi varieties of corn (*Bornali* and *Khaibhutta*) showed results comparable to wheat diets.

Internal quality of eggs: Table 5 shows the results of internal quality characteristics of eggs fed different dietary treatments. Except egg-yolk colour, the other internal quality of eggs such as albumen index, yolk index, Haugh unit, fresh albumen weight, dry albumen weight, albumen dry matter, fresh yolk weight, dry yolk weight and yolk dry matter at 8th and 16th weeks of the experiment did not differ significantly. Krishnappa et al. (1986) found non-significant difference with respect to Haugh unit between diets containing yellow corn and hominy feed. Non- significant results were also reported by Korane et al. (1992) for albumen index, yolk index and Haugh unit by feeding maize at 275 and 550 g/kg dietary levels.

The egg-yolk colour improved significantly ($p<0.01$) by feeding two new varieties of corn (*Barnali* or *Khaibhutta*) as replacement for wheat. The pigmentation of yolk increased as the dietary level of corn increased at the expense of wheat. The total replacement of wheat by corn showed the highest yolk colour score in case of both *Barnali* or *Khaibhutta* diet groups (table 5).

The intensity of yolk colouraton in both the varieties of corn was more or less similar. The Yolk Colour Score (YCS) obtained for 250 g/kg corn fed diet groups (either *Barnali* or *Khaibhutta*) ranged from 3.67 to 4.50 and for 500 g/kg corn fed diet groups ranged from 5.40 to 6.10. The lowest score was obtained from the control group (1.17 to 1.50). The values of YCS for eggs collected after feeding for 16 weeks were lower in comparison with those fed for 8 weeks and this indicates that storage of feed ingredients for further period of 8 weeks caused deterioration in xanthophyll contents slightly. The highest YCS was obtained by feeding all corn diets and the lowest YCS was obtained by feeding all wheat diets (figures 2 and 3).

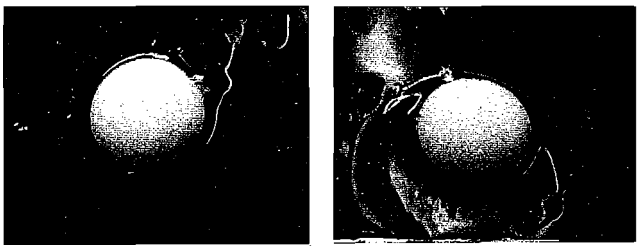
Roush and Arscott (1979), Britzman (1985), Krishnappa et al. (1986), Woodward et al. (1987), Korane et al. (1992) reported such an improvement in yolk colour resulting from feeding of corns.



T_1 [50% Wheat] Yolk Color Score 1

T_7 [50% *Khaibhutta*] Yolk Color Score 6

Figure 2. Improvement of yolk colour score 6 in 500 g kg^{-1} *Khaibhutta* diet as against 1 obtained for 500 g kg^{-1} wheat diet



T_1 [50% Wheat] Yolk Color Score 1

T_4 [50% *Barnali*] Yolk Color Score 6

Figure 3. Improvement of yolk colour score 6 in 500 g kg^{-1} *Barnali* diet as against 1 obtained for 500 g kg^{-1} wheat diet

CONCLUSION AND FUTURE WORK

The chemical composition of two new varieties of corn was more or less similar and all the varieties were found to be good sources of energy. Laying performance and both external and internal quality characteristics of eggs laid by chickens fed two varieties of corn as replacement of wheat were comparable between wheat and corn diets except that of egg yolk colour which significantly improved in corn-based diets. So, *Barnali* or *Khaibhutta* can be included in the diet of laying chicken up to 500 g/kg level. Future work should be aimed at deterimination of xanthophyll concentrations of these two varieties of yellow corns and their amino acid concentrations since both varieties of yellow corn showed slightly higher protein values from proximate analysis.

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