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THE EFFECT OF SUBSTITUTION BROKEN RICE (*ORYZA SATIVA*) FOR THE YELLOW CORN (*ZEA MAYS*) ON THE PERFORMANCE OF BROILER ROSS 308

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Abstract

This study was conducted to inspect the effects of substitution of Broken Rice in diet instead of yellow corn (Maize) on broiler productive performance. A total of 240 one day old chicks of commercial strain were used in this study, which were separately weighted and randomly spread into four treatments. Each treatment included 3 replicates (20 chicks/replicate).The treatments were as follows: Control (B1) (content 50% yellow corn + free of Broken Rice), Second (B2) substituted of 25% Broken Rice by yellow corn, Third (B3) substituted of 50% of Broken Rice by yellow corn, Fourth (B4) substituted of 75% of Broken Rice by yellow corn. The results showed that: the treatment (B1) included of 25% Broken Rice showed no significant differences as compared to control group (free of Broken Rice) in the percentage of live body weights, weights gain, feed consumption, feed conversion ratios, Also no significant differences were shown among other Experimental treatments compared to control group in relative weights gain, feed consumption, feed conversion ratios during the whole experimental period (8 – 35 days of age).This study indicated that the dietary Substitution levels of 25% of Broken Rice by yellow corn have beneficial effects on broiler productive performance.

Key words **:** Broken Rice, performance, Broiler, rice by product, Ross 308.

Introduction

In Iraq the providing feeding resources is still the main problem for the broiler industry. Locally produced cereal grains such as corn cannot suffice for production and high cost of these feeding stuff burdens the whole supply and demand process. Therefore, one strategy to reduce pressure on conventional energy ingredients is supplemented from unusually feeding byproduct. However, Iraq grows number of local rice varieties (*Oryza sativa*); a staple food of most of the Iraq is with is produced in good amounts. There are a large number of reports regarding the use of broken rice as an energy supplement in poultry feeding and several studies have been made on substitution of broken rice for corn in broiler diets. Broken rice can be a suitable source of poultry diets because of its prosperity in acceptable amounts and its suitably low prices. Economically speaking the feed costs will be reduced as well as increasing the income boundary for the poultry projects. Although the nutritive value of broken rice, contains less energy, than corn, and depends on the method of processing. It has been projected that broken rice procedures about 6 percent of total paddy milled (Abu Baker *et al*., 1973). The main factor which has limited the use of broken rice as a main energy source in poultry feeding is the high oil content, which may cause oxidative rancidity in hot climate. It has crude protein of about 8.7% and metabolism energy about 2990 kcal/kg (N.R.C. 1994) that means a nutritional contents are the same for both (Krutthai *et al*., 2015).The risk of Mycotoxin contamination in broken rice is lower than corn. Broken rice has successfully been used to replace at least between 5 - 15 % of desirable level of corn in Lohmann brown layer diets (Al-Qassar *et al*., 2009) or up to 50% in growing Japanese quail diets (Ashour *et al*., 2015). The lack of xanthophyll can cause the shark skin of broiler which appears paler and less attractive to the local consumer but there were no adverse effects in performance when used it in diets between 15 - 60 % (Abu Baker, *et al*., 1973).The AMEn values of maize and broken rice, were 14.65, 14.63, MJ/kg DM, respectively and the TMEn values were between 0.76 and 1.47% higher than the AMEn values (Hoai *et al*., 2011).

However replacement of local ingredients such as broken rice to substitute a part of maize was important to low the cost for feed prices with no significant effect on Growth and Carcass Quality of Local H'mong broiler (Hung *et al*., 2014).The object of this revision was to discover the present use of broken rice instead of corn on broilers productive performance.

Material and Methods

This study was directed at the farm of poultry in Animal production Department, Agricultural Faculty/ Kufa University in the period from 17/4/2018 to 21/5/2018, for a period of 5 weeks. 240 unsexed one-day old Ross 308 broiler chicks, spread randomly into four experimental Treatments, with 3 replicates of 20 chicks each. The first Treatment was fed a control diet

(50% yellow corn + 0% broken Rice), however the other treatments, substituted of 25, 50, 75% of broken rice by yellow corn respectively. Chicks were housed in flower pens and provided 23 hours daily of synthetic lighting for 5 weeks experimental period. Treatment Starter diets were formulated to contain about 23 % CP and 3000 Kcal ME / kg and was used from age of 8 to 21 days, whereas finisher diets were framed to contain about 20% CP and 3200Kcal ME/kg and was used from 22 to the age of 35 days (Table 1). Methionine, lysine, vitamins and minerals mixture were added to cover the dietary requirements of chicks in accord once with the Ross 308 broiler management guide (2014). Diets and water were presented *ad libitum* over the experimental period; chicks in all treatments were kept under the same management system, Diets formulated according to (N.R.C., 1994). Mortality was recorded daily, while live body weights and feed consumption was documented at the age of 14, 21, 28 and 35 days. Body gain and feed conversion ratio were calculated. Data obtained from the education were verified for significance by one-way ANOVA using the GLM procedures of SAS (1990). Differences among treatments means were divided by Duncan's new multiple range test (Duncan, 1955).

Table 1 : Composition of experimental diets fed to broiler

Feed staff	Starter Diets (8-21) days of age				Finisher Diets (22-35) days of age			
	B0	**B1**	**B2**	**B3**	**B0**	**B1**	**B2**	**B3**
Maize Corn	40	30	20	10	40	30	20	10
Broken rice	0	10	20	30	0	10	20	30
Rice bran	0	0	0	0	3.5	5.5	8.5	11
Wheat	23	22	21.5	20.75	24	21.5	17.75	15
Soybean meal (48%)	31	31.5	31.5	31.75	24	24	24.5	25
Premix M-25 [1]	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Limestone	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Salt	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Vegetable oil	2.5	3	3.5	4	5	5.5	5.75	6
Total (%)	100	100	100	100	100	100	100	100
Calculated Nutrient Levels								
ME, kcal/kg	3009	3005	3001	2997	3193	3198	3189	3180
Crude protein cp (%)	23	23	23	23	20	20	20	20
Methionine (%)	0.55	0.55	0.56	0.56	0.51	0.52	0.52	0.53
Lysine (%)	1.35	1.38	1.39	1.41	1.17	1.2	1.21	1.23
Cysteine (%)	0.38	0.38	0.38	0.38	0.34	0.34	0.34	0.34
Calcium (%)	0.62	0.63	0.63	0.64	0.61	0.61	0.62	0.63
Nonphytate P. (%)	0.37	0.36	0.36	0.35	0.36	0.36	0.35	0.35
Total P. (%)	0.41	0.46	0.51	0.56	0.43	0.50	0.58	0.66
Ether extract (%)	2.5	2.25	1.92	1.59	3	2.87	2.81	2.76

1 Composition per kg of product: folic acid – 2200 mg; calcium pantothenate – 17000 mg; vit. E - 80000 mg; biotin - 220 mg; copper – 16000 mg; choline – 500000 mg; iron – 40000 mg; iodine - 1250 mg; manganese – 120000 mg; methionine – 2190000mg; niacin – 60000 mg; riboflavin – 8600 mg; selenium - 300 mg; vit. A – 12000,000 IU; vit. B12 – 17 mg; vit. D3 – 5000,000 IU; vit. K - 3200 mg; zinc – 110000 mg.

Result and Discussion

Results during the experimental period are summarized in Table 2&3, show that growth performance of broiler chick fed the different levels of broken rice replaced with corn diets from 2-5 weeks of age. The results indicated that in Live Body Weight (LBW) there is no significant difference between dietary treatments at 14, and 28 days of age, but Live Body Weight (LBW) significantly ($P<0.05$) affected during the late experimental periods which recorded the highest value in broiler chick fed broken rice at level 10% replaced of yellow corn diet during the experiment periods 29-35 days of age compared to the control diet. However, no significant differences were recorded between chicks given 10% broken Rice and the other experimental groups at the same age. While, LBW decreased significantly ($P<0.05$) for chicks fed diets supplemented with 20, 30 % of broken Rice at 35 days of age compare to the control group. That means 10 % of broken Rice is the dietary concentration that might be used to stimulate growing in broiler chick, without affecting growth or marketing body weight. Although

our results indicated no significant difference between dietary treatments at 14, 28 and 35 days of age or in Average period (8 - 35) days of age in body weight gain (BWG) except B2 treatment was the lower at (15 – 21) days of age. Our outcomes are in arrangement with those obtained by Krutthai *et al*. (2015), who pointed out that using broken rice as a potential energy source in soybean diet with a good source of methionine have yielded good results by improving production performance of weaned pigs such as growth rate and FCR. On the similar situation, Filgueira *et al*. (2014) reported that in Meat-Type Japanese quail chicks, broken rice can replace corn up to a level of 50% in the diet without any adversative result on their performance with considerable decrease in the feed cost. While, Abu Bakar *et al*. (1973) concluded that broken rice could replace up to 60% of dietary corn without affecting broilers performance. Nanto *et al*. (2012) found upper last weight in broilers when corn (Maize) was completely substituted by dehulled paddy rice in broilers fed a diet. Similarly, Hung et al. (2014) found healthier performance in Local H'mong broiler at 5-14 Age fed a different ingredient ratios diet containing broken rice as main source of energy up to 32 % with those fed with corn and recognized this effect to the higher starch contents in rice. Ijiri *et al*. (2013) quantified that the greatest performance of broiler fed diets containing Rice-Washing Water can be explained by its higher polyphenol fillings of this feedstuff. On the contrary, Edwin et al. (2002) indicated that no significant variances of body weight were observed in broiler chicks at eight weeks of age, with replacement of maize about 75% with broken rice verified 9.8% advanced body weight than the control. Table (4) showed significant differences ($P<0.05$) in feed consumption were detected at 14, 21 and 35 days of age between experimental treatments at terminated experimental period age (8-35 days), treatment B2 recorded less feed intake at 14 days of age while treatment B1 recorded higher feed intake at 35 days of age, however no significant differences ($P<0.05$) were found between the group of birds consuming broken rice compare to control at 28 days of age. This result agree with Brum *et al*. (2007), who did not note any significant differences in broiler cob 500 fed broken rice substituted until 40% from corn on feed consumption, body gain or feed conversion ratio. In our study, Table (5) showed no significant differences in feed conversion ratio (FCR) were noticed at 14, 21, 28, 35 days of age between experimental treatments although no significant differences were recorded between experimental chickens and the control treatment at total experimental period age (8-35 days), this means diet concentration with broken rice can be used to support growth of broiler. These results are in agreement with those attained by; Ashour *et al*. (2015), informed that helpful importance of using amount of broken rice replaced (0, 10, 20, 30, 40 and 50 %) with maize on birds performance, feed utilization the improvement in effects FCR and increase in BWG had resulted from group fed 20 and 30% of broken rice substituted by corn in diet perhaps due to, rice by products for their phenolic compounds base, which having high amounts of vitamins, minerals and fiber, whom can act to lower cholesterol and enact anti-atherogenic activity, another advantage is the risk of Mycotoxin contamination in broken rice is lower than corn which attitude risk to the survivability of poultry and other livestock's. Broken rice has successfully been used to replace at least between 5 - 15 % of desirable level of corn in Lohmann brown layer diets without any adverse effect on performance (Al-Qassar *et al*., 2009). On the other hand, Nanto *et al*. (2016) reported that feeding broiler chicks with 43% whole-grain paddy rice with 6% soybean oil caused a normal performance. The results of the current study are in line with the findings of Vicente et al. (2008), who identified that feedstuffs that excite rather great glucose and insulin postprandial reactions, from broken rice, might raise feed consumption and higher weight gain by animals fed diets containing broken rice that was observed in our present study. Generally note the greatest performance was found by feeding broiler diets supplemented with 10 % broken rice instead of 25 % of corn maize. This ratio showed the superlative growth and feed exploitation.

Table 2: The Effect of substitution Broken Rice for yellow corn in broiler diets on Body weight (g).

Treatments	**Body weight(g) in days of age**			
	8 – 14	**15 – 21**	22 **– 28**	**29 – 35**
Control B0 (0%)	392±6.64	751±4.40a	1179±18.73	1638±67.84a
B1 (10%)	359±2.02	731±4.40a	1172±24.53	1580±14.43ab
B2 (20%)	396±25.22	692±15.88b	1107±30.31	1485±5.77 b
B3 (30%)	385±8.66	748±10.13a	1133±24.55	1473±33.20b
Level of sig.	NS	*	NS	*

Table 3 : The Effect of substitution Broken Rice for yellow corn in broiler diets on Body gain (g).

Treatments	Body Gain(g) in days of age				Average
	8 - 14	15 - 21	22 – 28	29 – 35	8-35
Control B0 (0%)	351±6.64	361±2.18a	427±14ab	459±86.19	339±27.55
B1 (10%)	321±1.45	369±4.93a	441±20a	407±10.10	384±9.15
B2 (20%)	355±25.22	295±10.17b	415±14ab	377±36.08	360±21.55
B3 (30%)	344±8.66	363±1.66a	376±17b	340±8.66	355±9.61
Level of sig.	NS	*	*	NS	NS

Table 4 : The Effect of substitution Broken Rice for yellow corn in broiler diets on Feed consumption (g)/bird/week.

Treatments	Feed consumption (g) in days of age				Average
	8 - 14	15 - 21	22 – 28	29 – 35	8-35
Control B0 (0%)	505±8.66a	760±36.66ab	647±38.68	807±59.40b	680±35.85ab
B1 (10%)	493±8.66ab	871±1.45a	750±27.13	1001±26.85a	779±16.03a
B2 (20%)	463±14.14b	790±60.91ab	660±64.08	910±64.08ab	751±50.77ab
B3 (30%)	493±5.77ab	651±84.27b	635±30.92	890±28.86ab	667±37.44 b
Level of sig.	*	*	NS	*	*

Table 5 : The Effect of substitution Broken Rice for yellow corn in broiler diets on Feed converge ratio.

Treatments	Feed converge ratio in days of age				Average
	8 - 14	15 - 21	22 – 28	29 – 35	8-35
Control B0 (0%)	1.43±0.05ab	2.11±0.11ab	1.51±0.04	2.14±0.52	1.79±0.19
B1 (10%)	1.53±0.03a	2.36±0.02a	1.71±0.03	2.33±0.06	1.98±0.03
B2 (20%)	1.31±0.05b	2.36±0.11a	1.58±0.09	2.27±0.59	1.88±0.22
B3 (30%)	1.43±0.01ab	2.00±0.01b	1.69±0.14	2.60±0.13	1.93±0.08
Level of sig.	*	*	NS	NS	NS

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References

Abu, B.S.; Yeong, S.W. and Seet, C.P. (1973). Direct substitution of maize with broken rice in the broiler Diet. Mardi Res. Bull., 2: 37-40.

Al–Qassar, A.; Abdul-Abass, M.H. and Alsaag, A. (2009). The effect of partial and complete substitution of rice broken instead of corn in returns and productive performance of Lohmann layer hens. Al-Qadisiyah Journal of veterinary medicine Sci., 8: 31-38.

Ashour, E.A.; Reda, F.M. and Alagawany, M. (2015). Effect of Graded Replacement of Corn by Broken Rice in Growing Japanese Quail Diets on Growth Performance, Carcass Traits and Economics. Asian Journal of Animal Sciences. 9: 404-411.

Brum, B.S.; Zanella, I.; Toledo, G.S.P.; Xavier, E.G. and Vieira, T.A. (2007). Performance of broiler feed with broken rice in diets. Cienc. Rural, 37: 1423-1429.

Duncan, D.B. (1955). Multiple range and multiple F-test. Biometrics.11: 1-42.

Edwin, S.C.; Viswanathan, K.; Kumararaj, R. and Rangareddy, P. (2002). Effect of replacing maize with broken rice on growth performance of broilers. Indian J. Poult. Sci., 37: 187-189.

Filgueira, T.M.B.; Freitas, E.R.; QuevedoFilho, I.B.; Fernandes, D.R.; Watanabe, P.H. and Oliveira, A.N. (2014). de. Corn Replacement by Broken Rice in Meat-Type Quail Diets. Brazilian Journal of Poultry Science. 16: 345-350.

Hoai, H.T.; Kinh, L.V.; Viet, T.Q.; Sy, P.V.; Hop, N.V.; Oanh, D.K. and Yen, N.T. (2011). Determination of the metabolizable energy content of common feedstuffs in meat-type growing ducks. Anim. Feed Sci. Technol. Animal Feed Science and Technology; Article in press.

Hung L.T.; Van Son, V. and Hong-Nhan, N.T. (2014). Effects of Different Ingredient Ratios in Diets on Growth and Carcass Quality of Local H'mong

Broiler at 5-14 Age Week. International Journal of Emerging Technology and Advanced Engineering. 4: 10-14.

Ifeanyichukwu, U.S. (2012). Response of broiler birds to diets containing graded levels of rice milling waste and supplementary Yeast (*Saccharomyces cerevisae*). Post Graduate Diploma of the University of Nigeria, Nsukka.

Ijiri1, D.; Shogo, N.; Kenji, T.; Satoru, I. and Akira, O. (2013). Effects of Feeding Dried Concentrated Rice-Washing Water on Growth Performance and Skeletal Muscle Lipid Peroxidation in Broiler Chickens. J. Poult. Sci., 50: 370-374.

Krutthai, N.; Vajrabukka, C.; Markvichitr, K.; Choothesa, A.; Thiengtham, J.; Sawanon, S.; Kaewtapee, C. and Bunchasak, C. (2015). Effect of source of methionine in broken rice-soybean diet on production performance, blood chemistry, and fermentation characteristics in weaned pigs. Czech J. Anim. Sci.; 3: 123–131.

N.R.C., National Research Council (1994). Nutrient requirement of poultry.9th ed. National Academy Press, Washington D.C.,U.S.A.

Nanto, F.; Chiaki, I.; Motoi, K.; and Masaaki, T. (2016). Effect of Feeding Diets Combining Whole-Grain Paddy Rice and High Levels of Fat on Broiler Chicken Growth. J. Poult. Sci.; 53: 34-39

Nanto F.; Motoi, K.; Chiaki, I.; Shota, S. and Masaaki, T. (2012). Effects of Dehulled, Crushed and Untreated Whole-Grain Paddy Rice on Growth Performance in Boiler Chickens. J. Poult. Sci., 49: 291-299.

SAS (2004). SAS/STAT Users Guide for personal/ Computer, Release 6-12.SAS Institute Inc.Cary, NC.U.S.A.

Vicente, B.; Valencia, D.G.; Pe´rez-Serrano, M.; La´zaro, R. and Mateos, G.G. (2008). The effects of feeding rice in substitution of corn and the degree of starch gelatinization of rice on the digestibility of dietary components and productive performance of young pigs. J. Anim. Sci., 86: 119–126.