

**THE EFFECT OF DIFFERENT CRUDE FIBER
LEVELS ON THE GROWTH AND PERFORMANCE
OF GROWING BALADI WHITE CHICKENS**

By

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Chicks used in this experiment totaled 156 two weeks old bird and were divided into 4 groups of equal number and average body weight. These 4 groups were offered iso-caloric, iso-nitrogenous rations but contained different crude fiber levels as follows : ration 1 : 4.24% , ration 2 : 7.12% , ration 3 : 11.98% and ration 4 : 16.84% . This study was undertaken to investigate the effect of different crude fiber levels on the growth and performance of Baladi White chicks up to 20 weeks of age.

Results indicate that male B.W. chicks can tolerate crude fibers up to 12% while feeding them on 17% crude fiber caused growth depression, less feed consumption and higher mortality rate. The 12% crude fiber ration also produced the best growth measure. However, a rather high mortality rate was associated with feeding the ration containing 12% crude fiber. Therefore, crude fiber level suitable for feeding male B.W. chicks would be in the range from 7 to 12% .

The suitable level of crude fiber in female B.W. chicks was found to be 4% . Higher levels caused increased mortality rate. However, the level of crude fiber could be increased to 7% until the age of 8 weeks without ill-effect on either mortality or body weight. The feed consumption started to decrease by feeding rations containing higher than 7% crude fiber.

The suitable levels of crude fiber in poultry rations has received attention by many investigators. It is a widely known fact that fibrous material is generally not well assimilated by the growing chick. Furthermore, the effect of fiber on the growth of chicks may be quite derogatory depending on the quantity of the fibrous material used in the diet.

Davis and Briggs (1947), using purified diets, reported that the addition of 5-15% cellulose caused improvement of growth of chicks. In 1948, the same workers found that as high as 20% sawdust could be tolerated in purified chick rations without ill-effects. Morris *et al* (1932), concluded that the amount of fiber in the diet could be increased to 9% without harmful effects on chick mortality, rate of growth feed consumption. However, Insko and Culton (1949), found that maximum growth was obtained in chicks

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fed on a ration containing 5% or less fiber. According to Tortuers (1963), increasing the crude fiber level of the ration up to 8.5% caused an improvement of 4-18.5% in body gain and 6-12% in feed conversion over conventional rations.

This paper reports on the effect of using 4 rations, which are nearly iso-caloric and iso-nitrogenous but containing different crude fiber levels, on the growth and performance of Baladi White (B.W.) chicks up to 20 weeks of age.

Material and Methods

Chicks used in this experiment totaled 156 and were divided into 4 groups equal in number and nearly equal in average body weight. Chicks were wingbanded at 1 day old and vaccinated against Newcastle using the eye-drop vaccine. Chicks were maintained in electrically heated batteries with wire floors up to 8 weeks of age. From the 9th week onward birds were raised in open-air pens. Beginning the first week, chicks were offered the experimental rations but data were not recorded until chicks were 2 weeks old and this period was considered as a pre-experimental one. Feed and water were offered *ad libitum*. Chicks were individually weighed biweekly at 7.0 A.M. Analysis of variance and least significant difference (LSD) were performed according to Snedecor (1959).

Results and Discussion

Table 1 shows the composition of the experimental rations. Levels of crude fiber (CF) were 4.24, 7.12, 11.96 and 16.84% for ration 1, 2, 3 and 4 respectively. These (CF) levels will be referred to in the text as 4, 7, 12 and 17%. Sawdust was used to raise the crude fiber level, while cotton seed oil was used to maintain rations iso-caloric. The starch equivalent (SE) of the rations was $63.97 \pm 0.63^*$ while the crude protein level was 14.84 ± 0.21 . * Raising the level of crude protein was obtained by increasing the percentage of decorticated cotton seed meal up to 19%.

Average body weight of B.W. chicks

A.—Males :

Figure 1 shows that chicks fed ration 4 (17% C.F.) were inferior in their live body weight as compared to the other three groups up to 20 weeks of age ($P < .01$). It may also be concluded that the male B.W. chicks can tolerate levels of crude fiber as high as 12% in their rations without ill effect on body weight up to 14 weeks old. However, starting at the 16th week, group 1 (4% C.F.) showed higher average body weight ($P < 0.05$) than group 2 (7% C.F.).

* Standard Deviation.

TABLE 1.—COMPOSITION OF THE EXPERIMENTAL RATIONS FOR GROWING B.W. CHICKS

Item	Rations			
	1	2	3	4
Corn, ground	47.8	49.8	44.8	34.8
Wheat bran	30.0	27.0	20.0	13.0
Decorticated cotton seed meal	15.0	12.0	15.0	19.0
Dried skim milk	5.0	5.0	5.0	5.0
Cotton seed oil	—	—	2.5	6.0
Sawdust	—	4.0	10.5	20.0
Ca CO ₃	1.5	1.5	1.5	1.5
Na Cl	0.5	0.5	0.5	0.5
Vitamin mix ¹	0.2	0.2	0.2	0.2
TOTAL	100.0	100.0	100.0	100.0
<i>Chemical analysis</i>				
Moisture %	10.18	10.41	10.16	9.11
Crude protein %	14.58	14.81	15.08	14.91
Crude fat %	2.71	2.57	4.56	6.91
Crude fiber %	4.24	7.12	11.96	16.84
Nitrogen free extractives% . .	62.89	59.18	52.34	46.17
Ash %	5.40	5.91	5.90	6.03
S.F.²	64.90	63.64	63.90	63.45

1. Vitamin mixture supplied the ration with 5000 I.U. Vit. A and 1000 I.U. vit. D-per 1.0 kg.

2. Starch equivalent was calculated using figures reported by Abou-Raya (1967).

The average body weight of group 1 was not significantly different from that of group 3 (12% C.F.). The final body weight of the four groups at the age of 20 weeks was 1108.3 ± 40.0 , 981.0 ± 30.6 , 1019.1 ± 54.1 and 655.0 ± 46.4 gm for groups 1, 2, 3 and 4 respectively (Table 2). These results agree with those reported by Davis and Briggs (1947).

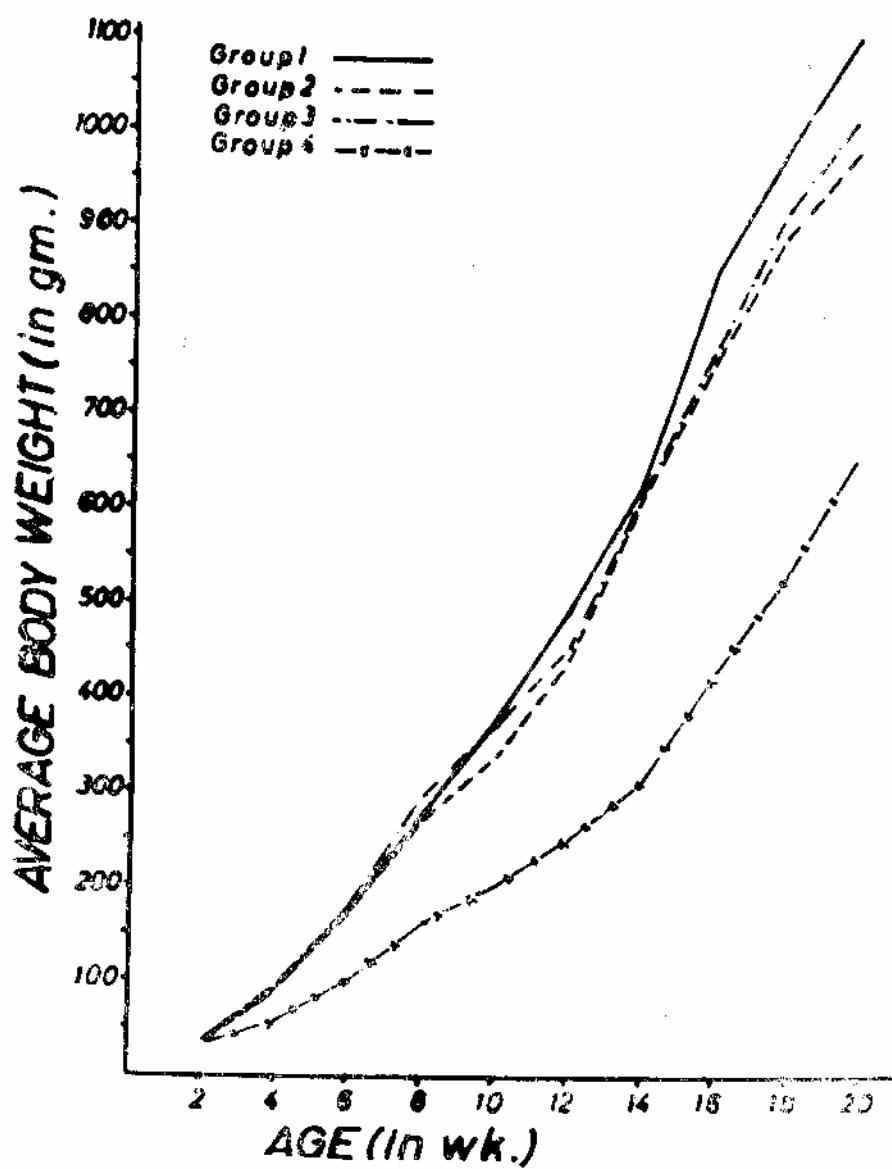


FIG. 1.—Average body weight of male B. W. chicks fed 4 different levels of C.F.

TABLE 2.—BODY WEIGHT, FEED CONSUMPTION AND MORTALITY OF B.W. CHICKS FED 4 DIFFERENT LEVELS OF CRUDE FIBRE

	Ration 1		Ration 2		Ration 3		Ration 4	
	Male	Female	Male	Female	Male	Female	Male	Female
Initial No. of chicks	19	20	21	17	15	24	16	20
Initial Av. Body Weight g.	36.7 (0.80)*	37.6 (1.32)	37.7 (1.30)	38.0 (1.19)	39.1 (1.50)	33.5 (0.77)	36.5 (0.60)	38.4 (1.12)
Final Av. Body Weight g.	1108.3 (40.0)	1010.4 (34.07)	981.0 (30.6)	889.3 (40.68)	1019.1 (54.1)	836.1 (23.1)	655.0 (46.4)	746.0 (29.08)
Gain in Weight g.	1071.6	972.8	943.3	851.3	980.0	802.6	618.5	707.6
Feed consumed/chick g.	6967.0	4967.0	7117.8	7117.8	5999.6	5999.6	4414.8	4414.8
S.E. Consumed/chick g.	4521.6	4521.6	4529.8	4529.8	3833.8	3833.8	2801.2	2801.2
Growth measure kg.	4.22	4.65	4.80	5.32	3.91	4.78	4.53	4.61
Mortality rate %	15.87	10.00	19.04	17.60	33.33	25.00	75.00	75.00

* Figure between parantheses represents standard error of the mean.

Examining the final body weight of male B.W. chicks it can be noticed that male chicks fed diets containing 4 or 12% C.F. (gp 1 and 3) did not differ statistically in their body weight (Table 3). However, group 4 which was fed on a diet containing 17% C.F. had significantly lower body weight than the other groups ($P < 0.01$) as presented in Table 3.

TABLE 3.—L.S.D. ANALYSIS OF BODY WEIGHT OF MALE AND FEMALE B.W. CHICKS

Groups compared	Age (weeks)				
	4	8	12	16	20
<i>Males</i>					
1 vs. 2	—1	5	49	100*	127*
1 „ 3. . . .	—3	—18	35	91	89
1 „ 4. . . .	28**	115**	239**	437**	453**
2 „ 3. . . .	—2	—23	—14	—9	—38
2 „ 4. . . .	29**	110**	190**	337**	326**
3 „ 4. . . .	31**	133**	204**	346**	364**
<i>Females</i>					
1 vs. 2. . . .	—5	5	62*	—	121*
1 „ 3. . . .	20**	53**	132**	—	174**
1 „ 4. . . .	24**	91**	204**	—	264**
2 „ 3. . . .	25**	48**	70*	—	53
2 „ 4. . . .	28**	86**	142**	—	143*
3 „ 4. . . .	3	37	72	—	90

* P — .05

** P — .01

B.—Females

From Figure 2 it may be seen that the average body weight of group 1 (4% C.F.) and group 2 (7% C.F.) were similar up to the age of 8 weeks. However, group 3 (12% C.F.) had higher body weight than group 4 (17% C.F.) beginning at the 6th week of age. From the 10th week, it can be noticed that group 1 was leading in its body weight followed by group 2, then group 3 and at last group 4. This trend was evident until the end of the experiment. Insko and Culton reported similar results (1949). The L.S.D. analysis at age of 20 weeks revealed that group 1 had significantly higher body weight than group 2 ($P < 0.05$), group 3 ($P < 0.01$) as shown in Table 2 and 3.

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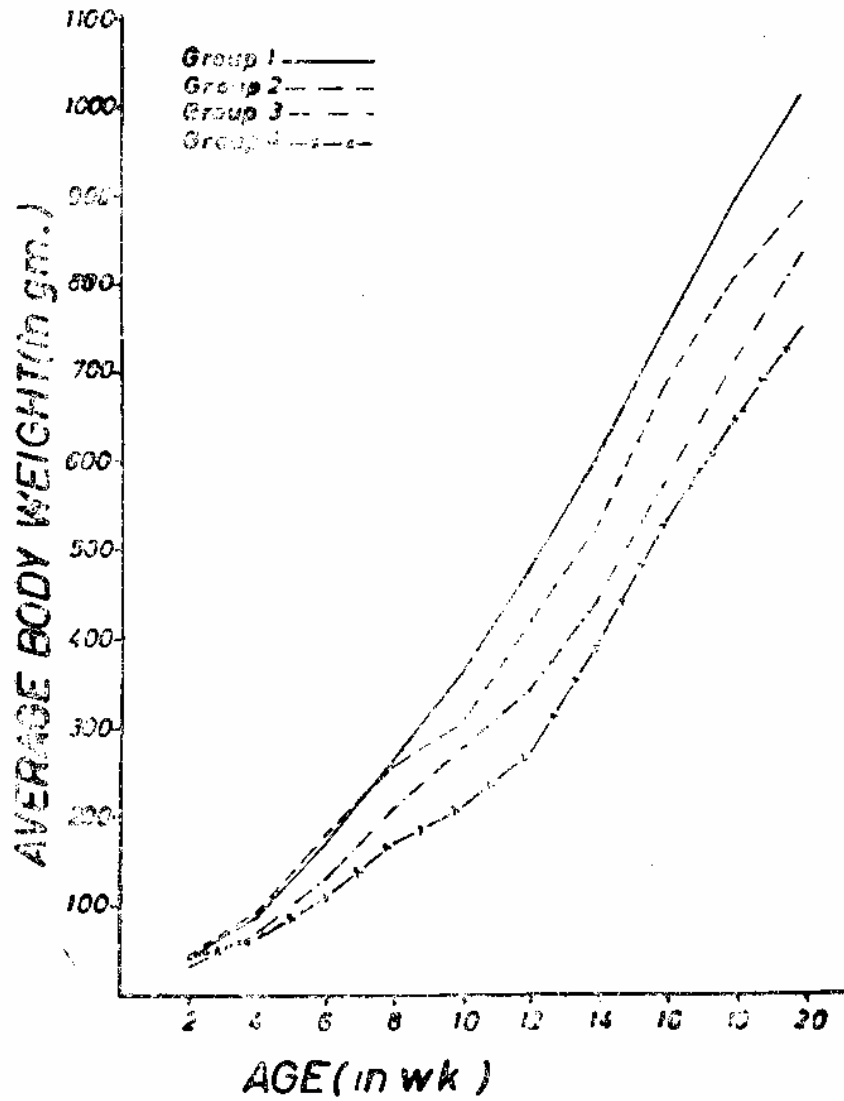


FIG. 2.—Average body weight of female B W chicks fed 4 different levels of C F.

Female B.W. chicks fed on a low level of crude fiber (gp. 1 : 4% C.F.) showed significantly higher body weight ($P < 0.01$) than the other three groups fed on higher levels of crude fiber (Table 3). Female chicks fed on ration containing 7-17% C.F. did not differ in their body weight except group 2 (7% C.F.) which differed ($P < 0.05$) from group 4 (17% C.F.).

Thus it may be generally concluded that the critical crude fiber level (beyond which a noticeable depression in body weight is observed) for the males is some where between 12 and 17% and for the females between 4 and 7%.

Feed and S.E. Consumption

Chicks (males and females) were raised in the same brooders and fed from the same feed containers. Thus the amount of ration or S.E. consumed represents average amount eaten by males and females mixed together. Table 2 shows that the amounts of feed or S.E. consumed by gp. 1 and 2 are comparable. However, increasing the crude fiber level than 7% (gp. 3 and 4) resulted in lower feed and S.E. consumption. Thus the critical effect of fiber level on feed consumption is in the range between 7 and 12%. In this connection Morris *et al.* (1932), found that increasing the C.F. level up to 9% did not affect the feed consumption.

Growth Measure (G.M.)

A.—Males :

The average G.M. (kg starch equivalent consumed/kg gain in live weight) of male B.W. chicks during the entire period (2-20 weeks) was 4.219, 4.802, 3.912 and 4.529 kg for groups 1, 2, 3 and 4 respectively. Thus it can be noticed that the lowest average G.M. was produced by the third group. Taking the average G.M. of the third group as 100, the average G.M. for chicks fed on rations 1, 2 and 4 would be 107.9, 122.8 and 115.8 respectively. Therefore, it would be concluded that the third ration (12% C.F.) was the best (from G.M. point of view) followed by the first, the fourth and at last the second ration (Table 2).

B.—Females :

The G.M. for female B.W. chicks during the whole period (2-20 weeks) was 4.648, 5.321, 4.776 and 4.610 kg for groups 1, 2, 3 and 4 respectively. This shows that the G.M. for chicks fed on the 7% C.F. (gp. 2) was the highest while groups 1, 3 and 4 were nearly equal in their G.M.

Mortality Rate

A.—Males :

From Table 2 it may be concluded that the mortality rate of male B.W. chicks correlates positively with the percentage of C.F. in the ration. Namely,

the first ration which contained the lowest percentage of fibre produced the lowest percentage of mortality while the fourth ration (which contained the highest percentage of crude fiber) recorded the highest mortality rate. Ration 3 (12% C.F.) although produced good growth and G.M. however it increased mortality rate to 33.33% (Table 2).

B.—Females :

The mortality rate of the female B.W. shows almost the same trend as found in the males (Table 2). This indicates that using rations containing high fiber (rations 3 and 4) increases the mortality rate to the extent of 150 and 650% over that observed in the first ration (4% C.F.). In this regard, Morris *et al* (1932), reported that raising the crude fiber level over 9% affected mortality of chicks.

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دراسة تأثير تغذية الكتاكيت البلدى الأبيض النامية على علائق مختلفة في مستوى الألياف الخام

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الملخص

اجريت هذه الدراسة في محطة البحوث الزراعية بكلية الزراعة - جامعة القاهرة على ١٥٦ كتكوت محلى من سلالة البلدى الأبيض . وكان عمر الكتاكيت في بدء التجربة اسبوعين وقد استمرت حتى بلغ عمر الكتاكيت ٢٠ أسبوعا . وقسمت الكتاكيت الى أربع مجاميع متساوية في العدد ومتوسط الوزن . وقد غذيت الكتاكيت على اربعة علائق متماثلة في قيمتها الغذائية (معادل النشا والبروتين الخام) واختلفت في نسبة الألياف الخام حيث بلغت في عليقة المجاميع ١ ، ٢ ، ٣ ، ٤ على الترتيب ٤٢٤ ، ٤١٢ ، ٤٠٠ ، ٣٨٤٪ وكانت تغذية الكتاكيت حتى الشبع مع تسجيل الفناء المأكول واوزان الكتاكيت فرديا كل اسبوعين .

وتشير نتائج هذا البحث الى انه يمكن لذكور الكتاكيت المحلى من هذه السلالة أن تتحمل من الألياف الخام في عليقتها حتى مستوى ١٢٪ دون أن يؤثر ذلك على وزن الطائر النهائى في عمر ٢٠ أسبوعا غير أنه وإن كان هذا المستوى (١٢٪) قد سجل أفضل مقياس للنمو خلال فترة التجربة إلا أنه سجل في نفس الوقت أعلى نسبة نفوق (٣٢٪) الأمر الذى يمكن معه القول بأن المستوى المناسب من الألياف الخام في علائق ذكور الكتاكيت البلدى الأبيض تتراوح ما بين ٧ - ١٢٪ تحت ظروف تجريبية متشابهة .

وقد اتضح أن احسن عليقة للأنث من حيث متوسط الوزن النهائى ونسبة الوفيات هي العليقة الأولى المحتوية على ٤٪ ألياف خام غير أن احتواء العليقة على ٧٪ ألياف لم يكن له تأثير ضار على نسبة الوفيات أو معدل النمو حتى عمر ٨ أسابيع بينما زيادة نسبة الألياف عن ٧٪ يصاحبها زيادة في نسبة الوفيات وانخفاض في معدل استهلاك العليقة وفي معدل النمو .