

**THE EFFECT OF FEEDING DIFFERENT CRUDE
FIBER LEVELS ON THE GROWTH AND PER-
FORMANCE OF WHITE AUSTRIAN TURKEY
POULTS**

By

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The total number of White Austrian (W.A.) turkeys used in this experiment was 92 four-week old poults. Birds were divided into 4 groups equal in number and nearly equal in average body weight. These 4 groups were offered rations that were nearly iso-caloric and iso-nitrogenous but contained different crude fiber levels as follows: ration 1: 4.34%, ration 2: 8.37%, ration 3: 12.55% and ration 4: 16.29%. This study was undertaken to investigate the suitable crude fiber levels in W.A. turkey rations and to determine the maximum levels beyond which growth and/or performance of poults are affected.

Results of this investigation may be summarized as follows: Male W.A. turkey poults can tolerate up to 9% crude fiber in their rations until the age of 24 weeks. This crude fiber level also produced the best growth measure and had no effect on mortality rate.

Female W.A. turkey poults can tolerate up to 9% crude fiber in their ration till they are 18 weeks of age. After they reach this age, the crude fiber level may be reduced to secure good growth. The low crude fiber level (4%) produced also the best growth measure. Feed consumption was not affected by feeding the 9% crude fiber ration during the whole period. However, mortality of the group fed the 9% crude fiber was almost double that of the 4% crude fiber group.

In the U.A.R. studies on the suitable crude fiber levels in turkey rations are limited. Dymrza *et al.* (1953), used four rations containing 5, 10, 15 and 20% fiber in feeding growing turkeys. They found that at 27 weeks of age, all turkeys except those fed the 20% fiber made satisfactory gains and produced carcasses of good quality. Efficiency of feed utilization was best with the 5% fiber ration.

Goff (1932/34), reported that average weight of 16 weeks old Bronze poults, fed diets containing from 3.77 to 11.62% fiber increased as fiber increased. Dymrza *et al.* (1957), found good growth of turkey poults fed mash diets containing 5-10% crude fiber. In pelleted diets, good growth was obtained on rations containing 5-20% crude fiber.

This research undertaken to investigate the best crude fiber levels for White Austrian (W. A.) turkey poults and to determine the maximum allowable level beyond which growth and/or performance are affected.

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Material and Methods

The initial number of W.A. turkeys used in this experiment totaled 92 four weeks old poults. Birds were divided into 4 groups equal in number and nearly equal in average body weight. After hatching and up to 4 weeks of age, poults were fed a practical ration for turkeys used in the poultry Nutrition, Farm, Faculty of Agriculture, Cairo University. Poults were offered the experimental rations starting the 4th week of age. The interval 4—6 weeks was considered as a preliminary period so that the poults may get accustomed to the rations. Records of body weight, feed consumption and mortality were kept beginning the 6th week of age and up to 24 weeks old. Poults were weighed individually every two weeks. Water and feed were supplied *ad libitum*. Data were subjected to analysis of variance and least significant difference (LSD) as outlined by Snedecor (1959).

Results and Discussion

Table 1 shows the composition of the experimental rations. The four rations used have similar starch equivalent (S.E.), (66.90—68.37) and crude protein (17.80—18.30%). Levels of crude fiber (C.F.) of the experimental rations were : 4.34, 8.87, 12.55 and 16.29% for ration 1, 2, 3 and 4 respectively. The C.F. levels will be referred to in text as 4, 9, 12.5 and 16%. Sawdust was used to raise the level of crude fiber while the cotton seed oil was used to keep rations iso-cloric as possible.

Average Body weight of W.A. turkey poults

A.—Males

From Figure 1 it can be seen that the average body weight increased gradually in all groups. At the age of 6, 8 and 10 weeks the average body weight showed only slight differences among the four groups indicating that differences in crude fiber of the ration had no effect on body weight up to 10 weeks of age. Starting at 12 weeks group 3 (12.5% C.F.) showed significantly lower average body weight ($P < .01$) than either group 1 (4% C.F.) or group 2 (9% C.F.). At 14 weeks and up to 24 weeks of age, group 1 and 2 had comparable average body weight while group 3 (12.5% C.F.) and group 4 (16% C.F.) had also similar body weight (Figure 1 and Table 2). At 16 and 24 weeks of age group 1 had significantly ($P = .01$) higher average body weight than groups 3 or 4. Also group 2 showed higher average body weight than group 3 or 4 ($P < .01$) as presented in Table 3.

This clearly indicated that male W.A. turkey poults can tolerate up to 9% crude fiber in their rations without ill-effect on body weight. Dymysza *et al.* (1953), reported similar results. El-Abbady *et al.* (1969), reported higher figure of 12% C.F. for male Baladi White chicks up to 20 weeks of age. This points out, under the conditions of this experiment, that male turkey poults are more sensitive to higher C.F. levels than male Baladi White chicks.

TABLE 1.—COMPOSITION OF THE EXPERIMENTAL RATIONS FOR W.A. TURKEYS.

Item	Rations			
	1	2	3	4
Corn, Ground	46.8	47.8	42.3	30.8
Wheat Bran.	15.0	5.0	—	—
Horse Beans	10.0	13.0	14.0	15.0
Decorticated cotton seed meal	19.0	19.0	20.0	21.0
Dried Skim milk	7.0	7.0	7.0	7.0
Cotton Seed Oil	—	—	2.5	6.0
Sawdust	—	6.0	12.0	18.0
Ca CO ₃	1.5	1.5	1.5	1.5
Na Cl	0.5	0.5	0.5	0.5
Vitamin Mixture ¹	0.2	0.2	0.2	0.2
Total	100.0	100.0	100.0	100.0
<i>Chemical Composition</i>				
Moisture	10.01	9.73	9.70	9.55
Crude Protein %	17.80	18.02	18.30	17.81
Crude Fat %	3.48	3.32	4.81	7.04
Crude Fiber %	4.34	8.87	12.55	16.29
Nitrogen Free Extractives %	58.92	52.38	48.62	43.32
Ash %	5.45	7.65	6.02	5.99
S. E ²	68.37	66.90	67.25	67.23

(1). Vitamin mixture supplied the ration with 5000 IU vitamin A and 1000 IU vitamin D₃ per 1.0 kg.

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

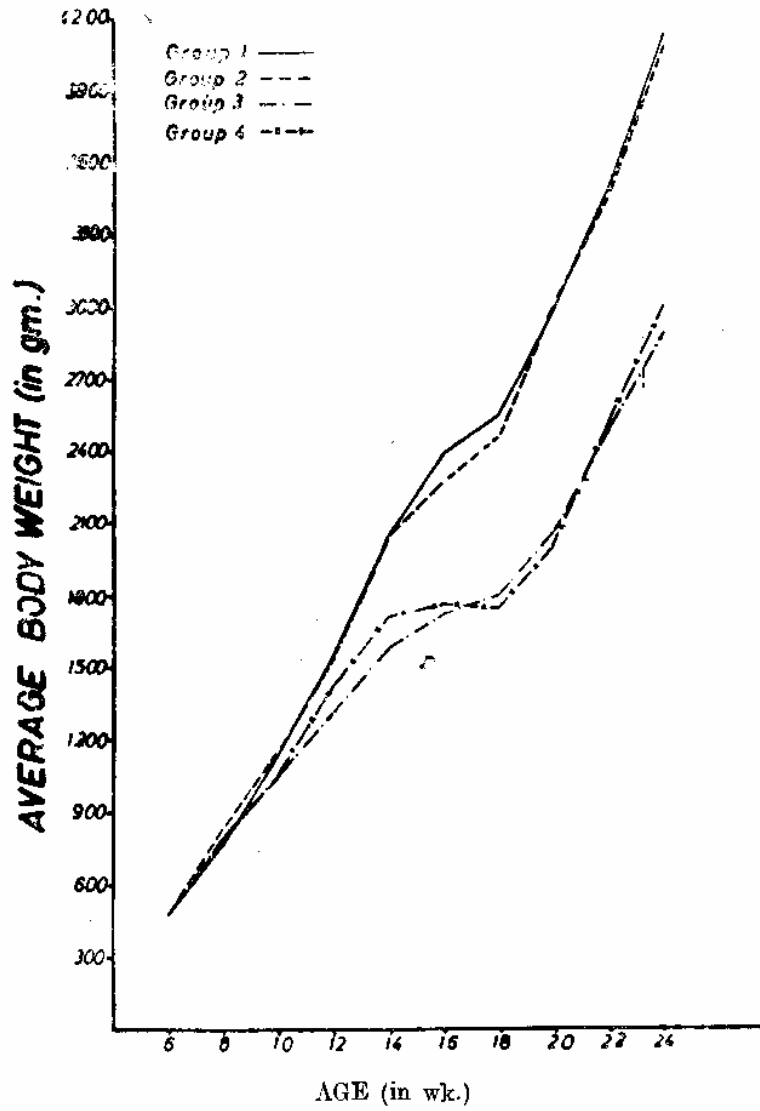


FIG. 1.—Average body weight of male W. A. turkey poults fed 4 different levels of C.F.

TABLE 2.—BODY WEIGHT, FEED CONSUMPTION AND MORTALITY OF W.A. TURKEYS POULTS FED 4 LEVELS OF CRUDE FIBER.

	Ration 1		Ration 2		Ration 3		Ration 4	
	Male	Female	Male	Female	Male	Female	Male	Female
Initial Number of poults	14	9	13	10	12	11	10	13
Initial Average body weight, g.	476 (21.3)*	418 (20.8)	473 (20.9)	413 (12.6)	473 (22.9)	419 (19.4)	469 (28.8)	399 (16.6)
Final Average body weight, g.	4142 (66.8)	2971 (107.1)	4088 (137.3)	2709 (168.2)	2901 (201.4)	2469 (70.9)	3001 (181.9)	2374 (104.7)
Gain in weight, g.	3666	2553	3615	2296	2423	2050	2535	1875
Feed consumed/poult, g.	14928	14928	14812	14812	13573	13573	12271	12271
S.E. consumed/poult, g.	10206	10206	9909	9909	9128	9128	8250	8250
Growth measure, kg.	2.78	4.00	2.74	4.32	3.76	4.45	3.25	4.40
Mortality Rate	7.14	11.0	7.69	20.0	8.33	18.2	30.0	23.1

* Figure between parentheses represents standard error of the mean.

B.—Females

As can be seen from Figure 2, group 2 (9% C.F.) had the highest average body weight up to the age of 18 weeks. Group 1 (4% C.F.) showed slightly lower average body weight than group 2. However, group 3 (12.5% C.F.) and group 4 (16% C.F.) were similar in their average body weight and were lower than group 1 or 2 during the same age. At 20 weeks of age, group 1 showed an increase in body weight than all groups. This increase in body weight became clearer toward the end of the experiment. This shows that up to 18 weeks of age, female W.A. poults can tolerate crude fiber in their rations up to 9% without any ill-effect on body weight.

TABLE 3.—L.S.D. ANALYSIS OF BODY WEIGHT OF MALE AND FEMALE W.A. TURKEY POULTS FED 4 DIFFERENT LEVELS OF CRUDE FIBER

Groups compared	Age in weeks				
	8	12	16	22	24
<i>Males :</i>					
1 vs. 2	—	7	116	—	54
1 vs. 3	—	239**	668**	—	1241**
1 vs. 4	—	139	618**	—	1138**
2 vs. 3	—	232**	552**	—	1187**
2 vs. 4	—	132	502**	—	1084**
3 vs. 4	—	-100	-050	—	-103
<i>Females :</i>					
1 vs. 2	-70	—	-26	120	262
1 vs. 3	-29	—	411**	531**	502**
1 vs. 4	46	—	466**	659**	696**
2 vs. 3	41	—	437**	411**	240
2 vs. 4	116**	—	492**	539**	434*
3 vs. 4	75*	—	55	128	194

* P < .05.

** P < .01.

However, this level seems to affect growth of female W.A. poultS beyond this age. Therefore, the 4% crude fiber level may be used beyond 18 weeks of age of maximum growth is sought. Similar results were obtained by El-Abbady *et al.* (1969), using female Baladi White chicks where they reported that as high as 7% C.F. in the ration was tolerated without affecting growth of birds up to 8 weeks of age during the period 10–20 weeks of age the 4% C.F. surpassed the 7% C.F. levels in terms of body weight.

Table 3 shows that group 1 was not significantly different from group 2 during the whole experimental period. Similarly group 3 did not differ statistically from group 4 except at the age of 8 weeks ($P < .05$). At 16 and 22 weeks of age, group 1 was found to differ significantly ($P < .01$) from group 3 and 4. Similarly groups 2 was significantly different ($P < .01$) from groups 3 and 4. At the end of the experiment, the previous trend was evident except that groups 2 and 3 were not statistically different and groups 2 and 4 differed only at the 0.05 level of probability.

Feed and S.E. Consumption

The amount of feed or S.E. consumed represents that amount eaten by male and female poultS. Even after female poultS were identified from males, they were confined to the same houses and ate from the same feed containers, so there was no way of calculating the amount of feed consumed by each sex. Table 2 shows that poultS fed on ration 1 or 2 consumed comparable amounts of feed or S.E. However, raising the crude fiber level over 9% resulted in reduced feed and S.E. consumption

Growth measure (G.M.)

A.—Males

The average G.M. of male W.A. turkey poultS during the period 6–24 weeks of age was : 2.78, 2.74, 3.76 and 3.25 kg for groups 1,2,3, and 4 respectively. If the G.M. of group 2 is considered as 100, it would be 101. 6, 137.1 and 118.7 for groups 1, 3 and 4 respectively. Therefore, it would be concluded that the lowest G.M. was produced from group 1 and 2 that these two groups were better in this respect followed by group 4 and then 3.

B.—Females

The average G.M. for female W.A. turkey poultS during the period 6-24 weeks of age was: 4.00 (group 1), 4.32 (group 2), 4.45 (group 3) and 4.40 (group 4). Thus it can be concluded that the lowest G.M. was produced by group 1. Taking the G.M. of this group as 100, it would be 108, 111 and 110 for groups 2, 3 and 4 respectively. This shows that group 1 was different from the other three groups as far as the G.M. is concerned and that the other three groups were similar.

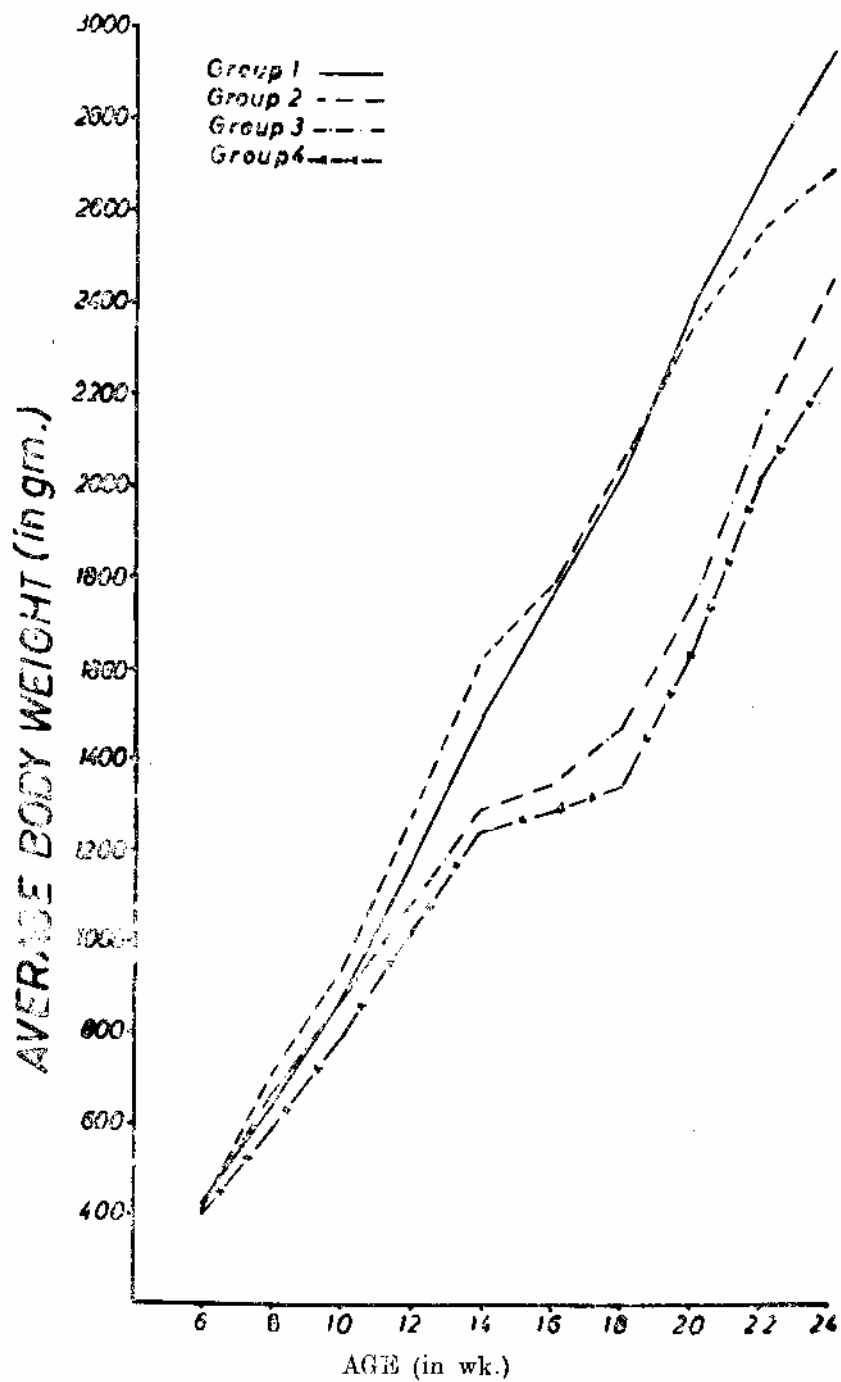


FIG. 2.—Average body weight of female W. A. turkey poults fed 4 different levels of C. F.

Thus it is clear that good growth measure was obtained on the low fiber rations (ration 1 in males and ration 2 in females).

Mortality Rate

A.—Males

The mortality rate of male poultS ranged between 7.14 and 8.33% for rations containing 4—12.5% crude fiber (Table 2). This shows that up to 12.5% crude fiber in the ration had no effect on mortality rate. However, the mortality rate rose up to 23.1% in poultS fed on the ration containing 16% crude fiber (group 4). Thus it may be concluded, from the mortality point of view, that up to 12.5% crude fiber in ration of male W.A. turkey poultS can be tolerated. However, taking in consideration the body weight and G.M. favour using 9% crude fiber as a maximal limit.

B.—Females

Table 2 shows that the mortality of female W.A. turkey poultS fed on the 4% crude fiber ration was 11.0%, this figure was almost doubled when the level of crude fiber was increased up to 16%. Thus it may be concluded that mortality rate is affected by feeding rations containing higher than 4% crude fiber. However, this effect is not progressive since poultS fed on rations containing 9 or 16% crude fiber, had similar mortality rate. Therefore, from the mortality rate point of view, rations used for feeding female W.A. turkey poultS up to 24 weeks of age, should not contain over 4% crude fiber. This conclusion is in accordance with data of final body weight, feed consumption and growth measure.

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دراسة تأثير تغذية كتنايت الرومي الهولندي الأبيض النامية على علائق مختلفة في مستوى الألياف الخام

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الملخص

أجريت هذه الدراسة في محطة البحوث الزراعية بكلية الزراعة - جامعة القاهرة على ٩٢ كتكوت رومي من نوع الهولندي الأبيض وكان عمر الكتنايت في بدء التجربة ٤ أسابيع واستمرت التجربة حتى عمر ٢٤ أسبوع. قسمت الكتنايت الى أربع مجاميع متساوية في العدد ومتوسط الوزن . وغذيت الكتنايت على أربع علائق متماثلة في قيمتها الغذائية (معادل النشا والبروتين الخام) واختلفت في نسبة الألياف الخام حيث كانت ٤٣٤٪ ، ٨٨٧٪ ، ١٢٥٥٪ ، ١٦٢٩٪ بالنسبة للمجاميع ١ ، ٢ ، ٣ ، ٤ على الترتيب . وكانت التغذية حتى الشبع مع تسجيل الغذاء المأكول وأوزان الكتنايت فرديا كل أسبوعين .

ويمكن تلخيص نتائج هذا البحث في الآتى :

بالنسبة لذكور الهولندي الأبيض يمكنها أن تتحمل من الألياف الخام في عليقتها حتى ٩٪ دون أن يؤثر ذلك على الوزن النهائى للطائر في عمر ٢٤ أسبوع وقد لوحظ كذلك أن العليقة المحتوية على نسبة ٩٪ ألياف خام كان يصاحبها أحسن مقياس نمو كما كانت نسبة الوفيات منخفضة .

أما بالنسبة للإناث الهولندي الأبيض فيمكنها أن تتحمل في علائقها حتى نسبة ٩٪ ألياف خام حتى عمر ١٨ أسبوع أما بعد هذا العمر فقد لوحظ وجود تأثير لهذه النسبة من الألياف الخام على معدل النمو - الأمر الذى قد ينصح معه بخفض نسبة الألياف الى المستوى الأقل (٤٪) لضمان مستوى نمو عال . كما لوحظ أن أحسن مقياس نمو كان للمجموعة المغذاة على ٤٪ ألياف خام . لم يلاحظ انخفاض ملموس في مقدار الأكل أو معادل النشا المستهلك في المجموعة المغذاة على ٩٪ ألياف خام بمقارنتها بالمجموعة المغذاة على ٤٪ ألياف خام . غير أن نسبة الوفيات كان في المجموعة المغذاة على ٩٪ ألياف خام ضعف تلك التى في المجموعة المغذاة على ٤٪ ألياف خام .

(*) قسم الإنتاج الحيوانى « فرع تغذية الحيوان » بكلية الزراعة - جامعة القاهرة - بالجيزة .