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CLOVER HAY AS A SOURCE OF NUTRIENTS AND CAROTENE IN CHICKS RATIONS

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Experiments were carried out to study the effect of supplementing the growing Baladi White (B.W.) and Rhode Island Red (R.I.R.)chicks with vitamin "A" preparation at a level of 7,500 I.U. per kg. of the basal ration and different levels of clover (berseem) hay. Hay was added to the basal ration at the levels of 3, 5 and 10%. Three weeks old chicks were divided into four groups similar in number and weight. Chicks fed vitamin "A" preparation yielded higher live weights during the experimental period than those fed hay.

Chicks fed 10% hay were, higher in their body wieght than those fed hay at both levels 3% and 5%. The differences between the experimental groups were statistically insignificant. Chicks fed vitamin "A" showed higher gains in live-weight and lower growth measure than chicks fed hay.

It was concluded that although feeding hay decreased the nutritive value of the experimental rations and increased its content of crude fibre and bulkness yet it did not significantly depress the growth.

Results indicated that feeding hay saved about 3% of the total starch value a quantity equals about 5% of concentrates usually used in growing chicks rations. Feeding hay spared the addition of vitamin "A" supplement for growing rations.

Clover (Berseem, *Trifolium alexandrinum* supplies about 4 million ton starch value. This amount exceeds the animal requirements during the season of feeding berseem in winter. The excess of berseem usually make into hay. Hay is an essential feed-stuff for ruminants in summer (Gihad, 1963). Beside its high contents of nutrients, berseem hay contains a high amounts of carotene which are the precursors of vitamin 'A'. El-Ridi *et al*, 1962, found that 100 grams of berseem hay contain an amount of vitamin 'A' varying from 7741 up to 22084 I.U. according to the method of hay making. They reported also that the losses in dry matter content of berseem during hay making varied between 12.2 and 40.6%. Dehyderated or sun crude forage crops are usually used in poultry rations.

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Cooney *et al*, 1948, found that the addition of dehyderated alfalfa meal above 5 % of the ration had an increasing depressing effect on the growth of chicks, diet consumption and utilization. Findrik and Cok, 1955, reported that alfalfa meal at a level of 5 % depressed slightly the growth rate, but feed efficieny was increased. Wheeler and Turk, 1961, indicated that chicks fed a ration containing 5 % dehydrated alfalfa of Bermuda grass meal grew better than those fed either 2 % or 10 % levels. Wilgus, 1943, reported that feeding alfalfa meal at levels higher than 10 % of chicks diet, had decreased feed consumption. Hay-wang, 1950 concluded that both dehydrated or sun cured alfalfa meal may contain a factor that retarded the growth of chicks. He indicated that alfalfa meals are very considerable in their growth depressing effect which seems to explain why some investigators had reported that alfalfa meals included in their experiments did not depress the growth of chickens. Lepkovsky *et al*, 1950 and Peterson, 1950, related the depressing effect of feeding alfalfa meal for growing chicks to its content of saponin or saponin- like substances. Mc Intyre, 1950, pointed out that some of depressing effect of forages crops was due to their high fiber content and bulkness.

Lacis *et al*, 1962, indicated that vitamin 'A' preparations did not give vitamin 'A' storage in chicks livers as that of dried herbage. Although the amount of vitamin stored in the liver was greatest with adding 15 % clover grass or alwalfa meal, yet these amounts were not beyond chicks requirements. Parish *et al*, 1963, compared the utilization of alfalfa carotene with standard vitamin 'A', his results indicated that there was no differences of chicks growth within both treatments.

Many invistegators used forage crop meals in poultry feeding to save some concentrates. El-Abbady and Gihad, 1968 used berseem as a partial substitute for concentrates in briolers rations. They reported that berseem can save an amount ranging from 5 to 15 % of the total starch value of chicks ration.

This work was carried out to study the effect of using berseem hay as a source of nutrients and vitamin 'A' in briolers rations on the growth and performance of Baladi White and Rhode Island Red chicks.

Material and Methods

Experimental birds

Chicks used in this study were chosen from the flock of the Animal Nutrition Station, Animal Production Departement, Faculty of Agriculture, Cairo University. The initial number of chicks used were 172 Baladi White (B.W.) and 220 Rhode Island Red (R.I.R.) chicks. Each breed was divided into four groups of equal weight and number. The experiment started on when chicks were 3 weeks old and lasted for 10 weeks.

Experimental rations

The basal ration was formed of 50 % ground maize, 23 % decorticated cotton seed cake, 20 % wheat bran, 5 % dry skim-milk, 1.5 % sodium chloride. Its calculated nutritive value was 68 kg. starch value and 15 % digestible

crude protein. Ration of group 1 was formed by supplementing a pure chemical preparation of vitamin 'A' manufactured by Philips Duphear Company, Amesterdam, Holland at a level of 7,500 I.J. per one kg of the ration as recommended by A.R.C., 1963. Rations of groups 2, 3 and 4 were formed by adding berseem hay to the basal ration at a level of, 3, and 10% respectively. Hay was chopped and thoroughly mixed with the basal ration. The nutritive value of hay was calculated, according to Abou-Raya, 1967 and Ewing, 1951, Hay content of carotene was chemicaly determined according to Hawk's, 1965. The increasing successive levels of hay did not exceed 10 % according to the recommended level of the former investigators. The nutritive value and I.U. of vitamin 'A' per one kg. of the experimental rations are shown in Table 1.

TABLE 1.—THE NUTRITIVE VALUE OF THE EXPERIMENTAL RATIONS

Item	Experimental groups			
	1	2	3	4
Level of adding hay to the ration % .	0.0	3	5	10
I.U. of vit. A per 1 kg. of the ration % .	7,500	4,890	8,150	16,300
S.V. supplied from hay %	0.00	0.88	1.43	2.86
Crude fibre on D.M. basis %	10.00	10.38	10.65	11.13
Digestible crude protein %	15.27	15.12	15.02	14.79
Starch value (kg.)	67.85	66.49	65.62	63.60

Management

A starting ration partially difficient in vitamin 'A' was offered to chicks from hatching day until the 3rd week of age to obtain semi- depleted chicks at the beginning of the experiment. The chicks were fed ad libitum and the amount of starch value consumed was calculated. Birds were weighed every two weeks during the whole experimental period.

Snedecor, 1959 was conculted for statistical analysis.

Results and Discussion

Results on the average live-weight, gain in weight, growth measure (G. M.) and mortality rate are shown in Table 2.

TABLE 2.—Effect of feeding vitamin A and different levels of hay on growing chicks

Treatment	Age in weeks	Baladi White				Rhode Island Red			
		Av. live wt.	Gain in wt.	G.H.	Mortality	Av. live wt.	Gain in wt.	G.H.	Mortality
		gm.	gm.		%	gm.	gm.		%
Group 1 fed vit. A Supplement	3	42				39			
	5	90	48	1.90	7.0	94	55	1.63	11.7
	7	156	66	2.43	2.5	170	76	2.75	3.8
	9	252	96	2.84	0.0	236	66	3.95	3.9
	11	375	123	3.16	0.0	339	103	3.28	0.0
	13	517	142	3.96	0.0	449	109	3.63	0.0
	3–13		475	3.12	9.3		409	3.16	18.3
Group 2 fed 3% hay	3	42				39			
	5	70	28	3.21	4.7	86	47	2.08	13.3
	7	135	65	2.50	4.9	154	68	3.31	0.0
	9	188	53	4.99	0.0	215	61	4.23	5.8
	11	288	100	3.75	0.0	319	104	3.30	0.0
	13	404	117	5.02	2.6	395	76	5.51	0.0
	3–13		362	4.09	11.6		356	3.77	20.0
Group 3 fed 5% hay	3	42				39			
	5	87	45	2.25	9.3	80	41	2.40	8.3
	7	141	54	2.76	0.0	152	72	3.10	5.5
	9	200	59	4.62	0.0	221	69	3.95	0.0
	11	308	108	3.58	0.0	304	83	4.43	0.0
	13	452	144	3.97	0.0	404	100	4.27	0.0
	3–13		410	3.61	9.3		365	3.80	15.0
Group 4 fed 5% hay	3	42				39			
	5	83	41	2.43	7.0	93	54	1.90	1.5
	7	150	67	2.61	0.0	166	73	3.08	3.9
	9	232	83	3.52	0.0	238	72	3.93	0.0
	11	362	130	3.11	0.0	339	101	4.48	0.0
	13	508	146	4.08	0.0	413	74	5.64	0.0
	3–13		466	3.37	7.0		374	3.68	18.3

1. *Average live-weight*

It is worthy to note that within the two breeds of chicks, absolute average body-weights of group 1 fed vitamin 'A' supplement were higher than those of groups fed different levels of hay during the whole experimental period. As for the groups fed 3, 5 and 10 % hay the chicks average-live weights increased with the increase of the level of hay in the ration. Group 4 fed 10% hay was almost higher in its average live-weights than the other two groups. Chicks fed the ration 2 supplemented with 3% hay had recorded the lowest average live-weight.

The regression of average live-weight on age of growing chicks was studied with the different groups during the whole experimental period. Results indicated the regression of weight on age were sgnificant during the experimental period. The calculated linear regressions of weight on age are shown in Table 3.

TABLE 3.—LINEAR REGRESSION OF WEIGHT ON AGE

Group	B.W.			R.I.R.		
	Reg. C.*	Confidence limits	't' calculated	Reg. C.*	Confidence limits	't' calculated
1	47.5	34.9—60.1	10.44	40.7	33.6—47.8	15.96
2	36.0	25.2—46.8	9.30	36.3	30.4—42.2	17.04
3	39.7	26.4—49.6	8.27	36.7	30.5—42.9	16.59
4	46.4	32.2—60.6	9.25	38.3	33.7—42.9	24.44

Theoretical "t" for degrees of freedom (4), 0.05 = 2.776

* Reg. C. = Regression coefficient.

Studying the differences in the rate of growth with the different groups during the experimental period did not show significant differences between the different groups as shown in Table 4.

Figures 1 and 2 show the graphs corresponding to the regression equations of growing Baladi White and Rhode Island Red chicks with the different experimental groups.

TABLE 4.—STATISTICAL DIFFERENCES IN THE RATE OF GROWTH

Groups compared	't' calculated	
	B.W.	R.I.R.
2	0.653	0.757
1 × 3	0.356	0.701
4	0.047	0.571
3	0.192	0 085
2 × 4	0.525	0.570
3 × 4	0.273	0.430

Theoretical "t" for degrees of freedom (3):

0.05 = 2.303
0.01 = 3.355

It can be concluded that chicks fed vitamin 'A' supplement were higher in their body weights than those fed different levels of hay. The depression of growth by feeding hay was not significantly different . As for the chicks for different levels of hay, chicks fed 10% hay were higher in weight than chicks fed either 3% or 5% hay. Chicks fed 3% hay showed the lowest body weights. However the differences between the groups fed hay were not significant.

2. *Total gain in live-weight*

The average total gain in chicks live-weight during the whole experimental period was 475, 362, 410 and 466 gm for B.W. chicks with groups 1, 2, 3 and 4 respectively. The corresponding gain in weight with R. I. R. groups were 409, 356, 365 and 374 gm respectively. Assuming that the averagain in weight of group I equals 100 it would be 67.3, 86.3 and 98.1 for groups 2, 3 and 4 of B.W. chicks respectively. The corresponding gain of R.I.R. groups would be 100.0 , 87.6, 89.2 and 91.2 respectively.

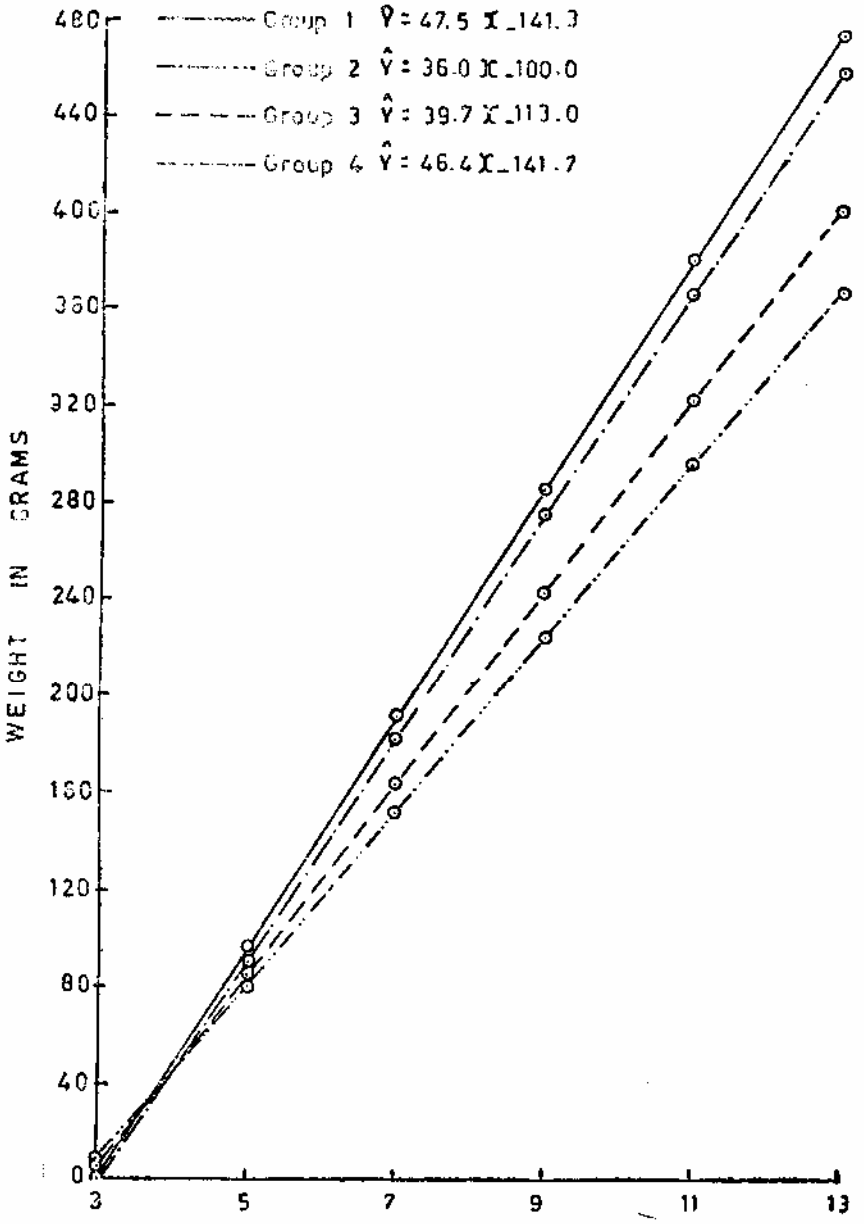

FIG. 1—Regression of weight on age with B.W. chicks fed on vitamin A and different levels of hay

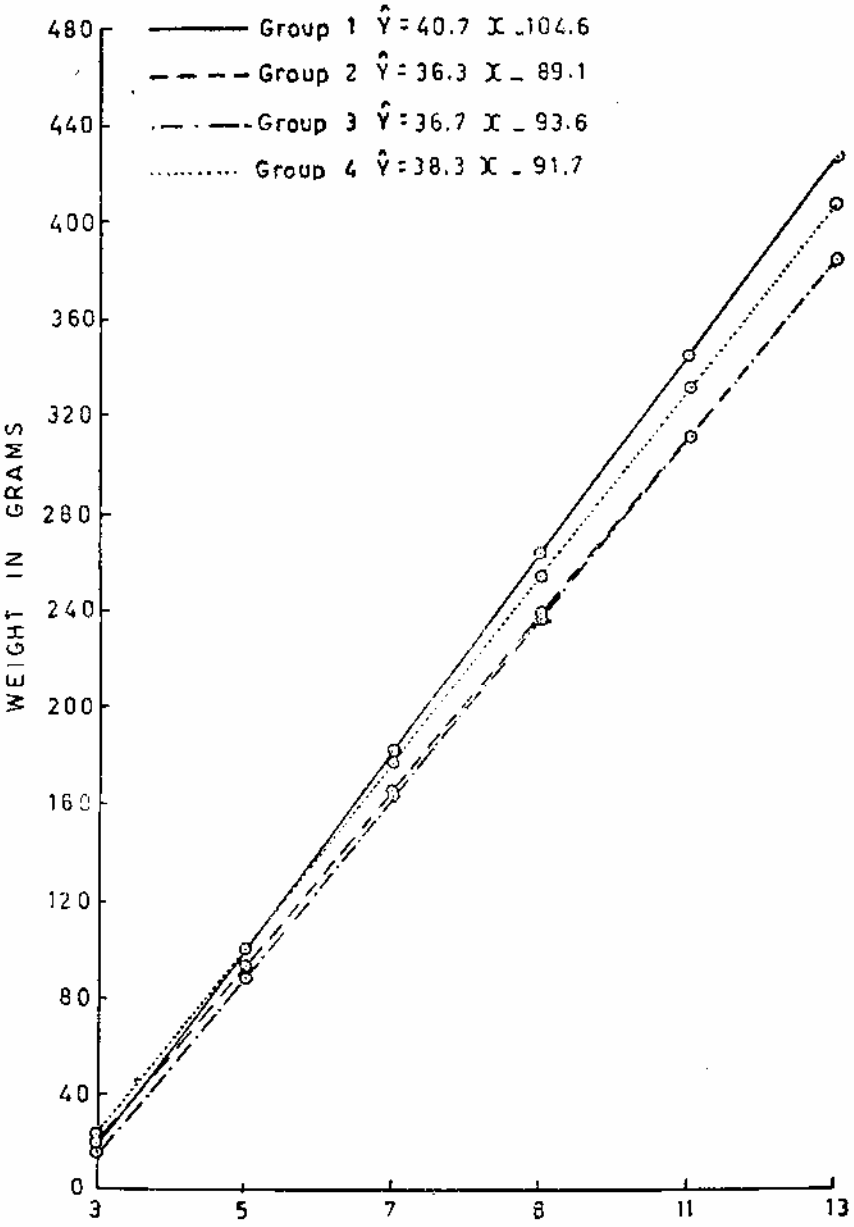

FIG. 2—Regression of weight on age with R.I.R chicks fed on vitamin A and different levels of hay

Therefore, it can be noticed that vitamin 'A' fed group had proved higher gain in live- weight more than hay fed groups specially with B.W. chicks. This trend was not obvious with R.I.R. chicks. The differences between the experimental groups were insignificant.

3. *Growth measure (G.M.)*

During the whole experimental period growth measure (Kgs of starch value needed for producing one kg increase in chicks live-weight) was 3 ; 12, 4.09, 3.61 and 3.37 kg, for B.W. groups 1, 2, 3 and 4 respectively. For comparison these figures would be 100, 131.1, 115.7 and 108.0 respectively. The corresponding G.M. of R.I.R. chicks was 3.16 2.77, 3.80 and 3.68 kg: for groups 1, 2, 3 and 4 respectively. For comparison these figures would be 100, 119.3, 120.2 and 116.4 respectively.

This indicates chicks fed vitamin 'A' supplement recorded lower G.M. than that recorded by chicks fed different levels of hay. B.W. chicks fed 10 % recorded the lowest G.M. of the hay fed groups, while with R.I.R. chicks the G.M. for hay fed chicks was nearly similar irrespective to the level of hay in the ration. This proves that there was no special trend for the effect of the level of hay up to 10 % on the G.M. for chicks.

4. *Mortality rate*

Total mortality rates among the experimental groups of B.W. chicks were 9.3, 11.6, 9.3 and 7.0 % for groups 1, 2, 3 and 4 respectively. The corresponding mortality rates among R.I.R. groups were 18.3, 20.0, 15.0 and 18.3 % respectively.

Most of casulaties occured during the first two experimental intervals among the different groups with the two breeds. There were no obvious differences in the total mortality rates with the different groups. Rhode Island Red chicks showed higher mortality rates than Baladi white chicks.

Results throughout this work show that feeding hay at levels of 3, 5, 10 % depress the growth of chicks. This depression was not significantly different when compared with chicks fed vitamin 'A' preparation. It can be concluded that although feeding berseem hay decreased the nutritive value of the experimental rations and increased its content of crude fibre and bulkness, the depression effect on the growth of chicks was insignificant. These results were in agreement with Wilgus, 1943, McIntyre, 1950 and Findrik and Cek, 1955.

This indicates that hay may be fed as a partial substitute of concentrates in poultry ration and in the mean time can spare the addition of vitamin 'A' supplements. The savings of feeding hay in growing rations reached about 3 % of the total starch value which equals about 5 % of concentrates. These results were in agreement with Sipe and Polk, 1941, Buckman *et al* (1941), Bickner *et al* (1943), and Almquist, 1944 cited with Ascarelli and Bondi, 1957 and El-Abbady and Gihad, 1968.

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دريس البرسيم كمصدر للمركبات الغذائية والكاروتين فى علائق الكتاكيت

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الملخص

أجريت التجارب لدراسة تأثير اضافة مستحضرات فيتامين (أ) ونسب مختلفة من دريس البرسيم الى علائق الكتاكيت البلدى الأبيض والرود ايلاند رد . ولقد قسمت الكتاكيت الى أربع مجاميع متماثلة العدد والوزن لكل نوع . وغذيت المجوعة الأولى على العليقة الأساسية مع اضافة مستحضر فيتامين (أ) بمقدار ٧٥٠٠ وحدة دولية لكل ١ كجم عليقة . وبالنسبة للأربع مجاميع الأخرى أضيف الدريس الى علائقها بنسب ٣٪ ، ٥٪ ، ١٠٪ على التوالى . وكانت القيم الغذائية للعلائق متماثلة .

ولقد بدأت التجارب من الأسبوع الثالث بعد الفقس للكتاكيت واستمرت حتى الاسبوع الثالث عشر . وفى الثلاثة أسابيع الأولى غذيت الكتاكيت على عليقة لا تحتوى اى مصدر للفيتامين .

ولقد أظهرت المجموعة الأولى التى غذيت على مستحضر الفيتامين زيادة طفيفة فى النمو ووزن الكتاكيت عن المجاميع التى غذيت على الدريس بالنسب المختلفة . كما أن المجموعة التى غذيت على دريس بنسبة ١٠٪ كانت اكبر وزنا من التى غذيت على ٣٪ ، ٥٪ دريس . ولقد كانت الفروق فى الأوزان الحية بين المجاميع المختلفة غير مؤكدة احصائيا . كما درست الزيادة فى الوزن ومقياس النمو ونسبة الوفيات ولم تكن هناك فروق ملموسة بين المجاميع المختلفة .

واستنتج من هذه الدراسة أن اضافة الدريس حتى نسبة ١٠٪ فى علائق الكتاكيت يمكن أن يكون بديلا لجزء من القيمة النشوية لعلائق الكتاكيت بنسبة ٣٪ تقريبا ـ اى بما يوازى ٥٪ تقريبا من المواد المركزة المستخدمة فى علائق الدواجن كما يمكن الاستغناء عن اضافة مصدر لفيتامين (أ) فى علائق الكتاكيت .

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