

The Effect of Balancing Amino Acids on Hatching Results of Chicken Eggs

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240 HENS and 60 cocks were divided into 6 groups each group was fed a ration that differ in the balance of essential amino acids. Two groups served as control without balancing the amino acids. The other four groups received food with balanced amino acids smulating that ratio found in eggs. The ratio was given in two levels and two sources of animal protein were given as skim milk and fish meal. All the eggs produced for each group were incubated and hatchability from all eggs set was calculated.

In general, the percentage of hatchability increased with the advancement of the months from September to December. This was due to, the decrease of air temperature, increase in humidity and increase in the age of pullets, which increase egg weight and fecundity. The groups that received rations containing balanced amino acids either in lower high levels gave better hatchability than the controls. Skim milk surpassed fishmeal, in hatchability, as a source of animal protein, in the case of the two groups which received the balanced amino acids in high level. While in the groups that received low levels of amino acids either balanced or not, the fish meal gave better results than skim milk in hatching results.

Balancing the essential amino acids in the ration of chickens was found to improve semen quality and quantity. Also hatchability was improved (Kamar, 1964). The supplementation of the ration with fish meal was found to improve hatchability (Arcsott and Combs, 1953 and Bethke *et al.*, 1956).

Material and Methods

240 hens and 60 cocks were divided into 6 groups, each group was fed a ration that differ in the balance of essential amino acids. Two groups served as control without balancing the amino acids. The other four groups were fed four rations, two of them receiving high level of balanced amino acids, while the other two received low level of balanced amino acids. Each two similar groups received two sources of animal protein, one as skim milk and the other as fish meal (Table 1).

The eggs produced by the hens for each group during the months of September, October, November and December were incubated. The cocks received the same ration used for each group. The hatched chicks for all the eggs set were recorded for each group at each month.

Results and Discussion

The eggs produced during the first three months of the experiment, namely, June, July and August were avoided in hatching tests. The eggs produced from each group at the months from September to December were incubated.

The eggs produced by each group during each month were incubated alone, and the number of chicks produced was available. The percentage of hatchability at each group for each month was calculated and monthly differences were observed (Table 2). Hatchability percentage increased with the advancement of the months from September to December. This may be due to two factors. The first, is the decrease in air temperature, and the increase in humidity percentage which is of favourable effect on hatchability. The second is the increase in pullets age that is normally coincided with increase in egg weight and fecundity.

The groups that received high balanced levels of amino acids in their rations accompanied by high level of animal protein, gave the best hatchability results during all the months of the study.

Generally speaking, the experimental groups that received balanced amino acid ratio in their rations either in high or on low levels gave better hatchability during all the months of the study. The treatment that received skim milk surpassed that which received fish meal in hatchability for the groups that received high balanced levels of amino acids. Meanwhile, the groups that received fishmeal surpassed those which received skim milk, for both the groups that received low balanced levels of amino acids and the control groups that received unbalanced levels of amino acids. This trend was also previously observed with respect to growth rate and egg production (Kamar *et al.*, 1971).

The hatchability in the groups that received high balanced levels of amino acids, ranged between 81.7 percent and 91.2 percent. In the groups that received low balanced levels of amino acids, the values ranged between 69.9 percent and 84.5 percent. The values of the control groups ranged between 57 percent and 72.6 percent.

TABLE 1. The composition and ingredients in the different treatments.

Ingredients % and composition	Control		Treatments			
	1	2	3	4	5	6
Corn	12	12	38	38	16	16
Rice polfishings	12	12	0	0	17.5	17.5
Wheat bran	12	12	1	1	15	15
Horse beans	16	16	4	4	16	16
Cotton-seed cake	20	20	0	0	22	22
Season cake	0	0	16	16	0	0
Barely mault	25	25	30	30	10	10
Bone meal	1	1	1	1	1	1
Salt	0.5	0.5	0.5	0.5	0.5	0.5
Liquid skim milk kg	32.4	0	180	0	32.4	0
Fish meal	0	2	0	11	0	2
Crude protein	19.22	19.22	18.71	18.71	19.30	19.30
Starch equivalent	57.34	57.34	49.40	49.40	63.70	63.70
Methionine 1	0.23	0.23	0.38	0.43	0.24	0.25
2	1.21	1.19	2.05	2.32	1.30	1.31
Arginine 1	1.16	1.17	1.03	1.09	1.35	1.36
2	6.28	6.11	5.51	3.83	7.00	7.50
Histidine 1	0.43	0.42	0.51	0.49	0.48	0.48
2	2.23	2.18	2.71	2.60	2.50	2.50
Leucine 1	1.12	1.07	1.55	1.44	1.32	1.29
2	5.83	5.59	8.27	7.70	6.80	6.70
Isoleucine 1	0.88	0.84	1.01	0.89	0.84	0.82
2	4.57	4.35	5.37	4.74	4.30	4.20
Lysine 1	0.83	0.81	0.85	0.95	0.86	0.86
2	4.34	4.21	4.52	5.07	4.40	4.50
Cystine 1	0.30	0.29	0.37	0.40	0.33	0.33
2	1.56	1.50	1.96	2.13	1.70	1.70
Phenylalanine 1	0.76	0.73	0.86	0.76	0.82	0.80
2	3.98	3.79	4.60	4.06	4.20	4.10
Threonine 1	0.57	0.47	0.65	0.64	0.55	0.55
2	2.97	2.47	3.44	3.44	2.80	2.80
Valine 1	0.99	0.93	0.89	0.90	0.95	0.95
2	5.13	4.84	4.73	4.81	4.90	4.90

1. % of amino acids to the total ration.
2. % of amino acids to the protein in the ration.

TABLE 2. Effect of different treatments on hatchability from all eggs set.

Months	Treatments											
	1		2		3		4		5		6	
	eggs set	hatch. %	eggs set	hatch. %	eggs set	hatch. %	eggs set	hatch. %	eggs set	hatch. %	eggs set	hatch. %
September	51	57	57	59.8	90	83.3	104	81.7	55	69.9	58	77.6
October	83	65	89	63.6	147	87.1	155	85.2	65	75.4	72	81.1
November	109	71.6	121	71	193	91.2	202	87.1	87	80.5	95	83.1
December	131	72.6	145	71	240	91.2	258	91.1	97	84.5	119	83.0
Total	374	68.4	412	68.2	670	89.4	719	87.3	304	78.9	344	81.4

It seems that the balancing of amino acid content of the ration of egg producers, raise the hatching results, due to its effect on both the fertility and the hatchability of eggs. The treatments influenced both, cocks to produce high fertility, and the hens to produce high hatchability. The balancing of the amino acid content or ration or supplementing it with a high level of animal protein source especially fish meal was found to increase semen production, fertility and hatchability (Kamar, 1964).

The increase hatchability results obtained in this study may be due to the balancing of the amino acids rather than the total protein or animal protein level. When the two groups of control and groups 5 and 6 were compared, the hatchability of groups 5 and 6 were higher than the control, although these four groups received the same level of animal protein. When the balanced four groups were compared, the increase in the level of animal protein, enabled this balanced ratio to be more suitable for the birds ; that caused groups 3 and 4 to show better hatching results than the alternative groups 5 and 6.

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اثر توازن الأحماض الأمينية على نتائج تفريخ البيض في الدجاج

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وضعت تحت الدراسة ٢٤٠ دجاجة ، ٦٠ ذكرا فيوميا مقسمة الى ستة مجموعات متساوية ، بحيث كانت المعاملات والظروف موحدة لكل المجموعات بينما استخدمت ستة علائق مختلفة، استخدمت مجموعتان للمقارنة وقدغذيت كل منها على عليقة مكونة بدون مراعاة لنسب الاحماض الامينية فقط روعى احتوائها على نسبة البروتين الكلى الموجودة في المجموعات التجريبية الأربعة .

المجموعات التجريبية الأربعة غذيت على علائق مكونة بحيث تحوى الاحماض الامينية العشرة الاساسية ينسب الى بعضها تماثل بقدر الامكان نسبتها في بيض الدجاج ، وقد اعتبر هذا التركيب متوازنا ، وكانت من العلائق الأربعة المتوازنة الاحماض الامينية اثنتان تحتوى على مستوى مرتفع من تلك الاحماض والاخرتين تحتوى على مستوى منخفض منها أى انه أصبحت ثلاثة مستويات : المقارنة ، ومتوازنة مرتفعة المستوى ، ومتوازن منخفضة المستوى وفى كل مستوى مجموعتين أعطيت احدهما اللبن الفرز والاخرى مسحوق السمك المجفف (سردين) كمصدر للبروتين الحيوانى . جرى تفريخ كل البيض الناتج من كل مجموعة على حده خلال مدة الدراسة التى امتدت حتى نهاية السنة الأولى من عمر الدجاجة (سن ١٢ شهرا) وحسبت نسبة الفقس من عدد الكتاكيت الناتجة .

لوحظ زيادة نسبة الفقس بتقدم العمر من سبتمبر الى ديسمبر ويعزى هذا الى انخفاض درجة الحرارة مع ارتفاع رطوبة الجو وكذلك تقسم عمر الدجاج الذى يزيد وزن البيض وخصوبته .

وقد كانت نسبة الفقس مرتفعة عموما فى المجموعات التجريبية الاربع المتغذاء على علائق متوازنة الاحماض الامينية ، سواء مرتفعة المحتوى أو منخفضة ، عن نسبتها فى مجموعات المقارنة .

كانت نسبة الفقس فى المجموعة المعطاء لبن فرز أعلى منها فى المجموعة المعطاء سمك مخفف (مصدر بروتين حيوانى) وذلك فى حالة ارتفاع مستوى الاحماض الامينية المتوازنة بينما فى مجموعات المقارنة وكذلك المجموعات التجريبية المحتوية على الاحماض الامينية المتوازنة بمستوى منخفض فان مسحوق السمك أعطى نسبة افضل من اللبن الفرز .