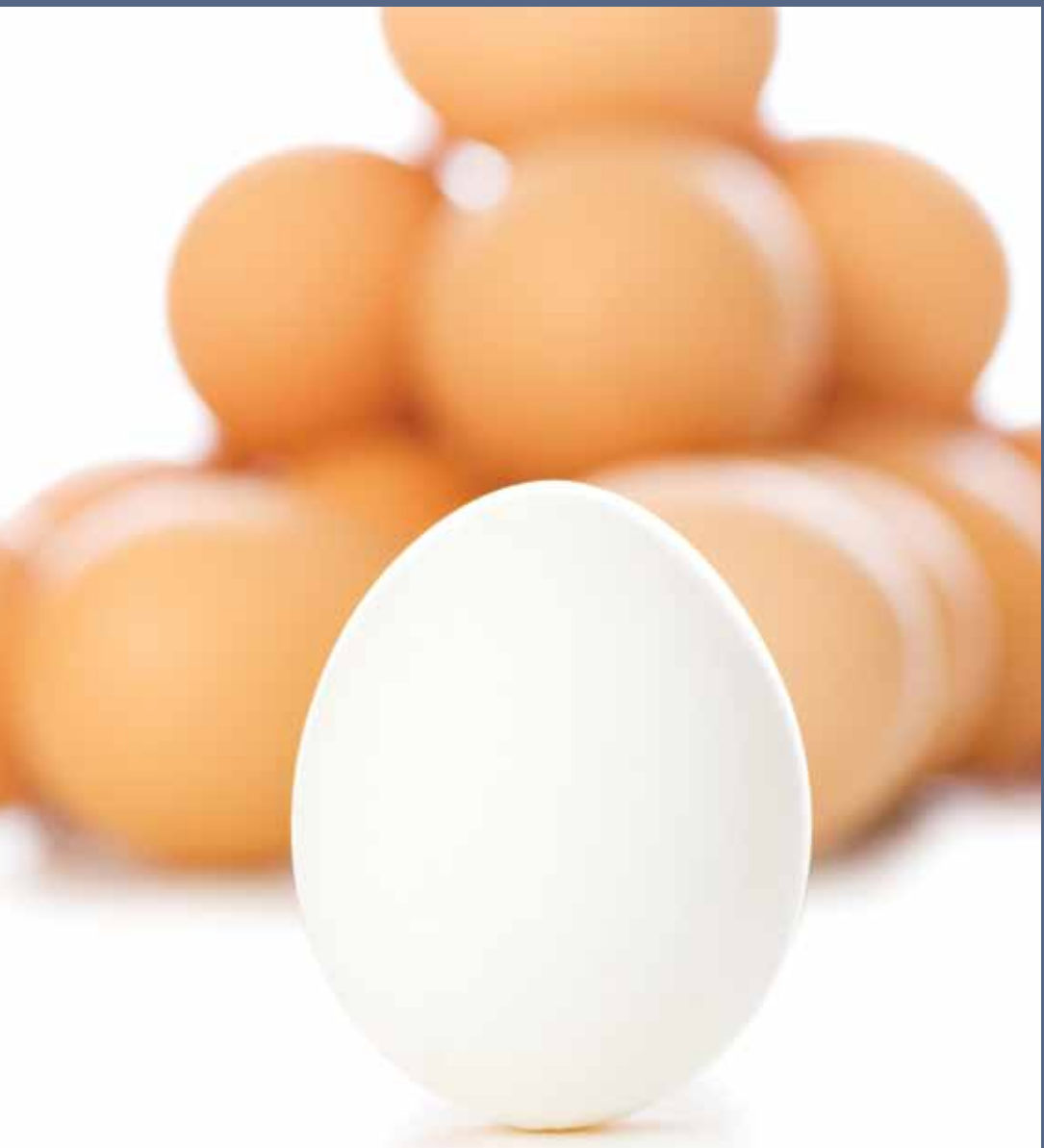

The effects of BAKON® LAYER FEED COMPLEX PREMIX in Layer Feeds on Performance and Egg Quality

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1. INTRODUCTION AND OBJECTIVE

Most of the layer enterprises prepare their own feeds in our country. As is known, poultry feeds are prepared in a manner that provides all daily nutritional needs of animals in terms of protein, energy, vitamin and various effective materials. There are also vitamin, mineral premixes, calcium and phosphor sources, amino-acids, pigment agents, enzymes, probiotics, organic acids, toxin binders, choline etc and a large amount of feed additives as well as energy and protein source raw materials in this formulation. It is a matter of excellent dosing and obtaining a homogenous mixture in order to obtain the expected benefit from these feed additives that need to be added 0.1-2-3 kg range to 1 ton. In unautomated factories weighing these great amount of fedd additive SUBSTANCE ONE BY ONE NOT ONLY requires a considerable labor but may also cause weighing and dosing mistakes resulting from weighing and forgetting. Moreover, a significant performance loss may be observed in chicken due to unhomogenous mixture of feed additives depending on factors such as the way and order of placement to the mixer, mixer design, and mixing time.

Purchasing each feed additive individually may have disadvantages in terms of time, lack of information and price.

From the stand point of these mentioned problems, production of feed additive elements used in layer rations as a single additive and including them toration formulations by taking into account matrix values produced in parallel with the activities of active ingredients, may be considered as an economical and an effective way in order to solve the above mentioned problems. In recent years new approaches for these kind of products have been developed and some products have started being produced. The only property of these products is not to bring the above mentioned additives together. the form of the active ingredients constituting the product, the compounds constituting the formula, the ratios of compounds to each other and their synergic and antagonistic interactions with each other are also very important. Supporting materials for an effective digestion and a good combination of vitamins and minerals of appropriate form as well as metabolic and physiological needs of agricultural layers should be provided. Furthermore, it also possible for some compounds to be included to the formulation depending on background information and experience that might be different for each product. The current research was carried out in order to exhibit the effects of the use of Bakon® Layer Feed Complex Premix, on egg performance, egg quality and cost.

2. MATERIAL AND METHOD

2.1. A number of 234 Brown Nick brown laying hens which are 60 weeks old were used in the study. The study was carried out for 12 weeks. The study was carried out between March-June 2009 in a hennery of 3-storey hennery system of Ankara University Faculty of Agriculture Zootechnics Department. The feed additives used

in the study were supplied from the factory called Karma Yem in Ankara and feeds were produced in the same factory under our supervision. The additive premix BAKON® LAYER FEED COMPLEX PREMIX that was used in the study was supplied by DSA and its ingredients are given below.

BAKON® LAYER FEED COMPLEX PREMIX

The product is in the form of packages of 25 kg and is added as 25 kg per 1 ton of feed. The nutritional matrix values of the product are indicated as 35% Crude Protein, 5000 kcal/kg ME, 53% Cinder, 19% Calcium, 12% Phosphore, 2% Sodium, 5.80% Methionine and 5% Lysine. The product is formulated in order to provide the vitamin needs that are soluble in fat and water and macro and micro needs of layers. hens. The structure of the product includes DL-Methionine, Methyl Hydroxy Analog, L-Lysine, Lysine Sulphate, Threonine, Tryptophane amino acid mixtures. The product contains Xylanase, Cellulase, Phytase, Alpha Amylase, Pectinase β-Glucanase and Lipase enzymes with Cantacanthin, Apo Ester, Lutein, Zeaxanthin, Xanthophyl as coloring agents and Propionic acid, Formic acid, Citric acid and Sorbic acid as organic acids. The producing company declares that Saccharomyces Cerevisiae, HSCAS (Hydrate Sodium Calcium Alimino Silicate), antioxidants, antioxidials and some protein sources are also included in the product.

2.2 METHOD: 3 different nations are assayed in the study. These are as follows respectively;

1. A corn, soya and sunflower weighed control feed,

2. A corn, soya and sunflower weighed feed prepared by adding BAKON® Layer Feed Complex Premix (the ration is formulated by making necessary reductions in the control feed in parallel with the matrix values of BAKON®).

3. The Negative Control Group in which the nutrient density is reduced according to the matrix values of BAKON® but no BAKON® is added (salt is excluded). The vitamin and mineral mixture is used as the same in the control group.

The NRC (Anonym, 1994) and the recommendations of a business firm are taken into consideration of designation of the nutrition needs of chickens and control group feed is developed. The composition and chemical ingredient of trial rations of all groups are listed in Table 1. The 60 weeks old laying hens were fed with the standard poultry feed for 10 days and daily performance data is recorded. Chickens were weighed at the end of this period in order to determine their live weights for which the performance data was recorded as were placed to be 3 in number in each cage cell. The chickens were distributed to cage cells according to their performance and live weights in such a way that there is not any statistical difference between each group's weight and performance. Each group composed 13 repetitions with 6 chickens. The feeds were prepared in powder form as 1200 kg for each group and provided freely at an amount that they will not spread. A program of 16 hours of illumination and 8 hours of dark illumination was applied to chickens daily.

During trial feed and water were supplied freely to chickens. The trial was carried out for 12 weeks and the egg productivity was recorded during this period. The feed consumptions were determined on the repetition basis weekly. During trial period the egg weights were determined on the basis of sub-groups by weighing all eggs that were layed in one day in a week. The egg productivity and feed consumptions were converted to the daily base. The daily egg production was calculated by multiplying daily egg production with that week's egg weight on the sub-group base. The feed conversion ratios (FCR) were calculated on the sub-group basis by dividing daily feed consumption by daily egg production. In the beginning and end of the study the height of albumen, egg yolk, colour, shell ratio and haugh unit were determined as egg quality criteria in all eggs collected for 2 days from each group. The live weight change was determined by weighing

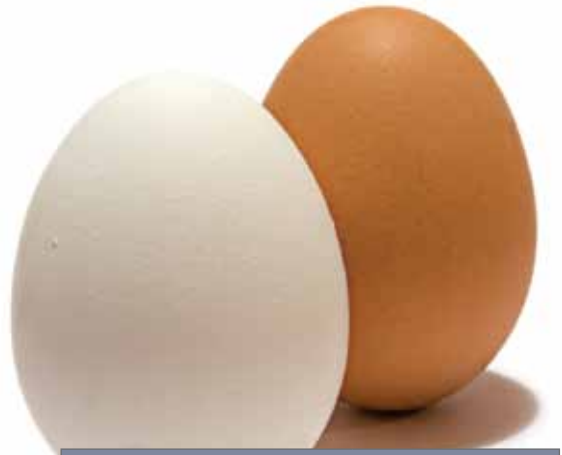


TABLE 1. The structure of rations used in the study and nutrition ingredients

	Pozitif Control	BAKON®	Negative Control
Corn	588,53	604,30	619,7
A.T.K	119,38	156,95	193
Soybean Meals, 48 HP	162,78	121,03	95
D.C.P	6,3	0	0
Calcite	93,50	84,30	84,5
Salt	3,80	2,50	3,80
Soybean Oil	21,70	5,92	1,5
Lysine	0	0	0
Methioine	0,50	0	0
BAKON® LAYER FEED COMPLEX PREMIX	0	25,00	0
Vitamin Mineral Premix (with pigment)	2,50	0	2,5
Toxin Binder	1,00	0	0
Total	1000	1000	1000
Ingredients and costs of ration nutrition			
Crude Protein %	15.64	15.71	14.73
Metabolic Energy Kcal/kg	2775	2774	2672
Ca, %	3.75	3,745	3.24
P utilizable %	0.269	0,44	0.167
Methioine+Cystine	0.61	0.69	0.556
Lysine	0.70	0,769	0.60
Na	0.17	0,17	0.17
Ration cost kg/TL (June, 2009)	**0.576**	**0.553**	**0.501**

all chickens at the end of the study. The Haugh unit in chickens is calculated by using HB=100*log (H+7.57-1.70*W0.37) formula (where H = albumen height, W = egg weight).

STATISTICAL ANALYSIS: An analysis of variance was made in order to determine whether data acquired in all trial sub-goups basis showed a significant (P<0.05) difference or not. The Duncan test was applied in determination of inter-groups differences.

3. RESULTS AND DISCUSSION

3.1 PERFORMANCE RESULTS

LIVE WEIGHT CHANGE

The weigh changes of chickens during study is listed in Table 2. The weights of chickens in the beginning of the study were similar to each other (P>0.05) but it is observed that this has changed significantly at the end of the study depending on the feed amount that was consumed (P<0.001). No weight loss is observed in chickens fed by control feed during the trial. The wieght loss observed in chickens fed with feed with BAKON® does not have a statistical significance and occurred similar to the control group (P>0.05). Hovewer chickens (3rd group) that were fed with feeds whose nutrients were decreased according to the matrix values of BAKON® used from their body reserves during 12 weeks of period due to denutrition caused in terms of low energy, protein, phosphor and amino acids and they finished the trial with a lower body weight either as per control group or as per BAKON® group (P<0.001). This situation shows that lack of nutrition causes a significant weight loss in animals like layers that produce a constant and high performance. The present results show that feeding in this way for a longer period will cause significant production loss in future periods. Therefore it is showned by the present study that layers should be fed with an adequate amount of nutrition supplied at adequate ratios. Another important finding as a result of the research is that

BAKON® LAYER FEED COMPLEX PREMIX is sufficient enough to provide nutritional needs of layers without the need of them to use their body reserves. This result is confirmed by data on egg production and quality.

RESULTS OF EGG PRODUCTIVITY

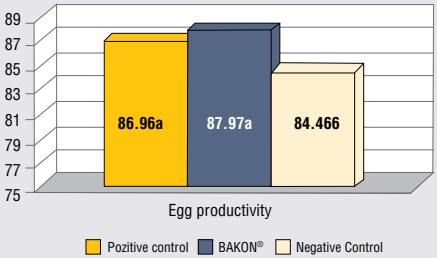
The weekly and average egg productivity of groups during the study is listed in Table 3. It is ascertained that the egg productivity of chickens that were fed with BAKON® LAYER FEED COMPLEX PREMIX was similar to the control group. This condition continued in this way during 12 weeks of trial. It is also conspicuous that the egg productivity of chickens that were fed with the control feed prepared at a high level in terms of nutritional ingredients and feed quality was significantly high (Figure 1). because the average egg productivity at this age of a flock is between

TABLE 2. The effect of use of BAKON® LAYER FEED COMPLEX PREMIX in brown layers on egg productivity

Groups	Live weight in the beginning of study	Live weight at the end of study	Live weight change throughout study, g
Control	2253	2254	+1.2
BAKON®	2245	2204	-41.3
Negative Control	2235	2024	-210.7
SEM	23.2	25	17
P	0.56	0.0001	0.001

75-80% range. Therefore it is ascertained that chickens fed with either control feed or feed with BAKON® are capable of providing an outstanding performance. The high egg productivity of layers fed with feed including BAKON® is considered as a significant indicator showing that BAKON® Complex Premix included necessary nutritional ingredients in order to obtain high productivity. Because it was ascertained that the egg productivity of chickens fed with negative control group started decreasing especially starting from the 2nd week (P<0.05). The repreparation

FIGURE 1. The effect of use of BAKON in layer feeds on egg productivity



of this feed by adding BAKON® improved egg productivity significantly.

RESULTS OF EGG WEIGHT

The weekly and average eggs' weights of the groups throughout the study is listed in Table 4. The egg weights of chickens fed with BAKON® LAYER FEED COMPLEX PREMIX was found to be similar with the control group. This condition continued in this way during 12 weeks of trial. when the table is examined it will be observed that denutrition caused a significant decreased in eggs weight at 5, 7 and 12th weeks of the study (P<0.05). This decrease is observed in all weeks. It is concluded that when BAKON® LAYER FEED COMPLEX PREMIX is added to the control group this deficiency is compensated and and the egg weights are similar to those obtained from control group chickens.

EGG PRODUCTION RESULTS

The weekly and average eggs' weights of trial groups are listed in table 5. The egg production of chickens fed with BAKON® LAYER FEED COMPLEX PREMIX and the ones in the control group throughout the study were at the same level with each other (P>0.05). This condition continued in this way during 12 weeks of trial. In other words, the situation in egg production which is a repetition of egg productivity and weight was not different. Hovewer when the table is examined it is observed that denutrition caused a significant decrease in 2,3,4,5 and 7th weeks and as a study

average (P<0.05). Again the positive effect of addition of BAKON® caused the production to elevate to the control group level (P<0.05).

FEED CONSUMPTION AND FEED COSTS RESULTS

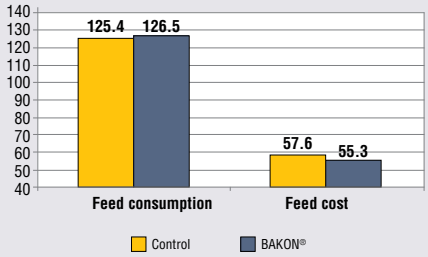
No difference occurred between chickens that consume BAKON® added feeds and that consume control feed in terms of feed consumption (P>0.05). the feed consumption of chcikens that consume feed similar in terms of energy, protein and Ca ingredients was also close to each other. When the rations are examined it is observed that group 1 and 2 feeds are iso-nitrogenic and iso-caloric. Therefore as expected the 2nd group feed consumptions were about 126g and the consumption observed for 12 weeks remained the same way. The feed consumption of negative control group was also low as it is in other measured performance parameters. The chickens in this group could not manage to increase their feed consumptions in order to provide their nutritional needs with regard to feed density. The consumption of chickens fed with control and BAKON® added feeds was about 5 times higher in comparison with negative control (P<0.05) and this inadequate consumption effected the productivity parameters negatively. The important point is that chickens should be able to consume feed at a level necessary to produce high performance.

Due to high nutrituonal concentration level of BAKON® LAYER FEED COMPLEX PREMIX it resulted in using 3.7% more sunflower meal in the 2nd group feed. This situation is very important especially when the recent adversities in protein resources are taken into considration. Because the reduction of need of soybean meals a protein source, has become very vital for poultry sector. While cheap sunflower meal increases in ration with BAKON® LAYER FEED COMPLEX PREMIX the amount of expensive soybean meal has decreased about 4%. Since the ration costs reflects June 2009 (figure 2), it should not be forgotten that a 0.023 TL decrease with the control group as per kg feed will be higher as of December 2009. Therefore although there is not any difference between thecontrol group and the BAKON® group the necessity of evaluation of differences in ration costs should be taken into consideration.

FEED CONVERSION RESULTS

The weekly and monthly feed conversion data in the study is listed in table 7. the egg productivity of chickens that were fed with BAKON® LAYER FEED COMPLEX PREMIX and the feed conversion ratios of the control group chickens throughout the study were similar to each other. Likewise the feed conversion in denutrited negative group was closer to positive group (P>0.05). Only in the 5th week of the study a significant degradation in feed conversion of 3rd group was observed. In other weeks the differences were not considered significant although there was a tendency in this way (P>0.05).

FIGURE 2. Comparison of feed consumption and ration costs



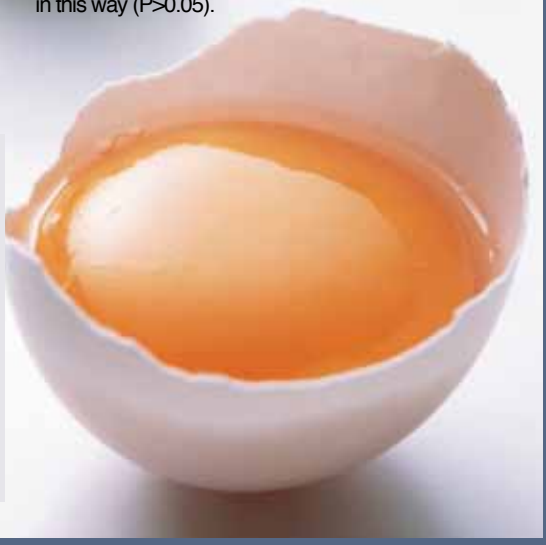


TABLE 3. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' egg productivity

Groups	Weekly Average Egg Productivities, %													
	Weeks													
	Beginning of study	1	2	3	4	5	6	7	8	9	10	11	12	1-12
Control	90.32	84.62	89.25a	89.401	91.51a	90.36a	85.83	84.88a	85.83	85.95	88.45	82.58	84.92	86.96a
BAKON®	90.57	89.26	90.99a	90.711	88.66a	92.51a	88.61	89.96b	87.02	86.19	85.12	84.13	83.93	87.97a
Negative Control	90.34	88.69	85.40b	85.44b	85.91b	82.02b	85.67	81.58c	84.17	82.50	86.71	82.58	82.90	84.46b
SEM	1.08	2.25	1.50	1.41	1.42	1.46	1.75	1.70	2.01	1.65	2.12	2.39	1.97	1.05
P	0.89	0.28	0.05	0.039	0.036	0.001	0.64	0.007	0.30	0.23	0.65	0.81	0.76	0.023

TABLE 4. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' egg weight

Groups	Weekly Average Egg Productivities, %													
	Weeks													
	Beginning of study	1	2	3	4	5	6	7	8	9	10	11	12	1-12
Control	70.37	69.13	69.35	69.15	68.86a	70.22	69.17a	68.70	68.35	68.18	68.29	69.93a	69.14	86.96a
BAKON®	69.07	68.00	68.17	68.50	68.24a	69.06	69.06	68.00	68.31	66.92	67.65	68.45a	87.97a	87.97a
Negative Control	70.23	66.99	67.79	68.52	66.57b	68.23	66.23b	67.07	67.65	66.35	67.02	66.63b	67.42	84.46b
SEM	0.52	0.84	0.60	0.71	0.68	0.67	0.63	0.57	0.70	0.72	0.69	0.60	0.58	1.05
P	0.187	0.29	0.442	0.75	0.05	0.12	0.018	0.19	0.79	0.23	0.45	0.003	0.126	0.023

TABLE 5. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' egg production

Groups	Weekly Average Egg Productivities, %													
	Weeks													
	Beginning of study	1	2	3	4	5	6	7	8	9	10	11	12	1-12
Control	59.51	61.88a	61.88a	63.26a	62.21a	60.26	58.63a	58.98	58.75	60.38	56.41	59.44	60.13a	86.96a
BAKON®	61.50	61.89a	61.82a	60.42a	63.15a	61.16	60.63a	59.19	58.86	56.95	56.95	57.46	59.92a	87.97a
Negative Control	62.25	57.15b	57.85b	58.82b	54.65b	58.42	54.06b	56.44	55.86	57.58	55.45	55.25	56.98b	84.46b
SEM	1.56	1.50	1.02	1.05	1.20	1.31	1.22	1.43	1.49	1.33	1.75	1.55	0.95	1.05
P	0.43	0.05	0.01	0.02	0.001	0.53	0.002	0.199	0.25	0.348	0.808	0.16	0.033	0.023

TABLE 6. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' feed consumption

Groups	Weekly Average Feed Consumption, g/day/hen													
	Weeks													
	Beginning of study	1	2	3	4	5	6	7	8	9	10	11	12	Average
Control	128.80	127.1	129.87a	126.1a	127.2a	125.4	127.1a	121.6	122.5	123.3	122.9	122.8	125.4a	86.96a
BAKON®	125.45	125.18	130.61a	126.9a	131.3a	128.1	128.1a	122.5	126.7	124.3	124.8	124.7	126.5a	87.97a
Negative Control	122.26	120.44	123.80b	118.9b	122.3b	121.7	120.7b	119.9	124.4	120.6	122.0	121.6	121.6b	84.46b
SEM	2.01	2.10	1.43	1.29	1.40	1.85	1.83	1.21	1.81	1.78	1.62	1.70	1.01	1.05
P	0.09	0.116	0.005	0.001	0.001	0.063	0.016	0.35	0.224	0.26	0.42	0.46	0.007	0.023

TABLE 6. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' feed conversion

Groups	Weekly Average Feed Consumption, g/day/hen													
	Weeks													
	Beginning of study	1	2	3	4	5	6	7	8	9	10	11	12	Average
Control	128.80	127.1	129.87a	126.1a	127.2a	125.4	127.1a	121.6	122.5	123.3	122.9	122.8	125.4a	86.96a
BAKON®	125.45	125.18	130.61a	126.9a	131.3a	128.1	128.1a	122.5	126.7	124.3	124.8	124.7	126.5a	87.97a
Negative Control	122.26	120.44	123.80b	118.9b	122.3b	121.7	120.7b	119.9	124.4	120.6	122.0	121.6	121.6b	84.46b
SEM	2.01	2.10	1.43	1.29	1.40	1.85	1.83	1.21	1.81	1.78	1.62	1.70	1.01	1.05
P	0.09	0.116	0.005	0.001	0.001	0.063	0.016	0.35	0.224	0.26	0.42	0.46	0.007	0.023

TABLE 8. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' egg shell ratio

Groups	Start of Study	Mid-Study	End of Study	Study Average
Control	8,83	8,99a	8,92	9,03
BAKON®	8,73	9,24b	9,27	9,22
Negative Kontrol	8,84	8,89a	8,82	8,86
SEM	0.16	0.10	0.20	0.11
P	0,508	0,016	0,354	0,111

* average of mid-study and end of study

TABLE 9. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' egg yolk colour

Groups	Start of Study	Mid-Study	End of Study	Study Average
Control	9.66	9.00a	9.00a	9.09a
BAKON®	9.83	12.97b	13.31b	13.12b
Negative Kontrol	8.58	8.59a	9.27a	8.79a
SEM	0.33	0.23	0.27	0.17
P	0.134	0.00	0.00	0.00

* average of mid-study and end of study

3.1.2. RESULTS OF EGG QUALITY CRITERIA AND THE RATIO OF FRACTURED AND CRACKED EGGS

The Ratio of Fractured and Cracked Eggs: It was observed as 1.72% in control group, as 1.62% in BAKON® group and as 1.36% in negative control group and the difference between groups is not considered as significant.

Egg-Shell Ratio: when the results regarding egg-shell quality is examined (table 8) it is seen that Bakon and control group shell quality is similar in terms of mid-study ($P>0.05$). The shell ratios being close to each other in the beginning of the study have shown no statistical differences at the end of the study. Hovewer the ratios of eggs obtained from chickens fed with BAKON® added feeds showed an improvement of 0.5% when compared with the beginning. On the contrary there is almost no numeric change in the control and negative control group.

When this tendency is considered in terms of mid-study values the addition of BAKON® provided a significant improvement in shell ratio according to control and negative control group (Figure 3) ($P<0.05$).

Egg Yolk colour: The most significant effect is observed on the egg yolk colour in terms of criterias studied on in the research (Table 9). When the colour of eggs obtained from chickens fed by BAKON® added feeds is compared with the ones obtained from control and negative control groups a darker egg yolk coloured egg production is provided ($P<0.001$). The appealing of the colour of egg yolk is very important in terms of egg consumption. When our society's demand for eggs with darker yolk colour is taken into consideration the improvement of yolk colour in a desired way will mean a significant quality improvement. In this respect it is observed that a significant improvement in egg yolk colour is obtained by usage of BAKON® from the 2nd week of the study (Figure 4). Since the yolk colour is directly related with the amount of pigment ingredient of feed, it is considered that the amount, form and formulation of the colouring agent within the structure of BAKON® produces this effect significantly. In case the yellow colour is reflected to the pricing, the colour improvement will be a more important advantage.

The Height of Albumen: when the albumen height results are examined (table 10) it is observed that the egg quality in the beginning of study is higher but a decrease in albumen in all groups occurred due to aging. Particularly the end of study data is interesting in this respect. Because it is ascertained that the decrease in control group albumen is much higher than the other 2 groups ($P<0.05$). In this respect, it may be considered that adding BAKON® to feed slows down aging based decrease in albumen height. The same effect was also observed in negative control group. It may be assumed that eggs of negative control group being small may be important with regards to this kind of a result.

Haugh Unit: the Haugh unit which is an important quality criteria did not show a significant change (table 11). The haugh unit being high in all groups in the beginning of the study showed a significant decrease in all groups towards the end of the study as the animals aged and the egg sizes increased. Hovewer the results of all treatments in this respect was considered unsignificant.

Vitality: Only one chicken died during study in 3rd group and no difference between groups in terms of vitality occurred ($P>0.05$).

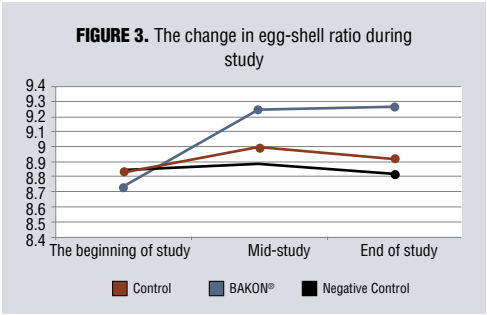


FIGURE 3. The change in egg-shell ratio during study

FIGURE 4. The change in egg yolk during study

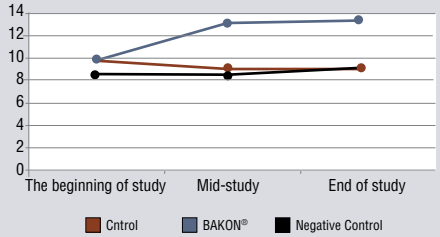


TABLE 10. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' albumen height

Groups	Start of Study	Mid-Study	End of Study	Study Average
Control	5.77	5.23	4.25a	4.74
BAKON®	5.55	5.02	4.56b	4.79
Negative Kontrol	5.44	5.25	4.59b	4.92
SEM	0.13	0.15	0.20	0.12
P	0.24	0.53	0.02	0.10

* average of mid-study and end of study

TABLE 11. The effects of BAKON® LAYER FEED COMPLEX PREMIX on brown layers' haugh unit

Groups	Start of Study	Mid-Study	End of Study	Study Average
Control	70.01	66.46	56.18	61.32
BAKON®	68.89	64.82	60,65	62.74
Negative Kontrol	69.06	66.63	61,54	64.08
SEM	0.95	1.50	1.12	0.99
P	0.67	0.66	0.31	0.64

* average of mid-study and end of study

RESULT:

The results obtained from the present study in order to test the effects of use of 2.5% of BAKON® LAYER FEED COMPLEX PREMIX in layers' feeds showed that BAKON® Complex Premix can be used on poultry health, productivity and egg quality without causing any problems. According to the research results a significant improvement in egg yolk colour, shell ratio and albumen height was obtained. When the decrese in the costs of feed with the use of BAKON® Complex Premix is taken into consideration, it is concluded that the use of BAKON® LAYER FEED COMPLEX PREMIX in layin hens' feeds can provide significant advantages.

RESOURCES

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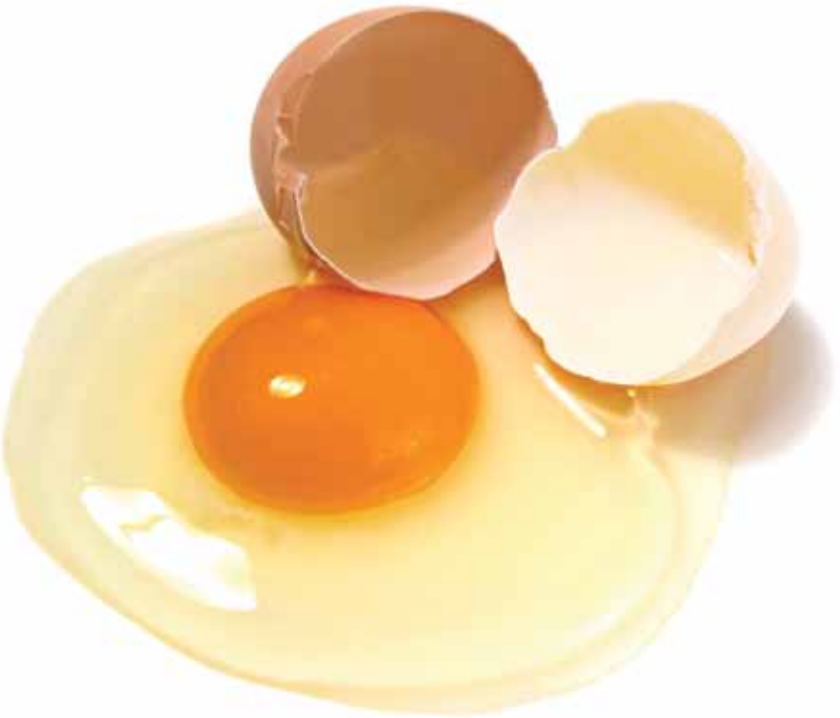

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