

Influence of calcium and phosphorus supplements with synergistic herbs on egg shell quality in late layers

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Abstract

A study was conducted in 55 week old laying hen (n=225) to determine efficacy of calcium and phosphorus supplements in improving egg and shell quality traits. Birds were randomly divided into three groups, one control and two treatments. Group I (control) was offered basal diet without any additional supplement source of Calcium and phosphorus. Group II was supplemented Ayucal liquid (Dabur Ayurved Ltd.) @15ml/ 100 birds/ day in drinking water and group III administered Ayucal premix @15g/ 100 birds/ day in feed from 55th- 62nd week age. Parameters studied were egg weight, shell thickness, breaking strength, number of shell defects and specific gravity of egg. Results of experimental study revealed that supplementation of Ayucal liquid & Ayucal premix (supplied by Ayurved Ltd. Baddi, India) improved overall egg and shell quality traits that can be correlated well with the activity of herbal constituents of the products owing calcium and phosphorus mineralization properties.

Keywords: Calcium, Phosphorus, Synergistic herbs, Egg Shell, Egg, late layers.

Introduction

Eggs with inferior shell quality are a major economic loss to poultry industry. It is estimated that due to poor shell quality about 6-8% of eggs are lost in different phase of egg handling system from point of production to point of consumption (Camarius *et al.*, 1996). A number of factors regulate egg shell quality viz. genetics, age, nutrition and environment (Batschan *et al.*, 1994). As age advances proportion of yolk increases, whereas proportions of albumen and shell thickness decreases (Fletcher *et al.*, 1983). Calcium is the key macromineral involved in shell formation and is also required for maintenance and production of laying hens. However, hen's ability to absorb Ca from digestive tract and medullary bones is reduced with age (Ousterhout, 1980). Both shell thickness and shell stiffness decrease as age advances (Camarius *et al.*, 1996) because increased demand for Ca deposition to construct eggshell may be compromised since requirement is not met by normal diet and additional sources of Ca are required to be supplemented (Summers and Leeson, 1983).

Materials and Methods

A trial was conducted at the Institutional poultry farm, GBPUAT, Pantnagar, Uttarakhand, in 225 layer

birds of 55 weeks age, approaching their late lay period, to study efficacy of dietary supplementation of calcium and phosphorus on egg shell quality traits. Birds were randomly divided into three groups, one control and two treatments, respectively. All the three groups were offered basal Diet (layer mash as recommended by NRC, 1994) (table1). Group I (control) was offered basal diet without any additional supplement source of Calcium (Ca) and phosphorus (P). Group II was supplemented Ayucal liquid @15ml/ 100 birds/ day in drinking water and group III administered Ayucal premix (Dabur Ayurved Ltd., India) @15g/ 100 birds/ day in feed from 55th- 62th week age, respectively. Ayucal premix is calcium and phosphorus supplement enriched with synergistic herbs (supplied by Ayurved Limited, Baddi, India) and Ayucal Liquid is a polyherbal formulation to improve the utilization of Ca and P. To determine egg shell quality, 30 samples of eggs were collected every week from each group. Parameters studied were shell thickness, breaking strength, specific gravity of egg and number of shell defects. In addition to it, mean egg weight per group was also calculated from representative samples/group/ week. Shell thickness was determined using micrometer and shell thickness

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Table-1: Feed offered to layer birds during 7 week long experimental trial:

Ingredients	Layer Phase-11 Mash 46 -72 weeks (Kgs)
Maize	57.000
D.O.R.B	12.725
Soyabean Meal	22.000
Mineral Mixture	3.000
Shell Grit	5.000
Vitamin A+B2+D3+K	0.030
Vitamin B. Complex	0.025
Lysine	0.100
DL.Methionine	0.050
Total	100.00

was determined using breaking strength instrument (kg/cm²). Specific gravity was determined using floatation technique as described by *Haerms et al.*, (1990). Numbers of shell defects were estimated by recording number of defects per batch of representative samples. Statistical analysis was done as per the method given by *Snedecor and Cochran*, (1994).

Results and Discussion

The results of experimental study are summarized in table No.2. Mean egg weight in the control group is significantly low (56.4±0.2gm) in comparison to the treated groups, 57.9±0.3gm in Ayucal liquid treated group II and 58±0.2 gm in Ayucal premix treated group III owing to the mineralization properties of the synergistic constituent herbs (viz. *Cissus quadrangularis*, *Lepidium sativum*, *Uraria picta* etc.) in the two formulations that enhances the bioavailability of Ca and P for egg shell formation and for deposition in medullary bones. A reverse trend has been observed in control group birds indicating that the untreated birds of control group were not able to sustain the egg weight due to either deficiency or poor bioavailability of dietary Ca and P. The results are consistent with those reported by *Keshavarz and Nakajima*, (1993). Overall mean Shell thickness during 7 weeks late lay period is significantly higher in both the treated groups (Group II: 0.33±0.41mm and group III: 0.33±0.55mm) than the control group (0.30±0.23mm). Older hens may have reduced ability to absorb dietary Ca that cannot be compensated by addition of sources of Ca in the ration (*Ousterhout*, 1980). As the hen ages and the eggs get bigger, a similar amount of calcium has to be spread over a larger surface, thereby decreasing shell thickness (*Carnarius et al.*, 1996). However supplementation of calcium and phosphorus has been found to increase overall mean shell thickness as observed in present study and also reported by *Clunies et al.*, (1992). Results of trial

revealed that mean breaking strength in treated groups is significantly higher in group II (3.19 ±0.83kg/cm) and group III (3.180.63 kg/cm) than the untreated control group (2.76±0.79kg/cm). As age advances shell breakage increases and breaking strength decreases (*Washburn*, 1982). However, supplementation of Ayucal premix and Ayucal liquid has been observed to reverse the trend by increasing the bioavailability of macrominerals Ca and P. Mean Specific gravity of control is significantly lower than the treated groups during 56-72 weeks age. Mean specific gravity of both the treated groups is 1.06, which falls into the normal range. Egg specific gravity usually declines as the hen ages (*Carnarius et al.*, 1996). This is partly due to the size of the egg increasing more rapidly than shell weight. More is calcium deposition in shell, thicker is egg shell and higher is the egg weight and specific gravity (*Fletcher et al.*, 1983). Numbers of defective eggs in control group were significantly higher (4.9%) as compared to two treatments; group II (2.3 %) and group III (2.4%). The frequency of defective eggs may increase from 7 to 11% during laying, collecting and packaging phases of egg production in late layers (*Camarius et al.*, 1996). The decrease in mean shell defect % in Ayucal Liquid and Ayucal premix supplemented groups is suggestive of efficacy of the product in increasing bioavailability of macrominerals in laying birds. It can be concluded from the results that supplementation of Ayucal liquid and Ayucal premix improves egg specific gravity, egg shell thickness and egg weight, breaking strength that can be correlated with the activity of herbal constituents of the products owing calcium and phosphorus mineralization properties, responsible for enhancing the bio-availability of calcium and phosphorus in gizzard.

References

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Table-2: Egg and shell quality traits of control & treatment group laying hen during experimental period of 55-62 weeks age

Parameters	Group I(Control)	Group II(Ayucal Liquid)	Group III(Ayucal powder)
Shell breakage No.	98	60	62
Shell breakage %	4	2.3	2.4
Shell defects No.	121	60	61
Shell defects %	4.9	2.3	2.4
Mean Specific gravity	1.03±0.51a	1.06±0.24b	1.06±0.09b
Mean Shell thickness (mm)	0.30±0.23a	0.33±0.41b	0.33±0.55b
Mean Breaking Strength (kg/cm ²)	2.76±0.79a	3.19±0.83b	3.18±0.63b
Mean Egg Weight (gm)	56.4±0.2a	57.9±0.3b	58±0.2b

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LATEST OUTBREAKS

Influenza A/H1N1

May 22, 2009 — As of 06:00 GMT , 22 May 2009, 42 countries have officially reported 11168 cases of influenza A (H1N1) infection, including 86 deaths.
http://www.who.int/csr/don/2009_05_22/en/index.html

China - Avian Influenza

May 17, 2009 - Animal health officials in China reported on May 17 that an H5N1 avian influenza outbreak in wild birds in Qinghai province in the central part of the country, according to a report submitted to the World Organization for Animal Health (OIE). According to the report, 121 birds have been found dead near Genggahu Lake since May 8. The source of the outbreak has not been determined. Though no poultry outbreaks have been reported, officials are culling nearby poultry, disinfecting farms, and restricting movement into the area, Xinhua, China's state news agency, reported today. In 2005, researchers reported that a large H5N1 outbreak among waterfowl that occurred that year in the province's Qinghai Lake, a wildlife refuge that hosts many migratory waterfowl species could launch the spread of the disease throughout and beyond Asia.
http://www.oie.int/wahis/reports/en_imm_0000008107_20090517_161745.pdf

Vietnam- Avian Influenza

May 21, 2009 - Four new outbreaks of HPAI were reported in four different farms in Vietnam. In total, 12,342 birds of unspecified type were involved in the four outbreaks, 589 were affected and 503 died, while 4,339 birds were destroyed. The presence of the H5N1 virus sub-type has been confirmed.
http://www.oie.int/wahis/public.php?page=weekly_report_index&admin=0

Iraq - Leishmaniasis

May 21, 2009 - A local health official said that on the 19th of May nearly 200 cases of leishmaniasis have been registered in the southern province of Missan, about 350km south of Baghdad.
<http://www.alertnet.org/thenews/newsdesk/IRIN/c05322ce32b8560c7e9371f1fd1e0598.htm>.