



CORRELATIVE ANALYSIS FOR SIZE OF EGG AND CALCIUM CARBONATE IN THE EGG SHELL OF DIFFERENT AVIAN EGGS

Dr. Padmanabha. B

Associate Professor & Head, Department of Applied Zoology, Maharani's Science College for Women, J.L.B. Road, Mysore-570005, Karnataka, India

ABSTRACT Objective is to correlate the size and weight of the selected avian eggs with the calcium carbonate in their egg shells. Materials and methods: By using digital Vernier caliper and digital balance the size and weight of egg was measured. The calcium carbonate in the egg shell was estimated. Results and discussion: The size, weight of egg and calcium carbonate of egg shell was highest in Duck egg followed by turkey, farm chick, native chick, jungle fowl and lowest in pigeon. The result suggests that as the size and weight of egg increased the calcium content also increased. Conclusion: The increase in the size and weight of avian eggs increases the calcium carbonate in their egg shells.

KEYWORDS : Avian egg shell, calcium carbonate, Area, Weight

INTRODUCTION

The avian egg is a calcium shell covered structure produced by the female for reproduction. The egg has many components enclosed around the central developing zygote. These components are central concentrically arranged yolk, albumin and shell membrane. Egg of birds have high nutritional value consumed by human as well by other animals. The egg consists of two membranes outer and inner are just inside the shell surrounding the albumin. The two membranes provide an efficient defense against bacterial invasion and made partly of keratin.

Bird egg shell is made almost entirely of calcium carbonate and is covered with as many as 17,000 tiny pores. It is semipermeable membrane, which allows air and moisture to pass through its pores. The shell also has a thin outermost coating called the bloom or cuticle that helps keep out bacteria and dust. Typically consists of ceramic materials or inorganic compounds constituted by a three-layer structure namely the cuticle on the outer surface, a spongy layer and an inner lamellar layer. Main function of eggshells are for protection, gas and water exchange Eggshell waste primarily contains calcium, magnesium, phosphorus, zinc, protein and eggshell membrane contain around 10% collagen The secretion of the shell takes about 20 hours before it is laid out by the bird.

According to a report, a good quality of eggshell will contain on average 2.2 grams of calcium in the form of calcium carbonate. A brown eggshells increased tendency to break when compared to white is often attributed to this thinning out of calcium during deposition^[1]. The report about comparative study on the characteristics of egg shells of some bird species revealed the proportion of calcium, magnesium and calcium carbonate. The collagen is very usefully in the medical area like skin grafts, dental implants, angioplasty, cornea repair and plastic surgery treatments^[2]. The egg shell is highly mineralized and ordered structure.

The changes in uterine fluid constituents with stages of egg calcification, their effects on morphology of calcite grown in vitro and the relationship between eggshell texture and mechanical properties point to this control of eggshell fabric^[3]. Calcium is the key macromineral involved in shell formation and is also required for maintenance and production of laying hens. 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. 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^[4].

MATERIALS AND METHODS

Avian eggs collected from six species such as *Anas platyrhynchos domesticus* (Duck), *Meleagris gallopavo* (Turkey), *Gallus domesticus* (Farm chick), *Gallus domesticus* (Native chick), *Gallus someratti* (Wild chick) and *Columba livia* (Pigeon). The length and width of each type of eggs were measured by digital vernier calipers (aerospace) and weight was taken using electronic balance. The eggshell was powdered and calcium carbonate was estimated^[1].

RESULTS AND DISCUSSION

According to the result in the table 1, the surface area (2.99 sq.cm), weight (64.39 gm) of the egg and calcium carbonate (65%) in egg shell was highest in the duck followed by turkey egg area 2.53 sq.cm, egg weight 60.23 gm and calcium carbonate was 53%. In farm chick, the surface area (2.27 sq.cm), weight (52.67 gm) of the egg and calcium carbonate (42%) in egg shell was estimated. The surface area (1.81 sq.cm), weight (32.58 gm) of the egg and calcium carbonate (37%) in egg shell was in the native chick. In wild chick the surface area (1.53 sq.cm), weight (26.11 gm) of the egg and calcium carbonate (35%) in egg shell reported. The surface area (1.10 sq.cm), weight (15.88 gm) of the egg and calcium carbonate (27%) in egg shell was lowest in the pigeon.

These results suggest that as increase in the size and weight of eggs increases the calcium carbonate in their egg shell. The large egg contains more albumen which has more calcium content in the egg shell to maintain the hardness. The larger egg contains more calcium in their egg shell to hold the more egg contents in it. These results are in concordance with the previous published results^[2].

CONCLUSION

The largest duck egg has highest calcium in its egg shell. The smallest pigeon egg has lowest calcium content in its egg shell. In conclusion, the larger eggs have more calcium content in their egg shells than smaller eggs.

Table-1: Area, weight and calcium carbonate in different egg shells.

Sl.No	Type of eggs	Length (mm)	Width (mm)	Area (L×W sq.cm)	Weight (gm)	CaCO ₃ (%)
1	Duck	65.27	45.83	2.99	64.39	65
2	Turkey	63.10	43.18	2.53	60.23	53
3	Farm chick	54.03	42.06	2.27	52.67	42
4	Native chick	50.22	36.11	1.81	32.58	37
5	Wild chick	45.80	33.33	1.53	26.11	35
6	Pigeon	39.5	27.67	1.10	15.88	27

REFERENCES

- Lechtanski V.L (2000) Calcium carbonate content of eggshells. Inquiry based experiment in chemistry. American Chemical Society publishers, 159-165.
- Adeyeye E.I (2009). Comparative study on the characteristics of egg shells of some bird species. Bull. Chem. Soc. Ethiop., 23(2), 159-166.
- Nysa Y, Gautrona J, Garcia-Ruiz J M, Hinckee M T. (2004). Avian eggshell mineralization: biochemical and functional characterization of matrix proteins. General paleontology, 3(6-7), 549-562.
- Sharma, R.K., Ravikanth, K., Maini, S. Rekhe, D.S. and Rastogi, S.K. (2009). Influence of calcium and phosphorous supplements with synergistic herbs on eggshell quality in late layers. Veterinary world, 2(6), 231-233.