Brief about Indian Blue Peafowl & their feathers; Case Study: Incomplete moulting of T-feathers in Indian Blue Peafowl *(Pavo cristatus)*

Yuvraj R. Kaginkar

The peacock tail contains spectacular beauty because of the large feathers, bright, iridescent colours and intricate patterns. The colours in the tail feathers are produced by an optical effect called thin-film interference. The eye pattern has a high degree of brightness and precision because of the colour-producing mechanisms containing an extremely high level of optimum design. Most birds have two types of tail feather: flight feathers and tail-coverts. The flight feathers provide stability during flight, while the tail-coverts 'cover' and protect the tail region.

An adult peacock has an average of 200 tail feathers and these are shed and re-grown annually. Of the 200 or so feathers, about 170 are 'eye' feathers and 30 are 'T' feathers. The 'eyes' are sometimes referred to as oscillations.

Figure No 1. Each 'eye' feather and 'T' feather is an object of outstanding beauty in itself. The eyes contain beautiful patterns, and the 'T'-shaped feathers form a beautiful border to the fan. T feather follows the outline of the eye pattern. The T feathers often form an 'ogee' curve on each side of the feather as shown in Figure. An ogee curve is beautiful because it is both concave and convex.

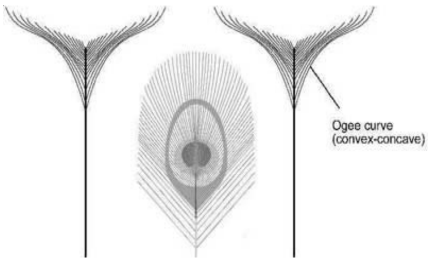
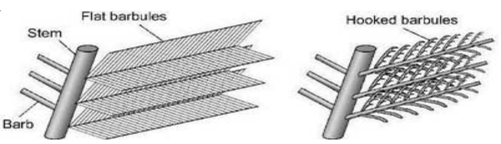


Figure No: 1

The data for the tail feather are summarized as follows:

Length of feather = 1.3 m
Number of barbs = 290
Maximum length of barbs = 200 mm
Average length of barbs = 105 mm
Barbules per mm on one barb = 32 (16 each side)
Length of barbules in eye pattern = 0.8 to 1 mm
Length of barbules below eye pattern = 2 to 3 mm
Total number of barbules in feather = nearly 1 million

Figure No: 2 Peacock barbules.



(Tail Feather) (Flight Feather)

Observation:

T-feathers did not molt completely, whereas the primary eye-feathers already started growing. As the bird was not able to lift the T-feathers, they were touching the ground, and appeared to be dragging. (Photo 1; Photo 2; Photo 3)

Treatment:

A total number of 21 T-feathers were manually removed with a little jerk and no bleeding was noticed. The area was dressed with povidine-iodine solution. Multi-vitamins & minerals were supplemented.

Discussion:

There are various ways of treatment for incomplete molting or to induce the molting in birds. Few among them are hormonal- Progesterone induced molt (Shaffner, C. S. 1955); fasting the birds; manual removal of the feathers; decreased photoperiods (Lanson & Smyth, 1995; Brake & Thaxton 1982) and control feeding or induced molting - forced molt by reducing Calcium (Gilbert & Blari 1975) & Sodium (Whitehead & Shannon, 1974) intake; forced molt by increasing Zinc supplement (Thaxton, 1982).

Causes of incomplete molting can be attributed to psychology, lack of exercise, Vitamins & Minerals deficiencies, other environmental factors and lack of enrichment activities.

Molting is not same for every species of bird, and differs from bird to bird in same species. The season of the year, the temperature of the environment, nutrition, and egglaying play a significant role in determining when a bird will molt as well as how long it will take to complete a molt. All birds molt at least once a year and this process normally does not affect their ability to fly.

The molting cycle typically begins after the breeding season, in late summer, and is triggered by secretions from the thyroid or pituitary glands. Hormonal processes, originating in the pineal and pituitary portions of the brain - tied closely to light and reproductive cycles govern the time and sequence of loss of the old feathers and replacement by new ones. Throughout the molting process, the metabolic rate of the bird increases by about 30%. For this reason, a molting bird has a higher nutritional demand and needs proper feeding. Molting is a stressful time for a bird and they can be more vulnerable to illness due to viruses, environmental changes, parasites and nutritional problems. *Incomplete molt is a sign of physical or psychological problems*. The same hormones

Veterinary-Cum-Extension Officer, S. V. Zool Park Tirupati, AP, yuvraj_kaginkar@yahoo.com

involved in molt are also involved in reproduction, broodiness and cause concurrent changes in a bird's mood, feeding habits and activity.

The first significant endocrine change observed in fasted hens is that corticosterone levels increase as the hypothalamic-pituitary-adrenal (HPA) axis is activated by the need to mobilize body energy stores. Thus the Exogenous Deoxy-Corticosterone is as effective as progesterone in inducing molting.

During fasting there is an increased thyroxin (T4) level, while refeeding induces a sharp decrease of T4 and an increase in plasma tri-iodothyronine (T3) concentration. Coincidence of feather molting and reproductive involution in the hen is seen in concert with evidence of thyroid participation in molting.

During molting, plasma levels of 1,25(OH)2-D3 are increased to levels similar to that of young hens. Receptors for 1,25(OH)2-D3 in the shell gland are also increased following an induced molt. In addition, cellular proliferation in the shell gland is correlated with increased tissue receptivity to 1,25(OH)2-D3 and increases Ca-binding protein content. Therefore, induced molting increases the level of the hormonal form of vitamin-D and tissue sensitivity to the hormone.

Induced molt produces discreet changes at the endocrine and cellular levels that improve reproductively. Natural molting is also associated with thymic recrudescence and lymphocytic repopulation that may improve immune function in the bird. However, during the induced molt, there are also transient reductions in the number of specific lymphocyte classes that may cause an increased susceptibility to infection. Reduced mortality during and after induced molting suggests that molting does not impair immune function with respect to avian pathogens.

Animal welfare activists have objected to induced molting on the grounds that fasting to induce molting is cruel. However, the degree of fasting imposed to induce molt must be viewed in the context of the physiological adaptations of the bird. Most birds are adapted to exploiting food sources that are unevenly distributed both time and space, forcing the birds to survive without food for indefinite periods. Many species are also required to fast for extended periods by the conditions of migration or incubation. These birds have a number of adaptations including the ability to build fat reserves. It is clear that many avian species, such as the jungle fowl, are well adapted to survive prolonged fasting. Likewise, it would appear that the commercial layer is tolerant of fasting as evidenced by reduced mortality during the fasting phase of induced molts.

Figure A: The two birds in the same enclosure, where the one peafowl have molted T-feathers and another at backside showing incomplete molting.

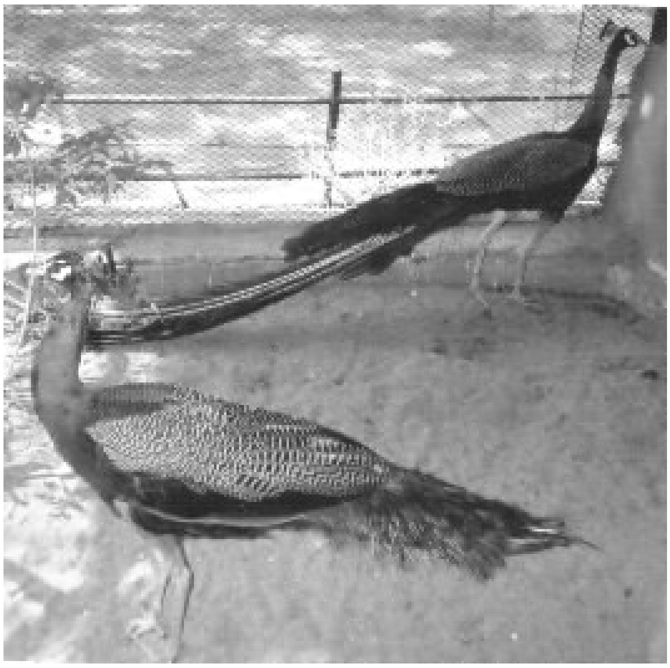


Figure B: The primary eye feathers which are growing, and down the old-T-feathers which are not molted.

Figure C: Removing the 21 T-feathers manually.

REFERENCES:

Brake, J., P. Thaxton, and E. H. Benton. (1979). Physiological changes in caged layers during a forced molt. 3. Plasma thyroxine, plasma triiodothyronine, adrenal cholesterol and total adrenal steroids. *Poult. Sci*. 58: 1345–1350.

Scott, J. T., and C. R. Creger (1976). The use of zinc as an effective molting agent in laying hens. *Poult. Sci*. 55: 2089. (Abstr.)

Shaffner, C. S. (1955). Progesterone induced molt. *Poult. Sci*. 34: 840–842.

Bull. AXT-412, Riverside, CA. Swanson, M. H., D. D. Bell, and D. R. Kuney. (1978). Effects of water restriction and feed withdrawal time on forced molt performance. *Poult. Sci*. 57: 1116. (Abstr.)

Tanabe, Y., and T. Katsuragi. (1962). Thyroxine secretion rates of molting and laying hens, and general discussion on the hormonal induction of molting in hens. *Natl. Inst. Agric. Sci. (Jpn) Bull. Ser*. G21: 49–59.

Wakeling, D. E. (1977). Induced molting-a review of the literature, current practice and areas for further research. *World's Poult. Sci. J.* 33: 12–20.

Wilson, H. R., J. S. Moore, A. W. O'Steen, J. L. Fry, and R. H. Harms. (1969). Forced molting of laying hens. *Agric. Exp. Sta. Bull.* No. 728. Univ. Florida, Gainesville, FL.

Acknowledgement:

I am thankful to Officials of Andhra Pradesh, Forest Department, Mr. Parthasarathi, in-charge Curator (S.V. Zoological Park), Dr. TH Thoibasingh, Vet Asst Surgeon, for their encouragement and generous support. I am also thankful to Mr. SelvaKumar Incharge F.R.O and Mr. A. Manohar Bird Keeper

---

Attention Zoos' Print Journal Readers

We are unable to post Zoos' Print Journal as part of Zoos' Print from this issue. Although we can post it separately it will take at least 3-6 months to get a postal concession for Zoos' Print Journal. With a postal concession, it costs just Re. 1 to post, but without the concession it costs upwards of Rs. 7.00 per issue depending on the number of pages. This makes the entire cost of sustaining Zoos' Print Journal prohibitive. We therefore seek your support and understanding to this problem and help us overcome this problem until we get the postal concession.

We have NOT stopped publication of Zoos' Print Journal. The April issue is printed and posted by Book Post on the usual date of 21st of March. We will continue the same publication frequency to the extent possible but we need to know is how many of you read Zoos' Print Journal, and whether you will be able to pay for the additional postage until the end of this year. If so, the postage amount is about Rs. 100.00 extra for this year for ZPJ only. We are mailing a separate questionnaire for you to which we hope you will respond. Zoos' Print Journal is available free of cost online at www.zoosprint.org. It is a completely open-access journal so even if you decide not to pay more for postage, the journal is still available online on the 21st of every month.

Thanking you for your understanding, support and cooperation.

Sanjay Molur and Sally Walker
Editor / Editor Emeritus
Zoo Outreach Organisation