

Block

5

POULTRY WELFARE – CASE STUDIES

UNIT 11

Beak - Trimming in Poultry

207

UNIT 12

Forced Moulting in Poultry

222

BLOCK 5 POULTRY WELFARE – CASE STUDIES

In the previous block, you were introduced to poultry farming, systems of poultry farming, and major welfare issues in commercial broilers and layers. In the unit 10 on ‘Welfare Issues in Commercial Layers’ we studied briefly about beak trimming and moulting. In this block, these two issues are discussed as case studies with more details.

UNIT 11, **Beak - Trimming in Poultry** outlines the concept of beak-trimming, how the beak-trimming practice developed, reasons and methods of beak-trimming, main welfare concerns, alternatives, precautions and alternatives to beak-trimming, beak-trimming precautions to reduce pain and stress.

UNIT 12, **Forced Moulting in Poultry** describes the concepts of natural and forced moulting, methods and welfare concerns in forced moulting and prevention of cruelty to animals (egg laying hens) rules, 2019.



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UNIT 11 BEAK-TRIMMING IN POULTRY

Structure

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11.1 LEARNING OUTCOMES

- a) **Knowledge and Understanding:** After studying this Unit, you will be able to:
 - Understand the meaning and purpose of beak trimming.
 - Explain the economic and behavioral reasons behind beak-trimming.
 - Distinguish the precautions to be taken before, during and after beak-trimming to reduce pain and stress.
- b) **Practical and Professional Skills:** After studying this Unit, you will be able to:
 - Discuss different methods of beak-trimming.
 - Demonstrate the main welfare concerns and alternatives to beak-trimming.

11.2 INTRODUCTION

“Beak-trimming will always cause a deprivation of sensory input in the beak; the end goal should be the avoidance of beak-trimming altogether through genetics, housing conditions, and management”

- Philip C. Glatz

Dear Learner,

In the unit 10 on ‘Welfare Issues in Commercial Layers’ we studied briefly about beak trimming in commercial layers. In this unit let us discuss more details about beak trimming along with the methods and welfare issues associated with it.

11.2.1 Meaning of Beak-trimming (Debeaking)

Beak-trimming is also popularly known as debeaking. It is undertaken usually after 6 weeks of age and most often in the grower house. It can be done in the brooder house also at early age. Beak trimming is the removal of approximately one-quarter to one-third of the upper beak, or both upper and lower beak of a bird (Gentle *et al.*, 1995). For the majority of birds, it involves the partial removal of the upper and lower beak using an electrically heated blade.

More recently, scientists have used the term ‘partial amputation’ instead of beak-trimming, although the beak does re-grow and receptors are functional in the regenerated beak tissue (Glatz *et al.*, 1998).

11.2.2 How the Beak-Trimming Practice Developed?

Increase in cost of land and wages of labour has made deep litter system costly. Therefore, alternate systems in which birds are totally restricted to meshwork compartments (cages) were introduced in the early 1920s. Due to less space and crowding, poultry birds got fewer options for natural behaviours like scratching, dust bathing and started pecking each other leading to feather pecking and cannibalism (Box 11.1). To prevent this, beak trimming or beak mutilation practice was developed by farmers in the following forms during 1920s to 1940s:

- Trimming / Paring of the tip of the upper beak
- Upper beak burning and cauterising with:
 - o Heated knife
 - o Gas torch
 - o Soldering iron

A heated knife attachment with frame was developed and named it as ‘debeaker’ by Lyon Electric Company in 1942 and registered in 1943 (Davis, 2008).

Box 11.1: Injurious Pecking

In Unit 10, we discussed that injurious pecking in laying hens is a major welfare concern that can spread through flocks, resulting in pain and high mortality. Injurious pecking can occur in all types of layer hen housing. In cage systems persecuted birds are unable to escape, but the problem tends to be confined to particular cages. In non-cage systems, once injurious pecking

starts it can spread rapidly throughout the whole flock. Injurious pecking comprises (Nicol, 2013):

- Feather pecking
- Vent pecking and
- Cannibalism

Savory (1995) reported that cannibalism develops either as a result of misdirected ground pecking or is associated with the dust bathing behavior. Cannibalism is a learned behaviour and it spreads very fast. It has been reported in all types of housing systems. The potential for the behaviour to spread may be increased in large flocks, as more birds are likely to learn the behaviour or to become victims. Due to the restrictive nature of battery cages, hens are unable to access many other birds, which may make the behaviour easier to manage, although, feather-pecked hens in cages are unable to escape from more aggressive cage mates. Feather pecking is the precursor of cannibalism (Rokade and Gopi, 2017).

11.3 WHY BEAK-TRIMMING?

Farmers usually perform beak-trimming due to following economic and behavioural reasons:

- Beak trimming is performed early in the life of commercial hens to decrease injuries caused by the behavioural bad habits (vices) like:
 - a) Pecking and eating one's own species (cannibalism)
 - b) Bossing over others (bullying)
 - c) Feather and vent pecking.
- To avoid feed wastage:
 - a) Quantitative: Birds have a natural tendency to scratch the feed and search for grains especially when feed is in the mash form. In this process, there will be spillage of feed from the feeders.
 - b) Qualitative: Grower ration comes as mash (powder form). Birds do establish a peck order within the enclosure. The stronger birds eat feed first and preferentially pick and eat the grains (also a natural instinct) if beaks are not trimmed. It is well known that the grains are energy-rich and poor in all other nutrients. Hence, the stronger birds become weaker. When the weaker birds reach the feeders after the stronger ones have left, they will be left with only powdery feed which they cannot eat because of sharp beaks. Therefore, they also suffer nutrient deficiency and become weaker. Consequently, the entire flock shows a poor feed conversion ratio and farmer will be at loss. If the beaks are trimmed, the birds cannot search for grains. Instead, they have to scoop the feed and eat thereby making available all components of the feed to all the birds ensuring uniform growth, production and reproduction.
- To avoid egg-eating vice.
- It reduces aggressive interaction among birds and trimmed laying birds are less fearful than untrimmed ones, both in multi-bird cages and in floor pens.

11.3.1 When Beak-trimming is Performed?

The common ages for birds to be beak-trimmed are:

- Day-old (very common)
- 5–10 days old (precision or block beak-trimming)
- 4–6 weeks
- 10–12 weeks (re-trimmed)

Many hatcheries are reluctant to carry out beak-trimming prior to delivery of chicks. Already baby chicks are exposed to pain and stress during sexing of day old chicks, vaccination, and transportation. Therefore beak-trimming adds further pain and stress to the chicks. However, day-old trimming results in fewer birds needing to be re-trimmed and also it can avoid bird handling stress at important growing stages of life (Andrade and Carson, 1975).

For birds 10 to 12 weeks of age, beaks should be trimmed 6 to 7 mm beyond the nostril with 2 seconds of cauterization (Figs. 11.1, 11.2 and 11.3).

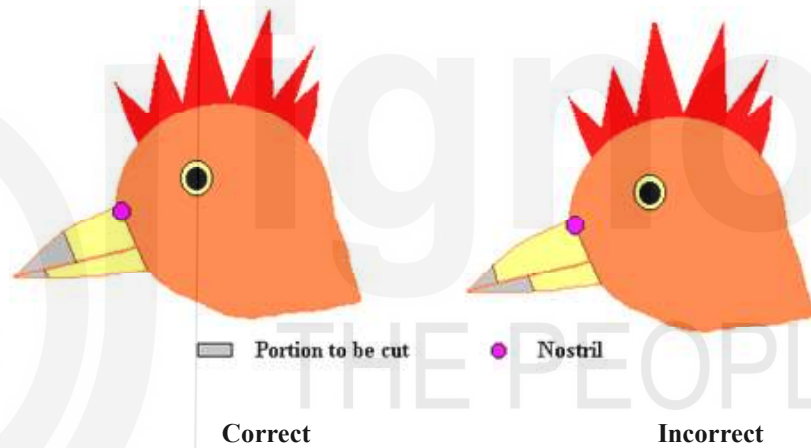


Fig. 11.1: Beak trimming – procedure(L L L rule: Leave Lower beak Longer)



Fig 11.2: Normal beak Fig 11.3: Trimmed beak

(Source: OLP-001, IGNOU Course Material)

Check Your Progress 1

Note: a) Use the spaces given below for your answers.

b) Check your answer with those given at the end of the unit.

1) Write the meaning of beak-trimming.

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2) How the beak trimming practice developed?

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3) Why farmers usually perform beak-trimming?

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11.4 METHODS OF BEAK-TRIMMING

11.4.1 Normally Beak-trimmed Poultry Birds

Beak - trimming is one of the most common methods used in layers and turkey birds to control peck injuries. Poultry birds that are normally beak-trimmed are summarised in Box 11.2.

Box 11.2: Beak-Trimmed Poultry Birds

Poultry birds that are normally beak-trimmed are:

- Laying hens
- Turkeys
- Broiler breeders (as they are kept for a long time)
- Quails
- Ducks

Broilers meant for meat are not normally beak-trimmed as they are marketed by 5-6 weeks before injurious pecking starts.

11.4.2 Beak-trimming Methods

Different methods of beak trimming are broadly classified under four categories:

- Heat blade method
- Cold method (scissors or secateurs)

- Electrical (Bio-beaker)
- Infrared

Salient points under these methods are given below very briefly for your understanding.

11.4.2.1 Heat Blade Methods

Consists of a hot plate / soldering iron (heated with gas / electricity) and cutting bar operated using a foot lever. Size is small and it's very easy to handle or transport. Beak is cut and cauterized simultaneously in these methods.

11.4.2.2 Cold Methods

In cold method, the beak is cut with clippers / scissors/ secateurs without cauterizing. Later cauterization is done with hot plate/iron touch.

11.4.2.3 Electrical Method (Bio-beaker)

The Bio-beaker, which uses an electric current to burn a small hole in the upper beak and is the preferred method for trimming the beaks of turkeys.

11.4.2.4 Infrared Method

The infrared method directs a strong source of heat into the inner tissue of the beak and after a few weeks, the tip of the upper and lower beak dies and drops off making the beak shorter with blunt tips.

The electrical and infrared methods are relatively welfare friendly compared to hot and cold blade methods as the former methods involve only the removal of beak tip only without an open wound. Other methods like lasers, freeze drying and chemicals have been tried, but are not popular. As per the Farm Animal Welfare Council - UK, cold cutting was the most accurate method in turkeys, but substantial re-growth of the beak occurred; although the Bio-beaker limited beak re-growth, it was less accurate. It was considered that the hot cut was the most distressing procedure.

Before we proceed, please complete activity 1.

<p>Activity 1 (Visit): Visit a nearby poultry layer farm and discuss with farm manager about method(s) of beak-trimming they are practising. Discuss the welfare concerns and write your observations.</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
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Note: a) Use the spaces given below for your answers.

b) Check your answer with those given at the end of the unit.

1) Name the poultry birds that are normally beak-trimmed.

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2) Why broilers are normally not beak-trimmed?

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3) Enlist different methods of beak trimming.

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11.5 WELFARE CONCERNS, ALTERNATIVES AND PRECAUTIONS IN BEAK-TRIMMING

11.5.1 Welfare Concerns

In a normal poultry bird, the functions of beak are:

- Feed particle identification
- Exploration of the environment
- Preening – Maintenance behaviour using beak to position and interlock feathers, clean plumage and keep ecto-parasites in check.
- Social defense

Beak trimming elicited a great deal of debate regarding its advantages and disadvantages vis-à-vis welfare of poultry birds (Box 11.3).

Box 11.3: Beak- trimming of Chicks in Poultry Farms - A Senseless Act of Cruelty

Do you know what operations the chicks in poultry farm undergo under the name of cost cutting? The upper part of their beaks gets cut off so that they don't harm other chicks. Although it's a 'routine' business, it's not as trivial as clipping your nails. Now, why would they hurt other chicks? Because of a great deal of stress to the factory chickens which in turn is due to:

- Overcrowding
- Forced-lighting
- Unnatural feeding

To ensure that losses through such acts of "cannibalism" (as the industry calls it) are minimised, the poultry farmer routinely cuts off the chicken's beak. This practice is called 'debeaking or beak-trimming'.

How did Debeaking Start? : It began in 1920s-40s, when American farmers discovered that if they burned away the upper part of the beak of chickens with a blowtorch, they won't be able to pick and pull each other's feathers. Later they modified the blowtorch into a soldering iron. A few years later, a local company began to manufacture the "Debeaker" – a machine that sliced off the tips of birds' beaks with a hot blade. This machine, with a few modifications, is what each factory farmer still uses today, whether in America, Europe or India.

Broiler chickens require no debeaking or only one debeaking because they are killed in 5-6 weeks of age. Most egg producers cut their birds' beaks twice: once when they are day old to one week old and then again when the birds are around 12 weeks of age. To save money, the debeaking procedure is carried out as quickly as possible. Experts recommend that the optimum value for money is 15 birds a minute. Because of this haste and monotony of the work, the beaks of many birds are sloppily cut. Also, the labourers employed in a poultry farm are illiterate, coarse and insensitive, as most of the butchers. Do they care whether the knife cuts too deep or too close? This is what happens, according to the description given by a journal for the poultry industry:

An excessively hot blade causes blisters in the mouth. A cold or dull blade may cause the development of a fleshy bulb-like growth at the end of the mandible. Burned or severed tongues result in worthless hens.

Even as I write this piece or you read it, hundreds of fluffy little chicks have had already gone through this ghastly and painful mutilation. Sometimes this operation, even when it is done properly, causes several other problems. In an article, "Mechanical Failures Plague Cage Dwellers", taken from a farm news journal, a farmer writes: "*Sometimes the irregular growth of beaks on debeaked birds makes it difficult or impossible for them to drink where a normal bird would have no trouble.*"

Of course, the poultry industry insists that debeaking is painless and that it is comparable to trimming one's fingernails. This is completely untrue. Twenty-five years ago, the British Parliament appointed the Brambell Committee to investigate animal welfare in factory farms. This is part of what the Brambell Committee said on debeaking:

“Irrespective of whether the operation is performed competently, we are convinced that it causes considerable pain, lasting for much longer than the second or so that the operation takes to perform. It has been frequently represented to us that the operation is similar to the clipping of fingernails of humans. There is no physiological basis for this assertion. The hot knife used in debeaking cuts through a complex of a horn, bone and sensitive tissue causing severe pain.”

In some factory farms, the birds are not only debeaked, their toes are clipped too, using the same hot knife machine. This operation is said to keep the birds “quieter” because of the extreme pain that moving would cause them after debeaking. Imagine your toes cut off without anaesthesia.

Are you appalled by this operation? It is just one of a series of mechanical operations and injections that the bird goes through. If you don’t believe me, write to the factory whose names are on the egg carton that you buy or on the neatly-wrapped chicken body under the cellophane, and ask them whether they debeak their birds. Or ask your state animal husbandry department inspectors. The answer will be yes. The only thing you can do then is to stop being the consumer and therefore the co-perpetrator of this senseless cruelty.

Source: Smt. Maneka Gandhi, Firstpost, August 22, 2016

Welfare concerns of beak-trimming include:

- An acute and chronic pain originating from the amputated end which leads to reduction in:
 - o Feed intake
 - o Pecking efficiency
 - o Pecking preferences
 - o Drinking ability
- Removal of sensory receptors with loss of temperature and touch responses.
- Stress of varying nature depending on age of bird and method of beak-trimming.
- Beak damage, shorten and uneven beak leading to:
 - o Impaired identification of feed particles
 - o Inability to explore environment
 - o Impaired preening and social defense

11.5.2 Alternatives to Beak-trimming

11.5.2.1 Genetic Interventions

Molecular technology, gene mapping and biotechnology tools provide alternative strategies for improving welfare such as control of pecking behaviour. Selection for low mortality reduces propensity of birds to develop feather pecking and cannibalism. Cannibalistic deaths occurred less frequently in stock selected on family performance without beak-trimming hens. Primary breeders need to select strains with a low pecking tendency.

11.5.2.2 Housing Enrichment and Changing the Light Intensity

Environment enriched cages with sufficient perch space, good water and feed management and litter quality improves welfare of birds by reducing aggressive behaviour and pecking. Light plays an important role in manipulating social behaviour of flock. Currently, the most useful method to prevent feather pecking and cannibalism is to house birds under very dim white light.

11.5.2.3 Nutrition Interventions

Lower density diets with higher fibre levels will make birds spend more time on feeding. Placing semi-solid milk blocks in the house, hanging green leafy vegetables and spreading grass clippings can prevent feather pecking. Millrun oat hulls, rice hulls and lucerne meal are effective sources of fibre. Providing adequate minerals, amino acids and vitamins minimises pecking mortality.

11.5.3 Beak-Trimming Precautions to Reduce Pain and Stress

Taking some precautions while beak trimming will minimise welfare problems. They are summarised in Box 11.4 under precautions before, during and after beak-trimming.

Box 11.4: Beak-Trimming Precautions to Reduce Pain and Stress

Precautions before Beak-trimming

- You will naturally expect bleeding when beak is cut. Therefore, administering vitamin K through drinking water 2 to 3 days before trimming can reduce bleeding.
- Birds should not be subjected to stress from housing, vaccination or deworming during the week before or after trimming.
- Sick birds should not be beak-trimmed.

Precautions during Beak-trimming

- You should hold the bird in such a way that it neither shakes its head nor suffocates.
- The beaks are opened with the help of index finger and the tongue is held back.
- The upper beak is cut first to the recommended level. The beak is held against the blade and circular motion is given for at least 2 seconds while holding to effect proper cauterization (blocking of cut blood vessels by heat).
- Lower beak is then cut as per the recommendation.
- Proper cauterization is once again ensured before the bird is left into the pen.

Note: If toe nails are grown in excess, they can also be trimmed.

Precautions after Beak-trimming

- Feeders must be kept full with feed to help birds eat easily. Probably, this is the only occasion when feeders are full with feed.
- Vitamins B-complex, C and K to be given through water to reduce stress.

- All the birds must be observed carefully for any bleeding, especially in the upper beak. If any bird shows bleeding, it must be separated at once and treated. Otherwise, there is a likelihood of cannibalism.

(Source: OLP-001, IGNOU Course Material)

Before we proceed, please complete activity 2.

Activity 2: Read the following two view points:

“Beak-trimming will always cause a deprivation of sensory input in the beak; the end goal should be the avoidance of beak-trimming altogether through genetics, housing conditions, and management” - Philip C. Glatz

“The emotion-laden word “mutilation” is sometimes used in describing husbandry practices such as removing a portion of a hen’s beak, However removal of certain bodily structures, although causing temporary pain to individuals, can be of much benefit to the welfare of the group”- James V. Craig

Which one you support and why? Based on your understanding of the discussion presented in this unit, write your response.

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Check Your Progress 3

- Note:** a) Use the spaces given below for your answers.
b) Check your answer with those given at the end of the unit.
- 1) Write the normal functions of beak in poultry birds.

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2) What are the major welfare concerns in beak-trimming?

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3) How housing enrichment and changing the light intensity helps in improving welfare?

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4) Write two precautions to be taken before, during and after beak-trimming.

a) Before beak-trimming:

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b) During beak-trimming:

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c) After beak-trimming:

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11.6 LET US SUM UP

- Beak trimming involves removing a portion of the beak which is often practiced to reduce feather pecking, aggressive pecking and cannibalism in laying hens.
- It is a very common management practice in poultry layers causing severe pain and sensory damage to the beak.
- Due to less space and crowding in cages, poultry birds have fewer options for natural behaviours like scratching and dust bathing, and start pecking each other leading to feather pecking and cannibalism. To prevent this, beak trimming practice was developed by farmers.

- Farmers perform beak trimming due to economic and behavioural reasons, to decrease injuries caused by the behavioural bad habits, to avoid feed wastage, to avoid egg-eating vice and to reduce aggressive interaction among birds.
- The poultry birds that are normally beak-trimmed are laying hens, turkeys, broiler breeders, quails and ducks.
- Broilers meant for meat are not normally beak-trimmed as they are marketed at an early age.
- Different methods of beak trimming are heat blade method, cold method, electrical and infrared methods.
- The major welfare concerns of beak-trimming are: acute and chronic pain which leads to reduction in feed intake, pecking efficiency and preferences, drinking ability and removal of sensory receptors, The other concerns are stress, beak damage, shorten and uneven beak.
- Management precautions before, during and after beak-trimming helps in reduction of stress.
- Beak-trimming will always cause pain and deprivation of sensory input in the beak. The end goal of scientific research should be the avoidance of beak-trimming altogether through genetics, housing conditions, and management.

11.7 KEYWORDS

Beak Trimming: Beak trimming involves removing a portion of the beak which is often practiced to reduce feather pecking, aggressive pecking and cannibalism in laying hens.

Cannibalism: Cannibalism occurs when the flesh or blood of another individual of the same species is consumed. It is a common problem in poultry, particularly laying hens.

Feather Pecking: Gentle feather pecking occurs when one hen pecks at the feathers of another, without pulling or removing the feathers. Severe feather pecking occurs when feathers are pulled violently or removed.

Preening: It is a maintenance behaviour that involves the use of the beak to position feathers, interlock feathers, clean plumage, and keep ecto-parasites in check.

Vent Pecking: As with feather pecking, vent pecking can lead to cannibalism. Vent pecking is directed at the tissue around the cloaca.

11.8 BIBLIOGRAPHY AND FURTHER READING

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11.9 SELF ASSESSMENT EXERCISES

- 1) Discuss the inter-relation between injurious pecking and beak-trimming.
- 2) Explain the economic and behavioural reasons for beak-trimming with examples.
- 3) Discuss different methods of beak-trimming with welfare concerns to poultry birds.
- 4) What are the alternative mechanisms for beak trimming?
- 5) Write the precautions to be taken to reduce pain and stress before, during and after beak-trimming.

11.10 ANSWERS / HINTS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) Beak trimming is the removal of one-quarter to one-third of the upper beak, or both upper and lower beak of a bird. For the majority of birds, it involves the partial removal of the upper and lower beak using an electrically heated blade.
- 2) Increase in cost of land and labour made deep litter system costly and cage system was introduced in the early 1920s. Due to less space and crowding,

poultry birds got fewer options for natural behaviours like scratching, dust bathing and started pecking each other leading to feather pecking and cannibalism. To prevent this, beak trimming practice was developed by farmers.

- 3) Farmers perform beak trimming due to economic and behavioural reasons, to decrease injuries caused by the behavioural bad habits, to avoid feed wastage, to avoid egg-eating vice and to reduce aggressive interaction among birds.

Check Your Progress 2

- 1) The poultry birds that are normally beak-trimmed are: Laying hens, Turkeys, Broiler breeders, Quails and Ducks.
- 2) Broilers meant for meat are not normally beak-trimmed as they are marketed by 5-6 weeks before injurious pecking starts.
- 3) Different methods of beak trimming are heat blade method, cold method, electrical and infrared method.

Check Your Progress 3

- 1) The normal functions of beak in poultry birds are: feed particle identification, exploration of the environment, preening and social defense.
- 2) The major welfare concerns are: removal of sensory receptors, acute and chronic pain which leads to reduction in feed intake, pecking efficiency and preferences, drinking ability. The other concerns are stress, beak damage, shorten and uneven beak.
- 3) Environment enriched cages with sufficient perch space, litter quality, good water and feed management improves welfare of birds by reducing aggressive behaviour and pecking. Dim white light plays important role in manipulating social behaviour of flock, which is the most useful method to prevent feather pecking and cannibalism.
- 4) The precautions before beak-trimming are: Administering vitamin K through drinking water 2 to 3 days before trimming can reduce bleeding and birds should not be subjected to stress from housing, vaccination or deworming during the week before or after trimming. The precautions during beak-trimming are: hold the bird in such a way that it neither shakes its head nor suffocates. The beaks are opened with the help of index finger and the tongue is held back and the upper beak is cut first to the recommended level. The precautions after beak-trimming are: feeders must be kept full with feed to help birds eat easily and administer Vitamins B-complex, C and K through water to reduce stress.

UNIT 12 FORCED MOULTING IN POULTRY

Structure

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- 12.4 Forced Moulting
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 - 12.5.1 Fast Induced Moulting
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- 12.10 Self Assessment Exercises
- 12.11 Answers / Hints to Check Your Progress

12.1 LEARNING OUTCOMES

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| <p>a) Knowledge and Understanding: After studying this Unit, you will be able to:</p> <ul style="list-style-type: none">• Understand the meaning and purpose of natural and forced moulting• Explain the economic reasons behind forced moulting. <p>b) Practical and Professional Skills: After studying this Unit, you will be able to:</p> <ul style="list-style-type: none">• Discuss different methods of forced moulting.• Demonstrate the main welfare concerns in forced moulting. |
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12.2 INTRODUCTION

Dear Learner,

Most pressing welfare issues in commercial layer poultry (egg laying chicken) are beak-trimming and moulting. In the previous unit we discussed the welfare issues associated with beak-trimming. Further, in the Unit 10 on ‘Welfare Issues in Commercial Layers’ we studied briefly about moulting. In this unit let us discuss more details about moulting with the following questions:

- What is natural moulting and forced moulting?

- Why forced moulting is practiced in commercial layer poultry?
- What are different methods of forced moulting?
- What are the welfare issues involved in forced moulting?
- How to improve welfare of birds in forced moulting?

12.3 NATURAL MOULTING

Moulting is a natural physiological process in domestic hens at the end of their laying cycle, where the reproductive system also undergoes complete remodelling concomitant to feather replacement. Natural moulting represents the renewal of old feathers few times at different stages of life cycle including the end of the egg laying period. Moulting at different stages :

- **First Moulting:** It starts when the chick is about 6–8 days old and continues up to 4 weeks, when the early feathers (down) are replaced. Feathers are first lost from the head, neck, then the breast, and finally the tail and wings. Moults can be partial (occurring on particular parts of the body) or complete.
- **Moulting in Pullets:** By the time hen start laying eggs they undergo four moults – one complete moult during chick stage and three partial moults (7–9 weeks, 12–16 weeks and 20–22 weeks). The hard tail feathers grow during the moult at 20-22 weeks.
- **Moulting in Cockerels:** During moulting of male chicken, their body weight is reduced, reproductive system is in a resting stage and they are nearly infertile.
- **Moulting in Adult Hens:** Normally adult birds moult once in a year (around 16-18 weeks age), but occasionally twice a year or once in two years. During these moults, birds stop egg production and build up their nutrient reserves. This is the most important moult for egg layers to continue their progeny naturally.

Natural moulting usually begins sometime during March-April and may be completed by July when egg production recommences. The main factors which bring about natural moulting are (Fig 12.1):

- Physical exhaustion and fatigue.
- Hormones secreted by the thyroid gland.
- Completion of the laying cycle - birds only lay eggs for a certain period of time
- Reduction of day length, resulting in reduced feeding time, and consequent loss of bodyweight.

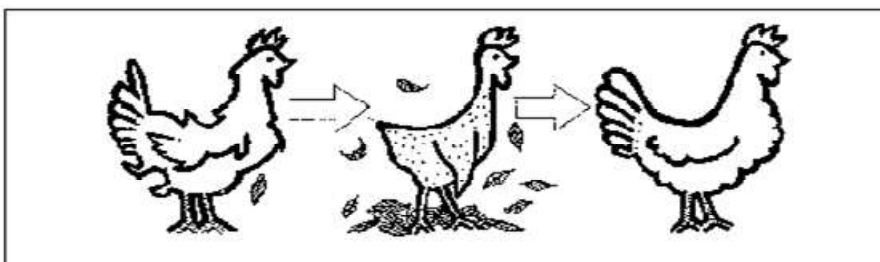


Fig. 12.1: Natural moulting (Source: Jim, 2004)

Before we proceed, please complete activity 1.

Activity 1 (Visit): Visit a nearby backyard / family poultry farmer and discuss about characteristics of birds during natural moulting. Write the outcome of the discussion along with your observations.

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Check Your Progress 1

Note: a) Use the spaces given below for your answers.
b) Check your answer with those given at the end of the unit.

1) What do you understand by the term natural moulting?

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2) What are the life stages in which natural moulting occurs in a hen?

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3) Write three main factors which bring about natural moulting?

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12.4 FORCED MOULTING

Normally hens live for more than six years. Egg laying in commercial hens starts giving eggs at around 16-18 weeks of age, reach peak at 25 weeks of age and continue up to 72 weeks. After that flocks are economically not viable and slaughtered as spent hens. However, instead of slaughtering, hens are force moulted to restart egg laying for one or two more laying cycles.

Forced moulting, sometimes known as induced moulting, is the practice of artificially provoking a flock to moult simultaneously, typically by withdrawing feed for 7–14 days and sometimes also withdrawing water for an extended period (Box 12.1).

Box 12.1: Forced Moulting

Forced Moulting is a process allowed in the egg production where hens are subjected to being starved and given no water for a period of 10-14 days. This “shocks” the hens into starting a new laying cycle and it is therefore done when egg production declines. This is a cruel and inhumane process that leads to a number of hens losing their feathers as well as dying from the starvation. It has been rightfully banned in some countries, but it continues to be legal in other countries. Forced moulting has been linked to *Salmonella* contamination in the eggs due to the weakened immune system of these animals. Forced moulting is not only unbelievably cruel but it is also a huge health hazard (Fig. 12.2).



Fig. 12.2: Forced moulting (Source: Rodriguez, 2017)

12.4.1 Common Moulting Stress Factors

The common stress factors which can induce moulting are (Jim, 2004):

- Lighting
 - o decreasing daylight
 - o decreasing artificial light
- Loss of bodyweight
- Diseases and internal parasites
- Climate - excessive cold, heat waves
- Feed, feeding and feedstuffs
 - o deficiencies of essential ingredients

- o irregular feeding
- o insufficient feed
- Predators eg. cats and dogs
- Fright (sudden fear due to wild birds and children)
- Peck order - low vitality
- Prolonged broodiness
- Mismanagement: overcrowding, movement to another house, water deprivation, insufficient feed and water space, faulty ventilation, wet litter, debeaking, vaccinations, exposed housing, etc.

12.4.2 Economic Reasons Behind Forced Moulting

During the forced moult, the birds cease producing eggs for at least two weeks, which allows the bird’s reproductive tracts to regress and rejuvenate. After the moult, the hen’s egg production rate usually peaks slightly lower than the previous peak, but egg quality and size are improved. The economic reasons behind forced moulting of egg laying hens are summarised in Box 12.2.

Box 12.2: Economic Reasons Behind Forced Moulting of Egg Laying Hens

Forced moulting is practiced due to the following economic reasons in layer poultry farms:

- Lowered egg production at the end of 1st egg laying cycle i.e. approximately after 72 weeks.
- Low egg rates in the market - moulting is done to save feed costs and to bring back layers for 2nd cycle of egg production.
- Shortage of replacement chicks/ high cost of day old chicks.
- To save feeding and rearing costs from chick to egg laying pullet stage.

The purpose of forced moulting is therefore to increase egg production, egg quality, and profitability of flocks in their second or subsequent laying phases, by not allowing the hen’s body the necessary time to rejuvenate during the natural cycle of feather replenishment.

Before we proceed, please complete activity 2.

Activity 2 (Visit): Visit a nearby commercial layer poultry farm practicing forced moulting and discuss with farm manager about purpose and economic reasons behind forced moulting of egg laying hens. Compare their reasons with the discussion given in the above section and write your observations.

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Check Your Progress 2

Note: a) Use the spaces given below for your answers.

b) Check your answer with those given at the end of the unit.

1) What do you mean by forced moulting?

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2) Why do farmers practice forced moulting?

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3) Write any four common stress factors which can induce moulting.

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4) What are the economic reasons behind forced moulting of egg laying hens?

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12.5 METHODS OF FORCED MOULTING

In the laying hens following are the methods practiced to induce moulting:

- 1) Fast induced moulting
 - a) Feed withdrawal
 - b) Water withdrawal
 - c) Combination of both feed and water withdrawal

- 2) Hormonal treatment
- 3) Mineral induced moulting
- 4) Food waste material
- 5) Photoperiod alteration

Among all the methods, fast induced moulting is widely practiced due to economic reasons.

12.5.1 Fast Induced Moulting

- Economic and widely practiced in egg laying hens and breeder birds.
- Fasting of hens to a particular length of time (number of days), or to a targeted body weight reduction (usually up to 30%)
- Length of moulting: Time taken from the initiation of fasting till the birds reach up to 50% egg production.
- Most common fasting duration
 - o Short term fasting: 4-6 days
 - o Medium fasting: 10 days
 - o Long term fasting: 12-16 days
- Fasting sometimes accompanied with water removal or followed alone. However, over the years practice of water removal is stopped and in turn increased the number of days of feed withdrawal.
- Prolonged feed withdrawal up to 14 days is widely practiced conventionally for achieving better eggshell quality during post moult production.
- Method of choice: Complete removal of feed for 10 - 14 days and reduction in photoperiod from 16 to 8 hrs (birds are out of production for a relatively short time).

12.5.2 Hormonal Treatment

- Moulting in laying hens can be induced with the use of hormones (Iodothyronines, thyroxin, triiodothyronine, progesterone etc).
- Hormonal treatment makes the reproductive tissue regress and induces moulting.

12.5.3 Mineral Induced Moulting

- High levels of dietary Zinc, Copper and Aluminium in the form of a soluble salt induce moulting.
- High dietary Zinc for 14 days reduces feed intake and consequently results in cessation of egg production.
- Dietary Zinc induced moulting was proved to be better in improving the immune status as well as the production performance and now becoming the favourable alternative to the conventional fast moulting procedures.

12.5.4 Food Waste Material

- The use of wastes generated from food processing industries like grape pomace, wheat middlings, cottonseed meals and jojoba meal have

experimentally proved to be a successful alternate to fast induced moulting methods.

- Similarly, alfa alfa is also used as feed additive to induce moulting in layers.

12.5.5 Photoperiod Alteration

- Annual change in photoperiod influences reproductive cycles of most birds.
- Most programmes also restrict the amount of lighting to provide a daylight period that is too short to stimulate egg production, providing a simulated autumn, the natural time of moult and minimum egg production.
- Lowered daylight terminates reproduction in many temperate, subtropical and tropical birds.
- Feather loss during this period may impair flight performance thus making moult and reproduction incompatible.

Among all the methods, fast induced moulting is widely practiced due to economic reasons. The other methods of forced moulting have not been widely used by the layer farms. Fast induced method is the cruel and inhumane moulting process that leads to a number of hens losing their feathers as well as dying from the starvation. The other methods also involve cruelty in one or the other form.

In the next section welfare issues involved in forced moulting are discussed for your comprehension.

12.6 WELFARE CONCERNS IN FORCED MOULTING

Feed withdrawal for 10-14 days is a serious and dreadful compromise of birds' welfare for whatever may be the economic reasons. This has received severe criticism from animal welfare organizations across the globe. Fasting of birds leads to negative impact on the welfare of hens. Various welfare concerns in fast induced moulting vis-à-vis compromise in five freedoms are summarised in Box 12.3.

Box 12.3: Welfare Concerns and Five Freedoms in Fast Induced Moulting	
Welfare Concerns	Compromised Freedom(s)
<p>Hunger and Thirst Concerns</p> <ul style="list-style-type: none"> • Birds are subjected to severe starvation and dehydration, which is inhumane. • Leads to malnutrition and stress to the highest order. • Higher morbidity and mortality during the early stages of moulting. • Dehydration results in impaired functioning of all body organs. • Research results proved that feed and water deprivation is not necessary to achieve moulting in poultry. 	<p>Freedom from hunger, thirst and malnutrition.</p> <p>Freedom from fear and distress.</p>

<p>Poultry Health Concerns</p> <ul style="list-style-type: none"> • Fasting leads to morbidity and mortality • Fasting makes the moulted hens more susceptible to and colonization of <i>Salmonella enteritidis</i> - a threat not only to hens, but also to the safety of eggs produced in next laying cycle. • Moulting promotes systemic disease conditions. • Fasting induced stress results in increased adrenal corticoids and decreased leukocytes, resulting in impaired immune response and more susceptibility to diseases. • Feed withdrawal is detrimental to the skeletal integrity of hens. • Feed withdrawal increases pH and alters the microenvironment of the birds' intestine. 	<p>Freedom from pain, injury and disease.</p> <p>Freedom from fear and distress.</p>
<p>Behavioural Concerns</p> <ul style="list-style-type: none"> • Increased pecking behaviour • More aggressive birds with other cage mates • Changes in vocal sound pattern 	<p>Freedom from pain, injury and disease.</p> <p>Freedom to express normal behaviour.</p>
<p>Metabolism Concerns</p> <ul style="list-style-type: none"> • High levels of dietary Zinc, Copper and Aluminium reduce feed intake up to 15%. • Zinc inhibits utilization of Calcium leading to bone and skeletal problems. 	<p>Freedom from hunger, thirst and malnutrition</p>

All methods of moulting are inhumane and severely compromise the welfare and five freedoms. Non-feed removal methods are slightly reasonable in comparison to the conventional total feed removal methods. However these methods need to be standardised in welfare friendly as well as cost effective form and made available to layer farmers, so that they will not practice forced feed withdrawal method.

12.6.1 Prevention of Cruelty to Animals (Egg Laying Hens) Rules, 2019

Globally it is recognised that forced moulting results in grossly inhumane treatment of hens and a significant health risk to humans who consume eggs from forced moulted hens. However, forced moulting is a very common management practice among egg producing poultry farms in several countries. The European Union, Australia, Canada and many other countries have prohibited forced moulting considering welfare grounds and safety of eggs for human consumption.

The Animal Welfare Board of India (AWBI) in 2011 ordered all poultry farms in India to immediately discontinue starvation forced moulting, stating that the practice is in violation of India's Prevention of Cruelty to Animals Act (1960),

and a punishable offence. AWBI has directed district SPCAs and local animal welfare organisations to work alongside law enforcement to ensure the ban is implemented.

The Government of India has prohibited the withdrawal of feed to induce moulting through Prevention of Cruelty to Animals (Egg Laying Hens) Rules, 2019. However it is yet to be implemented in full form in its letter and spirit

(Please refer to MAW-004 for more details).

Before we proceed, please complete activity 3.

Activity 3 (Discussion): Talk to few local commercial layer poultry farmers, local veterinarian and nearby SPCA / animal welfare organisation on challenges in implementing Prevention of Cruelty to Animals (Egg Laying Hens) Rules, 2019 that prohibited withdrawal of feed to induce moulting. Summarise the outcome of the discussion.

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Check Your Progress 3

- Note:** a) Use the spaces given below for your answers.
 b) Check your answer with those given at the end of the unit.

1) What are the methods practiced to induce forced moulting?

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2) Why fast induced moulting is widely practiced?

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3) What minerals are commonly used to induce moulting?

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4) Write the major welfare concerns in fast induced moulting.

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12.7 LET US SUM UP

- Moulting is a natural physiological process in domestic hens at the end of their laying cycle, where the reproductive system also undergoes complete remodelling concomitant to feather replacement.
- Main factors of natural moulting are: physical exhaustion and fatigue; completion of the laying cycle, and reduction of day length.
- Forced moulting, sometimes known as induced moulting, is the practice of artificially provoking a flock to moult simultaneously, typically by withdrawing food for 7–14 days and sometimes also withdrawing water for an extended period.
- Forced moulting is practiced due to the economic reasons like lowered egg production at the end of 1st egg laying cycle, low egg prices in the market, shortage of replacement chicks/ high cost of day old chicks, and to save feeding and rearing costs from chick to egg laying pullet stage.
- The methods practiced to induce forced moulting are: fast induced moulting (feed, water and combination of both feed and water withdrawal); hormonal treatment; mineral-induced light-dark manipulation and addition of food waste material to moulting diet.
- Due to economic and convenience reasons fast induced moulting is widely practiced.
- High levels of dietary Zinc, Copper and Aluminium in the form of a soluble salt are the commonly used minerals to induce moulting.
- The major welfare concerns in fast induced moulting are: hunger and thirst, malnutrition and stress, higher morbidity and mortality, susceptibility to salmonella other diseases due to impaired immunity, skeletal problems, increased pecking behaviour etc.
- The withdrawal of feed to induce moulting is prohibited in India now through Prevention of Cruelty to Animals (Egg Laying Hens) Rules, 2019.

12.8 KEYWORDS

Feather Pecking: Gentle feather pecking occurs when one hen pecks at the feathers of another, without pulling or removing the feathers. Severe feather pecking occurs when feathers are pulled violently or removed.

Forced Moulting: Also known as induced moulting, is the practice of artificially provoking a flock to moult simultaneously, typically by withdrawing feed for 7–14 days and sometimes also withdrawing water for an extended period.

Immune Response: The immune response is how hen's body recognizes and defends itself against bacteria, viruses, and substances that appear foreign and harmful to the bird.

Moulting / Natural Moulting: Moulting is a natural physiological process in domestic hens at the end of their laying cycle, where the reproductive system also undergoes complete remodelling concomitant to feather replacement.

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12.10 SELF ASSESSMENT EXERCISES

- 1) Discuss the difference between natural moulting and forced moulting.
- 2) Why forced moulting is practiced in commercial layer poultry?
- 3) Explain different methods of forced moulting?
- 4) Critically analyse the welfare issues involved in forced moulting with respect to five freedoms.
- 5) How to improve welfare of birds in forced moulting?

12.11 ANSWERS / HINTS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) Natural moulting represents the renewal of old feathers few times at different stages of life cycle including the end of the egg laying period.
- 2) Natural moulting life cycle stages in hen occur during: chick stage (6–8 days old to 4 weeks); pullet stage (7–9 weeks, 12–16 weeks and 20–22 weeks), and; adult hens (normally once in a year-around 16-18 months age).
- 3) Main factors which bring about natural moulting are: physical exhaustion and fatigue; completion of the laying cycle, and; reduction of day length, resulting in reduced feeding time and loss of bodyweight.

Check Your Progress 2

- 1) Forced moulting, sometimes known as induced moulting, is the practice of artificially provoking a flock to moult simultaneously, typically by withdrawing food for 7–14 days and sometimes also withdrawing water for an extended period.
- 2) The purpose of forced moulting is to increase egg production, egg quality, and profitability of flocks in their second or subsequent laying phases.

- 3) The common stress factors which can induce moulting are: decreasing daylight, loss of bodyweight, diseases and internal parasites, climate - excessive cold, heat waves, deficiencies in feeding.
- 4) Forced moulting is practiced due to the economic reasons like: lowered egg production at the end of 1st egg laying cycle; low egg rates in the market; shortage of replacement chicks/ high cost of day old chicks, and; to save feeding and rearing costs from chick to egg laying pullet stage.

Check Your Progress 3

- 1) The methods practiced to induce forced moulting are: fast induced moulting (feed, water and combination of both feed and water withdrawal); hormonal treatment; mineral-induced and; light-dark manipulation and addition of food waste material to moulting diet.
- 2) Due to economic and convenience reasons fast induced moulting is widely practiced.
- 3) High levels of dietary Zinc, Copper and Aluminium in the form of a soluble salt are the commonly used minerals to induce moulting.
- 4) The major welfare concerns in fast induced moulting are: hunger and thirst, malnutrition and stress, higher morbidity and mortality, susceptibility to salmonella other diseases due to impaired immunity, skeletal problems, increased pecking behaviour.