Literature Review on the Welfare Implications of

Beak Trimming

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THE ISSUE

Beak trimming (formerly debeaking) is the removal of approximately one-quarter[1] to one-third[2,3] of the upper beak,[2] or both upper and lower beak,[3] of a bird. Beak trimming is performed as part of an overall strategy to reduce peck injuries[4] and death[5] when raising groups of poultry. Beak trimming may be performed on many species including laying hens,[3] turkeys,[2] ducks,[6] and quail.[7]

Feather pecking, peck injury and peck mortality (cannibalism) in poultry occurs at variable rates and may unpredictably become severe and cause high rates of distress, injury and death in a flock. Beak trimming is acutely painful, as nociceptors are present in the tip of the beak.[3]

There are several different methods of beak trimming, which can be classified into four major groups: mechanical, hot-blade, electrical and infra-red. Other approaches such as the use of lasers, freeze drying and chemical retardation have been investigated but are not in widespread use.[7]

WELFARE CONCERNS

Gentle et al., (1997) concluded the adverse effects of beak trimming chicks of laying strains at one or 10 days of age were minor and were outweighed by the benefits of reducing cannibalism. Beak trimming younger birds appears to avoid the long-term chronic pain that can occur in the stump of the beak when older birds are trimmed. [8,9,10,11]

Pain—There is substantial evidence that neuromas form following beak trimming with a hot blade.[12] Cauterizing the beak of adult hens can damage nerves for a distance of 2 to 3 mm from the cut end due to the high temperature of the cautery blade.[9] By 10 days after trimming with a cautery blade the nerves of these hens' beaks are regrowing with some enlargement of the end of the nerve.[9] By 15 days after trimming with a cautery blade, clear neuromas may be present at the end of the nerve stump together with bundles of regenerating fibers.[9] The regenerating fibers continue to grow but are unable to innervate dermal structures because of the adjacent scar tissue.[9] These fibers can grow back on themselves and form complex masses of intertwining nerve fibers within the surrounding tissue (neuroma).[9] These neuromas have spontaneous discharge patterns similar to those seen in human amputees who experience chronic phantom limb pain.[9] Afferent nerve fibers isolated from beak trimmed birds showed abnormal patterns of discharge in comparison to normal nocioceptors.[9] The trimmed beaks had a larger number of spontaneously active units as compared to untrimmed birds.[9] Trimming reduces sensory function due to removal of mechanoreceptors;[13] the regrown beak lacks innervation, so the bill is probably relatively insensate.[2]

Behavior— Pullets trimmed with scissors show fewer bill-related behaviors and spend more time performing passive behaviors, such as resting and standing, when compared to untrimmed pullets.[6] Beak-trimmed pullets also show more guarding behaviors, such as tucking the bill under the wing, which have been associated with pain.[6] In many cases these behavioral effects are no longer obvious by 3

weeks after trimming (with scissors), although they may persist for months.[6] Tip-searing of Pekin ducks (searing the bill with a hot-blade without removing part of the bill by cutting first) resulted in more nerve fibers in the bill stumps than hot-blade trimming.[12] The authors of that study speculated that having more nerves in the bill may influence bill-related behavior (i.e., if the bird has more feeling in its bill it may perform more of its natural behaviors).

Hens beak trimmed at an early age with a hot-blade debeaker show oral behavior similar to untrimmed birds.[1] Hens must adapt to a new beak form and therefore, feeding behavior is altered (i.e., the bird's ability to consume feed is impaired).[14] Related behaviors may also be less effective as trimmed birds have been shown to carry more lice.[15] This may be because birds are slower to respond and less effective at removing material from their feathers (when trimmed with a hot-blade debeaker).[3] This reduced responsiveness has been equated to helplessness-related passivity and, as such, a state of suffering.[3]

Muscovy and Pekin ducks that were bill-trimmed spent significantly less time engaging in bill-related behaviors such as preening, feeding, drinking and exploratory pecking, and more time resting than their non-trimmed counter-parts for the first two weeks following trimming with scissors.[6] There was evidence of feather pecking in the pens of trimmed ducks, however, it was not as extensive as feather pecking in non-trimmed ducks.[6]

TECHNIQUES

Mechanical—Beaks may be trimmed using a simple blade or scissor device such as secateurs. This limits damage to the exact area of the cut may be the most precise method.[2] Turkeys that were trimmed with secateurs had very little damage to the underlying tissue and little to no bleeding into the tissue of the stump at 24 hours after trimming.[2] At 21 days after the trim the beak had increased in size with extensive bone growth.[2] The dermis at the tip had an extensive blood supply but did not contain regenerating nerve fibers or sensory nerve endings.[2] Regrowth of the beak continued through 42 days after the trim, however the beak's internal structure remained similar to that observed at 21 days.[2] There was no evidence of neuroma formation.[2] There was also no evidence of neuroma formation in Muscovy ducks that were bill-trimmed at 3 weeks old with scissors;[6] however, evidence of acute pain was noted in the behavioral data that were collected.[6] These mechanical methods rely on human precision instead of machines and, therefore, may produce variable results.

Hot-blade—Trimming may be carried out with a heated blade which is often mechanized.[1,3] This causes some tissue damage near the cut edge.[2] Heated blade trimming in turkeys destroyed variable amounts of tissue immediately adjacent to the cut surface.[2] The amount of tissue destruction was dependant on blade temperature and the amount of time the blade was in contact with the beak.[2] Twenty-one days after trimming with a heated blade the epidermis was well supplied with blood vessels, but devoid of afferent nerve fibers.[2] At 42 days after the trim the anatomy of the beaks was essentially the same as at 21 days after the trim except that the beaks were larger.[2] There was no evidence of neuroma formation following trimming with a heated blade.[2] Neuroma formation was also not found in Pekin ducks that were seared or trimmed with a hot blade. Acute pain was associated with both methods.[9]

Electric—Alternatively, an electric current may be used to damage the beak so that the tip is shed. The electrical method may cause the greatest amount of tissue damage.[2] In a study where turkeys were trimmed with the Bio-Beaker, a device generating a high voltage electrical current applied by two electrodes, one on each side of the beak, extensive tissue damage occurred.[2] Histological examination of the beak 24 hours after using the Bio-Beaker showed that damage to the epidermis of the upper surface extended close to the most distal point of the nares with only slightly less damage to the epidermis on the lower surface.[2] At 21 days after trimming with the Bio-Beaker there was extensive healing and regrowth.[2] Regrowth continued through 42 days post-trimming so that beaks appeared relatively normal but significantly shorter than un-trimmed birds.[2] The dermis of the regenerating beak was well supplied with blood vessels, but was devoid of a clear afferent nerve supply and sensory nerve endings.[2] However, these birds did not develop neuromas.[2]

Infrared— Infrared light (e.g., Nova-Tech) may be used to damage the beak so that the tip is shed. The infrared method has been given qualified endorsement by the British Farm Animal Welfare Council as a preferred choice in terms of animal welfare, because there is an absence of an open wound for which there might be adverse sequelae and there is consistent removal of the tip of the beak without evidence of the bird suffering lasting stress or pain.[16] When using the Nova-Tech system chicks are restrained by their head and suspended during treatment. The period of time they are held is short (approximately 15 seconds) and the restraint is firm. A study comparing infrared beak treatment with conventional hot-blade trimming in laying hens resulted in no difference in egg production or body weight between the two methods.[17] There was also no difference between the two methods when physiological measures associated with stress were assessed in the study.[15] Birds whose beaks were trimmed using infrared equipment showed superior feather condition and reduced aggressiveness under high light intensity even though their beak stumps were longer. [15]

REFINEMENTS

Early age—Trimming within the first week of life seems to avoid the formation of painful neuromas and allows for development of relatively normal oral behaviors.[1,18]

Novel/Enriched/Furnished cages--Many bird behavior problems including feather pecking and cannabilism can be somewhat reduced by increasing cage area and height when housing untrimmed birds.[19]

ALTERNATIVES

Many factors affect feather pecking in birds. Individual genetic selection may reduce feather-pecking, however, group selection of traits is a more beneficial way to reduce severe pecking while preserving rate of lay and longevity.[20] Reducing light levels does not, in itself, reduce severe pecking.[7,21] Enriched cages were shown to reduce mortalities due to pecking in one study, but they did not reduce them to an acceptable level for the authors.[7] However, attention to environmental factors can, if combined with genetic selection that targets both direct (the individual on its own survival) and associative (the social effect of the individual on the survival of it's group members) effects, substantially reduce feather-pecking and cannibalism.[22]

SUMMARY

Beak-trimming is currently considered to be a necessary management practice for poultry. Although younger birds that are beak trimmed experience less neuroma formation and have relatively normal oral behaviors, all methods of beak-trimming induce pain and physiologic stress in birds. Pain and physiological stress resulting from beak-trimming should be minimized to provide for the overall welfare of the animal. Although there are obstacles to reducing feather-pecking by use of genetic selection, research results suggest that the prospects are good and further research should be pursued.

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