USDA-ARS-MWA Livestock Behavior Research Unit

Laying Hen Welfare Fact Sheet

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Current Developments in Beak-Trimming

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Background: Beak trimming, removal of $^{1}/_{3}$ to $^{1}/_{2}$ of the beak, is a routine husbandry procedure practiced in the poultry industry to prevent feather pecking and cannibalism. Domestic chickens possess natural behavior and motivational systems inherited from their ancestors (Red Jungle fowls), such as dust bathing and foraging behavior-associated scratching and ground pecking. Preventing chickens from performing those behaviors due to living environments results in stress, which leads to the expression of harmful behaviors. Currently, there is no single housing system to meet all the chicken's behavioral and physiological needs. Feather pecking and cannibalism occur in all current housing systems and can lead to suffering and death in laying hens that have not been beak trimmed.

Issues Related to Beak Trimming: Beak trimming has elicited a great deal of debate and research concerning the relative advantages and disadvantages of the practice from an animal welfare perspective. The bestowed benefits of lowered aggression, feather pecking, and cannibalism may indeed favor improved welfare during the laying cycle. However, a chicken's beak is a complex, functional organ with an extensive nerve supply. Following beak trimming, several anatomical, physiological, and biochemical changes occur in cut peripheral nerves and damaged tissues. There is a considerable body of morphological, neurophysiological, behavioral and production research demonstrating the emergence of several markers of acute and chronic pain (e.g., persistent lethargy and guarding behaviors, reduced feed intake, and development of neuromas) as a result of trimming. This is of more concern when the beak trimming is conducted in birds which are 5 weeks old or older using a hot-blade beak trimmer.

Hot-Blade Beak Trimming: There are several methods used for beak trimming in the United States but the most popular method is hot-blade beak trimming. It employs a heated (650-750°C), 'guillotine'-type, blade that both cuts and cauterizes the beak tissue when birds are 5 to 10 days old. A second beak trimming may be conducted on birds when they are 5 to 8 weeks old if a trimmed beak grows back.

Infrared Beak Trimming: Infrared beak treatment is an automated process carried out at the hatchery on 1-day old birds. Birds are immobilized using a head restraint and infrared energy is focused on the area of the beak requiring trimming. High intensity (radiant at 50 to 60 watt) heat penetrates down through the beak's corneum layer to the corneum-generating basal tissue and inhibits further germ layer growth. After treatment the corneum layer remains intact until 7 to 10 days post-trimming after which the tip of the beak begins to soften and erode away with use.

Recommendation: Infrared beak trimming has several immediate advantages when compared to hot-blade beak trimming: 1) the elimination of open wounds that contribute to bleeding, inflammation, and pain; 2) better adaptation to eating because the changes in beak length and shape occur gradually over a 2-week period, which may better enable birds to alter their beak related behavior, resulting from a progressive adaptation, rather than an instantaneous change in the beak shape; and 3) a reduction in the number of stressors, such as catching, mixing, transfer, and handling, associated with the hot-blade beak trimming when it is performed on birds at 5 to 10 days of age. Long-term observation indicates that infrared beak trimming is more effective at reducing beak re-growth and resulted in less negative effect on feed intake and body weight than hot-blade beak trimming.

Until hens which express very low levels of aggression are commercially available or new housing systems are designed which better meet hens' behavioral and physiological requirements for minimizing damage imposed by feather pecking and cannibalism, infrared beak trimming is a useful alternative to hot-blade beak trimming. However, the results of beak trimming are affected by multiple factors. It should be noted that the effects of beak trimming on bird well-being is genetic-, lesion- and age-dependent. A future approach for controlling feather pecking and cannibalism in chickens should be the combination of breed, housing design and management practices, which will provide a more promising option for preventing the need for beak trimming.

Bibliography

Cheng, H.W. (2005) Acute and chronic pain in beak trimmed chickens. In: *Poultry Welfare Issues – Beak Trimming*, ed. P. Glatz, Nottingham University Press, UK. pp.31-49.

Dennis, R.L., Fahey, A.G. and Cheng, H.W. (2009) Infrared beak treatment method compared with conventional hot-blade trimming in laying hens. *Poultry Science* **88:** 38-43.

Dennis, R.L. and Cheng, H.W. (2010) A Comparison of Infrared and Hot Blade Beak trimming in Laying Hens. *International Journal of Poultry Science* **9:** 716-719

Lay Jr., D.C., Fulton, R.M., Hester, P.Y., Karcher, D.M., Kjaer, J.B., Mench, J.A., Mullens, B.A., Newberry, R.C., Nicol, C.J., O'Sullivan, N.P. and Porter, R.E. (2011) Emerging Issues: Social Sustainability of Egg Production Symposium: Hen welfare in different housing systems. *Poultry Science* doi:10.3382/ps.2010-00962

Gentle, M.J. (1986) Neuroma formation following partial beak amputation (beak trimming) in the chicken. *Research in Veterinary Science* **41:** 383-385.

Gentle M.J. (1989) Cutaneous sensory afferents recorded from the nervus intramandibularis of Gallus gallus var domesticus. *Journal of Comparative Physiology [A]* **164:** 763-774.

Gentle, M.J. and McKeegan, D.E. (2007) Evaluation of the effects of infrared beak trimming in broiler breeder chicks. *Veterinary Record* **160:** 145-148

Bibliography

Gentle, M.J., Waddington, D., Hunter, L.N. and Jones, R.B. (1990) Behavioural evidence for persistent pain following partial beak amputation in chickens. *Applied Animal Behaviour Science* **27:** 149-157.

Glatz, P.C. (2000) Beak trimming methods. Review. *Asian-Australian Journal of Animal Science* **13:** 1619-1637.

Henderson, S.N., Barton, J.T., Wolfenden, A.D., Higgins, S.E., Higgins, J.P., Kuenzel, W.J., Lester, C.A., Tellez, G. and Hargis, B.M. (2009) Camparison of beak-trimming methods on early broiler breeder performance. *Poultry Science* **88:** 57-60.

Jendral, M.J. and Robinson, F.E. (2004) Beak trimming in chickens: historical, economical, physiological and welfare implications, and alternatives for preventing feather pecking and cannibalistic activity. *Avian and Poultry Biology Reviews* **15:** 9-23.

Kuenzel, W.J. (2007) Neurobiological basis of sensory perception: welfare implications of beak trimming. *Poultry Science* **86**: 1273-1282.

Marchant-Forde, R.M., Fahey, A.G. and Cheng, H.W. (2008) Comparative effects of infrared and one-third hot-blade trimming on beak topography, behavior, and growth. *Poultry Science* **87:** 1474-83.

Marchant-Forde, R.M. and Cheng. H.W. (2010) Different effects of infrared and one-half hot blade beak trimming on beak topography and growth. *Poultry Science* (in press).

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