Comments by Dr Phil Glatz and Geof Runge on the Supporting Paper on **POULTRY WELFARE STANDARDS AND GUIDELINES – BEAK TRIMMING**

Prepared by the Poultry Standards and Guidelines Drafting Group, Oct 2016

The supporting paper states in the rationale that:

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 (American Veterinary Medical Association, 2010). It occurs in all production systems.

Further details could be provided about cannibalism which results in a horrendous death for poultry. The birds flesh is pecked, organs are irreparably damaged, and they bleed to death. A more recent publication relevant to Australia about cannibalism is:

Glatz, P. and Runge, G. (2017). Managing fowl behaviour. A best practice guide to help egg producers and poultry breeders manage feather pecking and cannibalism in their flocks. ISBN 1 920835 58 X, © Australian Egg Corporation Limited; 148 p.

The supporting paper in the Animal health and Welfare Considerations states that:

Birds may experience acute pain during the procedures of beak trimming due to the presence of nociceptors in the tip of the beak. Neuroma form in the beak as a result of beak trimming may also be associated with chronic pain. Beak trimming younger birds (less than one week of age) appears to avoid the long-term chronic pain that can occur in the stump of the beak when older birds are trimmed (Lunam et al., 1996).

Further details could be provided on the birds pain reactions to beak trimming. These responses can be divided into three phases: painless, acute, and chronic. Acute pain (2h to a few days) results from stimulation of nociceptors (pain receptors) in the tip of the beak and follows a pain free period (up to 26h) normally associated with action by the birds' endogenous analgesia system (H-W Cheng, 2005). Neuromas form in the beak when axons are severed as a result of beak trimming (Lunam, 2005). They may develop as scattered micro neuromas which regress (one-half upper beak, one third lower beak trim) or in the case of severe beak trimming (two-thirds of upper beak; one-half of lower beak) neuromas may persist and discharge action potentials that may be perceived by the bird as chronic pain.

H-W Cheng in Glatz PC (2005). Poultry Welfare Issues - Beak Trimming. pp 1-174 (ed. Glatz P.C.) Nottingham University Press: Nottingham, UK.

C A Lunam (2005) in Glatz PC (2005). Poultry Welfare Issues - Beak Trimming. pp 1-174 (ed. Glatz P.C.) Nottingham University Press: Nottingham, UK.

The supporting papers states that:

There are currently two routine beak trimming procedures, either infrared beak trimming of chicks at the hatchery, or hot blade trimming at 10 days old or younger. A second trim is sometimes performed out at 8-12 weeks of age to prevent the beak growing back enough to cause pecking damage. Therapeutic beak trimming is occasionally carried out on older birds to control an outbreak of pecking behaviour.

It is important that further details be provided on what is best practice hot blade trimming and infrared beak treatment. It is critical that details are provided on how IRBT is applied in hatcheries to demonstrate how superior this method is to HB trimming.

In the first instance details are provide below on best practice HB trimming as in some cases the IRBT method is not available; likewise, if beaks need to be retrimmed the HB method is the only option.

Best Practice HB trimming

Research by Glatz (1987, 1990) had identified that hot blade beak trimming birds at hatch and removing half of the upper beak and one third of the lower resulted in less stress to birds and better performance than beak trimming birds at older ages.

See Glatz, P.C. (1987). Effect of beak trimming and restraint on heart rate, food intake, body weight and egg production in hens. British Poultry Science 28: 601-609.

Glatz, P.C. (1990). Effect of age of beak trimming on the production performance of hens. Australian Journal of Experimental Agriculture 30: 349-355.

Lunam et al. (1996) used the recommendation from Glatz (1987, 1990) and beak trimmed birds at hatch with a hot blade. The incidence of neuromas at 10 and 70 weeks-of-age in untrimmed birds was compared with chicks given a moderate trim (i.e. one half the upper beak removed (3 mm) and one-third of the lower beak removed (2.5 mm) versus birds with a severe trim where two-thirds of the upper beak (4 mm) and half of the lower beak (3mm) was removed. The results were consistent with other workers and indicate that neuromas do form after trimming but resolved in birds moderately trimmed with sensory corpuscles still present in the upper and lower beak. Neuromas (consisting of masses of disorganised tangles of nerve fibres) only persisted in birds that had been severely trimmed and may discharge ectopic spontaneous action potentials perceived as pain.

The moderately trimmed birds had a 25% reduction in beak length compared to control birds at 70 weeks while the severely trimmed birds had a reduction of 50-65% in beak length of control birds. Beak trimming younger birds (less than one week of age) appears to avoid the long-term chronic pain that can occur in the stump of the beak when older birds are trimmed (Lunam et al., 1996) and suggests that beak-trimming at an early age decreases the formation of scar tissue and reduces the risk of neuroma development. A likely explanation for this is that the beak of young birds has a greater capacity for regeneration compared to the regenerative ability of older birds.

A case was therefore made by Gentle (the EU advocate originally calling for a ban hot blade trimming in 1986) to continue hot blade beak trimming in young birds using moderate trimming (Gentle, 1988) as previously recommended by Glatz (1987,1990) and Lunam et al. (1996)

Gentle (1988). Welfare aspects of beak trimming in poultry. Proc. Aust. Poult. Sci. Symp. 10: 56-64

Best Practice HB Retrimming

Work by Glatz (1987, 1990) was included in the 1992 Code recommending that hot blade beak trimming of half of the upper beak and one third of the lower beak be practiced on chicks early in life. To investigate impact of retrimming an anatomical and behavioural study examined the effects of moderate hot blade beak-trimming of chickens (as specified above) on the day of hatch and re-trimming of 2 mm of the upper and lower beak at 14 weeks-of-age (Lunam, 2005). Beak trimming was conducted per industry standards for beak trim accreditation (Bourke et al., 2002a, b). A heated blade on a commercial electric beak trimming machine (Lyon Electric Company) cut and cauterised half the upper beak and one-third of the lower beak for 2s. At 14 weeks of age chickens were re-trimmed using a heated blade that removed 2 mm of the upper and lower beak. The wound was cauterised with the heated blade for 2 s.

Sensory receptors and individual nerve fibres were observed near the tips of the retrimmed upper and lower beaks at 28 weeks-of-age. In the tip of the lower beak, large Herbst corpuscles were present and many nerve bundles traversed the dermis between the mandibular bone and epidermis of the beak tip. At 66 weeks-of-age, sensory receptors and nerve fibres were observed in the dermis at the beak tip (Lunam, 2005). That the hens returned to normal feeding and pecking behaviours by 66 weeks-of-age (Jongman et al. (2008) and supported the microanatomy that the sensory input to the beak is restored after retrimming.

The early findings on hot blade trimming by Glatz (1987, 1990) were recognised in the 1992 Australian Model Code of Practice for the Welfare of Animals. Domestic Poultry Edition 2 (and again in Edition 3, 1995). See P. 13 Management Practices (12.2.1 and 12.2.2) where one half of the upper beak and one third of the lower beak may be removed in day old to 10-day old birds and were supported by the later findings of Lunam et al. (1996) and Gentle (1988).

In the 2002 Australian Model Code of Practice for the Welfare of Animals, Domestic Poultry specified that beak trimming of birds be conducted using an accredited trainer under an accredited training program in accordance with an agreed accreditation standard. Dr Phil Glatz (SARDI) was requested by RIRDC's Egg Program to develop an accreditation standard published in a training manual for hot blade beak trimmers and worked with TAFE, NSW, VIAS and PIRSA (see Bourke et al. 2002) to develop the standards.

The standard developed for hot blade beak trimmers in the manual was to remove no more than half the beak length and provide a step to the lower beak for bird trimmed at day old to 10-12 days-of age (see P. 68 of Bourke et al. 2002b). It was simpler to include a step to the lower beak as this beak shape was better able to control feather pecking and cannibalism based on Industry experience.

The history of inclusion of best practice hot blade trimming in the Poultry Code prepared by Geof Runge has been included as an attachment in the submission to AHA and outlines that amount of beak trimmed using a hot blade was half the upper beak and one-third the lower beak.

Bourke, M., Glatz, P.C., Barnett, J.L. and Critchley, K.L. (2002). Beak trimming training manual. Edition 1, Publication no. 02/092. Rural Industries Research and Development Corporation.

Bourke, M., Glatz, P.C., Barnett, J.L. and Critchley, K.L. (2002). Beak trimming trainer's guidelines. Edition 1, Publication no. 02/093. Rural Industries Research and Development Corporation.

Best Practice IRBT

What is IRBT?

Beak treatment using infrared red (IR) light was introduced by the vendor into Australia in 2003. The innovative technology uses an IR lamp to treat the beak and is the most welfare-friendly method of beak tipping currently available.

IRBT is a non-invasive beak tipping technique that uses advanced technology to deliver a brief infrared light pulse precisely onto the tip of a hatchlings beak. With IRBT, there is no blood loss, open wound exposure or neuroma formation. The treated beak tissue subsequently sloughs off, resulting in a blunted beak. IRBT birds feed and drink normally soon after treatment.

The exposure time to and the level of IR energy can be varied to match the amount of beak to be treated. The amount of beak treatment applied is determined by what's best for the bird in the environment in which it will live. Factors considered are:

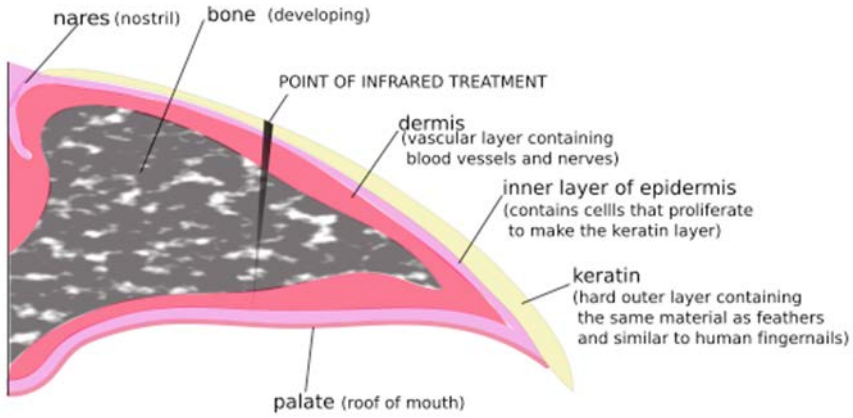
- Bird type, strain
- Beak colour
- Chick hydration
- Farm latitude
- Housing type (temperature and natural light intensity)
    - Controlled environment/open sided housing
    - Stocking density
    - Access to range area

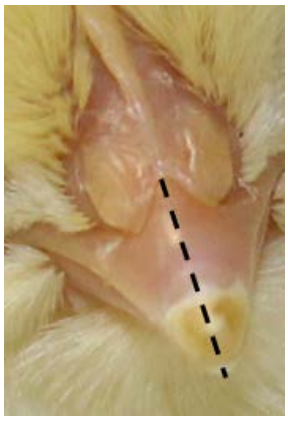
The heat delivered by the IR lamp's energy pulse coagulates the blood vessels in the beak tissues in varying amounts due to the decline in heat as it penetrates deeper into the beak structure. This affect controls the growth rate of the various tissues between the treatment site and the beak tip.

The blood supply to the epidermis (under the keratin layer) is impeded inhibiting the growth of the cells especially at the beak tip site.

There is a lower degree of impairment to the blood supply in the dermis allowing the beaks to grow at a faster rate than above. It contains numerous receptors, nerve fibres and blood vessels that continue to function and allow normal growth of the beak after treatment.

The nervous system of hatchlings is immature with high characteristics of plasticity and a capability to adapt to pain induced by treatment. They quickly recover from pain due to the neuronal plasticity.





Beak midline

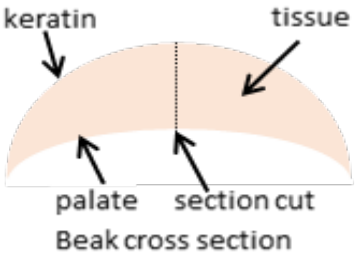


Diagram above represents the beak structure of a hatchling showing point of treatment. (Lengthwise section through midline of beak)

As the bone in the beak grows epiphyseal plates form new cartilage which is replaced by bone (ossification) as the chicken ages. Bone growth in the beak continues until the cartilage is completely replaced later in the pullet's life. The beak has several growth points which determine the shape and

length of the beak. When the beak is treated, the reduced blood supply affects some of the growth points. This has the effect of shortening the beak and slowing its growth. This remodelling results in a beak blunted shape in birds that makes them less likely to cause feather pecking and cannibalism in the flock.

Unlike hot blade trimming, the keratin layer remains intact after treatment, protecting the soft tissue underneath. This protection allows the tissue between the treatment site and the beak tip to grow at a rate allowed by the reduced blood supply before the tip sloughs off.

The IRBT technique is much more precise than hot blade trimming. It manages beak shape, length and the growth rate. There is some debate on the length of beak that is treated by the IR process at the time of application. It is not relevant to quote length of beak treated and compare it with the length of beak removed with hot blade beak trimming.

The chicken's beak has an extraordinary ability to regenerate after beak treatment, trimming with a hot blade or injury.

The innovative IRBT process can be compared to therapeutic treatments in humans using IR laser for treatment of skin conditions. The methodology applies cooling to the skins surface during treatment to alleviate the brief period of acute pain. The blood vessels feeding the skin condition coagulate and become non-functional as the new invigorated tissue develops underneath the blemish. In humans the IR laser treatment impacts on the surface of skin and therefore is comparable with IRBT technology.

Because of the differences between IRBT and hot blade trimming it is logical and therefore critical that a there is a separate hot blade beak trim standard and IRBT standard or guideline.

It is recommended that an IRBT standard/guideline be included in the proposed Australian Animal Welfare Standards and Guidelines for Poultry.

IRBT methodology

The infrared treatment machine (Poultry Service Processor – PSP) has several parts that control precisely where the treatment on the beak is applied and how much energy is applied.

- Head holder positions the hatchling for treatment. It is moulded to the shape of the birds head and precisely positions the hatchling for treatment. It protects the chickens face and eyes from exposure to infrared light. Each species of poultry and strain requires a head holder moulded to its head shape enabling repeatable treatment of hatchlings with different sized heads and beaks.
- Interface plate presents the beak to the infrared treatment source and controls the amount of tissue treated. Interface plate options are available for different species and strains of poultry. The combination of head holder and interface plate protects non-targeted tissues from exposure to the infrared energy pulse.
- Mirrors reflect the energy pulse to the area to be treated on the bottom beak.
- The infrared module controls, generates and directs the infrared light pulse to the beak area to be treated. Lamp power is adjusted to control the amount of infrared energy applied to the beak.

Consistent treatment is achieved by selecting the appropriate head holder, interface plate, mirror and lamp power setting. The head holder can be quickly changed to accommodate different breeder

flock age, birds and strains. The optimal energy pulse power, exposure time and depth of treatment are determined by the breed or strain of bird, bird age and farm environmental factors.

The environmental stress on birds increases as farm location moves from the higher latitudes to the equator. That is, they are subject to the higher temperatures and light intensities of the subtropics and tropics. In Australia layers will be exposed to this brighter light in open sided housing or if they are free ranging.

Hatcheries using the IRBT processor follow a industry developed QA protocol. The vendor provides training and a certification program to ensure the equipment is set up correctly and a consistent amount of beak is treated. The treatment team is trained to establish the machine settings; pick up, hold and load chickens correctly; monitor treatment application using quality control protocols and chick health after the process; consign treated birds to farms and follow up monitoring on the quality of beak treatment and bird behaviour during rearing and lay. Trained supervisors and managers manage the process.

Beak length measurement

Beak length is measured from the outer edge of the nostrils or nares to the tip of the beak. This is a visual assessment. IRBT measures how much of the outer keratin layer has been treated from the external line left on the beak after treatment to the tip. Internally the amount of tissue treated varies allowing these tissues to continue growing at a rate determined by the amount of treatment applied. With hot blade trimming beak length measures how much of the beak is actually removed.

Effect of IRBT on bird welfare

The risk factors associated with development of chronic pain or persistent neuromas for IRBT are lamp power settings, interface plates and/or mirror types, exposure time and depth of treatment.

The treatment settings and procedure has changed over time in response to increasing knowledge on how the beak responds to treatment and its effectiveness in minimising the risk of feather pecking and cannibalism. This knowledge has come from worldwide research and the vendors quality assurance monitoring program.

Recent research in the EU and Canada show that IRBT does not result in a reduction in sensory feedback, with no significant effects on nociceptor thresholds or response characteristics There is no evidence that IRBT is associated with hyperalgesia (increased sensitivity to pain) or allodynia (painful response to a stimulus during eating, drinking or foraging). The outer beak structure goes through a natural healing response. Importantly, no neuromas or abnormal proliferations of nerve fibres are observed in the beaks at any age and concurs with the lack of abnormal sensory responses.

The findings provide evidence that infra-red beak treatment of hatchlings does not have chronic adverse neurophysiological consequences. The purpose of beak tipping is to reduce or eliminate damaging bird-to-bird pecking (which can be a very substantial welfare issue) and IRBT represents an innovative refinement of beak tipping. The minor short-term pain birds have because of the process are far outweighed by reducing the risk of feather pecking and injury. It prevents the bird's ghastly death by cannibalism.

Infrared beak trimming (IRBT) does not create an open cauterised wound as hot blade trimming does. After use treatment, the beak remains intact until 10-14 days of age, after which the treated portion sloughs off gradually (12-28 days of age depending on breed and strain) as the bird uses its beak. The IRBT system uses a non-contact, high intensity, infrared energy source to treat beak tissue

in a bloodless procedure. The beak surface remains intact, protecting the treated soft tissue underneath.

Recommendations for S&G for beak treatment/trimming based on current science:

Currently SA9.15 states that a person must not remove more than one-third of the upper and lower beaks.

This is a significant change to the current/usual amount of beak removed at hatcheries at day old by IRBT or by hot blade or later on in the birds life by hot blade trimming. Hot blade trimming operators are applying the guidelines in the 1992, 1995 and 2002 Poultry Welfare Codes. If only one-third of the beak is trimmed with a hot blade the beak will grow back and birds will commence serious cases of feather pecking and cannibalism under Australian environmental conditions.

Infrared beak treatment (IRBT) was introduced into Australia in 2003 after Version 4 of the Poultry Welfare Code. It is a different technology and has a different effect on the beak tissues to hot blade trimming. Hence it is critical that a separate guideline for IRBT and HB trimming be included in the new code for beak tipping. If one one-third of the beak is treated using the IRBT method the beak will grow back and birds will commence serious cases of feather pecking and cannibalism.

Recommended standard/guidelines

IRBT standard/guideline:

It is recommended that an IRBT standard/guideline be included in the proposed Australian Animal Welfare Standards and Guidelines for Poultry that states:

- Hatcheries must adhere to the vendors Quality Assurance program for birds housed in various production systems. The hatcheries must use a IRBT that achieves a beak length later in the bird's life which minimises the risk of pecking and cannibalism in the birds environment for each poultry species, strain and housing system and improves welfare outcomes.

Hot blade trimming standard/guideline:

It is recommended that SA9.15 in the draft proposed Australian Animal Welfare Standards and Guidelines for Poultry be replaced with:

- When performed as a preventive measure hot blade beak trimming should be carried out by a competent operator soon after hatching and preferably within 3 weeks.
- For chickens, the hot blade operator may remove not more than half of the upper beak and one-third of the lower beak. This means:
    - For day old chickens, not more than 3mm of the upper and 2.5mm of the lower beak.
    - For 10-day old chickens, not more than 4.5mm of the upper and 4mm of the lower beak.
- Where retrimming of beaks is required not more than 2mm of the upper and lower beaks is removed (preferably before 12 weeks of age).

Implications

The mandating of the standard on beak treatment as drafted would have serious impacts on bird welfare. It is likely to substantially increase mortalities and the cost of managing this will be significant.

Turkeys

The supporting paper states in the rationale that:

Injurious pecking is a serious issue in the turkey industry (Dalton et al., 2013). Causes are multi-factorial, involving interactions between turkey genetics, environment and nutrition. At this stage factors associated with injurious pecking in turkeys are not well understood, and more research is required to better understand the causes more clearly so that interventions may be devised that do not involve beak trimming. Many turkey operations are on a small-scale and these producers do not have access to IRBT. Allinson et al. (2013) evaluated the effect of beak trimming on turkeys. They found that beak trimming had no significant effect on the performance of the turkeys. Beak trimmed turkeys recorded higher feed intake, protein intake and feed conversion ratio than turkeys with intact beaks. The severity of damage was higher in untrimmed turkeys than the turkeys that had been beak trimmed. They suggested that one quarter of the beak should be removed at the sixth and fourteenth weeks.

In contrast to the above recommendation on removing one-quarter of the beak, Noll and Xin, (2006) and Noll and Xin, (2007) showed that removing only one quarter of the beak was insufficient to control feather pecking as indicated by the number of birds that had to be removed due to damaging pecking: 19% of controls and 21% of hot blade treated birds, compared to 7% of electric arc and 11% of infrared treated birds.

Noll S, Xin H (2007). Performance and behaviour of market tom turkeys as influenced by beak trim and form of feed. Midwest Poultry Federation Convention, pp. 1-6.

Noll SL, Xin H (2006). Turkey beak trim and feed form. 1. Effect on turkey performance. Poult. Sci. Assoc. Ann. Meeting. P.17.