RSPCA APPROVED FARMING SCHEME
INFORMATION NOTES

TURKEYS

DECEMBER 2020
v1.1

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Information relating to the RSPCA Approved Farming Scheme Standard – Turkeys

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The RSPCA Approved Farming Scheme is part of the RSPCA's efforts to improve the lives of Australia's farm animals. The RSPCA Approved Farming Scheme Standard for turkeys provides the requirements for placement, housing, husbandry and management, handling, euthanasia, catching, transport and slaughter that must be met under the Scheme. The RSPCA encourages producers to exceed this Standard as the opportunity arises, and commit to a pathway of continuous improvement in the welfare of their turkeys. These notes provide information about a range of aspects relating to the Standard, to turkey welfare and to the growing of turkeys generally.

In recent years, there has been an increasing amount of research aimed towards improving poultry welfare, however much of this has focused on meat chickens and layer hens. There continues to be a significant gap in our knowledge and understanding of turkey welfare including production and management aspects known to impact welfare such as genetics, behaviour and social dynamics, health, nutrition, housing and environment, euthanasia, handling, transport and slaughter. To ensure and promote the welfare of turkeys farmed for meat production, there is a critical need to address these gaps in the scientific literature.

Turkeys – production cycle

Turkeys, along with chickens and ducks, are one of the more common species of poultry farmed for meat. Domestic turkeys were originally bred from wild turkey stock native to North America. Early selection focused on breeding birds with light feather colour for improved aesthetic appearance of the finished carcass, resulting in the distinctive white plumage of domestic turkeys compared to their darker, wild counterparts. Over the past 50 years, breeding companies have been selecting for production traits such as fast growth, large breast and thigh muscles, and feed efficiency. Similar to meat chickens, this selection pressure has resulted in significant welfare problems for turkeys including leg disorders, impaired locomotion and cardiovascular disease. The RSPCA supports the development and uptake of slower-growing breeds which will help improve bird welfare.

There are no genetic breeding companies in Australia, so turkey genetics are imported in the form of eggs from breeding companies in the USA or Canada. The birds who hatch from these eggs on specialist breeding farms are the great grandparents of the turkeys eventually raised for meat production on the growing farms. The male breeder lines are selected for body conformation and fast growth, while female lines are selected mainly for reproductive traits and growth rate.

The male birds' (toms) large breast muscles, and their size and body conformation prevent them from being able to naturally mate with female birds (hens). Hens are therefore routinely artificially inseminated. This involves semen being collected via manual abdominal massage of the toms. Hens are then inseminated by applying abdominal pressure and depositing the semen via a sterile straw. There has been limited research into the welfare implications of artificial insemination practices in turkeys, which should be considered a priority area for future scientific investigation.

Breeding hens are vaccinated for common diseases such as haemorrhagic enteritis, cholera and fowl pox, and this provides immunity to the poults who are normally not vaccinated. Eggs from breeder birds are transported to hatcheries, where the eggs are incubated for around 28 days. Beak trimming is routinely performed at the hatchery on poults using an infrared laser technique, where the tip of the beak is lasered causing it to erode away as the poult eats. During transport to the farm, poults rely on the nutrients provided by the remains of their embryonic yolk sac to sustain them for the journey. Both fertile eggs and poults may have to travel long distances across the country, due to the limited number of turkey breeding and rearing operations in Australia.

Male and female turkeys grown for meat production are usually housed separately either through a partition in the shed or in separate sheds, for easier management and harvesting as they grow to different sizes.

Upon arrival at the growing farm, poults are placed into sheds, where they are confined for the first few weeks in a designated area, called the 'brooding area'. This area provides poults with the necessary warmth and other essential provisions such as bright lighting and easy access to feed and water, until they are old enough and sufficiently feathered to regulate their body temperature. A layer of litter bedding is provided across the shed floor, usually sawdust, wood shavings or rice hulls, which provides a suitable resting surface, helps maintain temperature and acts as a substrate for absorbing moisture and faeces. At the end of the brooding period, poults are given access to the whole shed where they remain until they reach slaughter weight, unless in the case of 'brood and move' systems where they may be transferred to another growing farm at five to six weeks of age. The flock and the shed environment are regularly inspected and monitored by on-farm staff throughout the life of the flock.

Turkey sheds may be climate-controlled using tunnel or other mechanically ventilated systems, while older sheds may be open sided and rely on natural ventilation. An average turkey shed in Australia typically houses around 8,000 to 15,000 birds. RSPCA Approved turkey farms may house birds indoors where their behavioural and physical needs are met, or in systems where they also have access, once they are reasonably feathered, to an outdoor area with shade, shelter and protection from predators.

Turkeys are collected (or 'harvested') for slaughter in smaller batches or all at once depending on the market, such as whether they are for whole-bird products (usually during Christmas) or further processed products (such as drumsticks, turkey loaf). At harvesting, birds are caught by hand and placed into transport crates or modules. Alternatively, larger heavier birds may be herded onto loaders where birds are then moved on a conveyer belt into transport crates or modules. These transport crates or modules are then loaded on to trucks for transport to the abattoir. In Australia, turkey production is largely seasonal with the majority of turkeys produced for the Christmas market.

Turkeys arriving at the abattoir, are rested for up to two hours to allow them to settle from being transported. Currently, in Australia, only electrical waterbath stunning systems are used for turkey processing, where birds are removed from their transport crates or modules and placed in shackles to be stunned (rendered unconscious). Birds then pass through an electrical waterbath which renders them unconscious prior to being slaughtered. An alternative to electrical waterbath stunning is controlled atmosphere stunning using carbon dioxide gas. This method does not require the need of conscious shackling of birds. RSPCA Australia encourages the use of controlled atmosphere stunning systems as it avoids the inherent negative bird welfare outcomes associated with shackling of conscious birds. In both systems, unconscious birds then have their necks cut and are bled out to cause death prior to regaining consciousness. Once dead, birds are plucked, cleaned and further processed either as whole birds or cut into pieces such as drumsticks, breasts, wings and thighs.

Aggression

Turkeys are highly social birds and may become aggressive towards one another when establishing dominance relationships ('pecking order') or when competing for resources. Aggression in commercial turkey flocks can be a significant risk to bird welfare as this can cause stress, fear or may result in physical injury or death. Persistent aggression may also increase the risk of injurious feather pecking in the flock. Common signs of aggressive behaviour include: pecking directed at the head, neck or snood of another bird, loud vocalisation, chasing, fighting and escape or hiding behaviour.

The high rate of injury due to aggressive encounters in domesticated flocks compared to their wild counterparts is thought to be due to feed and nutrition (e.g. diet formulation, feeder and drinker space), environmental factors (e.g. housing, lighting, stocking density and limited opportunity to escape attack in commercial settings) and genetic disposition as a result of selective breeding in some strains. Aggressive behaviour is more commonly displayed by toms towards other birds but also towards stockpersons. Turkeys are able to distinguish individuals within a group (up to a certain group size) and will display more aggressive attacks on unfamiliar group members, suggesting flock size and stocking density may be important factors influencing the level of aggression. However, more research is needed, particularly for large commercial flock sizes, to further investigate the relationship between flock size, stocking density and aggression.

Early detection and management interventions are key to reducing outbreaks of aggression. Aggression can be minimised by reducing competition for resources, providing more space and opportunities for birds to escape aggressive encounters (e.g. visual barriers and perches), maintaining optimal environmental conditions and providing environmental enrichment.

See also 'Injurious pecking'.

Animal welfare

The welfare of an animal includes both its physical and mental state. Ensuring good animal welfare goes beyond preventing pain, suffering or distress and minimising negative experiences, to ensuring animals can express their natural behaviour in an enriching environment, feel safe, have healthy positive experiences and a good quality of life. Thus, good animal welfare means providing animals with all the necessary elements to ensure their physical and mental health and a sense of positive individual wellbeing.

RSPCA Australia encourages participation in independent certification schemes that improve animal welfare along the supply chain, such as on farm, during transport, and at slaughter, and allow participants to demonstrate compliance with relevant codes, standards and legal requirements. Regular as well as unscheduled on-site assessments (including resource- and animal-based measurements) are important in ensuring farm animal welfare along with improving animal welfare along the supply chain, identifying and resolving animal welfare issues, and improving animal welfare standards. On-site assessments must include inspections by the relevant government authority as well as third-party audits.

See also 'Five Freedoms / Five Domains'.

Animal Welfare Officer at the abattoir

The RSPCA Approved Farming Scheme Standard for turkeys require the abattoir to nominate one or more designated employees who are responsible for overseeing animal welfare at the facility and monitoring compliance with the Standard. These employees may often be given the title of Animal Welfare Officer and are also responsible for ensuring company standard operating procedures (including the setting and monitoring of trigger levels) and legal obligations are adhered to in relation to animal welfare.

The Animal Welfare Officer should be trained and certified by a recognised training organisation and must have the authority and technical knowledge on all relevant aspects of animal welfare during the slaughter process including holding/lairage, restraint, handling, stunning and confirming signs of unconsciousness and death in birds. In addition, it is essential they have a good understanding of turkey behaviour and promote positive attitudes towards animals amongst all staff to ensure animal welfare is seen as a priority in the day-to-day operation of the facility. Where additional investment or changes are needed to improve or safeguard animal welfare (e.g. infrastructure or equipment upgrades, additional training), the Animal Welfare Officer should promptly raise this with upper management and provide advice on appropriate action.

See also ‘Stockpersonship’ and ‘Animal-based welfare assessment at the abattoir’.

Animal-based welfare assessment

Resource-based indicators of animal welfare (e.g. access to food and water, litter condition, shed design) are commonly used to assess animal welfare in various accreditation schemes. Although these indicators are an important part of animal welfare assessment, it is also crucial to assess welfare based on animal characteristics such as the birds’ physical health, appearance and behaviour. Animal-based welfare assessment provides direct information about the response of and effects on the animal, rather than just an assessment of the environment or management system.

Using a combination of select animal-based measures can be a valid and robust way of assessing welfare on-farm, at the abattoir or any other part of the production process. The RSPCA Approved Farming Scheme Standard for turkeys require on-farm assessment of animal-based welfare measures such as: incidence of aggression or injurious pecking, wounds, feather cover condition, lameness, gait score and foot pad lesions. In addition to providing valuable information about the bird’s welfare and quality of life, these measures are practical to assess under various conditions and can be easily and reliably assessed by different assessors. Given the large size, active and often flighty nature of turkeys, unnecessary catching and handling may increase the risk of injury and unwanted stress response. Shed transect walks are a practical and time efficient method of assessing large numbers of turkeys on-farm without the need to handle individual birds. However, in order to properly assess some measures (e.g. foot pad lesions), it is necessary to physically catch and restrain individual birds.

Routine on-farm animal-based welfare assessments should be used to complement and build on daily inspection procedures to better support management decisions, strengthen self-responsibility of the farm manager, improve transparency and for benchmarking at the individual farm and producer levels. Routine assessment of animal-based measures promotes early intervention, meaning adjustments can be made in a timely manner and adverse impact on the birds can be minimised.

There has been significantly less investment in the development of animal welfare assessment protocols for turkeys compared to meat chickens and layer hens. The selected indicators and assessment protocols prescribed in the Standards have been developed using guidance from the scientific literature, other animal welfare assessment protocols and RSPCA assessment procedures.

See also ‘Stockpersonship’.

Animal-based welfare assessment at the abattoir

The principle of continuous improvement in animal welfare also extends to the welfare of animals at abattoirs where, through regular self-assessments using measurable and objective criteria, benchmarks can be established. The Approved Farming Scheme Standard for turkeys require animal-based welfare observations to be recorded at the abattoir, and trigger levels to be set for the criteria to be assessed. A trigger level is a predetermined threshold which sets in motion a course of action to investigate and address the cause of a breach of that threshold. Feedback must be provided to the source farm or abattoir when a relevant trigger level is reached. The self-assessments should quickly and accurately allow trends to be identified and thus any deviations from that trend to be recognised and acted upon.

The protocol used to assess animal-based measures at the abattoir should be objective, differentiate between minor, moderate and severe conditions, be able to be implemented consistently and provide consistent results within and between different observers, and provide reliable and accurate data. The targets for each criterion should reflect an excellent rating where there is very little hock and foot lesions, wing or leg damage or scratches, and no ineffective stunning or cutting.

Antimicrobials

An antimicrobial is an agent that kills or stops the growth of microorganisms such as bacteria, viruses, fungi, and parasites. The World Organisation for Animal Health does not include anthelmintics, disinfectants or antiseptics in their definition of antimicrobial agents. Antimicrobials may be used therapeutically for treatment of a diagnosed disease or injury, or they may be used prophylactically to prevent the occurrence or spread of disease. Ionophores (compounds containing antimicrobials not used in human medicine) and non-ionophores are a category of antimicrobial. Antimicrobials called coccidiostats that protect against coccidiosis are routinely added to turkey feed to prevent a disease outbreak in the flock.

Where antimicrobials are administered preventatively (e.g. through the use of ionophore or non-ionophore coccidiostats to improve gut health), the impact on animals due to poor housing and management conditions may be masked as well as contributing to antimicrobial resistance which occurs when microorganisms continue to grow in the presence of levels of antimicrobial agents that would normally stop their growth or kill them.

The RSPCA supports the responsible use of antimicrobials for the treatment of sick birds. Where antimicrobials (including coccidiostats) are used, an Antimicrobial Stewardship Plan is required to be in place and updated annually to demonstrate responsible antimicrobial use. Some strategies to implement in disease prevention include good farm biosecurity and shed hygiene, reducing stocking density, effective shed ventilation, appropriate feeding and the use of effective antibiotic alternatives and vaccination. The aim is to see greater focus placed on optimising the animal's environment, on good animal handling and appropriate management practices to reduce reliance on antimicrobials (particularly where they are used preventatively).

Public reporting of antimicrobial use (including coccidiostats) in every livestock sector would provide transparency to consumers while at the same time allow industry to demonstrate commitment to their responsible and prudent use. Surveillance and public reporting of antimicrobial resistance is needed to monitor the effect of antimicrobial reduction on the prevalence of antimicrobial resistance.

See also – 'Biosecurity', 'Health and disease'.

Beak trimming

Beak trimming is the removal of the sharp tip of a birds' beak, in turkeys it is commonly performed using an infrared technique at the hatchery on newly hatched poults. Beak trimming raises a number of welfare concerns including altered effective function of the beak (such as impaired ability to feed, forage, preen and remove ectoparasites), neuroma formation and associated experience of chronic pain. Impaired function of the beak and ability of the bird to perform highly motivated beak-based behaviours can lead to frustration. It has been suggested that this frustration may further motivate beak-trimmed birds to exhibit pecking and pulling behaviours towards other birds which may be a factor that increases the risk of feather pecking outbreaks.

The reliance on beak trimming as a routine method of managing feather pecking and cannibalism in turkeys is a concern and there is an urgent need to employ alternative management strategies to reduce the risk of injurious pecking. Where producers are successful in reducing feather pecking through implementing these management strategies, they are encouraged to source non-beak-trimmed birds.

Where beak trimming occurs, it is the responsibility of the hatchery to ensure that the trimming equipment is calibrated to match the weight and size of the poult and is well maintained to ensure an accurate tipping of the beak only. Inaccurate and otherwise poor beak trimming should always be reported back to the hatchery.

See also 'Injurious pecking'.

Behavioural needs

Good welfare can be measured by both the absence of harmful behaviours (e.g. injurious pecking) and the presence of natural and highly motivated behaviours (e.g. sleeping, resting, foraging). Turkeys display similar behavioural traits to domestic chickens such as the need to dustbathe, forage, perch, roost, scratch, peck, lay their eggs in a nest (for breeding birds) and engage in appropriate social interactions. However, compared to our understanding of the motivation (and frequency and length of time) of chickens to perform such behaviours, there has been very limited research investigating the behavioural motivation of turkeys and associated strength of this motivation when performing specific behaviours.

The provision of appropriate facilities, equipment and environmental conditions is critical to promoting positive behavioural expression in turkeys. This should include the provision of good quality adequate space for locomotion, exploration and social interactions; dry and friable litter; the provision of suitable lighting to encourage activity (during the light phase) and allow for appropriate rest and sleep (during the dark phase); environmental enrichment to encourage natural behaviours; perching and roosting sites; and visual barriers to escape/hide from aggressive attack.

Modern turkey strains are limited in their ability to express natural behaviours due to their body conformation and subsequent restricted movement and activity levels. This is a result of years of selective breeding for performance traits such as fast growth and large breast size. Future breeding programs which recognise the importance of behavioural expression and other positive welfare specific traits, and maintaining birds in optimal health, will help birds to perform these natural behaviours and promote improved bird welfare.

See also 'Environmental enrichment', 'Lighting', 'Litter' and 'Perching'.

Biosecurity

The key objective of biosecurity and quarantine measures is to prevent or control the introduction and spread of disease regardless of whether birds are housed indoors or have access to an outdoor area. Appropriate and effective biosecurity measures include hygiene and sanitation/disinfection procedures relating to the movement of staff, visitors, equipment, supplies, and vehicles onto and between different sites and work areas. Further information on biosecurity practices can be found at www.farmbiosecurity.com.au and in the National Farm Biosecurity Manual for Poultry Production.

See also 'Health and disease'.

Brood

Newly hatched poults have a very limited ability to thermoregulate and therefore require sufficient heat in trucks during transport and in the shed to keep them warm. To help them stay warm and ensure they have easy access to feed and water, for the first few weeks of life, poults may be confined to an area of the shed called the 'brood area'. This area should be pre-heated before the poults arrive to enable the surface temperature of the litter to reach around 32°C, this temperature is then gradually lowered as the birds grow. Young poults are particularly susceptible to starvation, overheating, dehydration, yolk sac infections and other bacterial infections. Mortality during the first week of life can be affected by the parent flock, incubation conditions, time of hatch, and conditions on farm such as temperature, feed and water access and environmental conditions during brood. Important aspects of their management include careful placement upon arrival in the shed, maintaining appropriate shed temperatures, ensuring dry friable litter, high light intensity to help poults find feed and water, and proper ventilation to remove noxious gases (such as ammonia and carbon dioxide) and bring fresh air into the brood area.

Poults require constant supervision particularly during the first few weeks so that necessary adjustments to the brooding environment can be made in a timely manner. Poults are easily frightened and prone to smothering so it is important to minimise stressors during the brood period. For example, minimising loud noises, moving through the shed in a slow and calm manner, maintaining optimal thermal comfort, providing adequate opportunity for rest and sleep, gradual removal of supplementary feeders and drinkers, and gradual transition between feed rations. The brood period is a critical time for bird development where handling, housing, feeding practices and social interactions can have significant impact on the birds' health, behaviour, stress physiology (i.e. how a bird's body responds to stress such as the hormonal and immune response) and musculoskeletal development later in life.

See also 'Egg storage' and 'Mortality'.

Catching for slaughter

Catching and handling during pick-up (or depopulation) is a very stressful experience for birds. Depending on the catching method used and handling practices of the catching crew, the act of catching and loading birds on to the transport vehicle may be more stressful than the transport journey itself. Additionally, poor catching and loading practices can have significant effects on a bird's stress response during transport and increases the risk of injury, so every effort should be made to ensure the process is conducted in a calm manner that minimises stress and discomfort for the birds.

Mechanical catching and loading systems, where birds do not have to be manually handled (or where handling is kept to a minimum) are likely to be beneficial for bird welfare compared to manual catching of individual birds, but only where appropriate operation of the equipment and well-trained staff are utilised. Where turkeys are herded into pens or modules as part of the catching

process, this should be done in a slow and calm manner. Herding aids such as waving a flag, rattling a bottle or spreading the arms may be used to gently encourage birds to move in the desired direction.

As turkeys vary greatly in size at various stages of production, catching and handling methods should take into consideration the size, weight and condition of the birds being caught. Some handling methods appropriate for small birds are not suitable for larger birds. Appropriate bird handling and catching techniques for different sized birds and handling procedures are prescribed in the RSPCA Approved Farming Scheme Standard for turkeys.

See also ‘Flight zone’, ‘Stockpersonship’ and ‘Pick-ups’.

Closed Circuit Television (CCTV)

The RSPCA Approved Farming Scheme Standard for turkeys requires that CCTV be used to monitor those areas of the slaughtering facility where live animals are handled. CCTV does not replace the need for the employment of people with the right attitude towards animals, comprehensive staff training and good stockpersonship. CCTV, however, is an excellent means by which facility management and auditors can monitor compliance with standards and regulations relating to animal welfare. CCTV allows problem areas to be identified and promptly addressed. It is important that a protocol is in place to determine the use of CCTV. Such protocols should include information about the positioning of the camera to allow a clear view of bird handling, stunning and slaughtering processes; about the period for which the footage should be retained (three months is considered good practice); about the review of the footage and who should be responsible; and how the footage should be kept safe and secure. These protocols are well described in the UK Farm Animal Welfare Committee’s *Opinion on CCTV in slaughterhouses.*

Contact dermatitis

Contact dermatitis is an inflammatory or ulcerative condition of the skin, most commonly presented in turkeys on the foot pads (foot pad dermatitis) and the hocks (hock burn). The skin may become hard, scaly and necrotic. Depending on the severity of the lesions, contact dermatitis can cause pain, reduced activity such as walking, standing and environmental pecking, exacerbate existing leg or joint problems, as well as increase the susceptibility to secondary infections.

Foot pad dermatitis can develop at an early age and changes to the foot pad surface have been observed at high frequencies in birds as young as three days of age. High litter moisture content appears to be the main factor associated with foot pad dermatitis, however diet, gut health and gut integrity, high stocking density, genetics, and other environmental influences such as temperature, humidity, ventilation and season also contribute to the development of the condition. Hens have a thinner outer layer of skin and appear to be more susceptible to foot pad dermatitis than toms. When assessing foot pad lesions, both feet should be checked and the worst foot scored and recorded.

The RSPCA Approved Farming Scheme Standard for turkeys requires weekly assessment and monitoring of foot pad lesions from 21 days of age until seven weeks of age using the lesion scoring system as below:

- 0 = no external signs of foot pad burn. The skin of the foot pad feels soft to the touch and no swelling or necrosis is evident.
- 1 = the pad feels harder and denser than a non-affected foot. The central part of the pad is raised, reticulate scales are separated and scale shaped black necrotic areas may be present.
- 2 = swelling is evident and the total foot pad size is enlarged. Reticulate scales are pronounced, increased in number and separated from each other. The amount of necrosis is half or more of the total area of the foot pad.

See also ‘Lameness, musculoskeletal disorders and gait score’.

Egg storage

Handling and storage of fertile eggs prior to incubation can impact bird welfare. Depending on the operation of the hatchery and the market demand, fertile eggs may be stored for long periods prior to incubation. Eggs are stored in environmentally controlled rooms where temperature and humidity are closely monitored. Typically, hatcheries will aim to keep egg storage time to a minimum (between two and seven days). However, in some cases, eggs may be stored for periods of two to four weeks. Longer egg storage times can increase embryonic abnormalities and mortality, thereby reducing hatchability. Embryonic development, post-hatch growth, and poult quality and viability can also be negatively impacted by long egg storage times. Eggs laid by young or old breeder flocks are less likely to tolerate long storage times. Good coordination and planning between the breeder farms and the hatchery are needed to ensure egg storage times are kept to a minimum (ideally less than seven days) in order to avoid the negative impacts associated with long-term egg storage.

See also ‘Hatching and placement’.

Environmental enrichment

Providing environmental enrichment can be an effective strategy to improve animal welfare by enabling positive affective states and improving biological functioning, particularly where animals are housed indoors. Environmental enrichment may improve the environment by increasing the complexity of the animal’s surroundings, and by increasing opportunities to engage in natural and rewarding behaviours.

Poor animal welfare occurs where there is a mismatch between the animal’s needs and aspects of animal management and/or the animal’s environment. However, environmental enrichment alone will not address this mismatch. Good animal welfare relies on meeting an animal’s physiological needs (e.g. good health, good nutrition, comfortable housing), on good stockpersonship (e.g. low-stress animal handling, positive interactions), on providing for innate behavioural needs (e.g. in turkeys, the ability to perch, dustbathe, and to perform foraging behaviours ground-scratching and ground-pecking), and on providing the opportunity to have positive experiences (e.g. through the ability to express play and social behaviour, and to forage and explore).

Enrichment such as novel objects can enable birds to better cope with fearful stimuli which can reduce the harmful effects of panic and smothering as well as the negative physiological effects of long-term stress and boredom. Some forms of manipulable enrichment material can also reduce the incidence of injurious pecking. Providing enrichment at an early age, before learned preferences or habits have developed, is likely to improve its effectiveness as a tool to reduce the risk of feather pecking.

Effective enrichment for turkeys may be in the form of roughage, visual barriers or panels, straw bales, novel objects for pecking and or scratching, elevated resting places such as perches and platforms, and access to covered verandas and outdoor areas with shelter and palatable vegetation. Straw bales can provide an interesting item for birds to peck at and straw pieces to manipulate. They can also encourage birds to jump and move, improving leg health. Perches, visual barriers and panels in the shed can allow birds to escape disturbances and aggression and reduce skin lesions (caused by aggressive encounters).

The ability for animals to manipulate enrichment objects is important. Enrichment objects can sometimes stimulate short-term interest which does not persist over a long period of time. Therefore, it is important to monitor whether birds are interacting with the enrichment or whether the level of interest and activity has decreased over time. Rotating and replacing enrichment may be necessary to maintain interest. Environmental enrichment must result in a genuine improvement of

the environment and not just a change of environment, as well as encourage a desired behavioural outcome. Thus, objects which are not used or are underutilised by the birds are considered unacceptable forms of enrichment. More research is needed to identify turkeys' preference for different types of enrichment and whether interest in these objects can be maintained.

Care is needed in selecting enrichment objects. Any objects which may cause injury or stress to birds should be avoided. This may include entanglement (e.g. string), entrapment, impeding movement or access to resources, particularly at a young age, or negative nutritional impacts or impaction if objects are ingested.

Bird welfare is enhanced through the provision of perches, foraging materials and other manipulable materials indoors. Where birds have access to an outdoor area that offers many more opportunities for enrichment, bird access is encouraged by providing shade and shelter.

RSPCA Australia encourages provision of these features above the minimum required under the Standard and the monitoring of the birds' use of environmental enrichment. Producers are encouraged to be creative and trial various enrichment types as there are several objects, substrates and materials that may be suitable for turkeys.

Euthanasia

Euthanasia is defined in the RSPCA Approved Farming Scheme Standard for turkeys as humanely ending the life of an animal when it is in the interest of the animal's welfare and using a technique that avoids further pain, suffering and/or distress. All methods of humane killing, including slaughter and on-farm euthanasia, must meet the same criteria: death of an animal without pain, suffering or distress, that ensures rapid unconsciousness followed by death without regaining consciousness; and with equipment that is easy to maintain.

Welfare risks associated with euthanasia include the reliability and suitability of the technique or method used, need for handling and restraint, maintenance and function of equipment, training and competency of the operator, health status of the bird and timely confirmation of death.

Animals may need to be euthanased because they are weak, sick, injured, and/or unable to walk, and will not recover. Following the euthanasia procedure, every bird must always be immediately checked to ensure it is dead. Signs of unconsciousness include the absence of the following: nictitating membrane reflex (third eyelid slides across the eye horizontally when touched), corneal reflexes (eye blinks when touched), pupillary light reflex (pupil constricts when a bright light shone in eye), rhythmic breathing, vocalising, and muscle tone. The euthanasia method must be immediately repeated if there are any doubts about its effectiveness, or an alternate humane method must be used.

Euthanasia methods

Manual cervical dislocation is the most common form of euthanasia for poultry used in Australia. It is performed by stretching the neck downwards and applying a ventrodorsal rotational force to the skull (pulling the skull back and upwards) to dislocate the first neck vertebrae from the cranium (skull). This causes separation of the spinal cord and brain stem, reduces the diameter of the carotid arteries, and death occurs by cerebral ischemia (insufficient blood flow to the brain) if performed correctly. There are welfare concerns with cervical dislocation and the time taken for unconsciousness to be achieved.

The Humane Slaughter Association do not recommend neck dislocation without prior stunning for the routine killing of poultry and suggest it should only be used in an emergency or for killing very small numbers of birds where better methods are not available. They further recommend that electrical

or percussive stunning followed by neck-cutting or neck dislocation are more appropriate, humane methods of killing poultry. The European Food Safety Authority (2004) also states that cervical dislocation should not be used due to welfare concerns, and if it is used, it should be limited to small numbers of birds weighing less than 3kg.

Captive bolt devices may be an alternative, more humane method of euthanasia than cervical dislocation, where equipment is specifically designed and appropriate for the size of the bird. Captive bolt devices are designed to kill the bird from a percussive blow from the bolt that is sufficient to produce significant damage to the skull and brain, resulting in rapid loss of consciousness and death. This method therefore offers animal welfare advantages over manual cervical dislocation.

Important aspects of using captive bolt guns include testing the devices each day prior to being used, appropriate restraint of birds, accurate positioning (placement and angle) of the device on the bird's head, the use of an appropriately designed device for the species, and always checking that the bird is dead following the procedure. Suitable size and shape of the bolt and firing energy are all critical to ensuring an effective stun and subsequent death. If any of these aspects are incorrect, such as placement of the device, it can result in severe trauma without loss of consciousness.

Carbon dioxide controlled atmosphere killing on-farm may be another acceptable alternative to cervical dislocation, where appropriate equipment and non-aversive gas concentrations are used. Where there is no commercially available purpose-built controlled atmosphere killing device for on-farm euthanasia, farmers looking to install controlled atmosphere killing systems should be guided by a suitably qualified practitioner to ensure the system is fit for purpose and appropriate safeguards are included in the design such as gas monitoring equipment, opportunity for visual observation, as well as regular calibration to ensure only suitable gas mixtures are used.

Once a bird has been identified as needing euthanasia, it must be performed immediately to minimise the bird's experience of pain, suffering and/or distress. Therefore, all farms must have suitable euthanasia equipment available on farm to perform the procedure, which in the case of larger birds will require either an appropriate captive bolt gun device or facilities for carbon dioxide controlled atmosphere killing.

Feed and water

Feed composition has important effects on health and welfare. Including whole grains into the diet can aid with the development of birds' digestive tract and may also improve immune function. However, the benefits of feeding whole grains are likely to vary depending on the grain type, what percentage of the diet it constitutes and the age of the birds at which it is included in the diet. Whole grains included into the diet at too high a level has been associated with increased excreta moisture, which could increase overall litter moisture. Whole grains can be included as a substitute for ground grains in the ration itself (complete diet) or provided separately (free choice feeding).

Feed form can also impact welfare. Crumbled diets may be beneficial for young poults, while mash diets may be beneficial for older birds to reduce the risk of injurious pecking and improve plumage condition. Ingredients such as vitamin D3, calcium and phosphorous, and their ratio in the diet affects bone quality and can result in impaired function of the skeletal system if not provided in sufficient quantities. The use of probiotics, additives or supplements added to feed or water may have a positive impact on welfare through improved immune function, bone development and reduced stress levels but can also potentially lead to increased growth rate and high litter moisture content which can result in poor welfare outcomes. Turkeys are particularly sensitive to aflatoxins, a common contaminant of poultry feed and feed ingredients. Sourcing good quality feed and correct storage of feed to minimise risk of contamination is needed.

For turkeys, feeding and drinking are socially facilitated behaviours meaning it is important to ensure there is sufficient feeding and drinking space appropriate for the size of the flock. Drinker position and water pressure should allow birds to access water easily while preventing dripping or spilling onto the litter.

Five Freedoms / Five Domains

The Five Freedoms were first mentioned in 1965 in a UK report on the Welfare of Animals kept under Intensive Livestock Husbandry Systems which stated that "farm animals should have freedom to stand up, lie down, turn around, groom themselves and stretch their limbs". Following the establishment of the UK Farm Animal Welfare Council shortly after, the concept was further refined into the Five Freedoms we know today:

- Freedom from hunger and thirst — by ready access to fresh water and a diet to maintain full health and vigour
- Freedom from discomfort — by providing an appropriate environment including shelter and a comfortable resting area
- Freedom from pain, injury or disease — by prevention or rapid diagnosis and treatment
- Freedom to express normal behaviour — by providing sufficient space, proper facilities and company of the animal's own kind
- Freedom from fear and distress — by ensuring conditions and care which avoid mental suffering.

The RSPCA considers that the welfare of an animal includes its physical and mental state. Good animal welfare implies both physical health and a sense of wellbeing. An overall welfare assessment can be made by looking at the bird's physical environment, its biological functioning and by observing bird behaviour in response to challenges in the environment. The latter, in particular, requires an understanding of normal behaviour, behavioural needs and wants, and being able to identify behaviours which are indicative of poor welfare.

More recently, a new framework for assessing animal welfare has been developed called the Five Domains which emphasises the need to consider the mental as well as physical wellbeing of animals. Thus, animals are able to be assessed on the basis of whether aspects of nutrition, health, housing and/or behaviour affects mental state either positively or negatively. For example, an animal housed in a barren pen may exhibit signs of frustration.

See also 'Animal welfare', 'Animal-based welfare assessment'.

Flight zone

The flight zone is effectively the animal's 'personal space' and is indicated by the distance an animal will allow a human to approach before moving away. An awareness of the flight zone allows a handler to move animals in a manner that minimises stress, particularly when combined with other low stress handling methods including slow, deliberate movements and low noise. A bird will move forward if the person stands on the edge of the flight zone at a point behind the bird, and backwards if a person stands on the edge of the flight zone in front of the bird. This point is known as the 'point of balance'. Animals quickly learn that, if they move in the desired direction, a handler will move out of their flight zone. The size of a birds' flight zone will vary depending on the individual animal, previous handling and human interactions and present level of stress or excitement.

See also 'Handling', 'Stockpersonship'.

Growth rate and genetic strain

In past decades, turkeys, similar to meat chickens, have been subjected to intense genetic selection for fast growth rate, increased body weight and large breast muscles. The fast growth rate and disproportional increase in breast muscles of modern fast-growing turkey strains has led to several significant welfare issues when compared with slower-growing turkey strains. Fast-growing turkeys display increased incidences of musculoskeletal disorders and leg problems including lameness, bone disorders and deformities, and reduced bone integrity. The large breast muscles of these birds has drastically altered their body conformation and resulted in a forward shift to the birds' centre of gravity, which has negatively impacted their gait and placed increased stress on the leg bones increasing the risk of leg problems and fractures.

Fast-growing, heavy turkeys are less active and will spend more time sitting compared to slower-growing birds who spend more time perching, walking and interacting with the environment. Despite their large size, it is likely that turkeys maintain their motivation to perch, forage and perform other active behaviours even when they are unable to do so due to their physical restrictions. This likely results in birds experiencing frustration and compromised welfare due to the inability to display these natural behaviours. Early research suggests there may also be genetic differences in stress responses of fast-growing, in comparison to slower-growing and cross breed turkeys.

While breeding companies have reportedly adjusted their breeding goals to address some of these issues, the reality is most commercial turkeys raised in Australia continue to be fast-growing birds with inherently compromised welfare. Balanced breeding programs, which factor in leg health and other positive welfare traits, must be implemented as a priority and slower-growing turkey strains should be utilised in future.

See also 'Lameness, musculoskeletal disorders and gait scoring'.

Handling

People handling turkeys should have an understanding of bird behaviour and, when moving them understand the principle of using the bird's flight zone and point of balance to move the bird in the intended direction. Turkeys must be handled competently and humanely at all times by people who have a positive attitude and behaviour towards the animals in their care – whether it is on farm, during transport or at the abattoir. Transport is recognised as a stressful experience for animals and poor handling at this time can compound the effect of stress on welfare and meat quality. The importance of good animal handling, stunning and slaughter at abattoirs cannot be overstated. Persons responsible for the handling (including stunning and killing) of animals must be appropriately trained and competent in their required tasks.

Turkeys must never be subjected to rough handling. Due to their size and weight, turkeys should not be inverted and carried by the legs as this is likely a stressful experience for the birds. The aim should be for birds to have positive interactions with those handling them. Positive handling results in less fearful, more productive birds.

See also 'Flight zone', 'Stockpersonship', 'Catching for slaughter'.

Hatching and placement

At the turkey hatchery, eggs set in a hatcher do not all hatch at the same time. The time span between hatching of the first and last poult is known as the 'hatch window'. The recommended hatch window for turkey poults is approximately 36 hours. This means the poults who hatch early in the hatch window can experience dehydration and impaired performance, and can have higher rates of mortality as they must experience longer periods of time before they access feed and water

on farm compared to poults who hatch late. Technologies where eggs are transported to the farm shortly before hatching have been developed overseas and allow chicks immediate access to feed and water after hatching, however these technologies are not currently used by the turkey industry in Australia.

For newly hatched poults, the time at the hatchery is likely to be very stressful. Poults may be subject to various procedures (e.g. vaccinations, sexing, infrared beak trimming), handling, noises, changes in temperature, vibrations and movements on conveyor belts and long periods being held in crates before being transported. The design, management and maintenance of equipment at the hatchery is a primary factor influencing the welfare of newly hatched poults including injury, mortality and experiencing fear or distress.

Poults are unable to effectively thermoregulate, so it is important for transport and placement conditions to be appropriately insulated, warm and maintain good ventilation and appropriate humidity levels. Poults should be unloaded from the truck and placed into the heated brood area of the shed as quickly as possible. Poults must be placed carefully into the shed in a coordinated and planned manner. When emptying poults from the transport containers, the containers must be kept close to the floor and tipped gently, without dropping the poults from a height and to avoid them falling on top of each other and being injured.

See also ‘Brood’.

Health and disease

Birds must be protected from pain, injury and disease, through good management and husbandry practice, and by rapid detection and treatment of disease. Disease can be a major cause of poor welfare and mortality. Therefore, it is essential to take all reasonable steps to minimise the likelihood of disease outbreaks. Maintaining good gut health, immune system function and ensuring proper skeletal development are critical for promoting good health and robustness within turkey flocks.

Poults are not routinely vaccinated, this is because breeding hens are vaccinated for common diseases such as haemorrhagic enteritis, fowl cholera and fowl pox, which provides immunity to the hatched poults. Turkeys on farm are usually only vaccinated when there is a high risk of a specific disease, such as a previous flock having fowl cholera in which case the next flock may be vaccinated.

Generally, the key risk factors for disease include stress, immunosuppression, high stocking densities, overheating, poor hygiene and biosecurity, poor nutrition, diet change (or insufficient feed and water), group size, temperature variation, poor litter quality and management and poor air quality. Optimising the environment and ensuring appropriate handling and management practices (including regular inspection of animals) will go a long way towards preventing disease. Some steps to consider include avoiding the preventative use of antimicrobials, reducing stocking density, vaccination, effective shed ventilation, appropriate feeding, genetic selection and breeding for robustness.

Ongoing adherence to established biosecurity protocols can also help to reduce the incidence of disease. Preventative treatment such as vaccinations should be implemented where available in addition to ongoing monitoring by farm workers who should be able to recognise early signs of disease. The RSPCA Approved Farming Scheme Standard for turkeys requires that producers develop a veterinary health plan in consultation with a designated veterinarian.

See also ‘Antimicrobials’, ‘Biosecurity’.

Injurious pecking

Injurious pecking is a major welfare concern for turkeys, it involves inappropriate pecking activity directed towards conspecifics, entailing repeated pecking at the feathers, vents or exposed skin of victimised birds. Gentle feather pecking involving the mild pecking or preening of other birds is a normal social and investigatory behaviour of turkeys and is not classified as injurious pecking as it is performed without force and does not cause damage. Injurious pecking in turkeys has typically been divided into three types of problem behaviours: head pecking, severe feather pecking and cannibalism. Head pecking is directed at the head, snood or neck of another turkey and is considered an act of aggression and maintenance of social dominance. Severe feather pecking is the forceful, repeated pecking and pulling of the feathers (usually on the back, tail or wings) and/or skin of another bird which can result in damage to the skin and increased susceptibility to secondary infections. Cannibalism involves the repeated pecking of exposed skin or blood of other birds and can lead to the consumption of blood and tissue.

Injurious pecking can spread quickly through a flock and result in large-scale injury, culling and mortality. The pain and discomfort caused by injurious pecking in addition to increased susceptibility to secondary infections, as well as the short-term and long-term effects of the associated stress all result in significant compromised welfare for birds.

While there has been a considerable amount of research investigating the potential causes, mechanisms and mitigating management practices of feather pecking in layer hens, there has been very little research focusing on abnormal feather pecking behaviours in turkeys. The development of injurious pecking is multifactorial but a main cause of severe feather pecking and cannibalism is thought to be a lack of opportunity to express natural behaviours and a lack of environmental stimuli in barren housing systems, resulting in frustration, boredom and redirected pecking behaviours at other birds. Other factors that can increase the risk of injurious pecking include, genetics, stocking density, lack of appropriate substrate for foraging, inappropriate feed form or composition, inappropriate lighting (intensity and spectral range) and stressors such as disease and sudden changes in the birds' environment.

Injurious pecking management and intervention should involve a pro-active, multipronged approach incorporating: genetic selection of various traits (e.g. survival, feather strength and/or plumage markings, behaviour, inherited social effects), environmental management (providing sufficient and even lighting, novel pecking objects, continuous access to good quality litter, perching and visual barriers), nutrition and feed form (feeding crumble or mash rather than pellets, appropriate provision of dietary requirements such as fibre), disease and parasite management, stress minimisation, management of stocking density, as well as good stockpersonship and bird handling practices. Injurious pecking behaviour can occur in turkey flocks from as young as two weeks of age, highlighting the importance of early pro-active monitoring and management of injurious pecking. Early removal of birds seen to be pecking at other birds, and the early identification and treatment of victimised birds are key to managing and preventing the spread of injurious pecking within a flock. The RSPCA Approved Farming Scheme Standard for turkeys requires daily bird observations for signs of aggression, wounds, feather cover and for signs of injurious pecking.

See also 'Beak trimming' and 'Environmental enrichment' and 'Stockpersonship'.

Lameness, musculoskeletal disorders and gait scoring

Good leg health promotes good welfare and opportunity for birds to actively engage with and utilise their environment. Conversely, lameness is a serious welfare problem which causes pain and discomfort, and restricts the expression of natural behaviours. Poor leg health may be due to abnormal bone development, nutritional factors, genetic influences and/or infections.

Additionally, there are a number of musculoskeletal disorders that can impact the welfare of turkeys including: long bone deformities, crooked or curled toes, inflamed or infected leg joints, bone fractures, tissue lesions, contact dermatitis of the hocks and foot pads, or general weakness of the musculoskeletal system.

Gait scoring to assess leg health and lameness should be conducted regularly. Although walking ability and activity levels in birds can decrease as birds age and become heavier and leg problems become more prevalent, turkeys can exhibit poor gait and lameness even from a young age (in some cases as early as one week of age). Regularly assessing levels of lameness on farm, as well as contact dermatitis on farm and at abattoirs, allows targets to be set, performance to be monitored, and early intervention with corrective actions if needed. This may result in a reduction in those conditions over time where abattoir data is communicated to producers.

The incidence of lameness can be reduced with genetic selection for robustness and leg health, such as slower-growing strains, by stimulating activity as well as providing a dark period to allow sufficient rest, and by maintaining good quality litter. There are several gait-scoring systems developed by different universities including Bristol and California. The RSPCA has included in the RSPCA Approved Farming Scheme Standard for turkeys a gait-scoring system to assess lameness, as below:

- 0 = normal (has uniform regular and even strides and is well balanced)
- 1 = abnormal (irregular and uneven strides and is unbalanced)
- 2 = unacceptable (bird is reluctant to move and is unable to walk).

See also ‘Contact dermatitis’ and ‘Growth rate and genetic strain’.

Lighting

Lighting, including the provision of adequate light and dark periods, light intensity, light source and gradual adjustment of light intensity between light and dark periods are all important considerations that impact turkey welfare. The lighting systems currently used and/or recommended by poultry breeding companies are often designed to benefit production and human observation, rather than meeting the requirements for bird development including visual ability, adequate opportunity for rest and sleep and the expression of other behaviours such as socialising and exploration.

The provision of bright light is encouraged for turkey welfare, particularly during brood where it should be sufficiently bright to facilitate poults finding feed and water and to stimulate activity. Birds of different ages have been shown to display varying preferences for a particular light intensity, with young poults preferring to spend the majority of time and perform all behaviours (including resting) in brighter light (200 lux), while older turkeys preferred to perform their most active behaviours in bright light intensities (20 or 200 lux) but preferred to perch and rest in lower light intensities.

Rearing turkeys in near continuous light (up to 23 hours) has been shown to negatively impact bird welfare due to reduced walking ability, reduced expression of comfort and exploratory behaviours, increased incidence of breast lesions, pathological changes in the eye, disturbed sleep patterns and overall higher mortality rates. Implemented lighting programs should be designed to prevent excessive growth, to reduce mortality, and the development of leg problems. Further, the provision of an appropriate photoperiod, particularly when used in combination with elevated structures (such as straw bales, platforms with ramp access, or low perches) encourages activity during the light period, and consequently improves leg health. Therefore, it is important that birds have access to complete darkness for an adequate and continuous period of approximately 6-8 hours, to allow proper rest. This means all lights off, not dimmed, and the dark period to be provided at night, to prevent any daylight from entering the shed.

Turkeys have a broad colour sensitivity that extends to the UV spectrum. This means that with full spectrum light, birds that appear uniformly coloured to the human eye may in fact appear

to have mixed colouring or markings to other turkeys. Due to this UV sensitivity, the limited UV radiation often provided in artificially lit sheds is likely to impair turkeys' ability to forage as well as form and maintain social hierarchies. The UVA-fluorescent and UVA-reflective characteristics of turkey plumage is likely influenced by plumage colour, feather type, moulting stage and age of the birds, suggesting that further clarification of the links between turkeys' visual perception, plumage marking and lighting on behaviour and welfare is needed.

The right type of lighting is important for normal eye development and to reduce the risk of eye abnormalities in turkeys. It can also stimulate activity and certain behaviours including foraging, exploration, and social behaviours. Consideration needs to be given as to how birds perceive light. The human eye is the most sensitive in the green spectrum and the least sensitive in the red and blue part of the spectrum. Poultry, however, are sensitive in the green, red and blue parts of the spectrum and the UV spectrum. The different colours affect bird behaviour and where monochromatic lights are used (e.g. blue or red LED lights) their impact on bird behaviour (resting, feeding, walking, etc.) needs to be considered. Light source can also have an effect on injurious pecking incidences.

Little research has been conducted specifically on the effects of light spectrum and wavelength on turkey welfare. However, the research in other poultry species has shown birds to prefer light which most closely resembles daylight. Meat chickens provided with natural light have been found to have better leg health and may also perform more normal behaviours and exhibit higher activity levels. Natural light also provides a range of brightness in different areas of the shed which changes throughout the day and therefore creates some variation in the environment. More research into the effects of coloured lighting is needed to better understand the welfare consequences of different coloured lighting. Until more information is available on the welfare effects of different types of lighting and coloured light sources, lighting that most closely resembles full spectrum natural light is required under the RSPCA Approved Farming Scheme Standard for turkeys.

Litter

RSPCA Australia places a strong emphasis on the need to maintain litter in a dry and friable condition. Litter quality and condition can have significant impact on the health and welfare of turkeys, particularly for birds reared indoors where they are in continuous contact with the litter surface in the shed.

Managing shed conditions and ongoing maintenance of features in the shed including drinker lines, combined with nutrition management and appropriate space allowance, will affect litter quality. The prevalence of disease, infection and stress levels can also impact litter quality due to increased moisture load as a result of poor gut health. Poor litter quality can cause lesions on the underside of birds due to contact with wet litter, dirty feathers, and may prevent birds from performing normal behaviours. If litter quality is managed well, conditions including foot pad burn, breast blisters and lameness can be minimised. Turkey poults reared on dry litter display more active and complex behaviours compared to those reared on wet litter.

Every effort should be made to ensure shed managers are aware of the principles and methods of removing moisture from the litter under varying environmental conditions. Scoring systems to assess litter quality have been developed (e.g. Welfare Quality) which give guidance on litter quality assessment methods. Assessment of litter quality is a combination of classifying the condition of the substrate (i.e. whether it is completely dry and friable, or in a condition where there may be caking or excess moisture in the litter), as well as the total area of the litter affected by the different litter quality. Visual scoring of litter is a reliable and easy to perform part of on-farm animal welfare assessment and has been highly correlated with actual litter moisture content measurements taken using instruments such as soil moisture probes.

Maintaining dry and friable litter is a combination of a number of different factors including selecting appropriate litter material, maintaining appropriate litter depth, good ventilation to remove moisture, appropriate water pressure and drinker height (to avoid spillage), good nutrition to avoid watery excrement, actively maintaining the litter and aerating the substrate with equipment if necessary, and removing litter that is not in a friable condition. Litter must be of an appropriate material and of sufficient depth to allow birds to scratch, forage and dust bathe. A key feature of good quality litter material is the ability to absorb and quickly release moisture, and consideration needs to be given to the ability of the chosen litter material to be maintained in good condition.

Litter substrates commonly used for poultry include wood shavings, sawdust, chopped straw or rice hulls. The use of sand as a litter substrate is not recommended during brooding or use in cold conditions (colder climates or colder months of the year) as it is a poor retainer of heat compared to other litter substrates. Sand may act as a suitable alternative to traditional litter substrates where it can be managed appropriately and does not negatively impact the health and welfare of birds.

The use of re-used litter over multiple flocks can result in an increased pathogen load in the litter and expose birds to health challenges from parasites, fungi and environmental bacteria and viruses. Some farmers may choose to compost their litter or apply various poultry litter treatments or amendment products to reduce the amount of ammonia released in the shed when litter is re-used. The use of litter treatments or amendments should not compensate for poor management of the shed environment such as inadequate ventilation, poor litter management or excessive stocking densities. Where such products are used, they must be proven to be safe for use in poultry sheds and used as per the manufacturer's instructions.

See also 'Stress and stressors' and 'Contact dermatitis'.

Mortality

Causes of mortality in turkeys can include metabolic and cardiac disorders, ascites, leg problems, lameness, and disease. Leg problems affect the ability for birds to perform natural and highly motivated behaviours, access feed and water, and can cause pain and are a major reason for euthanasia of growing turkeys.

Early poult mortality (within the first week) is a significant issue in the turkey industry, the main causes of which are linked to yolk sac infection, starvation and refusal of poults to eat and/or drink, and flip-over syndrome (a neurological disorder where poults fall on their back and are unable to right themselves). Poults may also be prone to injury (blunt trauma, fractured limbs, cuts) and show high levels of stress as a result of the transport and placement processes, which can make them more susceptible to disease and other external stressors during this time. Other factors which may impact early mortality rates include parent flock health and production, egg storage time, incubation conditions and time of hatch, hatchery management and hygiene, and the brood environment provided once poults arrive on farm. Early hatching poults (those that hatch early in the 'hatch window') are more susceptible to bacterial infections and have shown a higher prevalence of mortality due to air sacculitis (inflammation of the air sacs). Minimising egg storage times, appropriate incubation conditions, minimising the experience of stress, providing immediate access to feed and water, supplementation with a hydrated hatching feed during transport, good handling practices, optimal brooding conditions and enhanced rodent control (shown to reduce the risk of poult enteritis mortality syndrome) can reduce mortality during this critical stage of production.

After the first week, metabolic disorders, infectious diseases and severe lameness are the major causes of mortality. These conditions cause pain and compromise bird welfare. Efforts should be made to manage the birds appropriately and minimise the incidence of these conditions. Genetic selection for more robust birds with positive welfare traits is also an important area to progress.

See also ‘Egg storage’, ‘Hatching and placement’ and ‘Lameness, musculoskeletal and gait scoring’.

Noise levels

Excessive and unexpected noise can be a significant stressor for poultry and can negatively affect birds’ behaviour and welfare. Turkeys are routinely exposed to a range of noises during their life starting at the hatchery, during transportation, on farm, and at the abattoir. Sudden loud noises can induce fear and panic causing crowding or ‘pile ups’ inside the shed or in transport crates and modules, while chronic exposure to loud noises can cause long-term stress and have negative effects on production.

On-farm and shed equipment (including ventilation, and feed and water systems) and machinery should be designed, operated and positioned in a manner that minimises the impact of noise on birds. Abrupt or loud noises, vehicle noise, yelling or loud speech by stockpersons can also be a source of noise stress in turkeys and should be minimised. It has also been suggested that exposure to novel noise in a controlled manner may be beneficial in reducing fear responses and the risk of pile ups by habituating birds to a diverse range of auditory stimuli.

Outdoor area

Providing access to an outdoor area (range) may enhance welfare by providing additional stimulation in the environment for birds. However, a number of factors need to be considered and managed in order to encourage birds to utilise the outdoor area and make full use of the additional environmental stimulation such as the design and maintenance of the ranging area, design, number and position of the outdoor openings and ease of accessibility, drainage, risk of predation and provision of palatable vegetation and overhead cover.

Providing shrubs, trees and forage vegetation, shelters, and maintaining good drainage can encourage birds to access and use range areas and may also cause lower rates of lameness and contact dermatitis. Palatable vegetation must be provided in the outdoor area and palatability likely depends on several factors such as: the type or species of plant, nutritional content, plant height and stage of growth and nutritional needs of the birds. Foraging instincts and bird hunger levels may also be a factor influencing range use. Where birds are given the opportunity, they will consume large amounts of palatable vegetation even when provided with a balanced fixed ration of feed.

Overhead cover is an important feature of the outdoor area and can enhance range use. Shade may be provided in the form of trees, bushes, or artificial cover structures that provide shade as well as protection from the threat of aerial predators. Features of overhead cover that may affect their use could include the height of the structure, how it is constructed and maintained, its size, whether it moves in the wind, and how much visual protection or shade it provides. During periods of warmer weather, it may be necessary to give access to the outdoor area earlier and later in the day when the temperatures are cooler and birds are more comfortable outside.

Painful husbandry procedures

Turkey poults may be subject to a number of husbandry procedures such as desnooding, dewinging, toe trimming (also known as toe clipping) and spur removal. The snood is the fleshy appendage on the top of the head of male birds and is considered a target for injurious pecking from other birds.

Dewinging or wing clipping (trimming of the primary flight feathers) are performed to prevent or restrict flight behaviour which in term can minimise flightiness in the flock.Toe trimming is the amputation of the tip of the three forward facing toes to remove the sharp claw. Spur removal is the amputation of the long claw on the back of the leg on some birds. Both toe trimming and spur removal are performed to reduce the risk of birds scratching and injuring others and to reduce subsequent downgrading of carcasses at the abattoir.

Depending on the alteration and the method used, these procedures can cause both short- and long-term pain as well as restrict the birds' ability to display normal behaviours. Toe trimming has been linked to the experience of pain and skeletal deformities. Reduced activity during the first few days post-hatch and abnormal balance throughout the birds' life have also been observed following this procedure.

The RSPCA Approved Farming Scheme Standard for turkeys does not permit desnooding, dewinging or toe trimming procedures to be performed.

See also 'Beak Trimming'.

Perches / Platforms

Turkeys are highly motivated to perch. At night, in particular, turkeys will seek out a place to roost. Similarly, with other poultry species, the inclusion of perches can increase the activity levels of turkeys, which in turn promotes better leg health and development and also provides environmental complexity and an opportunity to escape aggressive attacks from flock mates.

Genetic strain, age, stocking density and light period are known to impact how turkeys use perching structures provided in the shed. Appropriate perch design and placement is critical as perches or platforms of inadequate size, material or structure are unlikely to achieve positive results in terms of encouraging use and improving bird welfare. The shape and size of the perch should be of a height where turkeys on the ground are not able to easily peck at the feathers of those perching and should accommodate the varying bird size from brood to clean out.

Turkeys will utilise perches more effectively if they are introduced to suitable perch structures at a young age, thus perches should be provided as early as possible. Perches or platforms should not be too far from the floor in order to facilitate use at all ages or should be height adjustable to cater for birds at different stages of their growth. Turkeys may prefer elevated platforms over straw bales or perching rails. Particularly for older turkeys, elevated platforms may be more appropriate than traditional perch structures when placed at a low height, because they may minimise compression of the breast muscles and thus reduce the incidence of breast lesions.

Pest control

There are a wide range of pest control methods available. The methods vary greatly in their impact on animal welfare. Many pest control methods cause significant pain, suffering and distress. Humane pest control is the development and selection of feasible control programs that avoid or minimise pain, suffering and distress to target and non-target animals. A humane pest control method is one where the animal experiences no pain, suffering or distress. The pest control methods employed should be the most humane methods available. Furthermore, considerations should be made to physically exclude pest animals from the production site and minimising or eliminating environmental factors that encourage pest animal activity. RSPCA Australia encourages ongoing investment in research and development to identify more humane pest control methods for use by the poultry industry.

Pick-ups ('thinning')

Pick-ups or 'thinning' are the partial depopulation of a shed, where some birds are caught and transported for slaughter, while others remain in the shed to be grown out to a larger weight. It is a common practice in Australia and allows a larger number of birds to be placed in the shed so that the maximum stocking density can be reached on more than one occasion prior to final depopulation. This allows producers to meet varying customer requirements.

The practice of thinning compromises bird welfare through the associated stress of the catching process, risk of injury, presence of unfamiliar people (catching crews), unfamiliar noises and disruption of the birds' normal routine. Birds are deprived of feed and water prior to catching, lighting patterns are adjusted, rest periods disrupted and air quality suffers as a result of the movement of people, birds and equipment in the shed. There is also an added risk to biosecurity as pathogens may be introduced onto the farm through the movement of vehicles, equipment or people. For these reasons, thinning should be minimised or eliminated.

See also 'Catching for slaughter' and 'Stocking density'.

Slaughter

For an animal to be killed humanely, they must be either killed instantly or rendered insensible to pain until death supervenes. When killing animals for food (termed slaughter) they must be stunned so they immediately become unconscious prior to bleeding out and processing. All methods of humane killing, including slaughter and on-farm euthanasia, must meet the same criteria: death of an animal without panic, pain or distress. This occurs when there is rapid unconsciousness followed by death without regaining consciousness. The chosen method must be reliable, simple and utilise equipment that is easy to maintain.

A high level of operator skill is essential for the humane killing of animals. Operators must be trained in both animal handling and all aspects of the slaughter method. This includes being able to select the most appropriate killing method, apply it correctly and properly maintain the equipment. It is also essential that checks for unconsciousness and death are performed following the stunning and killing methods. Indicators of death include the absence of the following: nictitating membrane reflex (third eyelid slides across the eye horizontally when touched), corneal reflex (eye blinks when touched), pupillary light reflex (pupil constricts when a bright light shone in eye), breathing, heart beat, vocalising, muscle tone and movement (limp carcass). There must be back up and emergency procedures in place for incidents where stunning or killing procedures have not been effective.

At slaughter, birds must be stunned so they are unconscious prior to bleeding out. Following stunning, permanent brain death must occur in sufficient time before the bird has the potential to regain consciousness. This is achieved by bleeding birds immediately after stunning, which results in death by cerebral ischemia (lack of blood flow to the brain). Severing both common carotid arteries and both jugular veins leads to a quicker bleed-out than severing only one carotid artery and jugular vein. Severing both carotid arteries and jugular veins will reduce the proportion of birds that show indicators of regaining consciousness after cutting. Effective stunning parameters are a critical monitoring point on slaughter equipment. The critical monitoring points while observing birds on the line are indicators of consciousness and whether both carotid arteries and jugular veins have been severed.

Failure to properly exsanguinate (bleed out) can result in birds entering the scalding tank (which removes the bird's feathers) before death. This leads to red discolouration of the skin, or 'red birds'. Studies have shown that red discolouration of the skin post-slaughter can be a result of live birds

entering the scalding tank, and that the red colouration is confined to the body areas where feathers grow. The occurrence of any 'red birds' is unacceptable, as all birds should be dead upon entering the scalding tank.

Use of appropriate slaughter methods and equipment, staff training and competency, development and adherence to standard operating procedures and having an effective internal assessment and monitoring program in place are all important aspects of ensuring turkey welfare at slaughter.

Stocking density

Animals need enough space to ensure they remain physically healthy and can carry out natural behaviours. Defining minimum space requirements/maximum stocking densities is complex due to the need to consider not only how much space birds need in terms of their physical body size, but also just as importantly, the birds behavioural and social space requirements so they are able to exercise, socialise, express natural behaviours and rest. Stocking density also has an impact on the quality of the environment (e.g. litter condition and air quality). As stocking density increases, it becomes harder to manage and maintain the shed environment at optimum conditions. In other words, it is not only the quantity of space provided to each animal, but also the quality of the space provided that influences animal welfare.

Determining the appropriate stocking density for a particular flock is likely to depend on a range of factors such as bird age, sex, final live weight, flock size, shed size, behavioural motivation, health status. Environmental factors such as the shed environment including the thermal comfort, ventilation and litter condition, and seasonal or local weather influences, also affect birds' space requirements. Poor welfare outcomes as a result of poor management and environmental influences are likely to be further aggravated by higher stocking densities. Lower stocking densities are associated with increased walking activity, reduced lameness and foot pad lesions, reduced risk of feather pecking and reduced risk of heat stress.

There are many other factors that affect animal welfare in combination with stocking density. Stocking density limits should be considered alongside other measures of animal welfare such as animal-based measures including lameness, foot pad dermatitis, feather cover, incidence of aggression and wound scoring. Stocking density should be reviewed regularly and where animals are ill, injured, or behaving abnormally, or where environmental conditions cannot be maintained appropriately (e.g. litter quality and air quality), lower stocking densities should be used to ensure the welfare of the animals.

Stockpersonship

The interaction between stockpersons and birds (the human-animal relationship) is a large determinant of welfare outcomes. It is important to recognise that humans have the potential to both compromise and enhance animal welfare. The attitude and behaviours of a stockperson strongly affects an animal's fear of humans and subsequently their wellbeing, productivity and meat quality.

The attitudes and competence of stockpersons and staff are vital in determining whether high standards of animal welfare can be achieved. It is the responsibility of management to ensure there is a culture among staff that prioritises animal welfare and recognises and rewards staff for maintaining good welfare. Financial rewards, career pathways, working conditions, organisational policy and general job satisfaction may also contribute to motivation and performance.

In addition to attitude and behaviour, technical skills, and knowledge are influential. Therefore, selection of the right people and formal training of stockpeople is crucial. It is essential that stockpersons are suitably selected, trained and experienced (or directly supervised by experienced staff) and are able to recognise indicators of poor and good welfare.

Stockpersons should observe birds' appearance, vocalisations and behaviour regularly. Birds' should be observed for signs of disease, injury or distress (including panting), body condition and plumage condition. Behavioural factors to be observed should include feeding and drinking behaviour, activity level, responsiveness, absence of abnormal behaviour, signs of aggression, even distribution of birds throughout the shed, response to stockpersons, use of environmental enrichment, perches and visual barriers, and walking ability (including lameness). In addition to observing and responding to birds' behaviour and physical needs, the stockperson is responsible for maintaining an optimal housing environment. They must have a good working knowledge of the husbandry system and the animals under their care.

See also 'Handling'.

Stress and stressors

The mechanism that allows animals to cope with challenges in their environment is called a stress response and it allows the animal to overcome or avoid such challenges (referred to as 'stressors'). Some stressors cause the animal to exhibit an acute stress response, whereby behavioural and physiological responses are generally short lived and biological functioning is soon able to return to normal. However, where the animal is not able to escape the stressor or where stressors persist beyond the short term, chronic stress can result. Chronic stress compromises animal welfare and can usually be observed through physical and behavioural changes in the animal (such as loss of appetite and weight, compromised immune and reproductive system, poor feather condition, lack of environmental engagement, changes in preening behaviour and social interactions and impaired mental function and coping ability).

Many stressors may elicit a fear or anxiety response, and as such fear, anxiety and stress are often considered together. In animal welfare terms, the distinction between fear (the perception of actual danger) and anxiety (the perception of potential danger) is not critically important as it is the animal's perception of the situation and potential negative experience which will have the greatest impact on the animal's welfare.

Turkeys may experience a number of stressful events during their lifetime including transport, catching and handling, disease challenge, feed and water withdrawal or restriction, unpredictable or novel events, as well as the impact of environmental or social stressors. Generally, larger birds react more adversely to stress. There is also evidence that lighter and slower-growing strains of turkeys have a higher resistance to stress than larger, fast-growing strains. Additionally, the fear response of individual birds can vary as some birds may show little to no reaction, while others may be highly vocal or become highly active as a response. Previous experience or exposure to the stressor can also have significant impact on the bird's individual response.

To improve turkey welfare, producers must minimise fear, anxiety and stress responses, and this is best achieved through a combination of genetics, environmental management and good stockpersonship.

See also 'Transport'.

Stunning – Controlled atmosphere systems

RSPCA Australia strongly encourages the use of systems where birds are rendered unconscious prior to being shackled. Controlled atmosphere systems (CAS) have the benefit of reducing handling of live birds and avoiding the need to shackle conscious birds, as well as allowing a greater level of control and uniformity of the stun between birds. These systems are widely used in Australia for stunning of some poultry species (such as meat chickens), but not for turkeys.

In CAS systems, birds are either moved into the stunning module in their transport crates or tipped out and transferred onto a conveyer belt which then moves the birds into the stunner. Systems that allow birds to be stunned in their transport containers to minimise the handling of live birds are encouraged.

Loss of consciousness is not as rapid in CAS systems as electrical waterbath stunning, instead birds gradually lose consciousness as a result of exposure to carbon dioxide or inert gas combinations (such as argon or nitrogen). Carbon dioxide at high concentration reduces the pH of cerebrospinal fluid which results in unconsciousness and eventual death. Inert gases cause unconsciousness by replacing oxygen in the air leading to progressive hypoxia (lack of oxygen). Carbon dioxide gas at high concentrations appears to be aversive to poultry due to the pungency of the gas which can lead to hyperventilation, breathlessness, and suffocation. Where carbon dioxide gas is used, birds should first be exposed to low concentrations and only exposed to higher concentrations (≥40%) once they have lost consciousness.

Inert gas mixtures appear to be less aversive, with studies indicating stunning with mixtures of argon or nitrogen gas may be ideal of poultry.

Stunning – Electrical water bath

Electrical waterbath stunning is the most common method used to stun turkeys for slaughter at the abattoir. Electrical waterbath stunning involves the shackling of conscious birds where they are suspended upside down by the legs on a moving shackle line. The shackled birds are stunned by passing their heads through an electrified waterbath (an electric current passes from the water through the head, body and legs and to the metal shackle).

The correct voltage, current, current type, frequency and application time must be delivered to ensure that every bird is humanely stunned. Where appropriate electrical parameters are used, birds immediately lose consciousness and cardiac fibrillation occurs. However, if inappropriate electrical parameters are used, birds may not be stunned, or they may be stunned, but cardiac fibrillation does not occur which increases the risk of birds regaining consciousness. There are a number of variables which influence an effective current being delivered to each bird these include bird and equipment variables. Bird variables may include the number of birds in the waterbath, individual bird, body muscle and fat content and plumage condition. The equipment variables may include the shackle condition and tightness, and water composition (such as the mineral content, dirt and brine (salt) concentration). It is therefore critical to maintain, monitor and routinely assess stunning effectiveness and make timely adjustments when needed to safeguard bird welfare and prevent bird suffering.

Good staff training, and well-designed and managed equipment, in addition to other provisions such as breast comforters, low light levels and noise, and the use of a ramp at the entrance of the water bath to avoid pre-stun shocks can improve stun effectiveness. The shackle line should also minimise bends and be free of sharp corners. Tight fitting shackles can cause pain, but contact is required between the leg and the shackle for an effective stun. Further, different-sized birds mean that larger birds experience greater leg compression, and shackle lines may not always accommodate birds of different sizes. Toms and hens should be processed separately in electrical waterbath stunning systems to reduce the associated risks of processing birds of variable sizes. Water may be sprayed on the shackles to improve conductivity while allowing the shackles to not be too tight but should only be done before birds are placed in shackles to avoid unnecessary disturbance to the birds.

There are significant welfare concerns with electrical waterbath stunning. Shackling of live birds requires handling and inversion. Hanging upside down is a physiologically abnormal posture for poultry which causes fear and stress and the compression of the legs by shackles is likely to be painful. Birds suffering from lameness, leg abnormalities or injury as a result of catching and

transport for slaughter are likely to experience greater pain and suffering during shackling both from compression on the legs and also from the pressure put on the legs due to the hanging weight of the bird. The experience of pain and stress during shackling will likely be greater for heavy birds and alternative stunning methods which do not require live shackling should be used. Shacklers may tire quickly when shackling heavy birds which will further compromise welfare. Birds which are unable to be shackled without experiencing pain, distress or associated excessive wing flapping and movement on the line, should be stunned using an alternative stunning method. The RSPCA strongly encourages the rapid adoption of systems that do not involve the shackling of conscious birds.

Severe wing flapping can occur during shackling which increases the risk of injuries to the wings, as well as the risk of pre-stun shocks. To reduce the pain and discomfort associated with shackling, bird handling should be calm and gentle. Wing flapping on the shackles can be reduced by gently running the hands down the legs and body of the bird or keeping hold of the legs for half a second after shackling, and by using low lighting and blue lighting in the shackling area. Breast comforters prevent wing flapping and head raising prior to entering the stunning bath. Painful pre-stun shocks may occur when birds flap their wings and make contact with the water before their heads are immersed, and birds may miss the electrified water bath completely or partially if they lift their heads, which leads to an inadequate of failed stunning. The risks of pre-stun shocks and ineffective stunning may be reduced by measures including entry ramps into the stunner and breast comforters.

There are concerns that incorrect electrical parameters may lead to electro-immobilisation but not an effective stun, and there may be higher rates of ineffective stunning than is reflected by bird behaviour. Different bird sizes mean that there are varying levels of resistance between birds and a variable stun. Further, inappropriate settings may mean that a high proportion of the current in the waterbath flows through the body of the bird rather than the brain.

While electrical waterbath stunning remains a common form of stunning turkeys in Australia, due to above noted welfare concerns, electrical waterbath stunning of turkeys should be phased out and replaced with alternative stunning systems such as controlled atmosphere stunning. As new and humane methods of stunning turkeys are developed and made commercially available, these could also be used to replace traditional electrical waterbath stunning systems.

Stunning – Low Atmospheric Pressure Stunning

Low Atmospheric Pressure Stunning (LAPS) is a method of stunning which causes birds to lose consciousness gradually by placing them into a chamber and gradually reducing the atmospheric pressure. The method has been studied and used effectively in meat chickens to achieve a reliable, irreversible and consistent stun, and birds remain in their transport containers, therefore avoiding the need for tipping or shackling conscious birds. LAPS may offer significant welfare improvements over controlled atmosphere stunning systems and electrical waterbath stunning systems commonly used to stun poultry. To date the system has been approved for testing by the USDA and a commercial-sized unit was developed and trialled in the United States. The system has also been approved for use in the European Union for meat chickens weighing <4kg but there is no research validating the effectiveness of this stunning method for turkeys. Due to the proven effectiveness of LAPS for meat chicken slaughter, the suitability of the system for commercial stunning of turkeys should be investigated as a priority for the industry to aim for continual improvements to the welfare of these birds at slaughter.

Temperature, ventilation and air quality

Shed temperature should provide a comfortable environment for birds at all times of the year. When external temperatures are extreme (hot or cold), birds require additional monitoring (e.g. for signs of panting or huddling, respectively) and ventilation may need to be adjusted to minimise

any impact on the birds. Adequate air exchange is essential for managing heat, moisture, dust and harmful gases, including ammonia. If ammonia can be smelled/detected by humans (10–15ppm) or dust levels are noticeably unpleasant to humans, corrective action, such as increasing ventilation, must be taken.

Facilities must be designed, constructed and maintained to manage periods of heat or coldness, and avoid impacts on the birds. Further, protocols must be in place to rectify situations in which temperatures may negatively affect birds. Mortality due to heat or cold stress is unacceptable and demonstrates an inability to effectively manage the shed environment.

The risk of heat stress increases with age and also with stocking density. This risk may be minimised by appropriate ventilation, lowering stocking density, by providing supplements in the diet, and by using more robust and tolerant strains.

Bird welfare is impacted not only by temperature, but also by the humidity and air flow in the shed. Air exchange and air flow have an important impact on litter condition, and therefore ammonia concentrations in the air, the presence or absence of health conditions relating to ammonia concentrations (eye and respiratory functions), and the ability for birds to scratch and dustbathe in the litter, and the propensity to develop contact dermatitis due to litter moisture. The shed environment must therefore, be proactively managed to avoid compromising bird welfare.

Maintaining optimal temperature, ventilation and air quality is also a critical factor during transportation, loading and holding in lairage prior to slaughter.

Training and competency

Good stockpersonship includes the knowledge, skill, attitude and behaviour necessary to handle animals, and is an essential component of any farming system. Stockpersons must always interact with animals in a caring and compassionate manner that ensures good animal welfare and enhances the human-animal relationship. Stockpersons must be appropriately trained and competent in their required tasks. Stockpersons should successfully complete recognised training and accreditation programs where they exist, and on-the-job training in all aspects of husbandry and care relevant to their role, including euthanasia.

Stockpersons must have an understanding of normal and abnormal animal behaviour, as well as have a basic understanding of how to optimise the environment for animal welfare, recognise conditions where animal welfare may be compromised, and take appropriate action to rectify the situation if observed. The development of a positive culture to support the humane treatment of animals is essential to ensuring good animal welfare.

See also ‘Handling’, ‘Stockpersonship’.

Transport

Transport is a stressful experience and can impact turkey welfare at various stages of production including transport from the hatchery to the brood or grower farm, brood farm to the grower farm (in brood-and-move systems) and from the grower farm to the slaughter facility. Stressors that can affect bird welfare during transport, and which should be taken into consideration, include: the ambient temperature and humidity; microclimate within the transport vehicle and the transport crates or modules; airflow; density of the birds in the transport crates or modules; bird age, size and health status; handling and catching methods and associated stress prior to transport; time off feed and water; duration of the journey; road type and conditions; and the unfamiliar environment of the truck including noise, vibrations, motion and the stops and starts of the vehicle.

It is crucial to assess the welfare of the birds prior to transport to ensure they are fit to make the intended journey, as well as monitor the welfare of birds during the journey to ensure that their welfare is not compromised. During transport, birds are at risk of experiencing stress, injury, thermal stress (cold and heat stress) and/or death. The temperature within the transport crates and modules should always be maintained within the birds' thermoneutral zone. In this zone, birds can control their body temperature without altering their metabolic rate and produce little excess heat or moisture, thereby minimising the risk of heat stress. Birds should not be transported in extreme weather conditions. If it is considered essential to transport birds in these situations, appropriate measures should be taken to ensure transport temperatures can be managed within the thermoneutral range. For hot weather, some strategies include transporting birds only during the cooler parts of the day or night, increased shade and airflow, reducing density in the crates and modules, minimising transport and holding time, and avoiding unnecessary stops of the vehicle.

Poults are less tolerant to temperature extremes and turkeys are usually more susceptible to heat stress rather than cold stress. Higher transport mortalities are generally observed during the hotter months, particularly where transport crate and module densities are high and ventilation is not uniform throughout the vehicle. Birds experiencing heat stress can display open beak panting but during transport this generates more heat and increases moisture within the transport crates or modules and eventually this method of thermoregulation may become ineffective. Birds may experience cold stress when transported in cold temperatures and at high densities as they may be unable to move to warmer areas of the crate. In extremely cold or wet weather, care should be taken when using covers or tarps to protect the birds as this may cause heat and moisture to become trapped and birds may be at risk of overheating or being cold shocked if they become excessively wet during transport.

Loading density of transport crates and modules should consider the environmental temperature, vehicle ventilation and control, bird size and health status. A trade-off is often needed to provide enough space for birds to move around to maintain their thermal comfort but also to prevent excessive movement such as wing flapping or mounting of other birds which may increase the risk of scratches and injuries.

In lairage, suitable conditions must be maintained for bird welfare including appropriate temperatures to avoid heat and cold stress, adequate air flow between transport containers, the provision of shade and cover to protect birds from direct sunlight or wind and cold temperatures. Regular monitoring of conditions in lairage as well the behaviour and condition of birds is important.

The multi-factorial nature of transporting birds means producers, transport companies, drivers and slaughter facilities must work collaboratively and have protocols in place to safeguard the welfare of birds during transport under varying conditions. Birds should be regularly monitored during the journey and upon arrival at the destination, which can be done using both quantitative and qualitative measures (e.g. environmental conditions, behavioural observations, loss of body weight, injury and mortality rate). It is recommended that transport vehicles and drivers participate in independent audit schemes that include animal welfare (e.g. TruckSafe or equivalent).

Birds should always be transported in a way that avoids injury and minimises stress and suffering.

See also 'Catching for slaughter'.

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