

# The welfare of egg layer, broiler and turkey

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The welfare of an individual is its stage as regards its attempts to cope with its environment. One of the first steps in the development of science-based guidelines is to determine which types of scientific studies and measures will be considered. As far as animal welfare is concerned, there are four general measures that are widely used to provide information about well-being; physiology, health, productivity and behaviour. These measurements will show how poor the welfare is and other sorts of measures give some information about how good welfare is. In the animal welfare debate, it is not necessary to know exactly what an animal is feeling. The important thing to know is whether the animal feels bad or feels good. It is a major challenge to design animal production systems such that all these freedoms are fully satisfied, and perhaps attempts to minimize stress and maximize welfare are more realistic objectives. Many areas that are potential concern for the welfare of the animals involved. These areas may include, housing of laying hens and broiler, beak trimming, molting of laying hens, feed restriction, lighting programs, growth rates, handling, transportation and slaughter effects on different poultry species. In this review is given some information about welfare of egg layer, broiler and turkey.

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## Introduction

In order that proper decisions can be taken about issues concerning animal welfare it is necessary to be clear in the terminology used when considering the subject and precise in the measurement of welfare (Broom 1989). Animal welfare is a “state” (Broom 1986) that encompasses many complex aspects of the animals and includes biological, psychological, and ethical components. The biological components can be further divided into physical, physiological and behavioral.

Most of the physical components of welfare are easy to determine, as it includes parameters traditionally used by the producers to evaluate performance and health. Behavior is frequently (if not always) used by experienced farmers to determine potential problems in animals (Estevez 2003). Many behavioral measures, such as occurrence of stereotypies, feather pecking, all forms of cannibalism, unusually high levels of aggression, and duration of tonic immobility (Kostal and Savory 1994) can be excellent welfare indicators for ethologist. Physiological parameters which include hormone levels such as cortisol or corticosterone (Craig et al 1986), heart rate (Price and Sibly 1993) or immune status (Patterson and Siegel 1998) are frequently used as reliable indicators of the welfare status as well. Animal welfare involves a psychological component as to “how the animals feel” (Duncan and Petherick 1991), and an equally important ethical component “their quality of life” (Duncan and Fraser 1997).

There are currently of animal health, or, more accurately, on extreme farming conditions (associated with more intensive production) as a source of animal illness. One of the most extreme cases is that of poultry: the faster growth of poultry species means a higher metabolic rate and higher oxygen requirement, seemingly in excess of the birds’ respiratory and circulatory capacity. The result is increased mortality (Anon 2000a). Poultry suffer from disabilities induced by extreme genetic selection for various characteristics desired for production or meat quality and from various routine

practices and procedures such as intensive confinement (by caging and crowding) and beak trimming and, in the case of laying hens, forced molting by a period of starvation (Halverson, 2001).

## **Factors That Influence on Poultry Welfare**

### ***Feed Restriction***

In some instances attempts to improve biological components of animal welfare may negatively affect their psychological aspects. A clear example will be the feed restriction programs applied to broiler breeders. If breeders are fed *ad libitum*, as are their progeny, body weights would increase to the point that many birds would become lame, and mortality associated with skeletal disease and heart disease would be unacceptably high (Katanbaf *et al.* 1989). High body weight is also associated with impaired immune function (O'Sullivan *et al.* 1991), increased incidence of multiple ovulations causing reduced production of hatchable eggs (Hocking *et al.* 1989), poor eggshell quality (Robinson *et al.* 1993), and reduced male fertility (Hocking and Duff 1989). Although feed-restriction clearly benefits broiler breeders in the biological sense, it is stressful to the birds (Anon 2000b), as they show increased pacing before the expected feeding time and increased drinking and pecking at non-food objects afterwards (Savory *et al.* 1992).

There are several scientific examples of how alternative management practices could improve welfare in cases like this one. Zuidhof *et al.* (1995) found that broiler breeders fed a diet diluted by oat hulls spent significantly less time at the drinker, thus it may be helpful in reducing the chances of wet litter and high ammonia in broiler breeder houses.

Nutrient dilution may be a method of helping turkey breeders to cope with feed restriction. Stress hormone production is reduced when this is used as compared to birds that are restricted on a standard breeder ration, hence welfare is thought to be improved birds that are restricted on a standard breeder ration, hence welfare is thought to be improved (Zuidhof *et al.* 1995).

### ***Beak Trimming***

Beak trimming effectively reduces feather pecking, aggressive pecking, and cannibalism in laying hens and turkeys (Cunningham 1992). Therefore, it can be argued that the welfare of trimmed birds is improved over full-beaked birds and result in reduced stress (Struwe *et al.* 1992). However, the beak-trimming procedure itself does cause either acute or chronic pain thus reducing bird welfare. Hence, beak trimming in poultry is regarded as a very controversial management tool, to the point that this practice has been banned in some European countries (e.g. Switzerland and Sweden) and severely criticized in others (Fawc 1991). Although beak trimming cannot be totally avoided because of management problems, at least for now, the negative effects on welfare may be reduced. Research has shown that the age at which beak trimming is performed has an immense effect on the duration of pain and healing level of the beak (Hughes and Gentle 1995). Pain, therefore, can be minimized if beak trimming is conducted between one and ten days of age (Gentle *et al.* 1997). On the contrary, when the procedure is done over older birds there is a greater chance of formation of neuromas in the beak stump, which may rapidly and spontaneously fire, resulting in chronic pain (Hughes and Gentle 1995).

Turkey parent stock should be beak trimmed for the first time at around 6 days of age. Males should not be beak trimmed between the ages of 9 and 18 weeks as it can lead to staphylococcol infection of the hocks, which causes leg disorders (Anonymous 2001). Before considering beak trimming, local welfare regulations and professional advice should be consulted.

Of the different beak trimming methods, the use of a hot blade appears to be more stressful because the birds vocalise during trimming. Electronic trimming may be hazardous and cold cutting, although slightly less effective in preventing pecking damage, maybe the best compromise (Grigor *et al.* 1995).

### ***Light and Effects On Welfare***

It can be manipulated in four areas that may be helpful, including source, intensity, wavelength, and photoperiod (Manser 1996). Aggressive pecking and cannibalism can and does occur in poultry species due to increase in light intensity at the growing period. Another tool that may be used is to lower light intensity. Once again, welfare may be improved by lowered aggression (Nixey 1994). Reduced weight gains and increased aggression can result in broilers at light intensities of more than

150 lux (Buyse *et al.* 1996). At very low light levels exploratory behaviour should be difficult to perform. Moreover, stock-persons may encounter problems in differentiating between blood and faeces on the plumage, and this may lead them to leave in the main flock individuals that should be placed into hospital pens or culled (Martrenchar 1999). Breeder turkey females are normally photostimulated at 29 weeks of age. Egg production will normally start 2 weeks after photostimulation. Lighting females much later than 29 weeks of age can result in a high peak followed by a lower persistency of egg production (Anonymous 2001).

Recently there has been a trend towards the use of fluorescent bulbs or high-pressure sodium discharge lights because of their longer lifeability and lower costs. The type of light source used generally does not affect production parameters such as growth rates, feed efficiency or mortality in broilers (Lewis and Morris 1998). Light source does not effect egg production, hatchability or growth rates in broiler breeders (Manser 1996). Recent research has indicated that light source may have an effect on leg disorders, with the use of fluorescent bulbs causing a lower incidence of the problem as compared to incandescent bulbs (Lewis and Morris 1998). When given the choice between fluorescent and incandescent light, turkeys will choose the fluorescent. This may be because fluorescent light actually mimics daylight (Sherwin 1999). Sexual maturity of laying hens, but not broiler breeders, may be delayed when incandescent bulbs are used in the bam (Lewis and Morris 1998).

Light wavelength via colored light may also be altered to reduce aggression in birds. Activity levels in turkeys are reduced when exposed to blue light versus white, green or red light. Broiler aggression is highest in red light and lowest in blue (Manser 1996).

Use of constant light in birds results less active, increase leg disorders, increase in eye damage and metabolic disease (Buyse *et al.* 1996). Use of increasing programs, which have a long dark period early in the life of the bird, results in slower growth and reduced feed intake during the early production period, and compensatory growth at the end of the production cycle. The result is a bird that weighs the same as those raised on constant light, but with significantly lowers leg disorders and metabolic diseases. Variations in the duration of photoperiod have been used to try to decrease the incidence of locomotory problems (Martrenchar 1999). There is also increased bird activity, lower electrical costs for the producer and improved feed efficiency (Gordon 1994).

From considerations based on a desire to reproduce natural conditions, animal welfare associations promote photoperiods including a continuous 6 h period of darkness in each 24 h. In consequence, they argue for the phasing out of intermittent lighting regimens. Apart from one experiment, which showed that an intermittent lighting regimen specially designed for curtain-sided houses significantly increased the incidence of leg abnormalities (Clarke *et al.* 1993), there are no animal welfare drawbacks that have been specifically related to intermittent lighting. One of the study on turkey broilers suggest that an 8 (1L: 2D) lighting regimen reduced injures due to wing and tail pecking but increased injuries due to head pecking and led to a decrease in visual acuity in 40% of the birds (Martrenchar 1999). Turkeys have fewer breast blisters and cleaner feather cover when raised on increasing versus constant light (Newberry 1992). This is believed to occur partially because of the reduced early growth rate, but also results from metabolic changes within the bird when given access to a dark period (Gordon 1994).

### ***Molting***

Some animal rights and welfare groups have indicated that molting is a cruel process for the purpose of extending the productive lives of laying hens (Webster *et al.* 1996). Feed deprivation in domestic fowl is known to increase stress hormone levels, and behaviours that are indicative of stress such as stereotypic (repetitive) pecking at inanimate objects (Savory *et al.* 1992). The restricted birds do show signs of frustration and aggression on day 1 of the program (Aggrey *et al.* 1990), and an increase in stress hormones are found during the restriction phase (Mench and Siegel 1997). Molting has also been associated with elevated mortality on large farms where daily individual monitoring of hen condition is difficult (Bell 2000, *unpublished data*). Koelkebeck *et al.* (1991) reported mortality rates ranging between 4.6% and 7.9%, and noted that the majority of deaths occurred during the post-molt period. Yilmaz and Şahan (2002) used three different forced molting methods (feed with whole grain barley for 7 days, fasted for 6 days and feed with normal laying diet containing 15000 ppm/kg Zn addition for 10 days) on egg layers and found weight loss rates +1.87 %, -0.51 % and -1.76 %, mortality rates 5.21 %, 6.25 % and 3.13 %, respectively.

Overall, liveability is improved in molted hens, as is bone strength (Gregory *et al.* 1991), which may both improve welfare for the hens. Management during the molting phase, no matter what program is used, is particularly important. Mortality levels must be monitored continuously (Ruszler 1998).

### ***Stocking Density***

High stocking density is one of the major points that raise animal welfare concerns. High housing densities in poultry have been associated with increased mortality, and decreased hen housed egg production, (up to 7.6% higher mortality, and up to 24.4 fewer eggs at higher densities), reduction in feed intake, and increased corticosterone levels (Cunningham *et al.*, 1987), all considered indicators of reduced welfare. Bell and Carey (1998) summarized the results of the 23<sup>rd</sup>–27<sup>th</sup> North Carolina Random Sample tests conducted between 1982 and 1987, which involved comparisons of hens housed either in 3 or 4 bird groups given and they found that mortality was higher at the higher density (11.0 vs 8.1% at the lower density), and hen housed egg production was lower (235 eggs versus 245 at low density). Cunningham *et al.* (1987) found that hens housed at higher densities (50 versus 66) had decreased egg production even when feeder space was held constant at 4 in/bird. Production of low ranking hens was affected at both densities, while production of high-ranking hens affected only at the higher density. No decrease in locomotory activity was observed at the highest density in Turkeys (Martrenchar *et al.* 1997). Resting birds tended to be more disturbed by other birds as the stocking density increased. The birds' gait appeared to be worst at the highest density. Experiments in laying hens have shown that the incidence of cannibalism increases with group size for small groups (less than 12 birds) (Hughes and Wood-Gush 1977). Conversely, in large groups (more than 100 birds) the impossibility of establishing a stable social hierarchy makes feather pecking behaviour independent of group size (Hughes *et al.* 1997). Turkeys reared at a density of 8 birds/m<sup>2</sup> showed a higher incidence of hip lesions and of foot pododermatitis than those reared at 6.5 or 5 birds/m<sup>2</sup>.

### ***Transportation and Slaughter***

Poor handling can result in pain for the birds, and 40% of bruising found after slaughter is believed to occur during catching of the broilers (Knowles and Broom 1990). Catching the birds by both legs, and placing them directly into coops or wheeled modules (rather than carried manually) helps to reduce bone breakage (Kristensen *et al.* 2001). The duration of transport between farm and slaughterhouse has been positively correlated with the prevalence of some carcass lesions (McEwen and Barbut 1992).

The welfare problems during transportation are mainly related to thermal stress, because the birds in the center of the truck poultry tend to overheat, whereas the ones placed by the edge tend to suffer the weather inclemency the most. Provision of tarps to cover the sides of the truck during harsh weather conditions will help to minimize these effects (Newberry *et al.* 1999). Many lorries are still equipped with fixed containers and catchers are therefore obliged to carry birds in an inverted position over long distances. Improving welfare would be to handle turkeys individually by one leg and the opposite wing and to create them gently (Martrenchar 1999).

The most common form of stunning of poultry at processing plants is water bath – electrical stunning. The current used is very important when examining welfare (Fletcher 2000). A minimum of 120 mA must be used to ensure unconsciousness (Raj 2000). Modified Atmosphere Killing Units (MAK) is being examined for on farm killing. These are contained units with gas tanks supplying an enclosed area (Webster *et al.* 1996). This method would eliminate the manual killing of the birds, and also the stresses placed on the birds during crating, transportation, waiting at the slaughter plant, and shackling.

This discussion demonstrates the inter-relationship of all the factors involved in poultry welfare similar to other farming enterprises. Housing conditions, management practices, catching, transport and slaughtering can all be causes poor welfare. It is hoped that there will be more fundamental research which will examine the problems of broiler, turkey, and egg layer production in a farming setting and thus facilitate future improvements in commercial practices and systems, and therefore optimise the welfare of the birds.

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