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Odor - An Emerging Concern for Producers

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INSIDE

It is important that poultry producers have a basic knowledge of odor control strategies and do their best to accommodate non-farming neighbors.

Introduction

Agricultural odors are an unavoidable part of livestock production and are emitted from every poultry operation. These odors along with the growth of the poultry industry have sparked debate, concern and action in many U.S. communities. Air and water quality have become major issues, along with social and economic concerns. These concerns stem from the fact that the difference between "the city" and "the country" is becoming increasingly difficult to distinguish. Today, a rural family is not necessarily an agricultural family. The gap is wide between an agricultural family that understands that odors are a part of production agriculture and a rural family that recently moved from the city with little or no tolerance for agricultural odors. Therefore, it is important that poultry producers have a basic knowledge of odor control strategies and do their best to accommodate non-farming neighbors.

Odor Causes

Some odors are generated by the poultry or livestock themselves, and some by the feed, but the most objectionable odors arise from manure and manure decomposition. More than 200 odor-generating compounds have been identified from microbial decomposition of manure (Pfost et al., 1999). This means that the intensity of the odor depends upon microbial growth and that growth rate will vary with moisture content, pH, temperature, oxygen concentration, and other environmental factors. This is illustrated by the fact that, as temperatures decrease with onset of cooler, autumn conditions, microbial activity slows, which is why odors are generally less noticeable in the cooler months. Yet odors vary greatly, and the offensiveness of each odor is dependent upon the person(s) smelling the odor.

Poultry and livestock odors originate from three primary sites or activities: 1) livestock facilities and the housed livestock within, 2) manure storage facilities, and 3) land application of manure. While land applying (spreading) poultry litter is a common practice in many areas, be aware that most odor complaints are associated with land application of manure, not storage facilities or housing. As rural areas continue to fill with an increasing exodus from the cities, litter application will become an even greater concern. Expect additional legal involvement and plan ahead for increased regulation of land application of poultry litter generated by your operation.

A serious detrimental component of odor is dust, which can be carried long distances on air currents. Dust particles act as a transport mechanism for odor. Land applying poultry litter often creates significant quantities of dust, which may travel as far as several miles or as little as several feet. Wind direction and speed are constantly changing, which can greatly affect dust and odor patterns making it difficult to predict the impact odors and dust will have on residents in areas surrounding a livestock enterprise.

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. . . helping ensure the efficient production of top quality poultry products in Arkansas and beyond.

Understanding Odor

Several different criteria may be used to evaluate odors. Familiarity with these parameters will help producers better understand odor source and interpret odor data. Odors are most commonly evaluated in terms of concentration (threshold), intensity, persistence (Table 1). These three variables are often used to provide regulatory and scientific personnel with some measurement of odor potency and how long the odor is likely to remain. Hedonic tone and character are more subjective measurements that are not typically used for regulatory purposes (Sheffield and Bottcher, 2000).

The amount of odor emitted from a particular farming operation is a function of animal species, housing types, manure storage and handling methods, size of the odor sources, and the implementation of odor control strategies (Nicolai and Pohl, 2005). A variety of strategies and innovative technologies are available for odor control. Some work better for liquid-type wastes (lagoons) while others are equally effective for both liquid and dry manure situations. Technologies that capture and treat odors include manure storage covers, organic mats, and biofilters. Technologies capable of dispersing or masking odors include vegetative windbreaks, windbreak walls, proper site selection, adequate setback distances and deodorant and masking agents. However, before adopting any method, producers should consider applicability, effectiveness, costs, and labor or management requirements of all available technologies.

Be Proactive

Most people today are generations removed from the farm and have little or no association to agriculture. Therefore, to most of the general public, this lack of association means that in their thinking agriculture continues to decline in importance. Their only relationship to the poultry industry may be to complain about dust, odors, noise, or someone spreading litter, which leaves a negative impression of poultry farming. Producers should be aware of that perception is reality for many people, particularly folks with no understanding of modern agriculture. In addition, producers should understand that those people's perception has a large influence on their opinions and actions. This is especially true with regard to the appearance of poultry production facilities. Visual perception has a huge influence on how much or how little people will accept before a complaint occurs. Well-maintained production units usually are not perceived to smell as bad as units that look uncared-for and run-down. Production sites that appear to be overgrown with weeds and that has junk scattered everywhere are more likely to generate a complaint than sites that are nicely landscaped with regularly mown lawns and an attractive appearance.

Livestock farmers in the U.S. are under increasing pressure to reduce odor emissions from their property and must become more proactive in addressing the issue. However, the current financial environment dictates that farmers identify control strategies that can be implemented with minimal cost. For example, the planting of trees around farmland or buildings has been identified as a potentially effective, low-cost measure to enhance ammonia recapture at the farm level and reduce long-range atmospheric transport (Theobald et al., 2001).

Properly planted and well-maintained windbreaks can serve a number of functions. Windbreaks that shield poultry houses from the view of passers-by may decrease the chance of odor complaints since people who cannot see the source of an odor, they are less likely to: 1) notice the odor in the first place and 2) complain about it. Windbreaks cause the air to be lifted up and over the windbreak, which causes mixing of fresh air with odorous air, thus diluting the odor effect. Well laid-out and landscaped windbreaks also increase property values. In addition, planting trees and shrubs is perceived in a positive manner and demonstrates a producer's commitment to protecting our environment.

Many nuisance complaints occur shortly after litter has been land applied. Producers should carefully select the time when litter will be spread. Let neighbors know when you plan to spread litter. Keep an open line of communication with anyone who may be affected by the spreading of litter from your operation. Avoid weekends and holidays, pay attention to wind direction, and once started, finish as soon as possible so that you limit the generation of dust and odor. Spread litter during the morning as much as possible because as air warms it will rise, which lifts odors upward for mixing and dilution with fresh air as well as drying litter. While your cooperative public attitude will have little effect on the actual odor, it may be very important in avoiding complaints against your farming operation. Neighbors are less likely to complain if they know you are aware and attempting to address their concerns. Always be courteous when dealing with neighbors, even if you may be unable to comply with all their wishes. In short, be a good neighbor.

Summary

Given the continuing urbanization of rural areas and the level of livestock intensification in the U.S., it appears likely that complaints associated with agricultural odors will increase. Increased regulations have drastically changed livestock production practices in many parts of Europe and could do so in this country as well. Poultry producers need to understand the causes of odors and apply basic odor control principles in their daily management routines. Odor control need not be difficult or expensive and, in fact, can start with something as simple as running an attractive operation, keeping the grass and weeds cut, projecting a positive image, and being a good neighbor. Address the potential concerns of your neighbors before they escalate into complaints, or restrictive regulations that may determine whether or not you are allowed to remain in business. The continued viability of poultry production in some areas is increasingly dependent upon a community's willingness to accept the industry as a responsible corporate citizen.

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Table 1. Description of odor parameters.

Odor parameter	Description
Threshold	Minimum detectable concentration
Intensity	Strength of odor
Persistence	Rate of change
Hedonic Tone	Degree of acceptability or offensiveness
Character	What the odor smells like

Source: (Sheffield and Bottcher, 2000)

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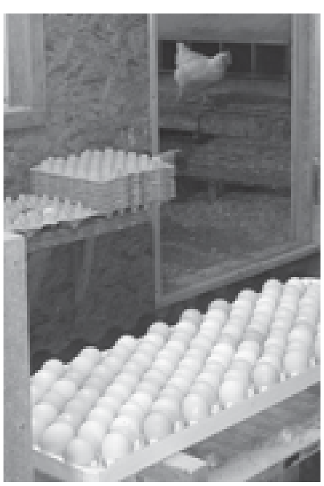
On-Farm Egg-Holding Temperatures for Commercial Broiler Breeders



Introduction

Although there have been great improvements in the breeder house, egg transportation and the hatchery, on-farm hatching egg storage has been largely ignored. The lack of improvement might be traced to a lack of information about the optimum environment to maintain viability of hatching eggs stored at the farm level.

Meeting chick placement needs and ensuring the full utilization of incubation equipment have made hatching egg storage inevitable in the commercial broiler industry. While hatching eggs are stored both on-farm and at the hatchery and egg storage data is available at the hatchery level, little if any research aimed at evaluating on-farm hatching egg storage is available..

Hatching-eggs are commonly held at the farm level for three or four days because hatcheries generally make two egg pickups at each farm per week. Eggs are stored at the hatchery for periods ranging from less than a day to a week or longer so that an adequate numbers of eggs can be set to meet chick demand. Length of egg-storage, hen age, egg-storage temperature, and humidity are all pre-incubation storage conditions that affect both hatchability and economic returns nearly as

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much as incubation conditions. However, as a general rule, hatchery conditions for egg storage are given much more attention than are on-farm egg storage conditions. The 'less than ideal' maintenance of on-farm egg storage rooms often reflects this lack of attention.

Current Situation

The embryo in each fertile egg laid has grown 20,000 to 40,000 cells while in the oviduct and represents an 'already started' embryo. Following collection at the broiler breeder farm, hatching-eggs are placed in on-farm coolers to reduce the internal egg temperature, arresting further embryonic development, while maintaining embryo viability. The temperature at which embryonic development is virtually stopped is known as the physiological zero, but there is disagreement as to actual temperature at which this occurs. Repeated research done in our lab has found that temperatures of 75°F or below halts embryo development for up to 96 hours of storage.

While some poultry companies are recommending on-farm egg storage temperatures as low as 63°F, the most commonly implemented an on-farm egg storage temperature is 68°F, regardless of flock age. However, this popular industry recommendation is based on data that were originally generated in 1902 and the genetics of both broiler breeders and their offspring have progressed dramatically since that point in time. Although management practices and equipment continue to evolve around the increasingly improved broiler of today, on-farm egg storage has remained largely unchanged.

As broiler breeder age increases, the hatchability typically decreases. While alterations in egg storage conditions might improve hatchability, altering storage conditions at the hatchery for each specific flock is not practical. However, altering egg storage conditions at the farm level may help to achieve improved embryo viability and hatchability. Furthermore, the changes in physical integrity (e.g. shell thickness, albumen quality and size) of the egg as flock age advances, makes it seem logical to investigate flock age as it relates to egg storage temperature. Therefore, the objective of this study was to determine if on-farm egg-storage temperatures would improve hatchability obtained from commercial broiler breeder flocks in four age groups.

Materials and Methods

Hatching-eggs were obtained from four commercial parent-stock broiler breeder flocks representing four ages (25 to 30, 35 to 40, 45 to 50, or 55 to 60 wk of age). Fourteen hundred forty (1440) eggs were collected from each flock on four occasions. Hatching eggs were collected from each breeder farm on day of lay. Eggs were not placed in the existing on-farm egg cooler. Eggs were transported to an experimental egg storage facility and 288 eggs were randomly assigned to storage chambers set to one of five temperatures (60°F, 65°F, 70°F, 75°F, and 80°F). To ensure conditions were maintained correctly during storage, each chamber was equipped with a data logger, which recorded temperature every minute during the holding period. Two trays of 144 eggs were stored at each temperature for 3 days before being placed directly onto the commercial egg transport truck.

At the hatchery eggs were held at 68ºF prior to normal incubation and hatching procedures. Hatchability was determined for each treatment group. Unhatched eggs from each treatment group were subjected to a complete hatch-residue breakout analysis.

Results

The data in Table 1 indicate that eggs from 25 to 30-week-old flocks stored at 60°F had 2.93% higher hatch of fertiles than did those stored at 70°F. However, no significant differences were observed in hatchability. Clearly additional investigation is warranted here.

Table 3. Hatchability and hatch of fertiles from 25 to 30 week old flocks

Storage Temperature	Hatch of Fertile (%)	Hatchability (%)
60°F	85.31[a]	83.77
65°F	84.47[ab]	83.59
70°F	82.38[b]	81.16
75°F	84.51[ab]	83.25
80°F	84.53[ab]	82.64

[a,b] Values within columns with different superscripts are significantly different (P<0.05).

The optimum on-farm egg storage temperature for eggs from 35 to 40-week-old flocks was 70°F (Table 2). These findings support much earlier research that indicated for maximum hatch of fertiles, eggs should be stored at or below 70°F. The hatch of fertile for eggs stored at 70°F was 2.56%, 1.80%, 0.21%, and 3.19 % greater than those for eggs stored at 60°F, 65°F, 75°F and 80°F, respectively. For 35 to 40 week-old flocks, an on-farm egg storage of 70°F was found superior to other temperatures with respect to both hatchability and hatch of fertiles.

Similar results were found in eggs from 45 to 50-week-old broiler breeder flocks (Table 3). For 45 to 50 week old breeder flocks, hatch of fertiles obtained from the 70°F storage temperature was 6.68%, 4.85%, 8.38%, and 7.00% higher

Table 2. Hatchability and hatch of fertiles from 35 to 40 week old flocks

Storage Temperature	Hatch of Fertile (%)	Hatchability (%)
60°F	87.36[ab]	85.94[ab]
65°F	88.12[ab]	85.68[ab]
70°F	89.92[a]	88.19[a]
75°F	88.71[ab]	86.63[ab]
80°F	85.73[c]	84.03[b]

[a,b]Values within columns with different superscripts are significantly different (P<0.05).

than eggs stored at temperatures of 60°F, 65°F, 75°F, and 80°F, respectively. Percent hatchability was also highest when eggs were stored at 70°F.

Hatchability and hatch of fertiles was the highest when eggs from 55 to 60-week-old flocks were stored at 75°F (Table 4). Hatch of fertiles for the eggs held at 75°F was 3.19%, 5.17%, 5.00%, and 4.48% higher than those stored at 60°F, 65°F, 70°F and 80°F, respectively. The requirement of a higher on-farm egg storage temperature for older hens was not an expected result. The initial hypothesis was that hatching eggs from older hens might require cooler storage temperatures in order to maintain the structure and composition of the egg albumen and yolk contents. However, these data suggest that eggs from older hens reach physiological zero at a higher temperature than eggs from younger flocks. In addition, higher storage temperatures for eggs from older flocks mi□
changes.

As previously mentioned, a complete egg breakout analysis was performed on all unhatched eggs. However, no significant differences were found between any of the on-farm egg storage groups. Thus, the improvements in hatch reported previously were the result of 'across the board' improvements in embryo livability. However, conditions during the research project exposed all eggs to increased handling and transportation conditions. These unusual conditions likely had an affect on overall hatchability and hatch of fertile for all treatment groups, producing hatch or hatch of fertile values which were lower than would typically be seen under industry conditions.

Table 3. Hatchability and hatch of fertiles from 45 to 50 week old flocks

Storage Temperature	Hatch of Fertile (%)	Hatchability (%)
60°F	78.13[b]	76.91[ab]
65°F	79.96[b]	78.21[b]
70°F	84.81[a]	83.42[a]
75°F	76.43[c]	74.57[c]
80°F	77.81[bc]	76.04[bc]

[a,b,c] Values within columns with different superscripts are significantly different (P<0.05).

Although hatchability problems can certainly be traced to poor fertility, when fertility remains high, care for hatching eggs can have a tremendous positive effect on the overall hatchability. Current industry on-farm egg storage recommendations vary from 63°F to 68°F. The data presented here suggest that hatchability of eggs from prime age flocks (36 to 49 weeks) is improved by an on-farm eggs storage temperature of 70°F. In addition, the data suggest that eggs from older flocks (>55 wks) will hatch better when stored in the on-farm storage coolers at 75°F. Apparently, hatching eggs from older hens are less viable and more susceptible to stress and therefore more liable to have increased incidences of early embryo mortality. Additionally, these warmer on-farm storage temperatures did not adversely affect the hatch profile. While there was a slight increase in early hatched chicks from eggs held at warmer temperatures it was not significant. Further research is under way to investigate in greater detail the affects of elevated on-farm egg storage on chick quality.

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Conclusion and Summary

Meeting chick placement needs and ensuring the full utilization of incubation equipment have made hatching egg storage inevitable in the commercial broiler industry. Although hatchability problems can certainly be traced to poor fertility, when fertility remains high, care for hatching eggs can have a tremendous positive effect on the overall hatchability. While alterations in egg storage conditions might improve hatchability, altering storage conditions at the hatchery for each specific flock is not practical. However, altering egg storage conditions at the farm level may help to achieve improved embryo viability and hatchability. Although poultry companies recommending on-farm egg storage temperatures between 63ºF and 68°F, regardless of flock age, previous research has been shown that a temperature of 75°F halted embryo development for up to 96 hours. The data presented here suggest that hatching eggs from young flocks (25 to 30 weeks) should be stored on-farm at 68°F. Eggs from flocks in prime age flocks (35 to 50 weeks) should be stored at 70°F on-farm and eggs from older flocks (>55 weeks) should be stored at 75°F. Research presented here would suggest that higher egg storage temperatures could produce an increase in hatch of between 2 and 5% over cooler on farm egg storage room temperatures.

Table 4. Hatchability and hatch of fertiles from 55 to 60 week old flocks

Storage Temperature	Hatch of Fertile (%)	Hatchability (%)
60°F	73.33[ab]	71.63[ab]
65°F	71.35[b]	68.40[b]
70°F	71.52[b]	68.40[b]
75°F	76.52[a]	73.52[a]
80°F	72.04[b]	69.79[ab]

[a,b] Values within columns with different superscripts are significantly different ($P<0.05$).

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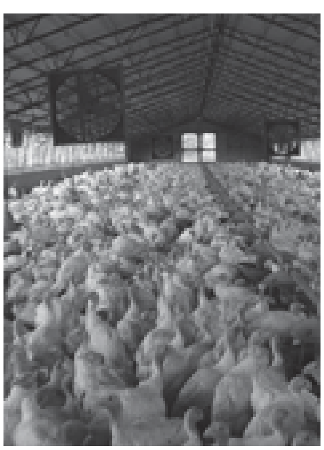
Factors Affecting Turkey Flock Performance



Introduction

In recent years, genetics and nutritional programs have contributed greatly to the commercial turkey's performance potential. However, turkeys raised on contract farms are subjected to many more challenges than birds selected back on the pedigree farm as parent stock. In addition, there is increasing concern from the general public over modern-day genetic programs (artificial insemination vs. natural mating), nutritional programs (feed ingredients, antibiotic use, and BSE fears), and grow-out environments (confinement buildings vs. free range). These concerns are making their way to fast-food and supermarket chains, food retailers and others who are demanding changes in the way turkeys are produced in the U.S. Animal welfare issues will require additional attention in the future. Let's look at some of the factors that can have a major impact on the performance of turkey flocks.

Locomotion

A turkey's ability to walk freely and painlessly is critical to performance. Without adequate bone development and locomotion capabilities, turkeys will be unable to reach their full genetic potential. Some bones in turkeys have been reported to grow an average of 1.9 millimeters a day during the first 10 weeks of the bird's life (Monk, 1998). Factors which impede this growth or make walking painful (leg deformities, swollen hocks, infected or ulcerated footpads) will result in turkeys making fewer trips to feeders and drinkers, thereby reducing feed and water intake and adversely affecting growth. Reduced feed and water intake will also likely lead to higher mortality rates, increased number of cull birds, and a higher condemnation percentage at the plant.

Management plays a key role in bone development. If poults are stressed from excessively hot or cold temperatures during brooding, cell growth in the bones can be greatly affected, leading to bone deformation and later leg weakness (Monk, 1998). Poults must be allowed to move unimpeded within the brooder ring from the outside edge to the heat source in order to find the ideal comfort zone. This will require proper placement of feeders and drinkers within the ring. Do not block access to heat source or outside edge of ring and do not place feeders or drinkers too close to the heat source, as poults will not consume feed or water that is too hot (Tabler, 2004).

Poor environmental conditions are a concern throughout the life of a flock, not just at brooding. If overall house conditions are not acceptable to the bird, feed and water consumption will decrease. Be aware that whenever a whole house of turkeys is just sitting (not eating or drinking) during the day, something is wrong. Some birds should be on the move at all times throughout the day. Ideal bird activity is when groups of birds can be seen standing and slowly maneuvering their way across the house to feeders and drinkers (Wojcinski, ND). Wet litter must be avoided, as this may lead to foot pad lesions, which provide opportunities for bacterial infection (Monk, 1998).

Litter Management

Most producers realize that wet litter leads to ammonia production and subsequent respiratory or leg quality problems. However, producers may not realize that typical poultry litter contains 1 billion viable microorganisms per gram (Rehbeger, ND). These microorganisms come from several sources with the primary source being the gastrointestinal tract of the birds themselves (Rehbeger, ND). Litter management involves reducing the multiplication of microorganisms to protect foot pads, control diseases and enhance the house environment. Knowing how to prevent wet litter may help reduce or eliminate these problems. Some of the common causes of wet litter are:

- Inadequate litter depth – make sure depth is adequate at start of the flock (follow integrator guidelines)
- Unsuitable ventilation rate – an inadequate air exchange rate allows humidity levels to rise, increasing the likelihood of wet litter
- Inappropriate temperature – cool temperatures mean elevated humidity levels, which leads to wet litter. Recognize that supplemental heat will be needed at times (particularly when birds are young) to keep the litter dry. Increasing air temperature by 20°F will double the moisture holding capacity of the air
- Improper drinker management – height, line pressure, spillage, and wastage all impact litter condition

Keep in mind the age of the flock when implementing a litter management strategy. Recall that young turkeys (less than 10 weeks) produce less body heat than older birds (13 weeks or older). This means (obviously) that during cooler temperatures additional heat must be added to maintain an ideal growth environment. Although fuel is expensive, the addition of extra heat not only warms the birds, it increases the capacity of the air to remove moisture. If no supplemental heat is added to turkeys 10 weeks old or less, the capacity of the air will be inadequate to remove the moisture exhaled and excreted by the birds. In contrast, in turkeys of 13 weeks or older, the heat produced by the bird is adequate to remove the excess moisture. Thus, properly maintaining temperatures and adequately ventilating are critical to good air quality in the turkey house. Good air quality is important 24 hours per day throughout the flock, not just when someone is working in the house or on days the service tech visits the farm.

Water

Like other livestock, water intake in turkeys is directly related to feed intake and therefore growth and performance. Water consumption of turkeys at the start of the growing period is around 2.5 times greater than feed consumption and around 2 times higher in the mid growing phase (Wojcinski, ND). It is essential to have water meters and keep daily records of water consumption. This is the only way producers will know if consumption is normal for flock age and season of year. Excessive or irregular changes in water consumption can alert producers to potential problems with either flock health status or malfunction of the feed and/or water system. As with bone development, if flock health is compromised, turkeys will never reach their genetic potential and performance will be disappointing. Even one compromised bird may contribute towards a deteriorating environment starting a long series of events that ultimately result in disappointing flock performance (Fernandez, 1998).

Not only is an adequate supply of water necessary, it must be high quality water if turkeys are to achieve high quality performance. Treating water lines during cleanout, sanitizing watering equipment during house preparation, and maintaining the correct amount of sanitizer present in the drinker throughout the flock are vital to providing quality drinking water. For example, Bordetella (which causes turkey coryza) has been isolated from the inside of nipple drinkers and from the rubber seal in the water line regulator in houses with Bordetella positive turkey flocks (Watkins, 2002). Chlorine levels in the last drinker should be checked weekly

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to ensure proper amount is being delivered. Also, water should be sampled regularly for mineral and bacterial levels. Producers must know how much water turkeys are consuming and what's in the water, otherwise it is impossible to know if the water supply is adversely affecting flock performance.

Summary

Locomotion is essential to the birds' ability to obtain feed and water. Litter management also plays a key role in how

Availability of a plentiful and high quality water supply is a necessity for flock performance. Water meters are valuable tools for tracking consumption and alerting producers to possible flock health or other serious problems. While modern, commercial turkeys can obtain remarkable performance, it is the concern and management skills of individual turkey producers at the farm level that ultimately determines whether potential becomes reality at flock harvest.

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Farm Animal Welfare Issues Affect Poultry Producers

Livestock production practices have evolved at a rapid pace over the past 30 years... few people (outside the industry) today are aware of current on-farm management practices.

Introduction

Livestock production practices have evolved at a rapid pace over the past 30 years. So much so that few people today are aware of current on-farm management practices. This fact is emphasized by evidence that many students enrolled in college animal science courses today are largely unaware of common practices associated with modern animal agriculture (Heleski, 2004). It can no longer be assumed that animal and poultry science students enter college with practical, on-farm experience. If these students are largely unaware of production practices, it's a safe bet the general public knows practically nothing about animal agriculture and modern-day production practices. Perhaps this should not be surprising given the fact that 98% of the U.S. population does not farm. Parents can no longer teach their kids livestock management practices because most parents are too far removed from the farm themselves. However, even though they may know little about livestock production, most of that 98% expects farm animals to be humanely treated. The following paragraphs offer information on welfare issues affecting the poultry industry and its producers.

Five Freedoms

The Farm Animal Welfare Council's so-called five freedoms (FARC, 1992) provide a framework for assessing farm animal welfare. These freedoms include:

1. Freedom from hunger and thirst – by providing ready access to fresh water and a diet to maintain full health and vigor.
2. Freedom from discomfort – by providing an appropriate environment including shelter and a comfortable resting place.
3. Freedom from pain, injury or disease – by prevention or rapid diagnosis and treatment.
4. Freedom to express normal behavior – by providing sufficient space, proper facilities and company of the animal's own kind.
5. Freedom from fear and distress – by ensuring conditions and treatment which avoid mental suffering.

5 FREEDOMS

Unfortunately, common husbandry practices which improve some aspects of animal welfare may diminish others (Anonymous, ND). For example, caging laying hens certainly restricts their freedom of movement but, every bird receives clean, fresh water and a nutritionally well balanced diet. In addition, raised cages also allow wastes to fall through, maintaining cleanliness for both birds and eggs. However, welfare questions still remain: e.g., just how important is it to a hen to build a nest or scratch for bugs in the barnyard (Anonymous, ND).

The poultry industry must constantly assess the situation and enhance animal welfare in a manner the public will accept. If production practices cannot pass the test of public acceptance, modern-day consumers have no problem changing their buying habits, leaving animal agriculture searching for answers. A good first step is a heightened awareness within the industry and among producers about animal welfare concerns and problems. Production advantages associated with improved welfare need to be emphasized by researchers to the industry (Mench and Duncan, 1998). Good management will minimize most welfare problems. Therefore, researchers must communicate current knowledge to industry personnel and contract producers in areas such as improved production methods, changing rules and regulations, and animal welfare audits and facility inspections. Poultry producers are referred to an excellent article by Watkins (2003) concerning what to expect and how to prepare for an animal welfare audit at your farm.

Additional Efforts Needed

Practical methods for improving poultry welfare are already available, particularly in the areas of catching, handling and slaughter (Mench and Duncan, 1998). Today, however, economics drive everything and research is needed to provide information from the public on what they will accept (and pay for) before the poultry industry can justify making costly sweeping changes to current production practices.

Despite potential for immediate improvement in some areas, Mench and Duncan (1998) listed a number of areas requiring additional efforts by the poultry industry. These include:

- Equipment design for new facilities
- Gas stunning methods that are effective and considered safe
- Less stressful methods to induce molting that ensure a complete molt
- Identification and breeding of stocks that do not require beak trimming
- Workable alternative production systems for laying hens
- Changing physiology and needs of broilers as a result of selection
- Mechanization of handling and loading of broilers
- Development of a use for spent hens; improved methods of on-farm disposal to ensure a humane death
- Identification of human factors responsible for welfare problems

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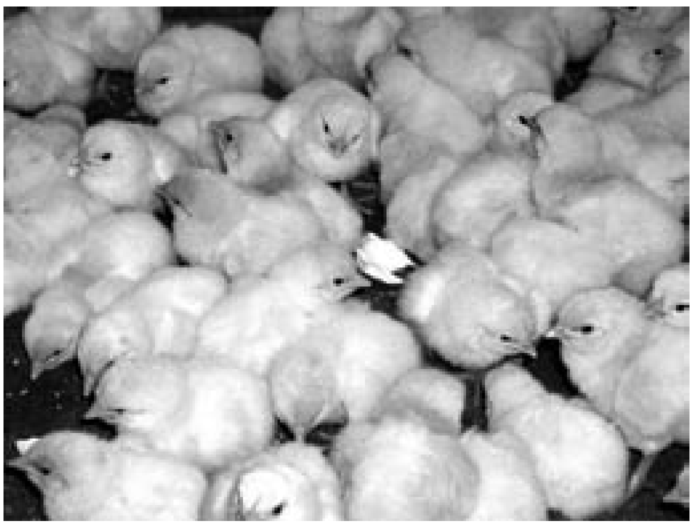
- Broken bones in hens; causes, economic effects, methods to decrease breakage, including dietary modifications at end-of-lay
- Effect of journey times and crate densities on broiler welfare during transport
- Improved house design to facilitate handling and catching
- Welfare effects of practices like toe-trimming and the use of NozBonz to prevent broiler breeder males from using the female feeders
- Perch design for layers and broilers
- Quality of house environment in relation to seasonal environmental extremes

Establishing a common set of standards for animal welfare in the poultry industry is made more difficult because facilities, management, and personal opinions differ between various poultry producing regions of the country and even within regions. For all its similarities, the U.S. poultry industry is not as uniform as it may first appear.

Animal Care

Each state in the U.S. has laws prohibiting cruelty to animals although few relate to livestock production. On U.S. farms, there are presently no laws or regulations that require farm animal care assurances, and voluntary programs of farm animal care are not widely used (McGlone, 2002). However, an increasing number of very large and influential companies are developing and implementing animal welfare programs which will greatly affect how animals are produced on the farm in the future. Consumers of livestock products expect producers to treat animals humanely and with respect. Retailers of farm livestock products know their markets depend on customers' confidence that farm animals are treated humanely. As a result, more and more retailers are demanding that suppliers be able to document humane animal treatment. Suppliers in the beef, pork, and poultry industries must develop animal welfare programs that satisfy their retail clients if they expect to keep those clients. For contract poultry producers, this likely means some form of verifiable, on-farm inspection that documents proper welfare procedures.



McGlone (2002) has suggested training and certification programs for farm animal care are needed to satisfy 1) the public, 2) consumers, 3) food retailers and 4) the government. With regards to farm animals in a commercial farm setting, it was proposed such programs should contain the following features:

- Tailored to the individual farm
- Information about humane care including husbandry, handling, and use of information services to remain up-to-date
- In-service education and training
- Formal or on-the-job training opportunities
- Information about a broad range of areas including husbandry, behavior, nutrition, environmental physiology, veterinary clinical, diagnostic medicine, agricultural engineering, and instrumentation.

Such a program would present an opportunity for the poultry industry to work hand-in-hand with researchers and extension personnel to develop animal welfare criteria that would satisfy the non-farm population yet, are realistic and workable enough to implement and still allow producers and their farming operations to remain viable.

At its heart, animal welfare depends on the producer's values and attitudes. It is an issue that has, for the most part, fallen under industry self regulation rather than government control. That could change, however, if the industry fails to address the issue head on and in a timely manner. Social pressure is driving the poultry industry to scrutinize its production practices. Customers, consumer groups, animal rights activists, and others are calling for action right now. The industry has little choice but to develop animal welfare criteria that customers accept and that producers will have to incorporate, including on-farm inspections. Even though some may not favor such inspections, they are quickly becoming part of the cost of doing business today. Not all producers will agree that such a plan is necessary, but it is better to police ourselves now than to be policed later by the courts and the government for failing to act soon enough. Animal welfare should not be looked upon by producers as being anti-livestock or anti-production agriculture. Rather, animal welfare should have the overall goal of maintaining the long-term sustainability of livestock production for current and future generations of producers.

Summary

Farm animal welfare is a major issue for the poultry industry and poultry producers. Even though few people outside agriculture understand current production practices, increasing numbers are demanding animal welfare assurances for the products they purchase. Major retailers, under pressure from customers, consumer groups, animal rights activists and others, are confronting the industry on issues involving cage space, withholding feed, forced molting, stocking densities, slaughter practices and catching, handling and transport of birds. The industry must address these concerns or risk alienating clients and customers. One likely outcome that will affect poultry producers is the animal welfare audit system (including on-farm inspections). Producers should prepare for such inspections and take steps to document their management program. This includes simple things like keeping mortality charts up to date on a daily basis and having a phone list of who to call if something goes wrong (feed system, well pump, generator, electrical power, fuel supplier, natural disaster, etc.). This may seem redundant and unnecessary now, but in the near future, this type information will likely have to be documented to comply with animal welfare guidelines.

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