

# **An Initial Analysis of Adoption of Animal Welfare Guidelines on the U.S. Egg Industry**

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## Executive Summary

Animal welfare activists have succeeded in persuading egg purchasers to purchase only eggs that are produced according to new animal welfare guidelines. This agreement will increase the cost of producing eggs that are sold in the shell. To date, the guidelines do not apply to eggs that are broken and further processed. This agreement creates a bifurcated market: high-cost eggs in the shell and low-cost eggs that are processed. We conduct a qualitative analysis of the effects on consumers and producers from creation of this new market structure. Restricting the movement of low-cost eggs into the in-shell market in

periods of peak demand will increase the price of in-shell eggs and will decrease the price of eggs destined for processing in these periods. Winners from adopting this restriction are those producers who produce only for the in-shell market. Losers from this restriction are producers who only produce for the processing market. We are currently undertaking a companion study that will provide estimates of the magnitude of the gains and losses from this new market structure.

**Keywords:** animal welfare, egg production, supply control.

## AN INITIAL ANALYSIS OF ADOPTION OF ANIMAL WELFARE GUIDELINES ON THE U.S. EGG INDUSTRY

ANIMAL WELFARE ADVOCATES have succeeded in bringing modern food production practices under scrutiny in the United States. One of the targets of animal rights advocates is the U.S. egg industry. In response to demands by major egg purchasers, such as McDonalds and Burger King, members of the United Egg Producers (UEP), a producer cooperative, have agreed to increase the amount of cage space per layer from 53 square inches to 67 square inches over the next six years. To make sure that egg producers are compensated for the 8¢ to 10¢ per dozen additional costs involved in increasing cage space per bird, the UEP would like buyers of eggs to agree to purchase only “welfare” eggs, that is, eggs that have been produced following agreed-upon animal husbandry standards. Currently, the Food Marketing Institute (FMI), the leading association of food retailers and grocery wholesalers, is considering whether to recommend that their members buy only UEP-certified welfare eggs. (See the appendix for more information about common husbandry practices in the egg industry, associated animal welfare impacts, and details of the new animal welfare guidelines.)

To date, demands for welfare eggs have arisen primarily by consumers of shell eggs. But approximately 30 percent of U.S. eggs are “breakers,” in that they are broken before being shipped and used as ingredients by the commercial food industry. If the animal welfare guidelines are not adopted by producers of breakers, then the industry will have two types of producers: high-cost producers of “graders” (in-shell eggs that have been graded) who follow welfare guidelines, and low-cost producers of breakers.

The creation and maintenance of two markets for eggs would not be too burden-

some if the grader market were kept separate from the breaker market. The price of high-cost UEP-certified eggs would be higher than the price of non-certified eggs destined for the processing market. Some kind of traceability system, such as UEP member certification that only welfare eggs are graded, would have to be implemented to keep the breaker and grader markets separate and distinct. However, the egg market is not currently kept separate. The flow of eggs to the breaker market is diverted to the grader market during periods of peak demand for fresh eggs, such as Thanksgiving, Christmas, and Easter holidays. Grader eggs flow to the breaker market during periods of low shell egg demand, such as in May. The surplus processing eggs can be frozen and stored for later use.

Under one joint proposal by the UEP and FMI, only UEP-certified eggs would be graded and sold as in-shell eggs. This proposal would lead to fewer eggs being available to meet peak demands because low-cost eggs produced using current production practices would not be able to flow into the grader egg market.

Our purpose here is to use a series of graphs to illustrate the impacts on egg producers and consumers from adopting the cost-increasing animal welfare guidelines in the egg industry. Because of data and time restrictions, this analysis does not provide quantitative estimates of the market, producer, and consumer effects. In addition, the analysis does not present a complete description of impacts on U.S. egg production. Rather, the graphs present a partial analysis of the situation to provide initial insight into

the problem. A more complete analysis, including a more detailed profile of the industry, the animal welfare guidelines, and empirical estimates of the supply, demand, and welfare effects of the guidelines, is in progress.

### A Graphical Analysis

Let us assume that all egg producers adopt the new “welfare” technology. The effect of adoption by the egg industry of a cost-increasing technology is shown in Figure 1. With higher costs, the industry is less willing to supply a given quantity of output at every price, so the industry supply curve shifts (and perhaps rotates) to the left. This shift is illustrated in the movement of the supply curve from  $S_0$  to  $S_1$ . This results in an increase in the market price from  $P_0$  to  $P_1$  and a reduc-

tion in the quantity of eggs delivered to the market from  $Q_0$  to  $Q_1$ . Consumer surplus, a measure of the benefit that consumers receive from the product, is reduced by area  $P_1EBP_0$ . Producer surplus, a measure of the benefit producers receive from producing and selling the product, is increased by area  $P_1EAP_0$  and reduced by area  $ABC$ . Thus, producers as a group will be better off adopting this cost-increasing technology if the price increase more than offsets the cost increase.

Now we can complicate the analysis and look at the implications of creating two distinct markets for eggs. For simplicity, let us assume that the supply of eggs will be treated as given at the profit-maximizing level of production. Furthermore, assume that egg producers do not have the flexibility to increase production in the short run to meet increased demand. Thus, the total supply of

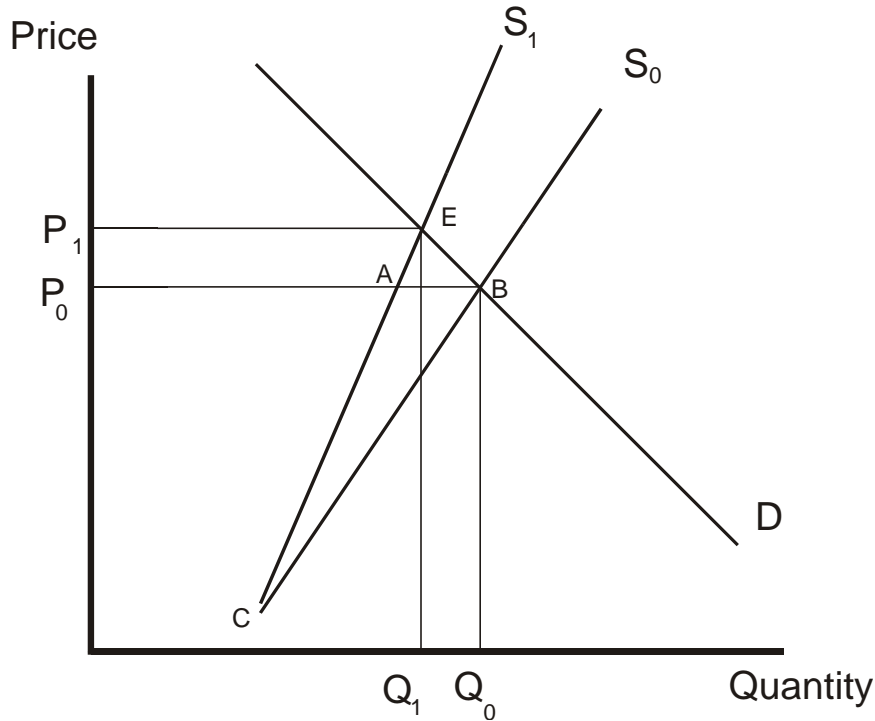


FIGURE 1. Effect of moving to a cost-increasing production technology

eggs in any short-run period is fixed at this profit-maximizing level of production. This level of production will be designated as  $S^T$ .

Figure 2 shows how price is determined under a single market for eggs. Total demand for eggs is found by summing horizontally the demand for breakers,  $D^L$ , with the demand for graders,  $D^S$ , which results in  $D^T$ . Given total supply,  $S^T$ , the free flow of eggs between the two markets, and the initial demands  $D_0^T$ ,  $D_0^L$ , and  $D_0^S$ , the price of eggs equals  $P_0$ . The quantity of eggs in the two markets is such that both markets clear at  $P_0$ . These quantities are  $Q_0^L$  in the market for breakers and  $Q_0^S$  in the market for graders.

Now suppose that demand for grader eggs increases because of a seasonal increase. The demand for breaker eggs is unchanged. Figure

3 shows this seasonal increase in demand as a parallel shift outward in grader egg demand,  $D_0^S$  to  $D_1^S$ , which shifts total demand to  $D_1^T$ . With no restriction on the movement of eggs, the quantity of eggs sent to the breaker market reduces to  $Q_1^L$  from  $Q_0^L$ , and the quantity sent to the grader market increases to  $Q_1^S$ . The price is equalized in the two markets at  $P_1$ .

Figure 4 shows the situation if graders typically slated for the breaker market cannot be diverted into the grader market because of inappropriate production technology. The quantities demanded in the two markets must stay the same, which creates a price wedge. The price in the breaker market stays constant at  $P_0$  because supply and demand remain unchanged. The price in the grader market increases to  $P_2$  to reflect the increased demand for graders. Thus, the effect of the restriction on which eggs may enter the grader market is

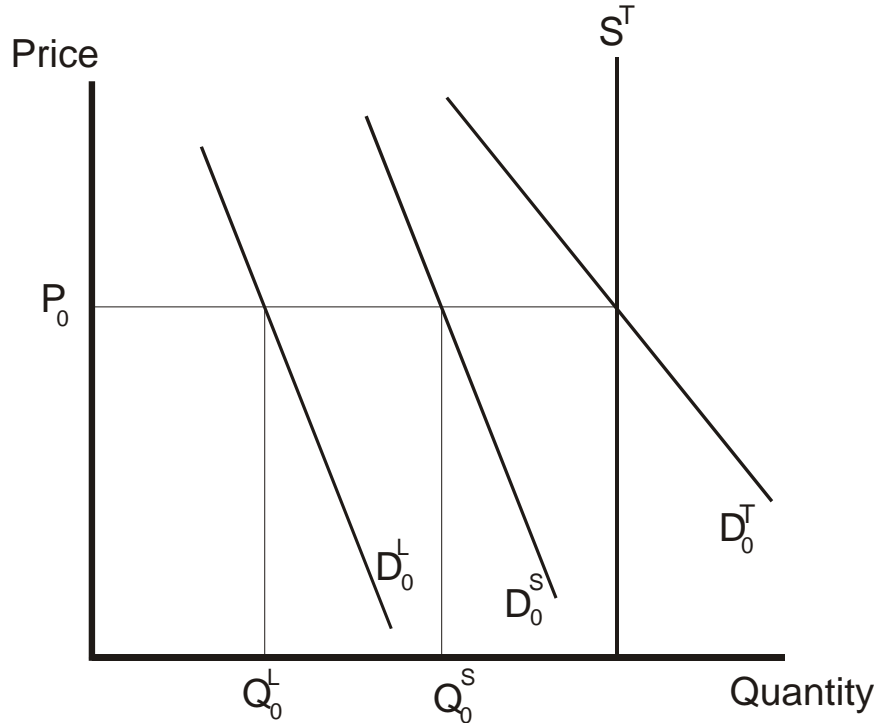


FIGURE 2. Price determination with a unified egg market

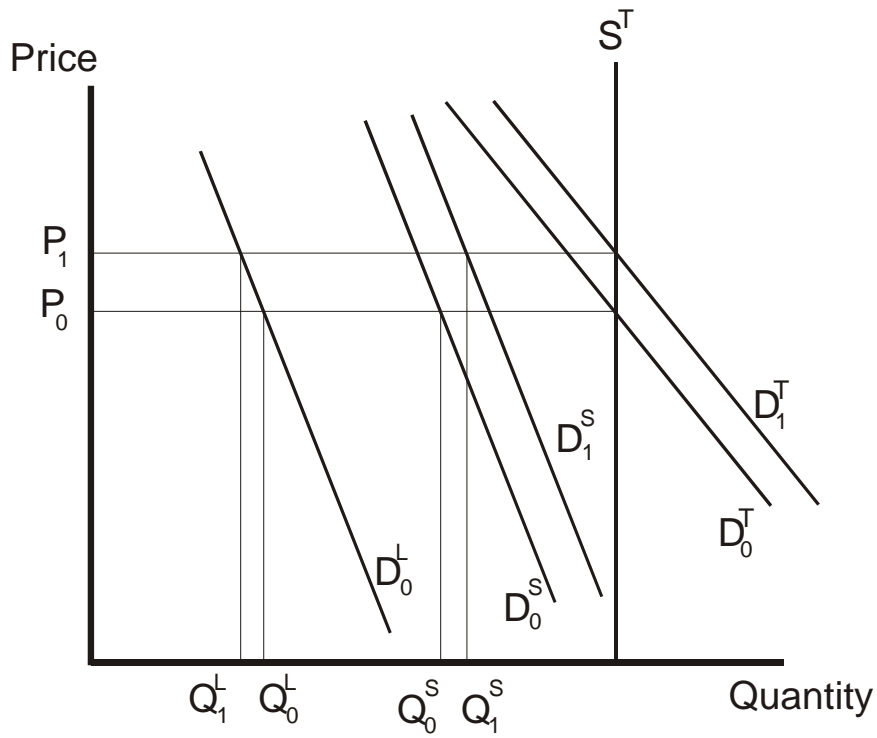


FIGURE 3. Effect of an increase in demand for grader eggs

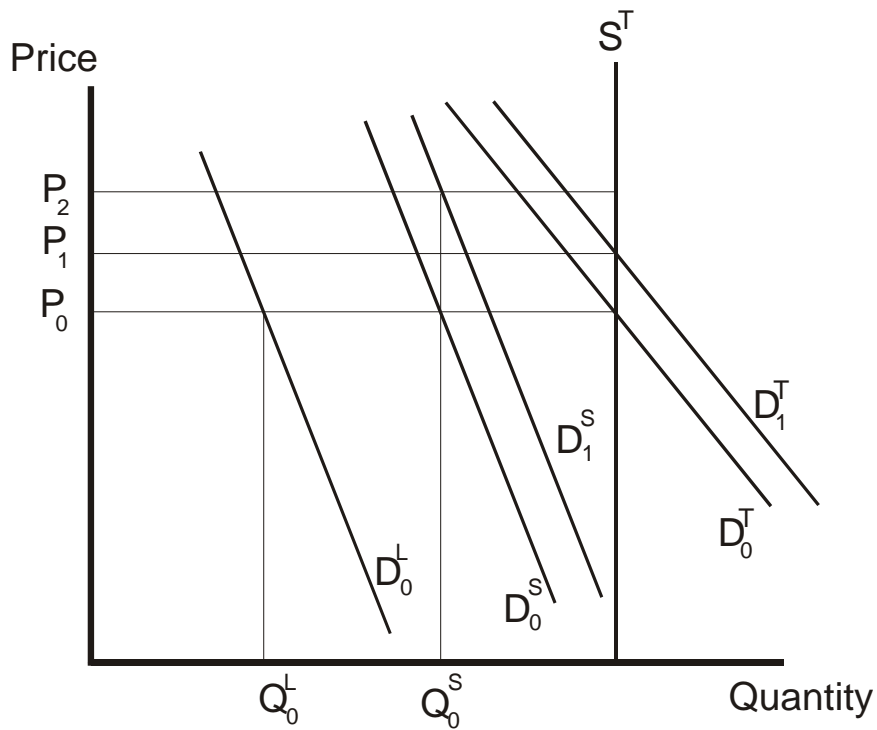


FIGURE 4. Effect of an increase in demand with a split market for eggs

to increase the grader price more than it would have increased without the restriction on what qualifies eggs for the grader market. A consequence will be increased volatility in grader egg prices.

Restrictions on the movement of low-cost non-welfare eggs into the shell market does not imply that there would be restrictions on the movement of high-cost welfare eggs into the breaker market during seasonal periods of decreased demand for graders. This situation is shown in Figure 5. Demand for grader eggs drops to  $D_2^S$ , which decreases total demand for eggs to  $D_2^T$ . With free movement of eggs between the two markets, the market price for eggs will fall to  $P_3$ . In addition, the quantity of eggs flowing to each market will adjust, with grader eggs decreasing to  $Q_2^S$  and breaker eggs

increasing to  $Q_2^L$ . Because of the higher cost of supplying welfare eggs with the cost-increasing technology and the smaller quantities of these eggs supplied at every price, the flow of graders into the breaker market likely would decline. Because breakers cannot flow into the grader market, processed eggs are more storable, and processed egg demand is less seasonal, we might anticipate decreased price volatility in the breaker market.

### Effects of Increasing Cost Technology and Restricting Egg Movement

Increasing cost technology and restricting the flow of breakers into the grader market would have some important market impacts.

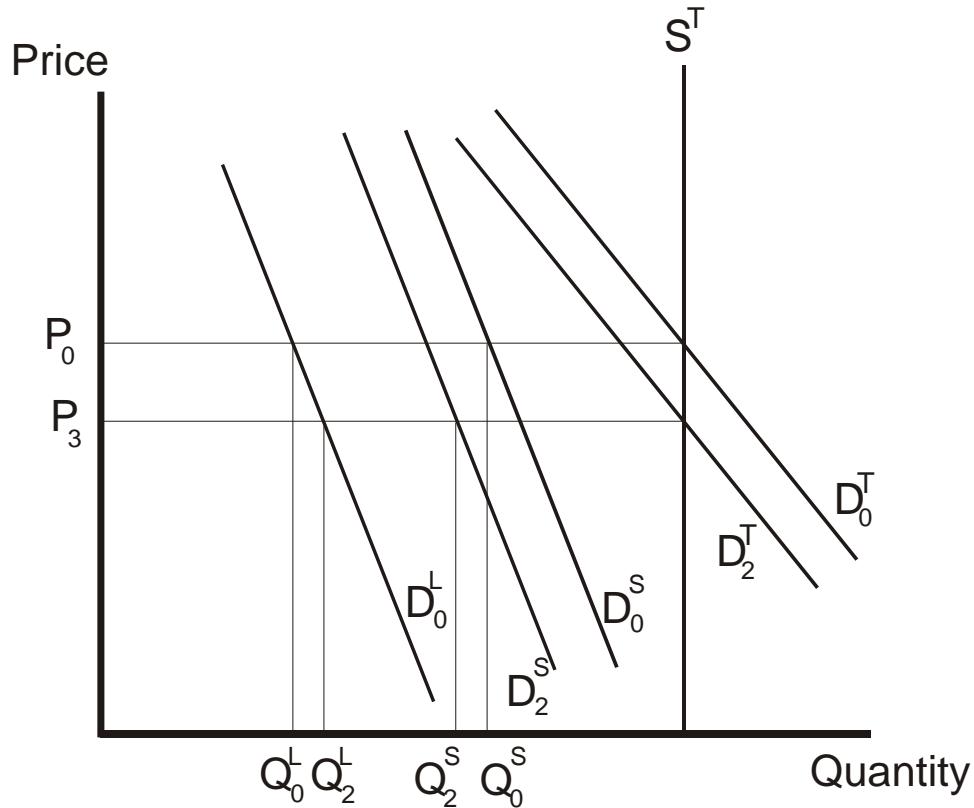


FIGURE 5. Effect of a decrease in demand for grader eggs

First, the supply of graders would decrease in response to the increasing cost of welfare technology and the market equilibrium grader price would be higher. Consumers' benefit from egg consumption would definitely decrease (not accounting for any psychic benefit of consuming eggs from animal friendly production practices). The impact on producers' benefit from production, however, remains ambiguous without further empirical analysis. However, if breaker producers do not produce graders, and if grader producers do not produce breakers, then the effect of restricting the movement of eggs from the breaker market to the grader market would be to reduce the profits of breaker producers and to increase the profits of grader producers.

Second, restricting the flow of low-cost breakers into the high-cost grader market would increase grader prices during seasonal demand peaks when supply is fixed, and we

would anticipate greater price volatility in the grader market. Currently, the less than 5 percent of breakers that flow into the grader market during seasonal demand peaks tend to reduce the magnitude of price fluctuations. Third, even though high-cost graders could flow into the breaker market during troughs in grader demand, it is less likely that this flow would occur given anticipated reductions in the supply of graders produced with the new high-cost technology. The magnitude of price fluctuations in the breaker market likely would be reduced. In effect, it is probable that both markets would operate with a great degree of independence.

Finally, given the relative independence of the breaker and grader egg markets under the restricted flow scenario, the economic value of market information on breaker prices and grader prices should be high and should improve the efficient operation in both egg markets.

## **Appendix**

### **Common Egg-Production Practices, Associated Animal Welfare Impacts, and New Production Animal Welfare Guidelines**

Some of the common husbandry practices that egg producers use are criticized for being detrimental to the well being of laying hens. The criticism prompted several organizations (for example, United Egg Producers, McDonald's, Burger King, and Wendy's) to develop new animal husbandry guidelines for egg-laying flocks. Here we identify common practices, impacts on animal welfare, and new guidelines that are being implemented by the industry.

| Egg-Production Systems/Management Practices   | Animal Welfare Impacts  |
|---|---|
| <p><b>General Management Practices</b></p> <ul style="list-style-type: none"> <li>▪ Lighting for Layers: Artificial lighting enhances hen growth rates and egg productivity.</li> <li>▪ Forced Molting: Practice employed by the U.S. egg industry to enhanced hen productivity. The removal of all food for 5 to 14 days stimulates the production of the hormones responsible for egg production and feather cover. This practice is prohibited in the EU.</li> <li>▪ Beak Trimming: Reduces pecking, feather pulling, cannibalism, and mortality.</li> <li>▪ Waste Management</li> <li>▪ Transportation and Handling</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Forced molting is inherently cruel because it involves the intentional deprivation of food to animals. Birds' feathers are plucked by other starving birds in their effort to satisfy their hunger. Causes severe stress in the birds which increase risks of diseases (<i>Salmonella enteriditis</i>).</li> <li>▪ Hens are debeaked once or twice during their lives. This practice causes severe, chronic pain.</li> <li>▪ When the laying period ends, hens are transported to the slaughter house. Usually, during handling, many bones are broken.</li> </ul> |
| <p><b>Laying Cage</b></p> <p>Over 98% of U.S. layers used for commercial egg production and 70-80% of the world's egg production involves cage systems (UEP).<br/>           The most popular U.S. cage sizes are</p> <ul style="list-style-type: none"> <li>▪ 16" x 20" with six-bird colony (53.33 in<sup>2</sup>/bird, 342 cm<sup>2</sup>/bird)</li> <li>▪ 24" x 20" with nine-bird colony (53.33 in<sup>2</sup>/bird)</li> </ul> <p>The EU requires a minimum of 450 cm<sup>2</sup>/bird.<br/>           Usually, the building is well insulated and windowless.<br/>           The birds are kept in cages arranged in a series of tiers.<br/>           The cages have mesh floors and these are sloping so when the eggs are laid they roll out of the reach of the birds.<br/>           Droppings pass though the mesh floor into boards, belts, or floors and are removed.<br/>           This system allows</p> <ul style="list-style-type: none"> <li>▪ easy control of the environment (temperature, light control, humidity, circulation of air),</li> <li>▪ good disease control (parasites), and</li> <li>▪ prevention of damage from predators.</li> </ul> | <ul style="list-style-type: none"> <li>▪ There is a lack of space and lack of exercise due to confinement.</li> <li>▪ Prevents certain normal behavior (roaming, flying, roosting in trees, dust baths).</li> <li>▪ Cage structure may cause feather and foot damage.</li> <li>▪ Birds have weak bones and often experience bone breakages. Birds can develop severe osteoporosis known as caged layer fatigue. Calcium depleted, some hens became paralyzed.</li> </ul>  |
| <p><b>Barn</b></p> <p>Similar kind of building as cage systems but in this system, birds are not caged and there is a maximum stocking density.<br/>           This system decreases ability to control poultry litter and the ability to control parasites.</p>  | <ul style="list-style-type: none"> <li>▪ Normal behavior can be expressed.</li> <li>▪ Bone strength is improved.</li> <li>▪ Birds can escape aggression from other birds by moving freely in the building.</li> </ul>   |
| <p><b>Free-Range</b></p> <p>Daytime access to outside runs is the only requirement by USDA for a "free-range certification." No criteria such as vegetation, size of run area, size of outdoor access points, or space per bird are involved in this certification given out by the Food Labeling Division of the FSIS.<br/>           Hen houses comply with the same regulations as barn systems.</p>   | <ul style="list-style-type: none"> <li>▪ Risk of predators increases.</li> <li>▪ Risk of disease increases (access to droppings and contact with wild birds).</li> <li>▪ Bone strength is improved.</li> <li>▪ Provides a more varied diet since birds could (potentially) graze on vegetation.</li> <li>▪ The environment is more difficult to control (adverse climate outside).</li> </ul>   |

### **United Egg Producer (UEP) Certification**

The UEP Advisory Committee, formed to review egg husbandry practices and animal welfare recommendations, did not conclude that the existing management practices of the egg-laying industry were inhumane but it advised that they could be improved. The following standards have been adopted by the UEP.

#### Housing:

- Cages should provide protection to birds from environmental extremes and predators.
- There must be 67-86 in<sup>2</sup> of usable space per bird (by April 1, 2008, all birds must have at least 67 in<sup>2</sup>).
- Feeder space should be sufficient to allow all birds to eat at the same time.
- Manure from birds in upper cages should not be dropped directly on birds in lower cages.
- Mesh-floors slope should not be greater than 8 degrees.
- Birds should have continuous access to clean drinking water.

#### Beak Trimming:

- If birds are from a docile breed, beak trimming might not be necessary.
- Beak trimming is recommended when an outbreak of cannibalism occurs.
- Two days before and after beak trimming, vitamin K should be added to the water.
- Levels of food and water should be increased until beaks are healed.

#### Molting:

- Body weight loss should not compromise hen welfare.
- Mortality during molting should not exceed normal mortality rates.
- Water must be available at all times.

Companies that participate in the program would have an annual inspection by independent auditors designated and approved by UEP. An 85 percent minimum score would be required to continue certification. If producers fail to meet the bird space requirements, the certification would be discontinued.

### **McDonald's Laying Hens Guidelines**

McDonald's follows the recommendations of the UEP Advisory Committee. In addition, in conjunction with the Animal Welfare Council, McDonald's has adopted the following goals regarding laying-hen welfare:

- By the end of 2001, McDonald's will purchase eggs from producers that follow their recommendations and the UEP recommendations.
- Cage space: requires a minimum of 72 in<sup>2</sup> of space per bird.
- A purchasing preference policy will be implemented.
- Force molting is not supported.
- The improper practice of beak trimming is not supported. Producers should follow UEP recommendations for this practice.

### **Burger King Corporation**

Effective March 2002, Burger King Corporation adopted the UEP Scientific Advisory Committee recommended guidelines for laying hens. In addition, the following guidelines were adopted:

- Cage space: requires a minimum of 75 in<sup>2</sup> of usable floor space in cages and two water drinkers per cage.
- Forced molting is not supported.

- Air quality guidelines require that ammonia concentrations do not exceed a daily average of 25 ppm over seven consecutive days.
- The use of beak trimming is discouraged and the breeding of less aggressive laying hens is encouraged. If producers consider that beak trimming is necessary, they should follow UEP recommendations and submit a protocol to Burger King for approval.

**Wendy's Laying Hens Welfare Program**

- After the third quarter of 2002, forced molting is not permitted.
- Cage space: requires a minimum of 72 in<sup>2</sup>.
- Incentive programs for employees for proper handling of the birds are recommended.

**Nest Eggs**

*[http://www.fact.cc/FrmP\\_Main.htm](http://www.fact.cc/FrmP_Main.htm)*

Nest Eggs is a trademark marketed by the Food Animal Concerns Trust (FACT) in Chicago. Hens are required to live uncaged in a building with nest boxes, perches, deep litter, feeders, and drinkers. Careful debeaking is permitted. Forced molting is prohibited.