



Cage-free Egg Production: Benefits and Challenges

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Background

The US Produces 75 billion eggs per year (Hardin 2018). The processes used in the production of the eggs, and the hens that lay them, are carefully regulated by the government and evaluated by producers, animal ethicists, and consumers. Egg producers and processors continuously upgrade their production systems to meet new regulations or changing consumer demands. In recent years, several large multinational grocers, retailers, and restaurants have pledged to utilize only eggs that are produced by hens in “cage-free” housing systems by the year 2025 (Starmer, 2016). Implementing new housing systems for laying hens is a significant task with social and economic implications on many differ-

ent levels for consumers, producers, and the animals themselves. In this paper, we describe cage-free housing systems used in egg production, how they differ from conventional cage systems, and the numerous challenges and benefits associated with transitioning to new egg production systems.

Conventional Cage Systems Used for Egg Production

Domestication of chickens for the production of eggs dates back hundreds of years. In the early 1900s, when farms in the United states were more diversified, farms regularly kept small poultry flocks for personal use as well as commercial production of eggs (Anderson, 2009). As demand for eggs increased, flock

sizes increased from a few birds to hundreds of birds. Increased flock sizes necessitated more labor to manage and feed the birds, prevent disease and predation, manage litter and mortality, and collect the eggs. To increase efficiency and to better manage bird health and nutrition, cage systems evolved. By the 1960s most eggs distributed and purchased through grocers in the US were produced by chickens in various cage systems. As the name implies, conventional cage systems house hens in cages, usually 5-10 hens per cage. United Egg Producers (UEP) guidelines for conventional cage systems recommend that each hen be allowed “67 to 86 square inches of usable space” (United Egg Producers, 2017). While in the cage, hens have *ad libitum* access to feed and water. The flooring is gently sloped and allows the freshly-laid eggs to roll to the front of the cage. The eggs are then collected either manually or by conveyor system. An example of such a system can be seen in Figure 1.



Figure 1. Example Cage System Used in US Egg Production. Hens are confined in cages, usually in tiered systems as shown here. Hens are provided free access to food and water. When eggs are produced, they roll to a collection tray in front of the cage. *Photo: Livestock and Poultry Learning Center: www.LPELC.org.*

Cage-free Systems Used for Egg Production

In recent years, numerous large buyers of eggs, including restaurant chains and grocers, have pledged to purchase only eggs produced by hens in cage-free housing systems. In response, many US egg producers have adopted or are transitioning to cage-free housing systems (Starmer 2016). While cage-free systems are diverse in design, some generalities can be made in their description based on common or shared charac-

teristics. First, and contrary to what may be implied, cage-free systems do not necessarily provide hens with outdoor access. Most cage-free systems that are currently being adopted are, in fact, indoor systems. Like conventional cage systems, most cage-free systems have tiered structures rather than an open floor as is typical for broiler (meat) chicken production. In contrast to conventional cage systems, all cage-free systems allow the hens access to perches and litter. Aviary systems allow vertical movement of hens often allowing hens enter and leave the different tiers of the cage and provide access to a litter or floor area. An example of a cage-free system can be seen in Figure 2.

Very often cage-free systems are adopted with the goal of improving hen well-being. Cage-free systems, almost invariably, provide greater space for the hens than conventional cage systems (the UEP recommendation is 1.0 - 1.5 sq. ft. usable space per hen, UEP 2017). This extra space combined with access to resources such as perches and nesting areas can allow the hens to engage in different natural behaviors, such as perching or dust bathing. Hens are highly motivated to roost (perch) at night and to lay their eggs in enclosed nest sites. Therefore, nesting and perching behavior are associated with improved hen well-being and could be limited in conventional cage systems (Appleby, 1998) that do not provide perches or nests.



Figure 2. Example Cage-Free Housing System Used in US Egg Production. Like conventional cage systems, cage-free systems usually consist of tiered structures. Most cage-free systems provide hens with access to perches, nests (orange curtains in picture above) and a litter or floor area for scratching and dustbathing. *Photo: Livestock and Poultry Learning Center: www.LPELC.org.*

Challenges and Benefits of Cage-Free Egg Production Systems

Large-scale innovations or changes in any industry often bring with them challenges in implementation, and this is certainly true with the transition to cage-free systems. Most obvious, perhaps, is the cost of investment in new facilities (Sumner et al., 2011). Additionally, while increased space may allow for some hen behaviors associated with improved well-being (e.g., perching, dust-bathing), increased space can also introduce detrimental behaviors including feather pecking and aggression due to the increase in social interactions among the hens within the group (Biláik and Keeling, 2000). Increased socializing can also facilitate spread of bacterial or viral infections (Lay et al., 2011). As such, unless properly managed, mortality rates in cage-free systems may be higher than in conventional cage systems, which could impose additional costs (Oddvar et al, 2018). Another cost associated with cage-free systems is labor to collect eggs. Although nest boxes are available to hens in cage-free systems, birds may often mislay eggs outside the nest box (floor eggs), requiring additional labor to collect eggs and leading to cracked and contaminated eggs that cannot be sold.

Cage-Free Systems and the Economic Effect on Consumers

Recently, Lusk et al., (2017) comprehensively examined the impact of the transition to cage-free egg production systems on the consumer, using the adoption of several animal welfare laws in California as a case-study. In 2014, California voters approved laws prohibiting conventional cage systems in egg production. The adopted statute prohibits the confinement of animals in manners that do not allow them to turn around freely, lie down, stand up, and fully extend their limbs.

Within two years of the implementation of the law, California egg production was reduced by 35% and the reduction in available eggs was compensated by importing eggs from other states. As a result, the average price of eggs in California increased by 22% from 2014 to 2016 (Lusk et al. 2017). Production decreases (and resulting price increases) were attributed, in part, to the productivity losses incurred by the farmers, which were estimated to be \$117 million across California markets (Lusk et al., 2017). Increased prices were also the result of significant capital investment in the adop-

tion of the new housing systems and an increase in labor. However, while there are numerous costs associated with adopting cage-free systems, several groups have shown that some consumers are willing to pay higher prices for eggs raised by hens in extensive housing systems (Sumner et al, 2011).

Egg Labelling

The Food Safety Inspection Service of the United States Department of Agriculture (USDA) regulates the labeling of many food products, including production claims such as “organic” or “raised without antibiotics”. For eggs sold in the US to be marketed as “cage-free” or “eggs that originated from a cage-free environment”, the USDA requires that the eggs must be “...produced by hens in a building, room, or enclosed area that allows for unlimited access to food, water, and provides the freedom to roam within the area during the laying cycle” (USDA-AMS 2016). Third-party groups independent of the governmental regulatory agencies, however, can provide additional certifications based on standards that may go beyond USDA requirements. As an example, for eggs to also contain a United Egg Producers certification, the hens must be provided with perches, among other requirements (UEP 2017).

Conclusions

Cage-free egg production systems can provide greater behavioral opportunities for laying hens, namely by providing the birds more space and capacity to exhibit natural behaviors, including dust bathing and perching. There are numerous economic costs associated with transitioning from conventional cage systems to cage-free systems, ranging from the cost of new facilities to increased production and labor costs. These costs are reflected in an increased price per dozen cage-free eggs vs. conventional eggs (USDA-AMS 2018). Ultimately, it is up to the consumer to determine how much value they place on differences in production methods and their willingness to pay for increases in costs associated with these production methods.

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