

# SUPPORTING HIGH WELFARE CAGE-FREE EGG PRODUCTION IN CHINA

Guidance Memo prepared for the Tiny Beam Fund

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## Key messages

- This document has been written through close consultation with the Chinese egg industry and is intended to be used by cage-free egg producers in China as an educational resource.
- While the vast majority of eggs in China are still produced in cages, higher welfare cage-free systems are increasing, and there is an increasing awareness of animal welfare in the country.
- The aim of the project was to identify successful production operations in China that employ sustainable practices with higher animal welfare standards, the factors that enable their success, and how they may be supported.
- Several cage-free egg farms were visited across China and egg farmers were surveyed about their current practices. This document was developed in order to provide tailored information to support these higher welfare systems.
- This memo provides information regarding international best practices in relation to farm productivity and animal welfare in the context of the Chinese egg industry.
- Information is given on key housing and management aspects including:
  - disease management
  - egg production
  - the provision of an appropriate environment
  - maintaining normal hen behaviours and avoiding mortality
  - humane killing on farm.
- An understanding of, and training and investment in, these key management aspects, particularly the prevention and control of severe feather pecking and infectious diseases, are crucial in maintaining a healthy flock and operating a successful and profitable egg production business.

## About the author

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An important aspect of this memo is that it was facilitated by Dr Hartcher, but it is truly a product of the Chinese egg farmers and researchers who provided the expertise, insight, and access to facilities. Their observations and the information they provided about their farms enabled the compilation of material which aims to act as a relevant resource for producers in optimising cage-free egg production across China.

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## Summary

China is the largest egg producer in the world and the number and scale of cage-free farms is expanding. With the appropriate development and information availability, China has the potential to be a world leader in layer hen welfare and productivity. Layer hen management is highly complex, and the objective of this project is to support the Chinese egg industry in the expansion of cage-free egg production and empower egg producers to employ best on-farm practices. This was done through close consultation with Chinese egg farmers, researchers and poultry experts.

The content is based on international best practice in the context of Chinese production and gives information on the production and economic benefits of employing best practices on farm. The three main themes in this document are 1) disease; 2) production and management; and 3) breed.

Hens are susceptible to a range of diseases, which can also present significant human health concerns. Many diseases are preventable with appropriate health care. Vaccination, biosecurity, regular monitoring, consultation with a poultry veterinarian, humane euthanasia practices and accurate record keeping are all essential in maintaining healthy flocks.

Cage-free egg production practices and hen welfare outcomes are known to be highly variable between farms. This was true for the farms visited for this project – while some appeared to have good health practices, this was not consistently seen on all farms.

Many aspects go into achieving optimal egg production rates. Recording daily egg production, feed intake and bird deaths allows producers to track flock performance and normal production rates. Providing birds with a safe and stimulating environment that meets their needs is important – this includes good quality perches, enclosed nests, and litter material on the floor which is maintained in a dry condition that allows hens to forage and dustbathe. These items were not provided on all farms visited for this project.

Bird behaviour and feather condition should be consistently monitored, and severe feather pecking behaviour prevented by providing an appropriate environment and selecting an appropriate breed. Some aspects which affect severe feather pecking are explained in this document and include the rearing environment, lighting, diet, and a stimulating environment. Severe feather pecking can be difficult to manage on the best of farms and can cause significant damage to the farm. There was variation in the awareness of, and practices used to prevent severe feather-pecking on the farms visited.

Utilising local expertise is important. This can involve consulting poultry veterinarians, other producers, researchers, industry experts, and animal welfare groups. There are also learning materials, many of which can be found online or from companies, such as breed management guides, industry guides and welfare standards. These can help in optimising farm management, hen welfare and ultimately farm profitability and the farm's overall success and sustainability.



# Introduction

## Key points

- China is the largest egg producer in the world and the number of cage-free operations is expanding
- Ten egg farms across China were visited, including two cage farms and eight cage-free farms. Nineteen farmers across seven provinces and two industry experts were surveyed for this project.
- This guidance memo was produced through consultation with local farmers, industry experts and researchers and aims to empower local farmers
- This document provides practical information for Chinese egg farmers on farm productivity, and hen health and welfare

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### *Chinese production and the shift to cage-free*

China is the world's biggest egg producer. Production has expanded at a rapid rate, and the demand for chicken meat and eggs is projected to increase. Currently, over 90% of egg-laying hens in China are housed in cages. However, cage-free production in China is expanding, and the industry will see more large-scale cage-free farms in the coming years.

### *China's potential*

China has an increasing interest in farm animal welfare and the ability to be a world leader with the appropriate development and information availability. Hen health and welfare is important to Chinese egg producers who show interest in optimising their production facilities and flock management.

### *Intent of guidance memo*

Layer hen management is highly complex, with many factors involved in good management. In all countries and industries, farmers need to be well-equipped with knowledge on best practices to establish and maintain sustainable, profitable industries with high animal welfare standards.

The objective of this project is to support the Chinese egg industry in the shift to cage-free production through collaboration and consultation with local egg farmers and researchers around the country. This guidance memo aims to provide information that is of practical use to Chinese egg producers who are operating or planning to operate cage-free systems.

By consulting local egg farmers, researchers and industry experts, considerable information, advice and expertise was collected. This resulting document focuses on some key practical and feasible production aspects which contribute to successful operations. It aims to encompass features of egg production that can be particularly challenging in a rapidly expanding and quickly changing industry, with the end goal to further empower local producers, experts and industries.

This memo is intended to be used as an educational resource and a general guide and may be accompanied by additional resources or training materials. All aspects covered are highly practical, and any implementation or training that is required at the farm level should be done in person by experienced people.

### *How it was written*

Rather than a 'top down' approach, industry-based research has been found to be effective when the research is directed by the end-users, in this case, the farmers.

To inform these guidelines, several cage-free farms across five provinces in China were visited as case studies to collect information on current farm practices. The majority of these farms were small-scale, free-range farms using traditional Chinese breeds. In addition to this, farmers from seven different provinces across China filled out questionnaires about their production practices.

Farms were located in the provinces Hebei, Guangdong, Guizhou, Jiangsu, Shanxi, Guangxi Zhuang Autonomous Region, and Shandong. Information was collected by observations of the farms and the birds, as well as interviews with the farmers. Questionnaires about the Chinese poultry industry were also completed by farmers, researchers and industry experts.

The content is based on international best practice for welfare and production in cage-free systems, information collected on Chinese farms and through interviews with farmers. The key themes that were identified as focal areas for this guidance memo were disease, management and production, and breed of chicken.

This document provides information on some of the main issues that are present in cage-free egg production worldwide, encompasses some of the 'lessons learnt' in other continents which have gone through large-scale transitions to cage-free egg production systems, and applied to the context of current Chinese production.

This memo is intended to be used directly by Chinese egg producers themselves, as guidelines for best practice. Each topic includes a summary of current practice in China and provides information on best practice, with some information on the economic and human health benefits of employing best practices.



## Section 1: Disease

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A. Current practice on surveyed Chinese farms

B. Avian influenza

C. Human health risks & economics

D. Prevention:

I. Biosecurity

II. Vaccination and health practices

III. Euthanasia



## Key points - Disease

- The prevention and management of diseases and performing euthanasia, the humane killing of suffering animals, were identified by Chinese egg producers as two of the most difficult areas of production. Some producers identified disease as the single greatest challenge.
  - Layer hens are susceptible to a range of diseases which can cause loss in profits
  - Many diseases are preventable with appropriate health management practices
  - All farms should have contact with a local poultry veterinarian who is consulted regularly
  - Biosecurity practices should be employed to avoid disease introduction and spread
  - Vaccination and health management programs should be in place, including regularly monitoring birds for signs of disease and recording bird sickness and mortalities
  - Farm workers should be well-trained in humane euthanasia methods
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## A. Current practice on surveyed Chinese farms

When surveyed, disease was identified as one of the main challenges facing cage-free egg production by farmers as well as academics and poultry experts. Some producers identified it as the single greatest challenge.

Disease prevention was also identified as a future obstacle and a reason that some producers may be hesitant to operate large-scale cage-free facilities.

Some of the main causes of mortality that were listed on farms included mycoplasma, clostridium, infectious laryngotracheitis, yolk peritonitis, and stress. Avian influenza was also identified as a big threat, and the prevention and control of epidemics was also identified as a challenge.

When disease or mortality occurred on a farm, there was not always an awareness of the causes. This was despite most farms reporting good access to vets, regular visits from vets and technicians, and performing autopsies. Some farms

reported to have veterinarians on staff, some regular access to veterinarians, while some had no access to a veterinarian.

A number of producers held the belief that a main cause of mortality was weakness, and that weak birds are unable to compete with stronger birds. On these farms it may be beneficial for veterinarians trained in diagnosing poultry diseases to visit the farm to check when there are reports of weak birds. It may be the case that weak birds are in fact affected by disease. If there are insufficient resources or the groups are changed there may be some aggression between birds which should not persist over a long time. It should be apparent in the flock when aggression between birds is occurring.



*Free-range farm visited in Guizhou, China*

## B. Avian influenza

Avian influenza is a particularly dangerous and highly contagious viral infection that can cause severe disease, significant mortality and economic losses. Signs of infection in poultry include severe respiratory signs (difficulty breathing) with watery eyes, discolouration of the comb, ruffled feathers and diarrhoea. Eggs often have no shells. Severely affected birds stop laying altogether. In acute cases, mortalities can occur 24 hours after the first signs of disease, and often within 48 hours.

Common signs to look for include:

- Ruffled feathers
- Unusual head or neck posture
- Inability to stand or walk
- Lethargy – reluctance to move, eat or drink
- Respiratory problems
- Diarrhoea
- Swollen head, wattle and comb
- Decrease in egg production
- Sudden death in several birds

## C. Human health risks and economics

Diseases can cause a reduction in egg production, reduction in egg quality, a decrease in feed conversion efficiency, and a higher incidence of bird mortality, leading to decreased profits.

**Preventing disease optimises bird performance, egg production and quality, flock survival rates and therefore maximises the profit for farmers.**

**Disease prevention is important for animal health and welfare but also for human health. Many people have died as a result of contracting diseases from animals.**

Some diseases such as avian influenza have been transmitted to humans, primarily through close contact with infected birds. Approximately half of the people who handled poultry infected with the avian influenza virus became infected with the virus. In China, humans contracted avian influenza directly from poultry, leading to human deaths in 2013. More recently, the novel coronavirus was also contracted directly from animals.

## D. Disease prevention: Recommendations

- **To prevent disease, it is important to vaccinate, practice good hygiene and biosecurity, regularly monitor the birds, provide good quality diets, good air quality, reduce stress, and have contact with a poultry veterinarian for advice.**
- There is a link between lowering stress and increasing disease resistance. Good handling and management of the birds is important for maintaining a healthy and productive flock.
- Layer hens are susceptible to many diseases which can cause high mortality and significant economic losses. **Many diseases are preventable, and appropriate health management practices are important to reduce the risk of disease in a flock.**
- Infectious diseases are usually caused by bacteria or viruses which can be spread between birds. There are several different common infectious diseases in poultry and the risk of each varies by country and region. The risk and prevalence of diseases can be different between cage and cage-free systems. **Prior to operating a cage-free system it is important to understand the disease risk and disease prevention and control strategies.**
- This information should only be used as a general guide, and specific information should be obtained from a local poultry veterinarian. All farms should have contact with a local poultry veterinarian who is consulted for advice on the prevention and treatment of disease.
- **It is important that all farms have an emergency disease response plan to ensure that birds are treated humanely in the event of an infectious disease outbreak.**
- Euthanasia should initially be performed under close supervision, for at least the first few months. Local veterinarians who are knowledgeable in humane methods may monitor the procedure. Videos may also be sent to people in other locations who are knowledgeable in correct procedures and can check the method.
- **In China, it would be beneficial to have training for veterinarians in the diagnosis of common poultry diseases, disease prevention, and humane methods of euthanasia.**

## I. Biosecurity

### ***Current practice on surveyed Chinese farms***

Some farms were relatively self-contained, with staff members living on site and the feed mill on site as well. Some farms had biosecurity measures including signage at the entrance, fencing around the farm and a disinfection room at the entrance to the farm. Half of the farms visited had no biosecurity measures.

Most farms did not have biosecurity equipment such as coveralls, boot covers or farm boots, or disinfectant at shed

entrances and exits; the disease risk is increased at these farms. On one farm, technicians were seen to be visiting multiple farms in a single day and did not use biosecurity equipment between or within farms.

Most of the free-range farms provide feed and water on the range areas, which can attract wild birds and increase the risk of contracting infectious diseases from wild birds.

### ***Recommendations***

Strict biosecurity measures should be employed at all times to reduce the risk of infectious diseases being introduced to the farm. Most diseases are carried onto the farm by people, equipment, or wild birds. Some key biosecurity measures to prevent infectious diseases are listed below:

#### ***Staff***

- **All people visiting the farm should wear protective clothing**
- Staff should not have contact with any other birds
- Personnel who are required to visit a number of sheds should visit the cleaner sheds with younger birds first
- Hand sanitiser and footbaths with disinfectant should be provided at the entry to each shed
- Trucks should be disinfected in between farms, and drivers should not enter the sheds
- Farm equipment should be regularly cleaned with a disinfectant and not shared with other farms



*People walking in a shed wearing biosecurity suits and boot covers at a farm visited in Shanxi province.*

## *Farm*

- **The property should be fenced, with signs to denote a bio-secure area**
- The farm should be well-drained with no stagnant water or water bodies that may attract wild waterfowl
- Other animals should be separated from poultry
- No other bird species or pigs should be kept on the same property
- **Dead birds should be removed promptly from the area** and disposed of hygienically (e.g. incinerating, burying away from the sheds)
- A pest control plan should be in place
- Feed and water should be stored in sealed, hygienic conditions
- Clean water should be provided. If clean water is not available, the water should be treated with safe chemicals to inactivate viruses (e.g. 1-2 ppm chlorine)
- Sheds and equipment should be cleaned and disinfected between flocks
- Wild birds should be prevented from accessing the farm where possible, such as using netting or fencing to restrict their entry, and **feed and water should not be provided outside the shed**
- If there is suspected disease, there should be heightened biosecurity measures by minimising movement on and off the property
- **There should be an action plan for when there is a disease outbreak on the farm, including procedures for humane killing**

## *Environment and medication*

Parasitic diseases are caused by parasites which can be transmitted through contact between birds or through the environment. Mites are an example of a parasitic disease.

**Most parasitic infections can be prevented or controlled with medication and maintaining a good, clean environment.**

Coccidiosis is a very common parasitic disease in poultry which is commonly controlled by in-feed antimicrobials in intensive production. It causes intestinal inflammation and mortality which can be controlled by medication. Pullets can now be vaccinated against coccidiosis, and there is an increasing use of vaccination, particularly with the increasing resistance of organisms to antimicrobials. **Importantly, maintaining the flooring and litter in good condition reduces the risk of coccidiosis.** Litter should be dry; if it becomes damp it increases the risk of diseases such as coccidiosis.

Mites are also very common in layer hens. They cause a variety of symptoms ranging from discomfort to death and can be difficult to control. Good quality, dry and fine substrate

(flooring material) that allows hens to dustbathe can help in controlling mites, and birds with intact beaks are more efficient at removing mites from their plumage.

It is important to maintain good ventilation and air quality inside the shed. This means keeping dust and noxious gases at low levels. **Ammonia concentrations should be no greater than 15ppm.** It is usually possible to detect ammonia by smell when the concentration is 15ppm or higher, but for a more accurate measurement, equipment (such as tape or electronic ammonia metres) can be used.

**High concentrations of ammonia in the air can cause eye and respiratory diseases, and in extreme cases, blindness. Air quality also affects humans who work in the sheds.**

## II. Vaccination and health practices

### ***Current practice on surveyed Chinese farms***

Producers generally reported good access to veterinarians and medicines, and that birds are vaccinated during the rearing period. All farms reported to do regular flock inspections. Approximately half of the farms monitored air quality.

However, farms did not always have health plans in place, and while some farms reported high mortality from disease, the cause of death was not always identified or recorded. Many farms solely use traditional Chinese herbal medicines and do not administer antibiotic treatments or other medicines.

It appeared that while many farms reported access to a veterinarian, this did not guarantee effective treatment or disease prevention. For example, all of the farms visited had access to a local poultry veterinarian. However, while most farms vaccinate, half do not administer medications or antibiotics to treat disease. Most reported disease outbreaks, and most did not seem to have health plans or processes for sick or injured birds. Only two of the farms reported performing euthanasia, and no farms had appropriate procedures in place for euthanasia.



## ***Recommendations***

Most infectious diseases can be effectively prevented by vaccination. Vaccines are available for a wide range of diseases, and vaccination programs should be in place for all flocks, combined with strict biosecurity practices to reduce the risk of disease introduction to the farm.

Vaccination programs are specific to the disease risk in the particular region, and it is important that a local veterinarian who is aware of the specific disease risks in the region is consulted when establishing a vaccination schedule.

### *Considerations for vaccination:*

- Veterinarians' directions and manufacturers' instructions should be followed
- Experienced veterinarians should train and supervise anyone who will be administering vaccines
- Only well-trained and experienced people should vaccinate birds, and great care must be taken to ensure that it is administered correctly and that injections do not enter any body organs
- Good quality equipment should be used (including sharp needles that are changed regularly), the needle diameter needs to be smaller for younger birds to avoid injury, and good hygiene should be practiced to reduce the risk of contamination
- Birds should also be monitored before, during and after vaccination for any signs of abnormal behaviour. They should return to normal feeding and drinking shortly after vaccination. Abnormal behaviours may include noisiness, flightiness, panicking, packing, or being very quiet

Examples of common vaccines, vaccination methods and vaccination programs are given in some breed management guides. There are also online training manuals on the administration of vaccines for poultry.

Pullets that go to cage-free systems are generally vaccinated against viral (Marek's Disease, Infectious Bronchitis, Newcastle Disease, Gumboro and Infectious Laryngotracheitis), bacterial (Salmonella) and parasitic diseases (Coccidiosis).

## *Handling*

Sometimes it is necessary to handle birds to administer vaccines or other standard procedures.

**Poor animal handling can cause injuries and reduce immune function, increasing the risk of disease in the flock.**

**Handling hens gently and with positive attitudes can achieve improved profits for the farm.**

Considerations for handling include:

- Bird handling must always be done gently calmly, quietly, and with unhurried movements
- Handling should never be rushed as this can cause injuries
- **Hens are fragile and wings and legs can be easily broken**, and if birds are held too tightly this can restrict breathing and cause bruising
- Birds should be gently lifted with both hands supporting the body
- **They must not be carried by the head, neck, a single wing, feathers or tail**
- Containing the birds in pens can be helpful and dimming the lights can help to keep the birds calm, while maintaining enough light to effectively vaccinate and inspect the birds
- It is important to monitor the birds and ensure they do not crowd in corners where they can suffocate and die

### III. Euthanasia (killing)

#### ***Current practice on surveyed Chinese farms***

Farmers were asked about key issues and potential improvements that can be made; they were asked to select a score on a scale of 1-5. High scores indicated that the particular aspect is difficult to achieve and could be improved. 'Killing sick or injured hens promptly using humane methods' was rated as the most difficult to achieve and needing improvement, after achieving good egg production rates.

It is common practice to bury sick birds alive. Many farms also reported waiting for birds to die naturally. Bloodletting (throat cutting), throwing birds into a well, incinerating, freezing and dumping were also reported to occur. None of these practices should be performed as they cause significant pain and distress to birds.

Most farms did not have processes in place for very sick or badly injured birds. Some farms reportedly separated affected birds for recovery, some let them die naturally, and some reported to treat them with medicine. Only two farms performed euthanasia, and none reported appropriate procedures.

When birds show symptoms of disease they should be separated and treated. If they have severe symptoms which they are unable to recover from, they should be euthanased (killed humanely) to prevent further suffering and also reduce the risk of disease transmission throughout the flock.

Since many of the farms used dual-purpose breeds, many farms sent the birds to an abattoir for slaughter. However, one farm has its own abattoir which uses neck cutting or suffocation in a plastic bag as the methods of slaughter. Another farm sends the live birds to friends' houses for killing and eating, and transport can be in cages or plastic containers. These methods are likely to cause significant distress to the birds. One farm reported various methods of depopulation which included birds being picked up by a contractor, being sent to other farms, or being slaughtered for meat.

Having consistent, planned methods for euthanasia, depopulation and slaughter can reduce risks to hen welfare.

## **Recommendations**

### *What is euthanasia?*

Euthanasia or 'mercy killing' is the humane killing of animals where they are suffering, particularly from injury or disease, and cannot recover. In the event that they are affected by infectious disease and cannot be treated, **euthanasia can prevent the spread of disease** to other birds, and also end the suffering of badly affected birds.

Similarly, if birds are injured from injurious pecking or other causes, this can cause cannibalism which can become very prevalent in a flock. **Euthanasing badly affected birds can prevent injurious pecking** or cannibalism spreading throughout a flock and affecting more birds.

### *Acceptable methods of euthanasia*

Euthanasia can cause significant distress prior to death, and pain during the procedure. **It is therefore very important that the method is quick, consistent, reliable, and causes immediate unconsciousness.** Common methods of performing euthanasia on-farm are cervical dislocation and captive bolt devices.

Cervical dislocation involves rapid and controlled stretching of the neck to instantly dislocate the neck (spinal cord) from the skull (brain), severing the spinal cord and carotid arteries. This method requires a very high level of skill and should only be performed by competent, well-trained operators who can guarantee success at the first attempt. If it is performed incorrectly it causes extreme pain and suffering and is unacceptable.



*Manual cervical dislocation.  
Source: Humane Slaughter Association.*

Captive bolt devices have been developed for chickens where a bolt is fired into the brain, causing brain damage and immediate death. The bird should be restrained gently but firmly, and the device positioned at the top of the head. A backup method such as cervical dislocation should always be available in case there is any doubt in the efficacy of the procedure.



*Non-penetrating captive-bolt device*  
*Source: Humane Slaughter Association.*

Carbon dioxide gas (CO<sub>2</sub>) can also be used. Using this method, the bird is placed in pre-filled container of CO<sub>2</sub> with the appropriate concentrations of gas (above 40%) and an appropriate time period (at least 3 minutes) to ensure death. This process should take several minutes. Birds should not be exposed to a CO<sub>2</sub> concentration greater than 30% until after they have lost consciousness. A gas concentration monitor should be used, and birds not placed on top of other live birds. There is some available information on gas killing, but advice from experts should always be sought on best practice before using this method.

**All methods of euthanasia require a high level of competency to perform effectively.** It is crucial that only well-trained and competent staff perform euthanasia, and there should always be someone at the farm that can perform euthanasia. Training should be by veterinarians or experienced people. **If there is any doubt in how to kill the bird or there is any risk that the bird will not die on the first attempt, assistance should be sought from a competent person.**

**Farm staff should have training in how to perform euthanasia humanely, and farms should have standard procedures for euthanasia methods.**

**Birds must never be buried alive as this causes extreme distress and suffering.**

### *Following euthanasia*

**Birds should always be checked to confirm death after any method of killing.**

Three or more signs of death should be checked including:

- Loss of consciousness
- Absence of a 'blink' reflex when the eye is gently touched
- Maximum dilation of the pupil

- Absence of breathing for at least five minutes
- For cervical dislocation, an internal gap between the skull and the spine can be felt in the neck

After death, violent flapping of the wings can occur which is a reflex and not necessarily a sign of life, if the signs of death have been checked. Bleeding out (cutting the neck to release blood) must only be performed after death is confirmed. Cutting and bleeding out of a conscious bird is likely to cause pain and distress.

### *Identifying signs of disease and death*

After birds have died (or been killed) due to disease, accurately identifying the cause of death (or euthanasia) and recording the cause and the number of birds affected is an important management tool. It allows the appropriate treatment to be administered to the flock, the application of preventative treatments, and to effectively manage and minimise the risk of disease in future flocks. **Identifying the causes of death can allow preventative methods to be employed in future.** Birds should be checked to confirm death before performing post-mortems.

Recording the number of birds affected can help farmers to identify normal rates for their farm, and to set benchmarks for future flocks. This helps to optimise management, healthy flocks, and ultimately, the productivity and profitability of the farm.

## Section 2: Management and production rates

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- A. Current practice on surveyed Chinese farms
- B. Effects on farm profitability
- C. Optimising management and egg production:
  - I. Severe feather pecking
  - II. Natural behaviours and the environment
  - III. Floor eggs



## Key points - Management and production

- When surveyed, Chinese egg producers identified achieving good egg production as the most difficult issue which could be improved
  - This section outlines some key areas that can improve bird productivity and farm profitability
  - Flocks should be managed to avoid the risk of severe feather pecking
  - Appropriate environmental features should be provided including perches, nests, adequate space, and dustbathing and foraging materials
  - The rearing environment should match the laying system as closely as possible
  - Birds should be regularly monitored for normal behaviours and feather condition
  - Egg production and mortality should be recorded daily
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## A. Current practice on surveyed Chinese farms

When farmers were surveyed, they were asked about key issues and potential improvements that can be made. Achieving good egg production rates was listed as the most difficult to achieve.

Some farms reported very low egg production rates, and a very high proportion of floor eggs (eggs laid outside the nest boxes, usually on the floor of the shed or in the outdoor range area). Not all farms kept regular and accurate records of productivity. One producer reported not knowing how to input records.

Not all farms visited were achieving optimal production rates that are possible for the breed they were using. Egg production rates ranged from 30% to 91% with an average of 57%.

One source cited that the efficiency of production is lower in the local breeds, with some producing just 40 eggs per year, the best local breeds producing 220 eggs per year, while some commercial breeds produce over 320 eggs per year.

Traditional breeds are often also used for meat consumption in the southern provinces due to the larger demand for chicken meat in the south of China. There is therefore less reliance on egg production rates on these farms than on farms solely producing eggs. There will likely be an increased focus on egg production rates when commercial layer breeds are utilised for large-scale production.

Average mortality ranged from 2.5% to 30% between farms surveyed, with an average farm mortality of 11%. One farm reported losing 10 birds every day from a flock of 6000 as an average for the farm. Mortality can be due to a range of different causes including disease, cannibalism and predation in free-range systems. Common predators were snakes and weasels which were largely not deterred or controlled; five farms reported weasels as a common predator.

## **B. Effects on farm profitability**

### *What is productivity?*

The profit that the farm makes is dependent on a number of factors including cost of the hens, feed costs, egg production rate, cost of labour, equipment costs and operating costs. The cost of feed is often the greatest cost for farmers. The number of eggs produced by each hen in relation to how much feed it consumes is referred to as 'feed conversion efficiency'.

**Providing a good environment and maintaining good health and welfare are important in optimising hens' performance and farm profitability.**

When all of the factors outlined in this section are managed correctly, productivity and feed conversion efficiency can be optimised, and egg production rates can be improved. This maximises the overall profitability and success of the farm.

## **C. Optimising management and egg production: Recommendations**

- Monitoring all aspects of production and recording these is an important way to benchmark normal levels for the farm and to assist in identifying ways for the farm to improve. It can also identify when disease may be present in a flock if egg production is compromised.
- Egg production rates greater than 90% are achievable in cage-free systems through appropriate bird and shed management.
- At a minimum, records should be kept of feed consumed, eggs produced, and number of bird deaths. It is also good practice to record the causes of death.

## I. Severe feather pecking

### ***Current practice on surveyed Chinese farms***

Severe feather pecking is where birds pull out feathers of other birds. It can lead to injuries, cannibalism, reduced productivity and high rates of mortality. It is one of the biggest welfare and economic problems in egg farms across the world.

The local, traditional breeds reportedly have a calmer disposition and do not have the same problems with severe feather pecking or flightiness as the modern commercial breeds. Feather condition appeared quite good, with hens on most farms exhibiting slight feather damage. However, mortality due to cannibalism was seen on farms using traditional breeds, and this was reported as a problem particularly in the weeks after arrival at the laying facility.

One farm identified severe feather pecking and cannibalism as the main cause of mortality. They reported that 10-20 birds die every day from cannibalism out of 20,000 that are placed. Several dead birds that had been cannibalised were seen at the farm.

Severe feather pecking and cannibalism are serious concerns in the egg industry worldwide, and the management and control of this behaviour becomes particularly important in large-scale cage-free systems.

Half of the farms visited had no methods to control feather pecking, and only one farm reported preventative methods.

Some farms use lighting and nutrition to control severe feather pecking. Reducing the light intensity is a common practice internationally to reduce severe feather pecking outbreaks once they have occurred. Nutrition is a good management practice which should be considered as a preventative method. Diet should also be considered and potentially adjusted where severe feather pecking occurs.

Other methods reported by farmers included providing enrichment, reducing the stocking density, providing vitamins, removing affected birds, and adjusting the diet composition, which are all acceptable approaches. Some farms also reported performing beak-trimming, and some did not have any management practices to manage severe feather pecking.

There was also some evidence of misinformation with regards to the prevention and control of severe feather pecking. One producer stated that food restriction was a good strategy for feather pecking and cannibalism.

Most farms sourced pullets from cage rearing facilities. Rearing pullets in cages and transferring them to a cage-free system can cause behavioural problems during the laying period including severe feather pecking. This may be a reason that farmers were seeing high rates of cannibalism in the weeks following the pullets' arrival at the farm.

Beak trimming was only performed on birds at three of the farms that were visited. Although there is a worldwide

movement away from the reliance on beak trimming to control severe feather pecking, infrared beak trimming at day-old is still commonly used in industries to prevent damage from severe feather pecking. It may be used more frequently in the future in China with the increase in large cage-free systems using commercial breeds. If this is the case, training in beak trimming and beak scoring, and the acquisition of appropriate equipment at hatcheries may be required.

## ***Recommendations***

Important management aspects that reduce the risk of severe feather pecking:

- **Enrichment** – pecking objects, enclosed nests, perches and good quality flooring
- **Stocking density** – enough space for birds to move and perform normal behaviours
- **Rearing** – matching the rearing and laying environments as closely as possible (both cage-free)
- **Diet** – mash rather than pellets, and adequate insoluble fibre, protein, vitamins and minerals, avoiding sudden changes and providing a sufficient number of feeders and drinkers
- **Health** – temperature, humidity, air quality, vaccination, biosecurity and health monitoring
- **Genetics** – selecting a breed with a lower predisposition to perform feather-pecking
- **Human behaviour** – calm, positive and regular interactions such as walking through the shed, no sudden changes, and avoiding loud noises
- **Lighting** – flickering lights should be avoided, lighting should be evenly distributed throughout the shed, and adequate periods of light and dark provided, with approximately 8 hours dark

**Once severe feather pecking occurs in a flock it can spread very quickly**, and it is very difficult to control. It is good to provide an appropriate environment that meets the birds' needs and reduces the risk of severe feather pecking occurring in the first place. Online resources such as FeatherWel can be helpful.

## *Rearing*

Birds are usually housed in a separate facility when they are chicks and pullets and then transferred to a different facility for laying when they are hens. This early life period is called 'rearing'. Early life experiences have big impacts on hens later in life, and an appropriate rearing environment increases the chances of a successful and profitable laying period.

**Matching the rearing environment to the laying environment is important** to enable the birds to successfully transition to the laying facility. This also helps to avoid behavioural problems including severe feather pecking throughout the laying period. Breed standards, poultry veterinarians, housing manufacturers and nutritionists should be consulted for the rearing and laying periods.

**It is important that hens in cage-free systems are also reared in cage-free facilities.** Both facilities should include perches, litter and pecking objects, place in similar positions in both facilities. Appropriate enrichment including good quality litter (flooring material) has found to be important to provide during rearing to avoid severe feather pecking in the laying period.

## *Beak trimming*

Beak trimming is commonly practiced to avoid damage from severe feather pecking. It is the removal of the tip of the beak which causes acute pain and sometimes chronic pain. All preventative housing and management measures should be implemented to reduce the risk of severe feather pecking. An alternative to beak trimming is placing beak abrasives such as sandpaper at the bottom of the feeder so birds wear their beaks down when they feed.

## *Monitoring*

Severe feather pecking can spread very quickly throughout a flock and cause high rates of mortality and economic losses.

**It is very important that staff monitor the birds regularly for any changes in feather condition or behaviour. Bird health and behaviour should be checked at least once every day. Recording feather condition can help in noticing when changes occur.**



*Feather loss on the wing and back due to feather pecking at an Australian facility.*

**Birds with wounds or repetitively victimised birds should be promptly removed from the flock and treated to avoid further injuries and death.** Sometimes deterrents may be applied to the affected area.

Staff should be able to recognise different types of pecking; severe feather pecking is towards the body, whereas aggressive pecking is towards the head. They should also identify abnormal behaviours such as flightiness or changes in vocalisations. Cannibalism should not occur and if it does occur, it should be immediately addressed. Cannibalism should not be greater than 1% over the life of a flock.



*Wound as a result of severe feather pecking and the beginning of cannibalism at an Australian facility.*

There is information available online on how to monitor birds for example, the [AssureWel](#) monitoring tool.

## II. Natural behaviours and the environment

### ***Current practice on surveyed Chinese farms***

Environmental enrichment was generally not provided inside sheds. Free-range farms usually had lots of vegetation including shrubs and trees on the outdoor range area and some had perches outside, but this was limited to the outdoor area rather than providing features including nest boxes, perches and pecking objects inside the shed. Half of the farms did not provide nest boxes.

Providing perches, pecking materials, litter and pecking materials inside the shed is relatively inexpensive and straightforward to install and maintain, and can yield large benefits in productivity and welfare. Therefore, the lack of enrichment inside sheds may be due to a lack of understanding of the

importance of these features in the internal environment. Providing environmental enrichment inside sheds is feasible and could be adopted on Chinese egg farms.

Providing perches allows roosting at night. The sheds could be closed at night to protect the hens from nocturnal predators and to encourage birds to lay their eggs in the morning. The sheds would then be opened in the morning. Since farmers inspect all sheds every morning, this could be a feasible option. Providing pecking objects inside the shed as environmental enrichment was not commonly practiced. This is likely due to a lack of awareness of the benefits of providing environmental enrichment.

This is because providing objects for hens to peck is straightforward to provide, and highly beneficial for behaviour and productivity.

Space allowance per bird is measured in stocking density, the number of birds per

m<sup>2</sup>. Stocking density ranged from 1 to 12 birds per m<sup>2</sup> with an average of 6.4 birds per m<sup>2</sup>. Generally, birds should not be housed at greater than 9 birds m<sup>2</sup>, since there can be difficulty in maintaining the environment and hen welfare with decreasing space allowance.

## ***Recommendations***

**Providing an appropriate environment allows hens to perform their natural behaviours, reducing stress which can reduce adverse behaviours (such as feather pecking and smothering), improve immune function and disease resistance, and increase productivity and profits.**

**Hens are motivated to peck the ground and look for food, dustbathe (crouching and spreading material through the feathers), and lay their eggs in an enclosed nest.** The environment should allow them to perform all these behaviours. Features which are important to provide include:

### *Space*

When birds have enough space, they can perform normal behaviours including social behaviour, stretching, preening, dustbathing, and pecking and scratching the ground. **If inadequate space is provided this can increase stress, cause poor litter (flooring) condition, compromise health, decrease activity, and increase the risk of adverse behaviours. This can subsequently reduce the profitability of the farm.**

The best stocking density (number of birds per unit of flooring area) depends on the ventilation system and how well the environment can be maintained including flooring and air quality. However, **stocking density should not exceed 9 birds per m<sup>2</sup>.**

## Nests

Enclosed, private nests can reduce cloacal cannibalism, stress and floor eggs. They should be of an appropriate size and provide a soft surface (e.g. dimpled rubber mats, Astro Turf, or clean straw. The nest boxes should be cleaned regularly and material such as straw replaced weekly). **Hens should have at least 1 nest per 5 birds or 1m<sup>2</sup> per 120 birds** for group nests to reduce competition and increase use of the nests.



*Group nest with entrance flaps at a farm visited in Heibei.*

## Perches

Perches can improve muscle and bone health, reduce fearfulness and aggression, improve litter condition, and reduce feather pecking and smothering. Perches should be non-slip, approximately 3-4cm wide, be elevated, and clean and dry.

**Each bird should have at least 15cm of perch space on which they can sit and stand comfortably using a normal posture.**



*Birds using a metal perch at a farm visited in Shanxi.*

## Foraging and dustbathing

Flooring material should allow foraging (pecking and scratching the ground) and dustbathing. Litter materials include substrates such as chopped straw, sawdust or sand. **Litter should cover a significant area of the shed floor (ideally at least 1/3 of the floor), and at least 10cm deep.**

**Litter should be maintained in a dry condition**, and not damp, wet or hardened which prevents normal behaviours and can cause poor air quality which can compromise bird health and productivity, as well as the health of humans working in the shed.



*Chicken dustbathing in dry litter.  
Source: PoultryHub*



## Pecking materials

Items such as straw bales, pecking blocks, pecking strings, scattering food on the floor (such as grain, cabbages, cauliflowers and other vegetables) are good to provide regularly.

**There should be enough enrichment items to allow all birds to access and use the enrichment easily and without competition.**



*Hens on a hay bale.  
Source: RSPCA Assured.*

Birds should be regularly observed to be interacting with the enrichment by pecking at it. If birds are uninterested, the enrichment items may need to be replenished or replaced to maintain interest.

**Hay bales are a good source of enrichment and can also be used for perching.** If hay bales are used as perches, they should provide at least 15cm of perching space per hen.

## III. Floor eggs

### ***Current practice on surveyed Chinese farms***

Half of the producers did not provide nest boxes and all eggs were laid on the floor of the shed or on the ground outside, posing a potential food safety risk and increasing labour requirements for egg collection. One producer reported that they could not control where hens lay eggs, requiring extra labour to collect the eggs.

If eggs are not collected promptly, food safety issues may arise due to the inability to identify the length of time that eggs were outside before collection. Further, since eggs could be laid in obscure locations and there could be plentiful natural vegetation in the outdoor range areas, one producer reported that occasionally eggs could hatch at the farm.

## ***Recommendations***

**Hens should be provided with good quality, private enclosed nest boxes.** This reduces the number of eggs that are laid on the floor and elsewhere, the eggs laid in nests are generally cleaner, and easier to collect.

Even if they are provided with nest boxes, when they first start laying, eggs laid on the floor can be as high as 10-20%, but this should decrease to approximately 1-5% at peak lay.

Factors that affect the proportion of floor eggs include:

- **Nests** – adequate number of nests in good condition providing a protected area, easily accessible before laying
- **Lighting** – even lighting throughout the shed, with darker nests
- **Ventilation** – good and even ventilation throughout the shed and nest boxes
- **Training** – birds may need training to use the nests by walking through the shed and promptly removing eggs from the floor
- **Equipment** – features in the shed should be placed so as not to make the nests difficult to access
- **Bird health** – good flock health

## Section 3: Breed

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- A. Current practice on surveyed Chinese farms
  - B. Impacts on profitability
  - C. Management of modern commercial breeds:  
Recommendations
- 



## Key points - Breed

- Breed can affect a wide range of behavioural and production traits
  - Appropriate breeds should be used which minimise risks of severe feather pecking, poor bone strength and overall health
  - Breed management guides and veterinarians should be consulted
  - Providing the optimal environment and management for the breed is important
-

## A. Current practice on surveyed Chinese farms

Most commercial layer hens are imported from large international breeding companies. There are also smaller breeding companies that provide chickens to local markets. These may include traditional Chinese breeds which can be dual-purpose, providing both eggs and meat. The modern commercial genotypes are generally kept in larger farms and located close to urban areas, whereas the traditional breeds are generally kept in rural areas in small flocks.

Chinese consumers have specific preferences which vary by region, for example smaller eggs are preferred in Hubei, northern provinces prefer eggs with red shells, south west provinces prefer pink shells. There are niche markets for particular products, and consumers can pay more for eggs from local breeds. This may be attributed to taste, product quality and tradition.

Currently, the majority of cage-free egg producers in China are small-scale, free-range farms which often use traditional, heritage breeds which are very different

to the modern commercial strains in their rate of egg production as well as welfare traits. The traditional breeds' rate of egg production is much lower, and they likely have different behavioural dispositions. Farmers reported that the traditional breeds are calmer with a lower predisposition to perform severe feather pecking, and a greater disease resistance than modern commercial breeds.

Large egg producers in China are making the transition to cage-free systems and are trialling these systems currently. Large-scale operations commonly use modern, commercial strains of chicken.

Whether producers are transitioning from using traditional Chinese breeds of chicken or from cage facilities, there are lots of management factors to consider to optimise the health, welfare and productivity of the hens and profits of cage-free farms. The prevention and control of severe feather pecking, cannibalism and infectious diseases are particularly important in large-scale, cage-free egg farms.

## B. Impacts on profitability

Understanding the breed is crucial for successful operations. Following breed guides and considering the management required for different breeds is important in maximising their potential with regards to health, production rates, behaviour and overall welfare.

Modern commercial layer hens have been selectively bred to produce a large number of eggs very efficiently. Genetics companies produce management guides for particular breeds. Providing the best environment for the birds and ensuring they are in good health is crucial in achieving good production rates.

### **C. Management of modern commercial breeds:** **Recommendations**

- Modern layer hens have a very high rate of lay (eggs produced) and can lay over 300 eggs per year. The calcium required to form eggshells predisposes hens to bone weakness and osteoporosis. By managing the birds well, farmers can minimise health risks and optimise the genetic potential of the breed. Management includes good placement of perches and other features in the shed to reduce the risk of fractures, and the provision of a good diet.
- Large genetics companies often produce information on the breed to guide farmers in their management of the birds. For example, a particular company may produce several 'product leaflets', a nutrition management guide and a management report for a particular breed. These are usually available online for free.
- The breed that is selected for a particular farm has big impacts on welfare and productivity. Some of the issues which need to be planned for and managed when farmers decide to use modern commercial breeds in cage-free systems include:

#### *Bone strength*

Layer hens have high rates of bone weakness and can have bone fractures due to falling on hard objects in the environment. Genetics can impact skeletal health. Nutrition is also important for bone strength, and birds with the greatest ability to exercise by walking, perching and performing normal behaviours generally have the strongest bones and muscles.

#### *Severe feather pecking*

While all modern breeds have problems with severe feather pecking, different breeds can have different rates of severe feather pecking, and this should be considered when selecting which breed is the most appropriate for the farm. Hens with less risk of severe feather pecking with blunter beaks should be housed in good environments with good management practices to minimise the risk.

## *Behaviour*

Breed may also affect other behaviours such as flightiness (excitability) which could affect ease of management and potential for smothering.

## *Health*

Genetics can impact immune function and therefore the incidence of disease and mortality rates in a flock. The environment, housing environment and health practices remain important in the prevalence of disease on a farm.

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