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Technical Guidelines for Management of Laying Hens

Scope: The guidelines cover the production period of laying hens (excluding parent stock) from the arrival of day-old chicks at farms through to the removal of end-of-lay hens from the laying production facilities.

The “Technical Guidelines for Management of Laying Hens” were developed and issued by the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF-J), based on the standards for animal welfare in the Terrestrial Animal Health Code of the World Organisation for Animal Health. This document is the English version of the guidelines translated by MAFF-J. While every effort has been made to ensure that the translation is as accurate as possible, the accuracy and completeness of the content is not entirely guaranteed. For accurate and up-to-date information, please refer to the original Japanese version.

Ministry of Agriculture, Forestry and Fisheries of Japan
Livestock Industry Bureau

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Section 1: Management Method

1. Observation and recording

It is important to keep track of the health of laying hens to make sure that they are being reared comfortably. Signs of poor health in laying hens include changes in plumage condition, lethargy, rapid and irregular breathing, persistent coughing or wheezing, trembling, poor appetite, diarrhea, pathological crouching, toe inflammation, and abnormal behaviors.

It is important to keep daily records to ensure that the rearing environment is comfortable for the laying hens in their rearing environment. The items to be recorded include the health status of the laying hens, the occurrence of diseases and accidents and their causes, the number of deaths, the state of egg laying (laying rate, etc.), the occurrence of feather pecking, feed rations or intake, adequate water supply, maximum and minimum temperatures, and humidity.

[Actions recommended for implementation]

Laying hens should be observed at intervals appropriate to the management practices and the risks to the health and animal welfare at least once a day. In particular, the frequency of observation should be increased immediately after changes in the rearing environment or during hot or cold seasons to prevent the occurrence of sickness and injuries. Observation should be carried out in a way that layer pullets and laying hens are not unnecessarily disturbed, for example handlers should move quietly and slowly through the flock.

When observing laying hens, their health status should be assessed by observing factors including their body condition, feeding status, presence of injury, occurrence of feather pecking, and presence of ectoparasites. The absence of any signs indicating a deterioration in animal welfare should be confirmed by referring to the animal welfare measurables shown in Section 7, and it should also be checked that feed and water are being administered appropriately, ventilation is adequate, lighting is adequate, and litter or substrate is clean. When observing body condition, the fact that feather cover can mask actual body condition should be taken into account.

If laying hens show signs of health deterioration or an increase in the number of deaths, clinical examination and lesion observation should be utilized to take appropriate action immediately. Diseased or injured laying hens should be given appropriate treatment as soon as possible by the manager (e.g., owner) or handler (person actually involved in the management of the laying hens). If the manager or handler is unable to provide adequate care, veterinary treatment should be provided. If treatment is not effective, euthanasia should be conducted. When laying hens die, they should be promptly handled and reported, and the cause should be ascertained.

Daily records should be kept of the health status of laying hens, the occurrence of diseases and accidents and their causes, the number of deaths, the state of laying (laying rate, etc.), the occurrence of feather pecking, feed rations or intake, adequate water supply, maximum and minimum temperatures, and humidity. Daily, weekly, and cumulative mortality, culling, and morbidity rates and performance should be within expected ranges. Depending on the key husbandry events in the production cycle, mortality, morbidity, and culling rates should be checked and periodically recorded along with the causes of increase or decrease and the details of treatment. Items to be recorded should be added in accordance with the situation, for example, when a

behavior that may be causing animal welfare problems is observed (refer to Section 7. 2).

[Actions recommended for future implementation]

None

2. Handling of laying hens

Laying hens are animals that are sensitive to changes in their surrounding environmental.

To prevent laying hens from feeling undue stress, managers and handlers should pay attention to avoid contact with animals other than laying hens and should try to avoid behaviors that cause unnecessary stress to laying hens. They should also recognize that laying hens have a habit of fighting to secure feed and space for activities and establish social rank, and that fighting behavior can cause injury or death.

With regard to painful procedures, possible options for improving animal welfare include suspension of the procedure, reducing or eliminating the need for painful procedures through proper husbandry, rearing strains that do not require painful procedures, and changing to less painful or less invasive alternatives.

[Actions recommended for implementation]

When working in the poultry house or approaching laying hens, managers and handlers should avoid sudden actions that may cause unnecessary stress or fear, avoid rough handling, and handle the laying hens as carefully as possible to avoid causing injuries.

Catching laying hens, especially when placing into or taking out of poultry houses or outdoor facilities, should be carried out by competent animal handlers, under dim or blue lighting to minimize stress, fear reactions, and injuries, and handlers should avoid picking them up by their necks or wing tips and pay attention to avoid giving them a strong impact. Laying hens that are injured during catching should be euthanized.

When transporting laying hens, the loading, transport, unloading, and stocking density during transport should be conducted appropriately according to the “Technical Guidelines for Transport of Farm Animals” and plans should be made in a way to minimize the time and distance for transport, and appropriate measures should be taken to reduce climatic stress during catching, transport, and storage.

Animal welfare and health considerations should balance any decisions on performance when choosing the genetics to be used for a particular location and production system, as well as egg production results.

The rearing system should pre-adapt layer pullets for the intended laying hen production system. Partial restocking after a flock of laying hens has been introduced into a poultry house should only be practiced with due consideration to biosecurity and in a manner that prevents co-mingling of flocks.

Painful procedures should not be performed unless necessary, and should be performed in such a way as to minimize any pain, distress, and suffering. Toe trimming, dubbing, and other mutilations should not be performed in laying hens.

[Actions recommended for future implementation]

None

3. Prevention and control of feather pecking (partial beak removal)

When chicks are kept in a flock, from about two to three weeks of age, some chicks start pecking each other on the tail feathers or feathers around the tail, eating feathers, or pecking and injuring other chicks, and if such a situation is left unchecked, pecking will spread throughout the flock. Pecked laying hens may lose feed intake and egg production due to stress and, if severely injured, they may die.

There are several control methods to prevent feather pecking, but partial beak removal should be considered as a last resort when these measures do not improve the situation.

Advantages of partial beak removal include the prevention of injuries due to the elimination of the sharp tip of the beak, improved laying rate due to reduced chronic stress, and reduced mortality rate. However, it should be noted that laying hens that undergo partial beak removal may not be able to consume feed immediately after trimming.

There are two methods of partial beak removal: cutting the beak tip with a high-temperature blade, and removing the beak tip by necrotizing with infrared radiation. It should be noted that if partial beak removal is inadequate, the beak may be regenerated and the preventive effect of feather pecking may not be expected, thereby requiring second-stage partial beak removal.

Performing partial beak removal at a mature age may cause chronic pain.

[Actions recommended for implementation]

In order to prevent feather pecking, more gentle and docile strains should be selected depending on the situation, and the following management methods should be implemented, where applicable: optimization of the feed composition and shape during the rearing and laying periods, raising the age at onset of egg laying, expansion of the space allowance during the rearing period, control of lighting during the rearing and laying periods, minimization of fear-related stimuli, provision of ancillary equipment (e.g., high perch, nesting area, and foraging materials), reduction of the flock size during the rearing and laying periods, and separation of injured hens and pecking hens. In the event of feather pecking, injured laying hens should be promptly removed and treated, cured, or euthanized. Partial beak removal should be used as a final measure if these control measures do not prevent feather pecking.

If used, partial beak removal should be carried out by a competent person at the earliest age possible and care should be taken to remove the minimum amount of beak necessary using a method that minimizes pain and controls bleeding. After partial beak removal, managers or handlers should make sure that the bleeding is stopped, carefully observe the laying hens, and take appropriate measures such as administering vitamins as necessary.

[Actions recommended for future implementation]

None

4. Induced molting (ceased egg production)

Induced molting may lead to animal welfare problems if not well managed.

Withdrawal of feed for more than 24 hours is not recommended, as risks such as the imbalance of intestinal microflora have been reported.

Recently, methods have been developed to induce molting while feeding low-calorie, low-protein diets.

[Actions recommended for implementation]

When induced molting is practised, only laying hens in good body condition and health should be molted, and the molting should be stopped immediately if any abnormalities are observed during the process. In addition, there should not be withdrawal of feed for more than 24 hours, and daily access to feed should be ensured. In this case, alternative methods that have been shown to be effective, such as a method for inducing molting while feeding low-calorie, low-protein diets, should be actively employed.

Laying hens should have access to water at all times and adequate periods of light.

During the induced molting period, loss of body mass should not compromise the welfare of laying hens, including their welfare during the subsequent laying period.

Mortality and culling rates during the induced molting period should not exceed normal variations in flock mortality and culling rates.

[Actions recommended for future implementation]

None

5. Control of diseases and accidents

It is most important to prevent the occurrence of diseases and injuries by daily management.

It is necessary for managers and handlers to acquire knowledge to identify and appropriately address laying hens affected by chronic diseases or injuries.

Reasons for euthanasia of individual laying hens include bone fractures or other illnesses, diagnostic purposes, disaster response, emaciation, rapid deterioration of condition for which treatment has been unsuccessful, and severe pain that cannot be alleviated.

[Actions recommended for implementation]

The health management of laying hens should be carried out in a way that the health and welfare of laying hens concerning the body and behavior are optimized. There should be an effective program for the prevention and treatment of diseases and health problems that is developed in appropriate consultation with veterinarians.

The program, including production information, morbidity rates, mortality rates, culling rates, and details of treatment, should be regularly updated by managers or handlers. For parasites, an appropriate program should also be in place for monitoring, control, and treatment.

Managers and handlers should acquire knowledge of dealing with laying hens affected by chronic disease or injuries and should consult veterinarians as appropriate. If managers or handlers are unable to identify the cause of disease, ill-health or distress, or are unable to correct these, or if they suspect the presence of a disease, they should seek advice from a veterinarian or other qualified advisers.

Vaccinations and treatments should be administered by personnel skilled in the procedures and with consideration for the welfare of laying hens under the guidance of veterinarians in accordance with the “Veterinary License Act (Act No. 186 of 1949) and other relevant laws and regulations.

Sick or injured laying hens should be moved as carefully as possible, separated, and treated promptly.

The decision of on-farm euthanasia should be undertaken by a competent person for laying hens that injured during catching, are not fit for loading or transport, not expected to recover after treatment, or severely stunted or weak,. On-farm euthanasia, except for cases where culling is carried out in accordance with the “Act on the Prevention of Infectious Diseases in Livestock (Act No. 166 of 1951)”, should be performed as soon as possible, following documented procedures and appropriate equipment, with reference to the “Technical Guidelines for On-Farm Euthanasia of Farm Animals”.

Records of diseases and accidents should be kept, and if the frequency of occurrence is high, consultation with a veterinarian or relevant experts should be sought for appropriate action, as the presence of disease may be suspected, or the cause of disease, pain, distress, or suffering may not have been improved.

[Actions recommended for future implementation]

None

6. Cleaning and disinfection of poultry houses

Providing a comfortable environment for laying hens will ensure good hygiene and minimize the risk of disease and injury.

[Actions recommended for implementation]

Floors, substrate, cages, and grounds outside poultry houses should be cleaned as necessary to ensure good hygiene and to minimize the risk of disease and injury.

Areas in contact with laying hens, including buildings and equipment, should be cleaned, washed, and disinfected to keep facilities and equipment clean.

Manure should be removed properly to provide a comfortable environment for laying hens. When litter is used, the floor surface should be kept dry by adding or replacing litter.

After shipment of laying hens, the poultry houses should be washed, disinfected, and dried as conditions warrant and at a minimum, after each production cycle.

[Actions recommended for future implementation]

None

7. Biosecurity measures on farm

In the event of the entry of highly infectious pathogens such as highly pathogenic avian influenza virus into a farm, there is a high risk that the disease will spread simultaneously throughout the entire flocks, posing a significant problem for animal welfare.

In order to prevent the outbreak of infectious diseases and to maintain the health of laying hens, it is necessary to implement thorough biosecurity management to prevent the entry of pathogens into the farm. In addition, harmful animals such as wild birds, rats, and flies are involved in the transmission of various pathogens, and degrade the rearing environment by causing contamination of feed and damage to facilities and equipment (e.g., electrical wiring).

[Actions recommended for implementation]

In addition to complying with the “Biosecurity Standards” as outlined in the “Act on the Prevention of Infectious Diseases in Livestock”, managers and handlers should design, implement, and periodically review “Biosecurity plans” and acquire the necessary knowledge for the daily prevention of infectious disease outbreaks. In the case of any abnormalities observed in laying hens or other necessary situations, managers and handlers should consult with veterinarians and when specific symptoms outlined in the “Act on the Prevention of Infectious Diseases in Livestock” are confirmed, they should notify that to the Livestock Hygiene Service Center immediately.

When vehicles enter or leave a farm, or when people enter or leave a poultry house, disinfection and footwear replacement should be carried out appropriately.

The major sources for spread of pathogens, including harmful animals, hematophagous insects, and ectoparasites, should be prevented from invading and if they emerge, prompt extermination measures should be taken.

[Actions recommended for future implementation]

None

8. Promoting understanding of animal welfare

It is necessary to understand that ensuring good animal welfare involves management practices such as designing management systems, maintaining proper rearing environments, responsible rearing, and providing appropriate care and that serious problems may arise if these factors are compromised.

Good management of laying hens plays a crucial role in ensuring good animal welfare. It is also necessary to constantly recognize that the acquisition of correct

knowledge, skills, and an aptitude for animal welfare by managers and handlers will contribute to the reduction of the number of end-of-lay hens due to diseases and injuries, and lead to the healthy rearing of laying hens.

[Actions recommended for implementation]

Managers and handlers should have adequate knowledge of normal laying hen behavior, handling techniques, health, biosecurity, general signs of disease and indicators of poor animal welfare (e.g., panting (open-mouth breathing), wing spreading, huddling, feather ruffling, diarrhea, changes in locomotory behaviors; reduced intake of feed and water, changes in weight or body condition, or abnormal appearance), and skills for their alleviation by appropriate training, and they should be competent in accordance with their responsibilities. In particular, they should acquire the knowledge and skills to identify and appropriately manage laying hens exhibiting injurious feather pecking, cannibalism, and conjunctivitis, and those with suspected chronic diseases or injuries.

There should be a sufficient number of animal handlers to adequately ensure the health and welfare of the laying hens.

[Actions recommended for future implementation]

None

Section 2. Nutrition

1. Nutritional and water requirements

In order for laying hens to maintain their health and carry out activities such as normal development and egg laying, it is necessary to provide them with sufficient feed that contains appropriate nutrition according to their developmental stage and laying status, and satisfies their physiological requirements in quality and quantity in a form that can be eaten, without excess or deficiency. In this regard, it should be noted that the amount of nutrition and nutrients required are different in the early laying period, from the first laying to near the peak laying, and in the late laying period, when laying gradually declines after the peak.

It should be taken into account that water requirements are generally about twice the amount of feed intake.

[Actions recommended for implementation]

Laying hens should be fed daily without excess or deficiency with water and feed containing adequate nutrients to meet requirements in both quality and quantity according to their age, production stage, production system and genetics, and should not deviate from the acceptable range of body condition according to the breed, strain, and physiological condition. At that time, feed should be provided with attention to the fact that the necessary nutrition and nutrients are different in the early laying period, from the first to near the peak laying, and in the late laying period when laying gradually declines after the peak. When feed is changed, it should be carried out in a planned and gradual manner.

Water requirements are influenced by factors such as age, temperature, humidity, body weight, egg production, and feed ingredients. Insufficient water intake can cause various diseases; therefore, a sufficient amount of fresh water suitable for drinking should be continuously available except under veterinary advice. When end-of-lay hens are shipped, water should be available up to the time of shipment.

The “Japanese Feeding Standards for Poultry”, “Standard Tables of Feed Composition in Japan”, and other sources should be referred to for information on the types and quantities of nutrients required.

[Actions recommended for future implementation]

None

2. Ensuring the quality of feed and water

When feed and water are stored in feeders and drinkers for a long time, problems such as contamination by the growth of mold and bacteria will occur.

Contamination of feed and water with excrement of wild animals such as rats and wild birds can lead to diseases.

[Actions recommended for implementation]

Feeders and drinkers should be sufficiently large and easy to clean, and should be inspected regularly and cleaned in consideration of the frequency recommended by

the equipment manufacturer. Concerning water, attention should be paid to high temperatures in summer and freezing in winter.

Feedstuffs and feed ingredients should be of satisfactory quality to meet nutritional needs, be managed to minimize contamination and degradation, and be tested for the presence of substances that would impact on the health of laying hens.

Measures to prevent the entry of wild animals should be taken to avoid contamination of feed and water with excrement from rats, wild birds and other animals that could cause diseases of laying hens.

When setting up an outdoor area, attention should be given to contaminated puddles, harmful plants, and other potential hazards to laying hens.

[Actions recommended for future implementation]

None

3. Feeding and water supply methods

When installing feeders and drinkers, it is necessary to ensure that all laying hens have adequate access to feed, water, and nutrition without any problems, and to keep in mind that requirements of feed and water vary according to age, weight, etc.

[Actions recommended for implementation]

In all rearing systems, feeding and watering facilities should ensure that all laying hens have adequate access to feed, water, and nutrition without problems.

Since the feeding and watering conditions required for laying hens vary depending on their status such as age and weight, managers or handlers should design feeding and watering systems to prevent excessive fighting among laying hens, ensure sufficient space according to the systems, and take appropriate measures.

In particular, when laying hens are newly introduced into the poultry house, it should be confirmed that they are able to consume feed and water.

All laying hens should be fed at least once a day, and feeding time should ideally be consistent every day. If it is difficult to maintain the proper temperature in the poultry house during hot weather, feeding should be avoided during the hottest hours of the day. From the viewpoint of hygiene management, it is necessary to withdraw feed for a certain period of time prior to slaughter; however, excessive and prolonged withdrawal of feed should be avoided taking into consideration the time required for transportation and other processes before slaughter. The period of feed withdrawal prior to depopulation should be minimized, and water should be supplied up to the time of depopulation.

[Actions recommended for future implementation]

None

Section 3. Poultry house

When newly building or renovating a poultry house, the impact of climate and geographical factors should be evaluated and the house should be designed based on expert knowledge on the health and welfare of laying hens, with taking into account the five freedoms. In order to mitigate the negative effects of these factors, efforts should be made to adapt the laying hen breeds to the location of the farm or to consider alternative locations. In addition, consideration should be given to the following: (1) ensuring the environment in the poultry house is comfortable for laying hens and fresh air can be supplied to the entire house; (2) prevention of the invasion of pathogens and harmful animals such as wild animals, rats, and flies; (3) maintaining stable temperature and humidity in the poultry house avoiding significant changes due to fluctuations in the weather conditions, such as heat and cold, which may adversely affect the health of laying hens; (4) designing the poultry house structure to facilitate daily management and observation of the laying hens, equipped with the necessary management facilities; and (5) providing a structure that enables appropriate disposal of manure.

It is necessary to strive for proper management, including repairs to prevent laying hens from being injured by damaged parts of poultry houses and equipment.

Managers or handlers should develop a maintenance program that includes record keeping for all equipment, and contingency plans to address any failure that may compromise the welfare of laying hens.

The form of the poultry house includes open-sided poultry house, semi-windowless poultry house, and windowless poultry house, which are selected according to the management techniques of managers or handlers and the environmental conditions around the rearing place.

[Actions recommended for implementation]

The location of the laying hen establishments should be safe from the effects of fires, floods, and other natural disasters to the extent practicable. Establishments should be located or designed to avoid or minimize disease risks and exposure of laying hens to chemical and physical contaminations, noise, and adverse climatic conditions.

Poultry houses, outdoor areas, and accessible equipment should be designed after considering the opportunities for laying hens to perform their motivated behaviors, as well as health, environmental factors, and animal management capability. They should also be maintained to avoid injury or pain. In addition, poultry houses should be constructed with materials, and electrical and fuel installations that minimize the risk of fire and other hazards and are easy to clean and maintain.

All production systems should be designed, maintained, and managed to prevent access by predators and wild birds.

Managers or handlers should have a maintenance program in place, including record-keeping for all equipment and contingency plans to address failures that may compromise the welfare of laying hens.

1. Poultry house without outdoor areas

(1) Open-sided poultry house

An open-sided poultry house is a poultry house with a structure that allows natural light to enter the house and allows air to flow in and out freely. Laying hens are fully confined in the house.

(2) Semi-windowless poultry house

A semi-windowless poultry house is an open-sided poultry house with curtains, etc. that facilitates environmental control through forced ventilation or other systems similar to windowless poultry houses, and laying hens are fully confined in the house.

(3) Windowless poultry house

A windowless poultry house is a house in which ceilings, walls, and floors are covered with insulation, etc., and ventilation and light management are artificially controlled. Laying hens are completely confined in the house.

[Actions recommended for implementation]

All establishments for laying hens should be designed, constructed, maintained, and managed in such a way as to minimize the adverse effects on the health and welfare of laying hens, which are caused by large changes in temperatures and humidity in the poultry house due to fluctuations in weather conditions such as heat and cold.

Attention should be paid to prevent laying hens from being injured by damaged parts of the poultry house.

Poultry houses should be designed and managed to prevent access by wild animals including predators, wild birds, rats and flies, as well as contact with laying hens, predation, and infestation.

The structure should be designed to facilitate daily management and observation of laying hens and equipped with necessary management facilities, ensuring appropriate manure disposal.

[Actions recommended for future implementation]

None

2. Poultry house with outdoor areas

There are two types of poultry houses with outdoor areas: a partially housed type in which laying hens are kept in a poultry house while having access to a designated outdoor area, and a completely outdoor type in which laying hens are not kept in a poultry house for the entire production period but are kept in a designated outdoor area.

Laying hens may be given access to outdoor areas only when they have sufficient feather cover and can range safely.

[Actions recommended for implementation]

In the case of the partially housed type, there should be sufficient appropriately designed openings to allow laying hens to leave and re-enter the poultry house freely.

Land and pasture should be appropriately managed to reduce the risk of laying hens becoming infected by pathogenic agents, infested by parasites, or being injured. For this reason, it should be kept in mind to limit the stocking density and to rotate the use of multiple plots during management.

Outdoor areas should be located on well-drained ground and managed to minimize wet conditions and mud. In addition, there should be a shelter for laying hens, and the areas should be managed to prevent laying hens from escaping and be free from toxic plants and contaminants in soil, feed, and drinking water.

Laying hens should be habituated early to the outdoor areas.

Outdoor areas should be designed and maintained to allow laying hens to feel safe and to encourage them to utilize the range optimally, while mitigating the contact and predation by predators and wild birds, disease risks, and adverse climatic conditions.

[Actions recommended for future implementation]

None

Section 4. Rearing system, structure, space allowance, and ancillary equipment

1. Rearing system

The rearing systems of laying hens include the cage system and the floor rearing system.

Good welfare of laying hens can be achieved by various rearing systems.

[Actions recommended for implementation]

In order to provide and maintain a good rearing environment for laying hens, managers and handlers should acquire knowledge and skills in management techniques and methods of using equipment.

[Actions recommended for future implementation]

None

(1) Cage system

The cage system is a method of keeping laying hens in metal cages equipped with feeders and drinkers, separated from the floor where manure accumulates. In addition to conventional battery cages, there are enriched cages in which ancillary equipment such as perches, nest boxes, and dust baths are installed.

[Actions recommended for implementation]

In consideration of factors such as the strain of laying hens to be reared, the structure of the poultry house, the ventilation condition, the type of cage, and the size of flocks, laying hens should be housed with a stocking density that allows them to consume feed and water, move in a natural posture, or adjust their postures normally.

When cages are stacked to rear laying hens, consideration should be taken so that the manure from the upper cages does not fall on the lower cages, and the cages should be arranged in a way that all laying hens can be fully observed and easily removed from their cages when necessary.

The cage opening should be large enough to allow removal of a laying hen without injury.

[Actions recommended for future implementation]

None

(2) Floor rearing system

The floor rearing system is a method of rearing laying hens in a way that laying hens can freely move on the floor or the ground in the poultry house or outdoors. As a type of floor rearing system, there is a multi-tier rearing system (aviary), which has a resting area with perches, a laying area with nest boxes, and an exercise area where laying hens can engage in dust bathing.

[Actions recommended for implementation]

In order to prevent fighting behavior, more gentle and docile strains should be selected depending on the situation, and management methods, such as expansion of rearing space, separation of injured hens and pecking hens (injured laying hens should be treated or euthanized), reduction of light intensity, adjustment of feed form (refinement), and provision of ancillary equipment (e.g., high perches, nesting areas, foraging materials) should be carried out. Partial beak removal should be used as a final measure if these measures do not prevent fighting behavior.

In order to provide and maintain a good rearing environment, the air environment (e.g., temperature and humidity) in the poultry house should be monitored and properly ventilated, especially in winter when the ventilation volume decreases. In addition, care should be taken to prevent the occurrence of coccidiosis and other parasitic diseases, by properly managing manure, such as changing litter frequently.

[Actions recommended for future implementation]

None

2. Structure, floor, and substrate

The structures of facilities for housing laying hens should ensure that laying hens will not be injured by protrusions and should be easy to clean, disinfect, and replace.

It is necessary to make the facilities comfortable and safe for laying hens by making the floor a slat structure or by providing a slat area, which allows speedy and efficient separation of manure from the living area of the laying hens and the floor to be kept dry.

[Actions recommended for implementation]

Facilities for housing laying hens should be constructed in a way that there are no protrusions which may cause injuries, and the flooring should be easy to clean and disinfect. The slope, design, and construction of the floors should provide adequate support for laying hens, prevent injuries and entrapments, promote good health, and allow comfort and locomotory behaviors.

When changing the poultry house according to the developmental stage, changes of flooring types should be avoided.

Manure contamination within a poultry house should be minimized through appropriate floor design, the design of the rearing system, and other elements.

Inspection of the floor for any damaged parts that could injure the legs of laying hens should be conducted. If the floor has a slat structure, the width should be such that laying hens can always grab at least two vertical and horizontal lines.

When substrate is provided, it should allow the performance of behaviors, such as comfort and locomotory behaviors and be managed to remain dry and friable, and adequately treated or replaced when required to prevent disease and minimize any detrimental effects on animal welfare.

[Actions recommended for future implementation]

None

3. Space allowance

Since the required rearing space varies depending on factors such as the breed, strain, and weight of laying hens, the structure of the poultry house, ventilation conditions, rearing system, and number of laying hens per flock, it is difficult to uniformly mention the appropriate level of space required. What is important is that managers or handlers observe the laying hens carefully and determine whether the rearing space is appropriate. When the space is overcrowded, it can be stressful for laying hens, leading to abnormal behaviors including feather pecking, disease, fighting, and injuries.

[Actions recommended for implementation]

Appropriate space should be provided to all laying hens for comfort and socialization.

If abnormal behaviors are observed, corrective measures such as increase of rearing space should be taken. Areas that are not suitable for resting, such as those with excessive water and manure accumulation, should not be included in the areas available to laying hens.

Laying hens should be housed with a space allowance that allows them to have adequate access to resources and to adopt normal postures. The rearing space should be managed in consideration of various spaces for resting, feeding, and drinking, and to avoid the adverse effects on normal behavior and resting due to close confinement.

When determining the space allowance, the following factors should be considered; age and weight of laying hens, ambient conditions, biosecurity strategy, equipment selection, feed and watering systems, flooring substrate, genetic characteristics of laying hen breeds and strains, housing design, management capabilities, production system, available space, and ventilation capacity.

[Actions recommended for future implementation]

Providing sufficient space for the expression of locomotory and comfort behaviors that contribute to good musculoskeletal health and plumage condition is desirable.

4. Ancillary equipment

Ancillary equipment includes dust bathing areas, foraging areas, nesting areas, and perches.

[Actions recommended for implementation]

None

[Actions recommended for future implementation]

Access to friable, dry substrate to encourage dust bathing is desirable. When provided, dust bathing areas should be designed and positioned to encourage dust bathing, allow synchronized behavior, prevent undue competition, and not cause damage or injuries. Dust bathing areas should be easy to inspect and maintain.

Access to substrate that encourages foraging behavior is desirable. When provided, foraging areas should be designed and positioned to encourage synchronized behavior, prevent undue competition, and not cause damage or injuries. Foraging areas should be easy to inspect and maintain.

Access to nesting areas is desirable. When provided, nesting areas should be built of suitable materials, and designed and positioned to encourage nesting, prevent undue competition, and not cause damage or injuries. Nesting areas should be easy to inspect, clean, and maintain.

Access to perches is desirable. When provided, perches should be built of suitable materials, designed, elevated, and positioned to encourage perching by all laying hens, prevent undue competition, minimize keel bone deformation, foot problems, or other injuries, and to ensure stability during perching. In the absence of perches, other structures that are perceived as elevated by laying hens and do not cause damage or injuries (e.g., platforms, grids, and slats) may be suitable alternatives. When provided, perches or their alternatives should be made available from an early age, be easy to clean and maintain, and be positioned to minimize contamination by manure.

Section 5. Environment of poultry houses

1. Thermal environment

The comfortable temperature range for laying hens depends on their developmental stage and other factors.

The optimum temperature range for adult laying hens is about 15 to 25°C. Since the comfort of laying hens is affected by environmental factors such as temperature, humidity, wind, ventilation method, floor structure, radiant heat, and stocking density, it is important to observe the laying hens carefully and maintain their comfort level.

When it is too hot for laying hens, there is a decrease in feed intake, panting, a significant decrease in egg production rate, and the action of spreading wings. Conversely, when it is too cold, there is huddling, an increase in feed intake, feather ruffling, rigidity, and shivering. Sudden temperature changes may cause heat and cold stress.

In particular, it is important to prevent heat stress in summer, as laying hens do not have sweat glands and thermoregulatory functions through sweating, and their body temperature is high at 40°C or more and their whole body is covered with feathers. In husbandry guidelines published by breeding hen companies, heat index or other information that is useful for understanding the appropriate thermal environment for the concerned breed may be provided.

[Actions recommended for implementation]

Since laying hens do not have sweat glands and a thermoregulatory function through sweating, and their body temperature is high at 40°C or higher and their entire body is covered with feathers, managers and handlers should understand the risks posed by heat stress in summer and the temperature and humidity for which measures are required. They should observe laying hens carefully to maintain the comfort, for example, when the temperature is abnormally high, measures should be taken to control the temperature rise in the poultry house. At this time, the thermal conditions should be maintained within a range that is appropriate for their stage of life and the genetics used by taking appropriate measures such as insulation materials, opening and closing of windows, ventilation, aeration, and adjustment of stocking density, so as to avoid extreme heat, humidity, and cold.

When the environment is too hot for laying hens and there is a decrease in feed intake, panting, a significant decrease in egg production rate, or the action of spreading wings, appropriate measures, such as spraying water around the poultry house, installing cooling pads (heat protection equipment using water evaporation), and introducing a fine-mist system, should be taken. When introducing a fine-mist system, care should be taken to maintain appropriate humidity and floor surface conditions.

When the environment is too cold for laying hens and behaviors such as feather ruffling appear, appropriate measures, such as preventing drafts, installing cold-proof curtains around the poultry house, and providing auxiliary heat sources including mobile hot air heaters, should be taken.

The thermal environment should be monitored regularly so that problems with the system can be detected and corrected before they cause an animal welfare problem.

[Actions recommended for future implementation]

None

2. Ventilation

Maintaining good air quality in the poultry house and providing adequate ventilation are important for the health and welfare of laying hens. Since laying hens have a high oxygen demand for their body size, they are effective in reducing discomfort and the risk of disease among laying hens.

The air composition is influenced by stocking density, flooring, substrate, manure management, poultry house design, and ventilation systems.

In order to provide a constant supply of fresh air and keep the comfortable environment for laying hens, adequate ventilation should be provided to remove ammonia, hydrogen sulfide, carbon dioxide, dust and moisture generated in the poultry house to the outdoors. It should also be noted that ventilation during hot weather has the effect of discharging heat in the poultry house and helping the body heat dissipate by using the wind from ventilation fans, and it is not solely intended to blow air directly to the bodies of the laying hens.

In particular, inadequate ventilation leading to the retention of ammonia and other substances in the poultry house poses risks not only to the laying hens but also to human health by causing damage to the respiratory and other organs. Since ammonia is generated from manure of laying hens, the amount and concentration of ammonia generated vary greatly depending on the ventilation system and the manure treatment conditions.

[Actions recommended for implementation]

The ventilation system should be designed to provide a constant supply of fresh air throughout the poultry house.

Ammonia concentration should not routinely exceed 25 ppm at laying hen level, at which managers and others working in the poultry house experience unpleasant odors, and the dust level should be kept to a minimum through constant supply of fresh air and thorough ventilation and manure removal.

If an automatic ventilation system is used, an appropriate backup power source (emergency generator) and an alarm system should be provided.

[Actions recommended for future implementation]

None

3. Lighting

The poultry house should be provided with appropriate lighting equipment as necessary to ensure that the light is bright enough for laying hens to perform natural behaviors such as feed and water intake, and bright enough for managers and handlers to observe and manage the condition of laying hens and check the operation of management equipment.

Since laying hens are long-day animals and their secretion of gonadotropins and other hormones is affected by changes in day length, light management (manipulation of lighting hours) is an important technique for controlling sexual maturation and preventing molting of chicks born in early spring.

[Actions recommended for implementation]

Appropriate lighting equipment should be provided to enable laying hens to perform natural behaviors such as intake of feed and water, and managers or handlers to perform daily work without hindrance.

In light management, there should be an adequate period of continuous light in the poultry house. The light intensity during the light period should be sufficient and homogeneously distributed to promote normal development, to allow laying hens to find feed and water, to stimulate activity, to stimulate onset of lay, to minimize the likelihood of injurious feather pecking and cannibalism, and to allow adequate inspection. When there are light and dark areas in the poultry house due to lighting or natural light, it may cause crowding of laying hens in one place or feather pecking. Therefore, attention should be paid to the location and intensity of the lighting.

When light management is performed, changes in lighting should occur gradually or in a step-wise fashion, as needed, except if molting is practiced, during which rapid adjustments to lighting should be considered.

There should also be an adequate period of darkness during each 24-hour cycle to allow laying hens to rest and sleep, to reduce stress and promote circadian rhythms.

[Actions recommended for future implementation]

None

4. Noise

Excessive or sudden noise may surprise laying hens, causing accidents such as broken bones, egg drop, and crushing death. In addition, laying hens may feel anxious or fearful and may not be able to rest or sleep normally, resulting in stress. Where possible, poultry houses should be placed taking into account the surrounding noise sources.

[Actions recommended for implementation]

Ventilation fans, machinery, and other indoor or outdoor equipment should be constructed, placed, operated, and maintained in such a way as to cause the least possible amount of noise.

Exposure of laying hens to unfamiliar, sudden, and unexpected loud noises, including those made by humans, should, where possible, be minimized to prevent stress and fear reactions such as piling up.

The location of establishments should, where possible, consider existing local sources of noise.

Strategies should be implemented to acclimatize laying hens to the conditions.

[Actions recommended for future implementation]

None

Section 6. Confirmation of the situation related to animal welfare

1. Confirmation of animal welfare status

It is important to confirm and record the current management of laying hens in order to address the concept of animal welfare appropriately.

2. Inspection and management of equipment

If automated equipment for feeding, watering, ventilation, defecation, etc. is installed, its failure could negatively affect the health of laying hens and the rearing environment, and it should be appropriately maintained and managed.

[Actions recommended for implementation]

All facilities should be constructed, maintained, and managed to minimize the risk to the welfare of laying hens.

The equipment should also be inspected at least once a day to ensure proper operation, considering the frequency recommended by the equipment manufacturers. If a fault is found, it should be repaired promptly.

[Actions recommended for future implementation]

None

3. Emergency response

Outages of the electricity, water, and feed supply systems may compromise animal welfare. Therefore, to respond to emergencies such as fires on the farm, flooding, power outages, water outage due to natural disasters, and feed supply disruptions due to road conditions, and to prevent adverse effects on the health of laying hens and their rearing environment, each farm should take measures such as obtaining contact information of main service providers, considering stockpile of feed and fuel, water intake methods, and developing their own power generators for ventilation, feeding and other equipment, and alternative systems.

[Actions recommended for implementation]

To address the failure of electricity, water, and feed supply systems, as well as to minimize and mitigate the effects of natural disasters or extreme climatic conditions (e.g., earthquakes, fires, droughts, floods, blizzards, typhoons, and high temperature stress), managers and handlers should have contingency plans to cover the failure of these systems by being familiar with them, and share them with all relevant parties, rather than to deal with the consequences of the disaster. The contingency plan or the crisis management manual should be consistent with the farm animal hygiene measures of national and prefectural Veterinary Services, and include matters related to the following: euthanasia procedures for sick or injured laying hens; evacuation procedures; maintenance and testing of backup generators and fail-safe alarm devices to detect malfunctions; access to maintenance providers; alternative heating or cooling arrangements; ability to store water on farm; access to water cartage services; adequate on-farm storage of feed; alternative feed supply; a plan for

managing ventilation emergencies; and farm-wide management in the event of emergency disease outbreaks.

In case of feed shortage due to drought or other reasons, managers and handlers should take measures to minimize the reduction period of feed supply and to mitigate the risk of damage to the health and welfare of laying hens. The measures including consideration of reducing the number of laying hens should be carried out as soon as possible.

When reducing the number of laying hens to prevent starvation, methods such as relocation, sale, slaughter, and euthanasia should be taken.

Backup systems such as alarms and generators should be checked periodically, considering the frequency recommended by the equipment manufacturers.

If there is a risk of damage to laying hens or poultry houses as a result of natural disasters preventive measures should be taken in advance whenever possible. Among the advance measures, the evacuation plans should include feasible actions, such as moving laying hens to lower-risk areas on the farm site. In addition, measures to prevent the spread of damage should be implemented after the weather conditions have recovered.

[Actions recommended for future implementation]

None

Section 7. Criteria or measurables of the welfare of laying hens

The welfare of laying hens should be assessed using outcome-based criteria or measurables, preferably animal-based measurables. Outcome-based criteria or measurables are particularly useful for evaluating compliance and improving animal welfare. Animal-based outcomes are usually the most sensitive measurables.

Criteria (or measurables) that can be used at farm level include conditions such as skeletal and foot problems, disease and infection or infestation, and can be assessed routine or targeted monitoring, or at depopulation. It is recommended that target values or thresholds for animal welfare measurables be determined by taking into account current scientific knowledge and appropriate national, sectoral, or regional data and recommendations for laying hens.

Determining the age and stage of production at which problems are detected may help to determine the cause.

The following animal-based and outcome-based measurables may be useful indicators of welfare of laying hens.

[Actions recommended for implementation]

The welfare of laying hens should be assessed using outcome-based criteria or measurables, preferably animal-based measurables.

The use of measurables and the appropriate thresholds should be adapted to the different production systems and situations in which laying hens are kept, also taking into account the genetics used, resources provided, and the design and management of the system.

The suitability of the measurables should be determined in accordance with the system in which laying hens are housed.

1. Beak condition

Evaluation of beak condition provides useful information about the extent to which laying hens are able to engage in normal behaviors such as foraging, feeding, drinking, and preening. Tools for assessing the beak condition have been developed and implemented in animal welfare assessment programs.

2. Behavior

The presence or absence of certain behaviors may indicate either good animal welfare or animal welfare problem such as fear, pain, or sickness. Some behaviors may not be uniquely indicative of one type of problem; they may be exhibited for a variety of reasons. Laying hens have evolved behaviors that they are motivated to perform, and a good understanding of normal behaviors, including their social interactions among laying hens, is required for appropriate management and decision-making. Opportunities to display these behaviors are influenced by the physical and social environment.

(1) Dust bathing

Dust bathing is a motivated behavior providing body maintenance benefits. During dust bathing, laying hens work loose substrate material, such as litter, through their feathers. This behavior helps remove stale lipids, which contributes to the maintenance of plumage. Good plumage condition helps to maintain body temperature and protect against skin injury. Reduced dust bathing behavior in the flock may indicate problems with substrate or range quality, such as the substrate or ground being wet or not friable. The performance of complete sequences of dust bathing may be associated with positive affect.

(2) Fear behavior

Fearful laying hens are highly reactive to various stimuli, and this may result in traumatic injuries or suffocation if they pile on top of one another. In addition, fearful laying hens may be less productive, and more prone to injurious feather pecking behavior. Methods have been developed for evaluating fearfulness, for example, by observing laying hens' behavior in response to novel objects or when people, including managers, walk through the laying hen areas of the poultry house.

(3) Feeding and drinking behavior

Changes in feeding or drinking behavior may indicate management problems, including inadequate spaces for, or inappropriate placement of feeders or drinkers, dietary imbalance, poor feed and water quality, or feed contamination. Feed and water intake is often reduced when laying hens are ill. Feed or water intake may also change as a result of heat stress or cold stress.

(4) Foraging behavior

Foraging is a motivated behavior. Foraging is the act of searching for feed, typically by pecking or scratching the substrate. Reduced foraging activity may suggest problems with the substrate quality or the presence of conditions that decrease foraging opportunity. When in the presence of an adequate substrate, laying hens spend a large amount of time foraging even when feed is readily accessible.

(5) Injurious feather pecking and cannibalism

Injurious feather pecking can result in significant feather loss and may lead to cannibalism. Cannibalism is the tearing of the flesh of another laying hen, and may result in severe injury, secondary infection, or death. These behaviors can have multifactorial causes and be difficult to control.

(6) Locomotory and comfort behaviors

Laying hens may display a variety of locomotory and comfort behaviors, including walking, running, leaping, turning, stretching legs and wings, wing flapping, feather ruffling, tail wagging, and preening. Some of these behaviors have been shown to be important for skeleton, body, and plumage development and maintenance. For example, walking and wing movements contribute to improved leg and wing bones strength, and preening helps remove stale lipids from the skin and keeps the feathers flexible and intact.

(7) Nesting

Nesting is a motivated behavior that includes nest site selection, nest formation, and egg laying. Uneven nest box utilization, delayed oviposition, increased pacing, and egg laying outside the nest may be indicative of problems with environmental or social factors, such as access to, or the suitability of nesting sites or disturbance by other laying hens.

(8) Perching

Perching is a motivated behavior. Laying hens may seek elevation during the day; however, the motivation to seek elevation is particularly strong at night when laying hens select a site for resting or sleeping. Reduced perching behavior in the flock may indicate problems with environmental factors, such as inadequate perch or poor space design, injuries or rearing experience.

(9) Resting and sleeping

Sleep is an adaptive state that allows laying hens to recover from daily stress, conserve energy, and consolidate memory. Laying hens display synchronized resting and sleeping behaviors, which can be disrupted by light intensity, photoperiod, and environmental or social factors.

(10) Social behavior

Laying hens are social and engage in synchronized behavior. Social behavior may differ according to the characteristics of the social environment. Problems in social behavior can be assessed using scoring systems for measuring the degree of damage caused by aggression and competition for resources.

(11) Spatial distribution

Uneven spatial distribution of laying hens may indicate fear reactions, thermal discomfort, or uneven availability or use of resources such as light, feed or water, shelter, nesting areas, or comfortable resting locations.

(12) Thermoregulatory behavior

Prolonged or excessive panting and wing spreading are observed during heat stress. Indicators of cold stress include feather ruffling, rigid posture, trembling, huddling, and distress vocalizations.

(13) Vocalization

Vocalization may indicate emotional states, both positive and negative. A good understanding of flock vocalizations and their causes is useful for good flock management.

3. Body Condition

Poor body condition may indicate animal welfare problems for individual laying hens. At flock level, uneven body condition may be an indicator of poor animal welfare . Body condition can be evaluated using on-farm sampling methods for body weight or

body condition scores. The choice of sampling methods should take into account the fact that feather cover can mask actual body condition.

4. Eye condition

Conjunctivitis may indicate disease or the presence of irritants such as dust and ammonia. High ammonia levels may also cause corneal burns and eventual blindness. Abnormal eye development may be associated with very low light intensity (< 5 lux).

5. Foot problems

Hyperkeratosis, bumblefoot, contact dermatitis, excessive claw growth, broken claws, and toe injuries are painful conditions associated with, amongst other things, inappropriate flooring, poorly designed perches, poorly maintained substrate, and inadequate maintenance of the production system. If severe, foot and hock problems may contribute to locomotion problems and lead to secondary infections. Scoring systems for foot problems have been developed.

6. Incidence of diseases, including infectious, infestations, and metabolic disorders

Ill-health, regardless of the cause, is an animal welfare concern and may be exacerbated by poor environmental or husbandry management.

7. Injury rate and severity

Injuries are associated with pain and risk of infection. They may be consequence of the actions of other laying hens (e.g., scratches, feather loss, or wounding), management (e.g., nutritional deficits leading to skeletal problems), genetics used, equipment, environmental conditions (e.g., poor flooring leading to foot injury), or human intervention (e.g., during handling catching). It is important to assess both the rate and severity of injuries.

8. Mortality, culling, and morbidity rates

Daily, weekly, and cumulative mortality, culling, and morbidity rates should be within expected ranges. Any unforeseen increase in these rates may reflect an animal welfare problem. Recording these rates and evaluating their causes can be useful aids in diagnosing and remediating animal welfare problems.

9. Performance

Daily, weekly, and cumulative performance should be within expected ranges. Any unforeseen reduction in these rates may reflect an animal welfare problem. Types of measurables that can be used include:

(1) layer pullet growth rate, which measures average daily gain of weight;

(2) layer pullet flock uniformity, which measures the range of weight in the flock;

(3) layer pullet feed conversion, which measures the quantity of feed consumed by a flock relative to the total live mass produced;

(4) laying hen feed conversion, which measures the quantity of feed consumed by a flock relative to the unit of egg production;

(5) egg production, which measures the number, size, and weight of eggs per housed laying hen; and

(6) egg quality and downgrade, which can be measured by, for example, grade percentage, shell strength, Haugh units (rise of egg white), abnormalities, and mis-laid or floor eggs.

10. Plumage condition

Evaluation of plumage condition provides useful information about aspects of animal welfare in terms of feather pecking and cannibalism, ability to thermoregulate, illness, and protection from injury. Dirty plumage may be associated with illness, environmental conditions, or the laying hen housing system. Plumage cover and cleanliness scoring systems have been developed for these purposes.

11. Water and feed consumption

Monitoring and evaluating daily water and feed consumption is a useful tool that may indicate thermal stress, disease, infection or infestation, and other conditions impacting animal welfare, taking into consideration ambient temperature, relative humidity, and other relevant factors. Changes in intake, crowding at feeders and drinkers, and wet substrate may be associated with problems with the quality or supply of water or feed.

*For more information on the measurables used to evaluate animal welfare in each section, refer to the references in Article 7. Z. 3. (pp. 94 - 97) of Annex 15 (pp. 93 - 113: Draft OIE Code submitted for adoption by the General Assembly in 2021 "Chapter 7.Z Draft Animal Welfare and Laying Hen Production Systems") of SG/12 CS 1A "Reports of the meetings of the Terrestrial Animal Health Standards Commission" at the following URL:

https://www.woah.org/en/event/88th-general-session-of-the-world-assembly-of-oie-delegates/#ui-id-3

(Connect to the WOAH website.)