



## Best Practice Hens

# Best Practices for Egg Production in non-cage systems

Pilot project to support the transition to cage-free systems for laying hens in the EU

**EUROPEAN COMMISSION**

Directorate-General for Animal Welfare

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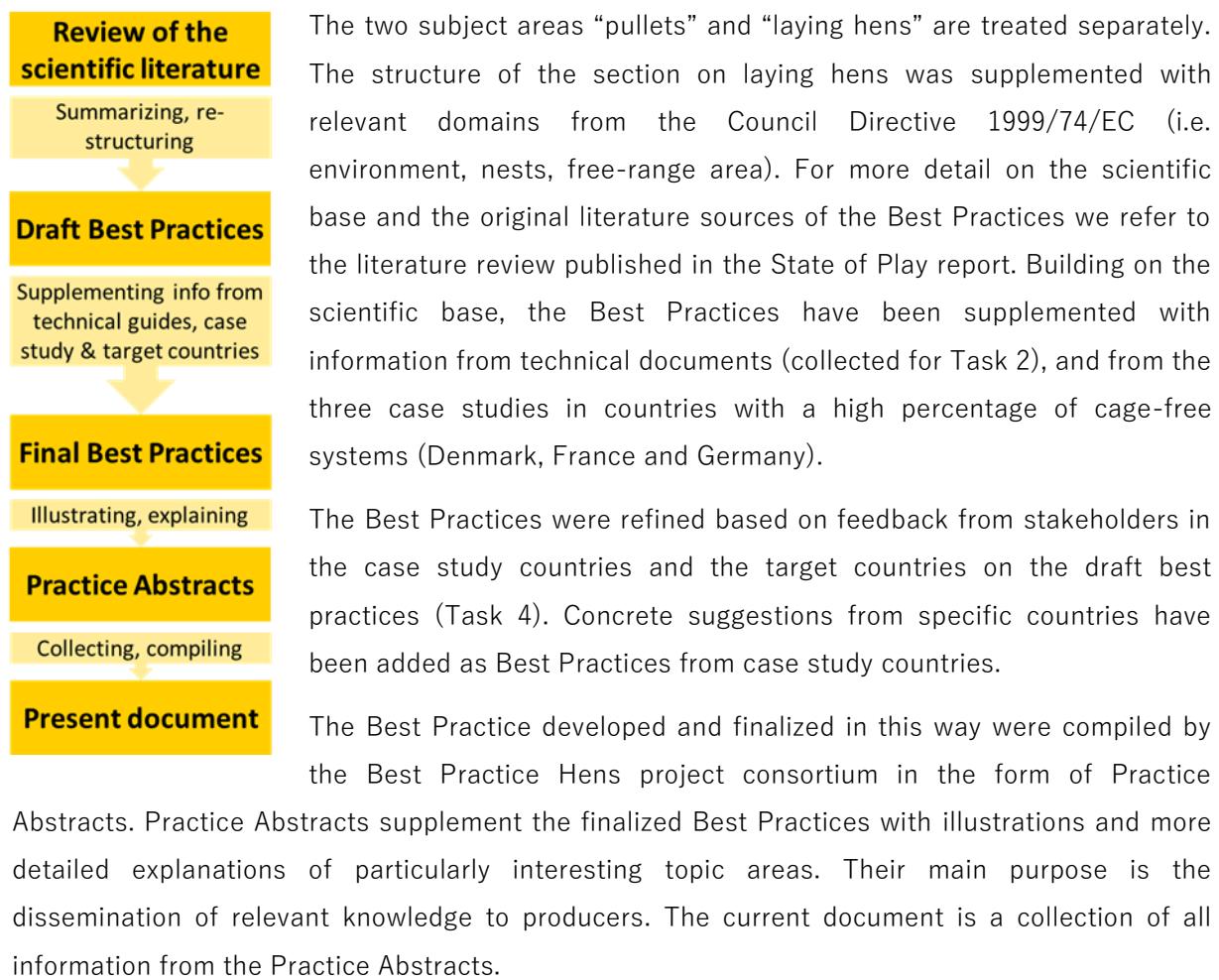
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# 1. Best practices for transitioning to higher welfare cage-free systems

Based on the scientific literature identified in Task 2 (State of Play), 68 draft Best Practices have been formulated. These draft Best Practices have been summarized, refined and restructured in analogy to the domains in the document ‘Guide on best management practice for the welfare of pullets (meant for production of eggs for human consumption)’ by the voluntary initiative group for the welfare of pullets at the EU platform on animal welfare. This structure has been chosen in order to facilitate the incorporation of the Best Practices developed here into the process of the revision of the EU animal welfare legislation.



## **Disclaimer**

This document is about Best Practices for keeping pullets and laying hens in cage-free systems. Therefore, it focuses on preventing problems and dealing with challenges which often occur in relation to these types of housing systems. This document does not address requirements for keeping animals in general. These requirements, which also apply to keeping hens in cage systems, are presumed to be known (e.g. that each animal must have daily access to fresh water or that there should be regular visits by and consultation with a specialized veterinarian). Under certain local conditions it may not be feasible to implement (all) Best Practices described in this document. Pullet and laying hen keepers are strongly encouraged to make use of additional local information sources and to seek advice from local consultants, such as veterinarians or advisors from feed or companies and housing construction companies.

## 1.1. Best Practices for pullet rearing

An overview of the Best Practices identified for pullet rearing and their domains can be found in Table 1

**Table 1.** Best Practices identified for pullet rearing with references to the draft Best Practices based on the scientific literature review.

Domain	Key words Best Practices
<b>1. Choice of rearing system</b>	Similar systems pullets – layers, resource space, bone quality, free-range access
<b>2. Choice of genetics</b>	Adaptation to system
<b>3. Training of farmer and staff</b>	Training, responsibilities
<b>4. Inspection and stockmanship</b>	Frequency of inspections, self-monitoring
<b>5. Welfare assessment</b>	Protocols, apps
<b>6. Pullet health</b>	Preventive programs, veterinary advice
<b>7. Feeding equipment and feeding</b>	Feed structure, density, methionine shortage
<b>8. Drinking equipment</b>	Height of drinker, matching equipment
<b>9. Enrichment</b>	Provision, type, dark brooders
<b>10. Litter</b>	Constant provision
<b>11. Perches</b>	Early provision, ramps
<b>12. Lighting</b>	Match with laying period, intensity
<b>13. Stocking density</b>	Limit stocking densities
<b>14. Air quality and thermal environment</b>	Brooding, ammonia, dust, CO <sub>2</sub> levels
<b>15. Beak trimming</b>	Limit where possible

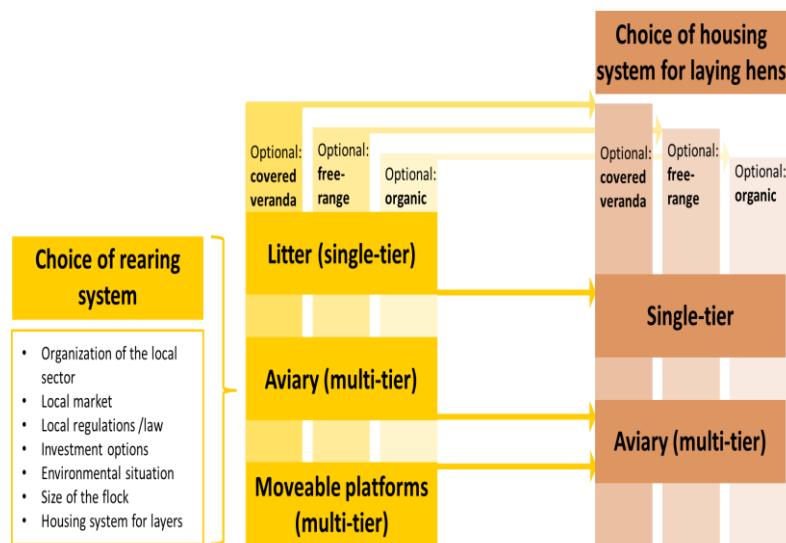
## 1.1.1. Choice of rearing system

PROBLEM	APPLICABILITY BOX
<p>A mismatch in housing systems between the rearing and the laying phase is likely to result in birds that are not well adapted to the housing system in which they will be housed at the laying farm.</p>	<p><b>Theme</b> Animal husbandry</p> <p><b>Keywords</b> Housing system, management, laying hens</p> <p><b>Context</b> Transition from rearing to laying farm</p> <p><b>Application time</b> Both during rearing and laying period</p> <p><b>Period of impact</b> Mainly during the laying period</p> <p><b>Equipment</b> Housing system design</p> <p><b>Best in</b> Barn, free range and organic systems</p> <p><b>Target audience</b> Farmers, farm advisors</p>
BENEFITS	
<p>If birds are already used to the type of housing system that they will produce in as adult laying hens, this benefits their adaptability to the system. This is especially important for birds that will be housed in multi-tier systems, as birds have to learn to navigate through this complex three-dimensional system and find the different resources (feed, water, nests, perches, litter) on the different tiers of the system.</p>	

## PRACTICAL RECOMMENDATIONS

- Birds that are destined to produce in single-tier systems, should be reared in floor housing systems or single-tier systems.
- Birds that are destined to produce in multi-tier systems, should be reared in a multi-tier system.
- Birds that are destined for free range or organic system benefit from exposure to daylight and free range access already during the rearing period.
- A transfer from the rearing farm to the laying farm before or at 17 weeks of age allow the birds to get used to the laying farm environment before the onset of egg production.
- A good communication between rearing company and laying hen farmer is essential to ensure a seamless transition from rearing farm to laying farm.
- Laying hen farmers are encouraged to visit their flock during rearing. At least once is strongly recommended, but multiple times is preferable.

Overview of factors influencing the choice of a particular rearing system for pullets. Pullets should be housed in a system similar to that in the later laying phase to facilitate adequate adaptation.



## ON-FARM APPLICATION

Laying hen farmers are strongly encouraged to discuss the topic of the similarity of the rearing system to the laying system with their rearing company.



Pullet flock in floor housing system.

#### FURTHER INFORMATION

- Video Laying Hen Welfare Forum <https://www.humphreyfeedsandpullets.co.uk/poultry-performance-centre/the-importance-of-a-seamless-transition-for-a-pullet-between-the-rearing-and-laying-houses>
- Guide on the Best Management Practices for the welfare of pullets (2021) [https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi x1O-R0Kn-AhUMgf0HHcXiAVEQFnoECEoQAQ&url=https%3A%2F%2Ffood.ec.europa.eu%2Fsystem%2Ffiles%2F2021-06%2Faw\\_platform\\_plat-conc\\_guide-welfare-pullets\\_0.pdf&usg=AOvVaw0ynO22iNHB2d2KS1Pm0yuf](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi x1O-R0Kn-AhUMgf0HHcXiAVEQFnoECEoQAQ&url=https%3A%2F%2Ffood.ec.europa.eu%2Fsystem%2Ffiles%2F2021-06%2Faw_platform_plat-conc_guide-welfare-pullets_0.pdf&usg=AOvVaw0ynO22iNHB2d2KS1Pm0yuf)
- Janczak, A. M. and A. B. Riber (2015). "Review of rearing-related factors affecting the welfare of laying hens." *Poultry Science*.



### 1.1.2. Choice of genetics

PROBLEM	APPLICABILITY BOX
Various brown and white commercial layer hybrids can show large differences in performance and behaviour in cage-free systems. The freedom of choice of the farmer is often limited by consumer demands regarding egg colour (brown or white eggs) or egg size.	<b>Theme</b> Genetics <b>Keywords</b> Genetics, breeding, behaviour, performance <b>Context</b> Transition to and operating cage-free housing systems for laying hens <b>Application time</b> All year round <b>Required time</b> Time needed to make an informed choice <b>Period of impact</b> Rearing period, laying period <b>Best in</b> All cage-free housing systems for laying hens: barn, free range, and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
To promote high levels of welfare in pullets and laying hens, genetic hybrids adapted to cage-free housing systems should be reared. Contact your breeding company/chick provider for more detailed advice on genetics.	
BENEFITS	
A genetic hybrid well-adapted to the cage-free system will show a good use of the three-dimensional housing environment, will respond calmly to humans walking through the flock and will not show feather pecking or cannibalistic pecking towards group mates. Furthermore, it will show an excellent technical performance, that corresponds with the management guide provided by the breeding company.	

## PRACTICAL RECOMMENDATIONS

Some general behavioural differences between brown and white hybrids are listed below. These may be considered when choosing the hybrid for your system. Please be advised that within brown and white hybrids, large differences may exist in performance and behaviour of the specific breeds. It is advised to contact your local breeding company or rearing company for more specific advice.

	Brown hybrids	White hybrids
<b>Egg colour (egg shell)</b>	Brown	White
<b>Ability to navigate in three-dimensional space</b>	Moderate	Very good
<b>Flightiness / docility</b>	Docile birds, not flighty	Flighty birds
<b>Response to humans</b>	Approach / stay in place	Avoid / fly up
<b>Distance between birds</b>	Small, tendency to flock together	Large, tendency to disperse



Brown flock. Source: Best Practice Hens.

## ON-FARM APPLICATION

### Evaluation

- Keep records of daily flock inspection and flock performance.
- Evaluate the records together with your breeding company/chick supplier.
- Decide whether you want to stay with the present hybrid strain or whether you want to house a different hybrid strain for the next flock.



White flock. Source: Fair Poultry.

## FURTHER INFORMATION

Hy-Line Brown Alternative Systems Management Guide (2021) <https://www.hyline.com/filesimages/Hy-Line-Products/Hy-Line-Product-PDFs/Brown/Brown%20Alt/BRN%20ALT%20COM%20ENG.pdf>

ISA Management Guide – Alternative production environments (2020) <https://cpif.org/wp-content/uploads/2014/04/ISA-Alternative-Productions-Management-Guide-copy.pdf>

Lohmann Breeders - Management Guide Alternative Systems – Management Recommendations for Barn, Aviary & Free-Range Systems: [https://lohmann-breeders.com/media/2022/06/LB\\_eMG\\_Alternative-Haltung\\_Printversion\\_EN\\_06.21\\_V01-21\\_high.pdf](https://lohmann-breeders.com/media/2022/06/LB_eMG_Alternative-Haltung_Printversion_EN_06.21_V01-21_high.pdf)



### 1.1.3. Training of farmer and staff

PROBLEM	APPLICABILITY BOX
<p>The care for pullets and laying hens in cage-free housing systems places high demands on farmers and staff. Caretakers who have only experience with managing hens in cages are often not sufficiently trained for this new task. Therefore, problems may arise particularly during the transition phase from cages to cage-free systems.</p>	<p><b>Theme</b> Training of farmer and staff, animal husbandry</p> <p><b>Keywords</b> Farmer, personnel, caretaker, education, laying hens, and pullets.</p> <p><b>Context</b> Transition to and operating cage-free housing systems for pullets and laying hens</p> <p><b>Best in</b> All cage-free housing systems (barn, free-range, organic production) for pullets and laying hens</p> <p><b>Target audience</b> Farmers, farm advisors, policy makers</p>
SOLUTION	
<p>Farmers and staff having the daily responsibility for pullets and laying hens in cage-free systems need to receive appropriate training, tailored to the specific cage-free system and adapted to the context of the farmer.</p>	
BENEFITS	
<p>Competent handling and management of hens in cage-free systems improve production performance, animal health and welfare. This leads to economic benefits and job satisfaction.</p>	

#### PRACTICAL RECOMMENDATIONS

Farmers need to ensure that they and their staff, who have the daily responsibility for the pullets and laying hens in cage-free housing systems, have the necessary knowledge and skills in good management procedures regarding these systems. They need to have a proper understanding of the welfare, including the health and the behaviour, of pullets and laying hens. These skills can be acquired and maintained by appropriate training, tailored to the cage-free housing system in place (barn, free-range, organic production).

Training should cover the following aspects:

- How to comply with relevant legislation
- How to recognize normal and positive behaviour and signs of good health
- How to recognize abnormal behaviour and signs of disease
- How to quickly take effective corrective measures
- How to seek additional help from experts (e.g. veterinarian, feed advisor) if necessary



Veterinarian training the Caretakers. Source: Fair Poultry.

## ON-FARM APPLICATION

### System approach

- Depending on the local situation, adequate trainings are offered by chambers of agriculture, integrations, breeding- and barn equipment companies, farmers' associations and others. Contact these local organizations for more information.

### Evaluation

- Farmers should keep records of their own training and staff training.
- Make sure everyone is up-to-date trained.



### 1.1.4. Inspection and stockmanship

PROBLEM	APPLICABILITY BOX
Frequent inspection of pullets is not always performed, possibly resulting in welfare issues and significant production losses. This situation can be worsened during the transition phase from cages to cage-free housing systems.	<b>Theme</b> Animal husbandry <b>Keywords</b> Welfare, health, production, pullets <b>Context</b> Transition to and operating cage-free housing systems for pullets <b>Application time</b> Daily <b>Best in</b> All cage-free housing systems: barn, free-range and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
Frequent and regular inspections can detect problems at an early stage and prevent welfare problems.	
BENEFITS	
Apart from preventing welfare problems, frequent inspections also make the pullets more used to humans, resulting in less frequent panic reactions.	

Check the litter for feathers, which is a good sign (no intestinal problems or feather pecking present). Source: WUR.



## PRACTICAL RECOMMENDATIONS

Daily inspections should be performed by walking slowly through the house. To prevent fear responses, knock on the door before entering the house so the pullets know someone is coming. Walk slowly through the aisles, frequently pausing to give the pullets the time to walk away. Check water lines to see if water is available. Check feeders to see if feed is available. Check for sick and dead birds on the slatted floors and litter. In multi-tier systems, check the upper levels of the systems as well. Check perches for the presence of red mites. Listen to the birds, they should produce calm sounds. Alarm sounds or screams may be an indication of injurious pecking behaviour.

Special attention is needed on specific moments: directly after arrival of chicks, feed and water should be easily accessible, and room temperature should be high enough to comfort the chicks. This is especially important for chicks that are beak trimmed, as they may experience discomfort due to the treatment and therefore may be reluctant to feed or drink. After each batch of vaccinations, special checks should be done to monitor the health of the birds. Supply the pullets with roughage to keep them busy, preventing injurious pecking behaviour. Pecking stones also serve as occupation and blunt beaks of chicks in case of intact beaks. Check the litter for the presence of feathers. Because of moulting, there should be feathers in the litter. Pullets may start eating feathers, which can be an indication of intestinal problems or the onset of feather pecking.



Providing pecking stones and roughage in buckets or nets give pullets occupation, preventing the start of feather pecking. Source: WUR

## ON-FARM APPLICATION

### System approach

- Train the staff to ensure they are familiar with the daily routine and checklist.

## FURTHER INFORMATION

**Checklist example:** <https://bestpracticehens.eu/wp-content/uploads/2022/10/Checklist-daily-house-inspection-Pullets-EN.pdf>



### 1.1.5. Welfare assessment

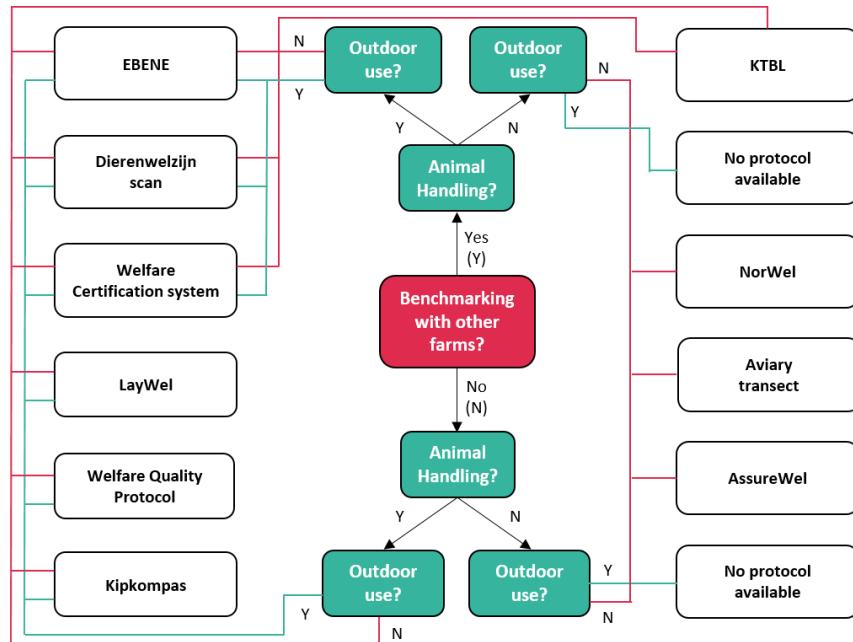
## How to decide which protocol to use for assessing the welfare of laying hens in cage-free systems?

PROBLEM	APPLICABILITY BOX
The current pullet and laying hen welfare assessment protocols used in the EU each have their own focus, duration, and application, making it hard to choose the protocol that best meets the expectations and limitations of the user.	<b>Theme</b> Animal husbandry <b>Keywords</b> Welfare assessment, laying hens, pullets, protocols, decision tree <b>Context</b> Transition to and operating cage-free housing systems for laying hens <b>Required time</b> Depending on protocol, number of flocks and outdoor option <b>Period of impact</b> After completion of the protocol <b>Equipment</b> Paper and pen or app compatible devices (if applicable) <b>Best in</b> Pullet rearing, laying phase; all cage-free housing systems: barn, free-range and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
A decision tree, based on three main practical considerations, helps the user choose the most appropriate method in line with particular goals, expectations and limitations.	
BENEFITS	
User satisfaction and quality of the outcomes depend to a large extent on applying the laying hen welfare assessment protocol which is most appropriate to the individual farm or organization unit.	
PRACTICAL RECOMMENDATIONS	
The decision tree uses branches to select one (or more) welfare assessment protocols that best suit the user's needs (Figure 1):	

1. **Has the user the intention to compare results with other farms?** Benchmarking is useful to obtain an insight in one's own farm status with other comparable (anonymous) farms. By choosing 'yes', only benchmarking protocols will be listed.

2. **Is the user prepared to handle animals for physical inspection?** Most tools require animal handling and most options will be listed if this option is chosen.
3. **Include outdoor use indicators in the assessment?** Protocols with specific parameters will be proposed if the user is interested in using outdoor ranges (e.g. free-range, organic systems or covered veranda).

.....  
Decision tree laying hen welfare assessment protocols. The tree starts with 'Benchmarking' (central red square).



## ON-FARM APPLICATION

- The decision tree is available to any farmer or stakeholder involved with the welfare assessment of laying hens or pullets.

## FURTHER INFORMATION

- Assurewel: <http://www.assurewel.org/>
- Aviary transect (coming soon)
- Dierenwelzijnscan: <https://www.dierenwelzijnscan.be/>
- EBENE: <https://organic-farmknowledge.org/tool/39330>
- Kipkompas: [www.fairpoultry.com](http://www.fairpoultry.com)
- KTBL: <https://www.ktbl.de/themen/tierschutzindikatoren-junghennen>
- LayWel: <https://www.laywel.eu/>
- NorWel method (coming soon)
- Welfare Certification system: <http://www.animalwelfair.com/es/>
- Welfare Quality Protocol: <http://www.welfarequalitynetwork.net/en-us/reports/assessment-protocols>



## 1.1.6. Pullet health: post-vaccination reactions

PROBLEM	APPLICABILITY BOX
<p>Due to the high amount of vaccines given during the pullet phase, post-vaccination reactions can be expected. If hens are given outdoor access, risks of infections are higher, and more vaccines are often necessary.</p>	<p><b>Theme</b> Animal husbandry</p> <p><b>Keywords</b> Animal health and welfare, Vaccinations, Post-vaccination reaction, rearing phase</p> <p><b>Context</b> Transition to and operating cage-free housing systems for pullets</p> <p><b>Application time</b> Year-round</p> <p><b>Period of impact</b> Pullet phase</p> <p><b>Equipment</b> Vaccination equipment</p> <p><b>Best in</b> All cage-free housing systems: barn, free-range and organic production</p> <p><b>Target audience</b> Farmers, farm advisors</p>
SOLUTION	
<p>Carefully schedule and balance the vaccination program. There should be at least 2 weeks between two vaccinations targeting the same organ. Furthermore, the program can contain additional inactivated vaccines for hens with outdoor access. These vaccines have a greater chance to cause post-vaccination reactions due to the adjuvants that are included.</p>	
BENEFITS	
<p>Maximizing vaccination protection with a minimum of post-vaccination reactions.</p>	
PRACTICAL RECOMMENDATIONS	
<ol style="list-style-type: none"><li>1. Vaccines need to be applied according to the manufacturer's guidelines to prevent post-vaccination reactions and reach a maximum immunological effect.</li><li>2. After vaccination, possible adverse side-effects should be checked by examining the flock and individual birds. The time-interval after vaccination depends on the type of vaccine and its application method.</li></ol>	



A: Spray Birchmeyer. Source: Fair Poultry

B: Vaccines applied by spray or eye-drop target the respiratory tract and spread through the flock. Source: Fair Poultry  
C: Injectable vaccines provide individual protection and do not spread through the flock. Source: Fair Poultry

## ON-FARM APPLICATION

### System approach

- Vaccination programs for pullets in cage-free housing systems contain several basic live and inactivated vaccines. Additionally, depending on the country, housing system (free-range: yes or no) and the disease history on the farm (and region), the program can be adapted (read: tailor-made). In practice, this means that more vaccination is added instead of being removed. More vaccines equal more stress for the hen and her immune system. To reduce the impact of these vaccinations, the programs need to be set up by a specialist.
- The flock should be visited: during vaccination to check proper vaccine application, and 5-7 days after vaccination, to evaluate possible adverse post-vaccination reactions through inspection and for checking vaccine efficacy by sample taking.
- Post-vaccination reactions can be evaluated both qualitatively (inspection) and quantitatively, although the latter is more difficult due to the lack of a uniform and objective scoring system.

## FURTHER INFORMATION

J.J. (Sjaak) de Wit and Enrique Montiel (2022). Practical aspects of poultry vaccination. In: Avian Immunology 2022, Pages 469-488. ISBN 978-0-12-818708-1.

<https://www.thepoultrysite.com/articles/pullet-vaccination-theres-always-room-for-improvement-2>

<https://www.poultryworld.net/home/vaccine-reactions-in-poultry-flocks/>



### 1.1.7. Pullet health: coccidiosis

#### Prerequisites for vaccinating pullets in cage-free systems: coccidiosis

PROBLEM	APPLICABILITY BOX
Pullets need to be protected against 7 Eimeria strains, ideally using a live coccidiosis vaccine at day 1. The vaccine, however, does not always achieve the desired results. Some of the most common reasons are improper dosing and application and insufficient re-circulation of the vaccine strains.	<b>Theme</b> Animal husbandry <b>Keywords</b> Animal health and welfare, Coccidiosis vaccination, Chick paper, OPG, rearing phase <b>Context</b> Transition to and operating cage-free housing systems for pullets <b>Application time</b> Year-round <b>Period of impact</b> Pullet phase <b>Equipment</b> Chick paper <b>Best in</b> All cage-free housing systems: barn, free-range and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	Vaccinated birds need extra attention in the first three weeks post-vaccination to safeguard sufficient spread of the vaccine strains among all birds and the onset of immunity. Chick paper is used to optimize the re-circulation of the vaccine strain. The humidity of the circulating air should be high enough to keep the strains alive. After 3 weeks, the chick paper can be removed from the surface and can be spread in the litter of the house. Monitoring oocyst per gram faeces (OPG) is advisable to follow the coccidiosis development in time.
BENEFITS	Cherishing the coccidiosis vaccine strains will minimize the chance of a breakthrough of a field infection that can cause severe health issues. Faecal monitoring of OPG levels enhances early detection of a field strain break-through. In general, proper coccidiosis vaccination prevents young hens from developing clinical coccidiosis.

## PRACTICAL RECOMMENDATIONS

The chick paper should be placed on the entire floor surface on which the day-old-chicks are released. Feed should be directly spread over the paper to support ground surface pecking behaviour. The key is to leave the chick paper in place during the first 3 weeks of life. When pullets are released into the litter and the larger area of the barn, the chick paper can be spread through the house.



Chick with coloured coccidiosis spray. Source: Fair Poultry

## ON-FARM APPLICATION

### System approach

- Application of the coccidiosis vaccine is generally performed at day 1 by spray, at the hatchery or on the farm. Please check the manufacturer's guidelines for the technical details of the method, such as dosage, spray volume, and colorant. It is important, however, that each chick picks up one full dose of all strains, that the vaccine can re-circulate in the flock during at least 3-4 weeks (chick paper) and that no chemical treatments are done that can stop or slow-down re-circulation, or even, inactivate vaccine strains.
- The re-cycling and efficacy of the coccidiosis vaccine and its individual strains can be evaluated by taking faecal samples at 2-week intervals (e.g., 3-5-7 weeks of age). Samples are examined microscopically, and oocyst numbers are counted using the Mc Master technique. Evaluation is both qualitative and quantitative. At the end of rearing (16 weeks), evaluation of a mixed faecal sample could be used as a final check for indications of field infection and/or proper vaccine-take.



2-week-old chick on chick paper. The paper clearly starts to disintegrate after 2 weeks Source: Fair Poultry

## FURTHER INFORMATION

For more information on the combination of a coccidial vaccine and bioshuttle:  
<https://www.thepoultrysite.com/news/2019/01/it-takes-two-coccidiosis-vaccines-effective-against-e-tenella-after-adequate-cycling>



## 1.1.8. Feeding equipment and feeding

PROBLEM	APPLICABILITY BOX
<p>Pullets must be provided with sufficient amount of nutritious feed to grow and develop properly. In cage-free housing systems, it may be difficult for some birds to access the feeder and feed without competition. Underweight pullets are at a higher risk to develop feather pecking during the laying period.</p>	<p><b>Theme</b> Animal husbandry</p> <p><b>Keywords</b> Pullet, housing, feeding equipment and feeding</p> <p><b>Context</b> Transition to and operating cage-free housing systems for laying hens</p> <p><b>Best in</b> All cage-free housing systems for laying hens: barn, free range, and organic production</p> <p><b>Target audience</b> Farmers, farm advisors</p>
SOLUTION	<p>In cage-free housing systems, it is recommended that the feed is provided in such a way that it is easily accessible for all pullets. In addition to feeding a sufficient quantity, it is important to pay attention to a balanced nutrient composition.</p>
BENEFITS	<p>An adequate and well-balanced diet supports the growth and development of the pullets. This improves pullet health. There are also long-term benefits, as pullets with an adequate body weight will perform better and will have a lower risk of developing feather pecking during the laying phase.</p>

PRACTICAL RECOMMENDATIONS
<p>Insufficient feeder space and feeding frequency may result in frustration, aggression, and uneven flock growth. Ensure that feeding equipment allows all pullets to eat with minimal competition. Depending on the size of the house, 6-7 (sometimes up to 10) feeding times are recommended. In addition, block feeding is advised, where two feeding times follow shortly after each other. Birds that have not been able to eat the first time will get access the second time, as the birds that fed during the first time are less eager. The feeding equipment for pullets should be as similar as possible to the equipment used for the same birds during the laying period to help reduce stress after transfer to the layer house. It is recommended to feed mash instead of pellets to lower the</p>

risk of feather pecking. Dietary dilution (about 15%) during rearing may be a further approach to reduce the risk of feather pecking by increasing feeding time and other feeding-related behaviours. It is recommended to avoid sudden diet changes during rearing as these may be associated with an increased incidence of feather pecking during laying. Masking the changes

between diets by mixing diets may help to prevent disruption to the birds arising from diet change. Insoluble grit of an appropriate size and quantity should be provided from 3 weeks of age to aid digestion.



Mashed feed for pullets. Source: Utrecht University

## ON-FARM APPLICATION

### System approach

- Apply 6-7 (or up to 10) feeding times per day depending on the size of the house and pullet behaviour (all birds should eat with minimum competition); apply block feeding.
- Provide mashed feed instead of pelleted feed to decrease the risk of feather pecking.
- Mask diet changes by mixing diets.
- For specific advice on diet formulation, contact your feed supplier.

### Evaluation

- Assess the behaviour of the pullets at feeding: if the birds stand in line to reach the feeder after it has been filled, then it is filled too rarely.
- Monitor the body weight of the pullets and compare the results with the breeding company's standards. Calculate the uniformity of the flock (proportion of pullets that weigh within  $\pm 10\%$  of the average flock weight). A uniformity of  $>80\%$  is considered good, and the highest uniformity can be observed at 15-16 weeks of age.

## FURTHER INFORMATION

Guide on best management practices for the welfare of pullets  
[https://ec.europa.eu/food/system/files/2021-06/aw\\_platform\\_plat-conc\\_guide-welfare-pullets\\_0.pdf](https://ec.europa.eu/food/system/files/2021-06/aw_platform_plat-conc_guide-welfare-pullets_0.pdf)

Youtube video on Drinking and feeding equipment (available on EN, PT, ES; BE, DE, PL and FR):

<https://youtu.be/Bx5z3I4YLrl>



## 1.1.9. Drinking equipment

PROBLEM	APPLICABILITY BOX
<p>During the transition from rearing to laying phase, hens may experience stress and difficulty adapting to new housing conditions, including new drinking equipment, which may affect their welfare and productivity.</p>	<p><b>Theme</b> Animal husbandry</p> <p><b>Keywords</b> Laying hens, pullets, drinking equipment</p>
SOLUTION	<p>Preparing pullets during the rearing phase for housing conditions, including drinking equipment, they will encounter during the laying phase will facilitate the transition.</p>
BENEFITS	<p>Both during the rearing and laying phase.</p> <p><b>Context</b> Transition and operating cage-free housing systems for laying hens</p> <p><b>Application time</b> All year round</p> <p><b>Period of impact</b> Both during the rearing and laying phase.</p> <p><b>Equipment</b> Drinking equipment</p> <p><b>Best in</b> All cage-free housing systems: barn, free-range and organic production</p> <p><b>Target audience</b> Farmers, farm advisors</p>
PRACTICAL RECOMMENDATIONS	<p><b>Rearing phase:</b></p> <ul style="list-style-type: none"><li>● <b>Adjust the height</b> of the drinker to the height of the pullets.</li><li>● <b>Adjust water pressure:</b> increasing water pressure during the first days may promote easier water flow through the nipples and drops on the nipples may attract chicks. Once the chicks are adapted, water pressure can be reduced to prevent water spillage.</li><li>● Supplementary chick drinkers (e.g. open water) can be provided the first few days but <b>need to be removed and replaced by the permanent (nipple) drinkers later</b> to prevent reliance on the supplementary drinkers.</li></ul>

- **Adjust the height** of the drinker to the height of the pullets.
- **Adjust water pressure:** increasing water pressure during the first days may promote easier water flow through the nipples and drops on the nipples may attract chicks. Once the chicks are adapted, water pressure can be reduced to prevent water spillage.
- Supplementary chick drinkers (e.g. open water) can be provided the first few days but **need to be removed and replaced by the permanent (nipple) drinkers later** to prevent reliance on the supplementary drinkers.

- **Match drinking equipment** with the same type the birds will encounter in the laying phase. Prevent differences in open vs. closed drinkers, colour of the nipples, presence of cups, water flow or pressure. If equipment does not match between farms, try exchanging every 10<sup>th</sup> nipple with one in the right colour or place a cup underneath.
- **Positioning of drinkers**, particularly if pullets are reared for laying housing systems in which water is provided on higher tiers. Training of the pullets is needed to find water: e.g. by closing random water lines periodically to encourage the pullets to look for water in the house.



Pullets drinking on drinking equipment example. Source: WUR

#### ON-FARM APPLICATION

**System approach:** ensure alignment in the management of the rearing and laying farm.

**Evaluation:** Check drinking equipment daily and register water intake on flock level.

#### FURTHER INFORMATION

EU guidelines: [https://ec.europa.eu/food/system/files/2021-06/aw\\_platform\\_plat-conc\\_guide-welfare-pullets\\_0.pdf](https://ec.europa.eu/food/system/files/2021-06/aw_platform_plat-conc_guide-welfare-pullets_0.pdf)

Management guide of the HSI: <https://www.hsi.org/wp-content/uploads/2020/10/Management-Guide-for-cage-free-hens.pdf>

Youtube video on Drinking and feeding equipment (available on EN, PT, ES; BE, DE, PL and FR):  
<https://youtu.be/Bx5z3I4YLrl>



## 1.1.10. Enrichment

PROBLEM	APPLICABILITY BOX
<p>Structurally complex housing, including outdoor setting is not suitably designed for modern hen's locomotor and flying skills. Optimizing the rearing environment, particularly for pullets going into alternative housing systems, is crucial for later behaviour, health, and welfare when layers. It is best to match the rearing housing system with the layer housing system to best prepare birds for an optimal laying cycle.</p>	<p><b>Theme</b> Environmental enrichment <b>Keywords</b> Enrichment material, welfare, free range, roughage, perch, pecking block, feather pecking, development <b>Context</b> Rearing pullets for cage-free housing systems for laying hens. <b>Period of impact</b> Pullets <b>Equipment</b> Environmental enrichments <b>Best in</b> All cage-free housing systems <b>Target audience</b> Producers, Farm Advisors</p>
SOLUTION	<p>Adding environmental enrichments is a method for improving birds' welfare and development. Pecking enrichments, perches and litter, or accessible ground area during rearing enhance bird development to suit alternative systems. The aim of different enrichment materials is to: increase the amount of time the birds spend actively standing, walking, running, jumping, and dustbathing; increase foraging behaviours, provide the opportunity to seek and peck at other materials in their environment and reduce the number of aggressive interactions between birds and create environment in which birds can find safe refuges.</p>

BENEFITS
<p>Enrichments may increase the performance of natural behaviour, reduce the incidence of abnormal and damaging behaviour, reduce negative emotional states, improve physical health, and improve the use of the provided environmental resources. Benefits (i.e. musculoskeletal strength, immunity) are greater when environmental modifications are applied during growth and physical development.</p>

## PRACTICAL RECOMMENDATIONS

If possible, similar enrichment items should be provided during the laying period. The type of enrichment material is important: pet toys, for instance, do not lead to the benefits mentioned above, while the materials listed below do. Effective enrichment can include: a) straw and shaving bales to jump on, to create low barriers and partitions within larger spaces, and provide a substrate to peck at (i.e., alfalfa hay in bales); b) perches and platforms at different levels to support different behavioural uses during the day and night, including refuge from other birds (i.e. perches with grip/wood as perch material; c) novel food for pecking; d) pecking blocks – some may incorporate nutritive value or beak blunting effects (i.e. pumice stone); e) a range of pecking objects; f) dustbathing boxes; and g) “verandas” or “winter gardens” to provide additional space, litter, and access to natural daylight and fresh air in housing systems where range access is not available or may be restricted for periods of time; h) in free range systems use of the range encouraged by a high percentage of sheltered areas.

The enrichment types should target the birds’ behavioural needs, i.e., be biologically relevant. Replace enrichment variants that are not used well by the birds with alternatives!



Pullets provided with the bale of straw as an environmental enrichment (Source: Tina Bøje Clausen).

## ON-FARM APPLICATION

### System approach

- Structural enrichments suited to pullets locomotor skills (perches, different height levels of the housing constructions) to optimize skeletal development. Ramps can improve the use of the elevated areas for hens housed in aviaries and decrease keel bone damage.
- Access to litter in the first four weeks of life can have long-term impacts on the development of feather pecking behaviours, which may be related to litter stimulating natural foraging behaviour.
- Sufficient light intensity and spectrum can improve visual traits necessary for optimal navigation within commercial housing systems and may prepare birds for specific types of adult non-cage housing environments.

### Evaluation

Enrichments improve pullets welfare by directly improving the affective state and indirectly promoting more positive interpretations of stressful situations and improving stress recovery, helping the physical and behavioural development, improve later health and productivity.

## FURTHER INFORMATION

Enriched environment buffers against stress in chickens – Linkoping University:  
<https://www.youtube.com/watch?v=TWdupVu98w8> –

Guide on welfare of pullets [https://food.ec.europa.eu/system/files/2021-06/aw\\_platform\\_plat-conc\\_guide-welfare-pullets\\_0.pdf](https://food.ec.europa.eu/system/files/2021-06/aw_platform_plat-conc_guide-welfare-pullets_0.pdf)

Youtube video on Enrichement and natural behaviour in alternative housing systems (available on EN, PT, ES; BE, DE, PL and FR): <https://youtu.be/3GQ8UgZdi5M>

## 1.1.11. Litter

PROBLEM	APPLICABILITY BOX
<p>The provision of litter in cage-free housing systems allows the hens to engage in natural behaviours and reduces the risk of feather pecking. However, often the litter is wet and of poor quality, which spoils its positive effects. In laying hen houses, too much litter can also lead to an increased number of floor-eggs.</p>	<p><b>Theme</b> Animal husbandry</p> <p><b>Keywords</b> Pullet, laying hen, housing, substrate, bedding, feather pecking</p> <p><b>Context</b> Transition to and operating cage-free housing systems for laying hens</p>
SOLUTION	Best in
<p>An adequate amount of high-quality litter with a high absorption capacity should be provided on solid floors in all cage-free housing systems. Throughout the rearing and laying phase, the litter quality needs to be monitored and corrective measures are recommended if the litter is not dry and friable anymore.</p>	<p>All cage-free housing systems for pullets and hens: barn, free range, and organic production</p>
BENEFITS	Target audience
<p>The provision of high-quality litter reduces the risk of feather pecking by enabling the birds to perform natural behaviours, such as foraging, scratching, and dustbathing. Litter also absorbs faeces on a solid floor, which is positive for the health of the birds.</p>	<p>Farmers, farm advisors</p>

Dry, friable wood shavings as litter substrate for laying hens. Source: UU



## PRACTICAL RECOMMENDATIONS

Upon the arrival of the flock, the solid floor should be covered with a thin layer of litter. Assess the quality of the litter during the daily inspection rounds: is it dry, friable, and flaky? Especially cold drafts may cause wet litter and also make the birds more vulnerable to disease. Leakages of waterlines and drinkers may also cause wet litter. Stimulating the scratching behaviour of the hens by scattering a little amount of feed or whole grain in the litter area helps keep it dry and friable. Another option is to use automatic litter scrapers, which ensure that the litter stays at an optimal depth and prevents faecal built-ups. In the laying phase, too much litter can lead to floor-eggs. In the first weeks after placing a new flock, the scrapers can be moved frequently to prevent hens from developing the habit of laying floor eggs.



Automatic litter scraper (Source: UU)

## ON-FARM APPLICATION

### System approach

- Provide a thin layer of litter on the solid floor of the cage-free housing system. A commonly used substrate are wood shavings. Consider rapeseed or barley straw (crushed, heat treated, pelleted, and then granulated) as litter, as these substrates have a high absorption capacity.
- Prevent cold drafts and leakages of waterlines and drinkers, which may cause wet litter.
- Stimulate scratching behaviour in the birds by providing small amounts of feed or whole grain in the litter.
- Use automatic litter scrapers to keep the litter at an optimal depth, which prevents faecal built-ups and floor-eggs.
- Run the scrapers frequently in the first weeks after the arrival of a new flock to prevent hens from developing a habit of laying floor-eggs.
- Remove wet litter and/or add fresh litter during the rearing and laying phase if necessary.

### Evaluation

- Assess the litter quality during daily inspection rounds: it should be dry, friable, and flaky.

## FURTHER INFORMATION

Maintaining litter quality during lay:

<https://www.featherwel.org/featherwel/litter/maintaininglitterduringlay.html>



### 1.1.12. Perches

PROBLEM	APPLICABILITY BOX
If opportunities for perching are thwarted during rearing, adult laying hens will have more difficulties to move around in complex systems, which will increase the risk for floor laying. Perches are essential for roosting at night, resting during the day, and to get away from other birds. Perch unavailability could cause frustration or restlessness, leading consequently to animal welfare problems.	<b>Theme</b> Animal husbandry, Perches. <b>Keywords</b> Perch utilization, perch preferences, perch design, perch balance, animal welfare laying hens and pullets, housing
SOLUTION	Context
Provide pullets with access to raised perches during the first 7 days of life at the latest. Perches at rearing and production facilities should be as similar as possible to facilitate the transition to the production house.	Transition to and operating cage-free housing systems for pullets and laying hens
BENEFITS	Application time
The early use of perches leads to better skeletal development and muscle growth, higher flexibility, better accuracy in flights and jumps between levels, a reduction in aggression and feather pecking within the flock. Laying hens well trained to use perches during rearing have lower prevalence of floor eggs.	Provide pullets with access to raised perches during the first 7 days at the latest
PRACTICAL RECOMMENDATIONS	Period of impact
Pullets and laying hens are highly motivated to perch. Pullets will learn to use easily accessible perches without assistance. Provide sufficient linear perch space for all birds to roost (at least 12 cm/pullet or 15 to 18 cm/hen), as this will promote an increased use of perches at night. Control the temperature of the perch area. Perches should be positioned to facilitate the movement of birds underneath, and there should be enough vertical space above the perch to allow the birds to	Throughout the rearing and productive life of the hens
Equipment	Best in
	Design and number of adequate perches, in the rearing and laying facilities
Best in	Target audience
	All cage-free housing systems for pullets and hens: barn, free range, and organic production
Target audience	farmers, farm advisors

stand in a normal posture. Perches must not be placed above the litter area. Hens prefer higher perches within one tier and on upper aviary tiers to rest at night. The preferred perch shape is rectangular with rounded edges or mushroom-shaped, and this shape should be the same during the rearing and the laying periods. Round or oval-shaped perches are less favourable because they provide a poorer grip. Some perch designs, especially round metal perches, require skills that hens need to develop during the rearing phase. Consider perches made of durable material and without sharp edges that could injure hens or workers. Covering standard round metal perches with a soft polyurethane material can reduce keel bone fractures and deviations.



Example of an oval-shaped perch (left) and round perch in a multitier system (right). Source: Fair Poultry.

## ON-FARM APPLICATION

### System approach

Perch access during the rearing period leads to animals with better physical condition and better ability to navigate in complex aviary systems, provides an ideal place to roost at night, and is a getaway option for individuals being harassed. Improved resting opportunities and behavioural options imply better welfare and health.

### Evaluation

Quantitative evaluation: assess the number of hens that use perches, average usage time/hen, and observe the reduction of welfare problems associated with the absence of perches.

## FURTHER INFORMATION

Scientific Opinion on welfare aspects of the use of perches for laying hens. EFSA (2015): <https://www.efsa.europa.eu/en/efsajournal/pub/4131>

Welfare of laying hens on farm. EFSA (2022): <https://www.efsa.europa.eu/en/efsajournal/pub/7789>



### 1.1.13. Covered veranda for pullets

PROBLEM	APPLICABILITY BOX
Pullets are mainly kept indoors, but in some stages of their life, outdoor access may be advantageous.	<b>Theme</b> Covered veranda, animal welfare
For older pullets, access to a covered veranda may provide them with extra stimuli and prepare them for the laying period.	<b>Keywords</b> Covered veranda, pullets, housing
The benefit of a covered veranda for pullets lies in the enriched environment and the preparation for the laying period in cage-free systems with outdoor access. A covered veranda provides pullets with outdoor climate, without exposing them to precipitation, infection risks and predation.	<b>Context</b> Transition to and operating on non-cage housing systems for laying hens
<b>PRACTICAL RECOMMENDATIONS</b>	<b>Application time</b> Second half of pullet rearing period
<ul style="list-style-type: none"><li>● Young pullets need a warm environment and are mostly not suited for a covered veranda. Later in the rearing period, they are more capable to stand cooler circumstances and can be given access to a covered veranda.</li><li>● Covered verandas for pullets may act as enrichment of the environment reducing risk for feather pecking. In addition, a covered veranda will prepare pullets well for the production period in a house with a covered veranda.</li><li>● When pullets are given access to a covered veranda, climate effects on the pullet rearing unit should be managed well, as open popholes may cause a draft.</li></ul>	<b>Required time</b> Only daytime access
	<b>Period of impact</b> May have an impact on the entire life of the birds
	<b>Equipment</b> Roof, sidewalls, water lines, litter, perches
	<b>Best in</b> Non-cage housing systems for pullets: barn with access to a veranda, free range, and organic production
	<b>Target audience</b> Farmers, farm advisors

- Covered verandas should be equipped with litter material. Additional nipple drinkers, roughage and perches can be provided.
- For free range and organic flocks, a covered veranda can provide a smooth transition between indoor and outdoor circumstances for both climate and light. This may encourage the birds to exit the pullet house and make use of the free range.

### ON-FARM APPLICATION

#### **System approach**

- The age at which access to the covered veranda can be given depends on the climate. In warmer circumstances, pullets can be given access earlier, in colder circumstances it may be better to wait longer.
- On days vaccinations are provided, it is better to keep the covered veranda closed.

#### **Evaluation**

- Check the covered veranda daily to see how many birds are using it
- Check litter quality and water provision in the covered veranda daily (and take action in case litter quality is poor and/or water provision is not functioning)
- Check the covered veranda for sick birds (in addition to the check indoors)
- Check the temperature in the covered veranda and keep it closed if the temperature is too low for the pullets (based on their age, check management guidelines for that)

### FURTHER INFORMATION

Featherwel project:

<https://www.featherwel.org/featherwel/managementhealth/thehouseenvironment.html>



## 1.1.14. Lighting

PROBLEM	APPLICABILITY BOX
<p>In pullet rearing, lighting is important to prepare the birds for egg laying, and to reduce the risk of feather pecking both in the rearing and laying period. As non-cage housing systems are more divers in environmental elements and the chicks have more possibilities for behavioural reactions to the lighting, it needs special attention.</p>	<p><b>Theme</b> Animal husbandry, lighting, pullets <b>Keywords</b> Light, pullets, feather pecking <b>Context</b> Transition to and operating non-cage housing systems for laying hens <b>Period of impact</b> Lighting during rearing has an impact on the entire life of a laying hen <b>Equipment</b> Lighting, dimming equipment <b>Best in</b> All cage-free rearing housing systems for laying hens: barn, free range, and organic production <b>Target audience</b> Farmers, farm advisors</p>
SOLUTION	
<p>Proper lighting and light management are the basis for a good start and good performance of a laying hen flock.</p>	
BENEFITS	
<p>Proper light management will reduce the risk of the development of feather pecking and prepare pullets for a long and productive laying period.</p>	
PRACTICAL RECOMMENDATIONS	
<ul style="list-style-type: none"><li>● Day-old chicks should be placed in a system with ample light to find their way around and find feed and water.</li><li>● After some days, the daylength and light intensity can be reduced, but the light intensity should not be reduced too much. Preferably an intensity of 20 lux or more is maintained. Light intensities lower than 5 lux may cause a later start of egg laying.</li><li>● A dimming phase of 15-30 minutes (depending on the complexity of the system) at the end of the day allow the birds to find their roosting places. A dimming phase of about 15 minutes at the start of the day prepare the birds for the day. Dimming phases will reduce arousal and stress in the flock.</li></ul>	

- A combination of sufficient light intensity and the provision of litter and roughage can reduce the risk of the onset of feather pecking.
- For rearing pullets, a slightly cooler light is recommended compared to the laying period (pullets: max. 4000K; laying hens: max. 3000K). Warmer light comprises more of red spectrum, which is stimulating hormone production for egg production. Cool light comprises less red and possibly more green and blue wavelength, that are associated with growth.



### ON-FARM APPLICATION

#### System approach

- Layer pullets tend to be fearful, with the risk of flightiness and smothering. Together with frequent flock walks (to get them used to humans), a proper light intensity can help as birds will be able to see from a distance what is approaching them.
- Although very dim light will prevent feather pecking, it will also cause fearfulness and is not preparing the pullets for their life as laying hens. The transition from rearing house to layer house should be as smooth as possible, with a maximum of similarities to prevent stress. Therefore, the lighting settings at the end of rearing and at the start of laying should be the same: starting time of the day, light duration, preferably type of light and intensity.

Sufficient light intensity and an even light distribution will enable the birds to learn to move around in the system and negotiate heights. Also, it will make them less fearful (Source: WUR).



A combination of enough light, good litter, roughage, and pecking stones can reduce the risk of feather pecking and prepare the hens well for their production period (Source: WUR)

#### Evaluation

- Light intensity can be checked with a lux meter at bird height, measuring between light sources directing the measuring cell towards the ceiling
- Light distribution can be checked by looking for very bright or dark spots.

### FURTHER INFORMATION

Practice Abstract on *Light management for laying hens*: <https://bestpracticeshens.eu/wp-content/uploads/2022/10/11-Light-management-hen-EN.pdf>

Check management guides of the breed used, to find detailed information about light programs.



### 1.1.15. Stocking density

PROBLEM	APPLICABILITY BOX
Pullets in cage-free systems may be housed at high stocking densities to compensate for potential economic losses during the transition phase to cage-free housing systems. However, if too many pullets are reared in an extremely limited area, they are not able to (fully) engage in natural behaviours, even in non-cage housing systems.	<b>Theme</b> Animal husbandry <b>Keywords</b> Pullet, space requirement, housing <b>Context</b> Transition to and operating cage-free housing systems for laying hens <b>Best in</b> All cage-free housing systems for laying hens: barn, free range, and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
For white hybrids, stocking densities of 10-15 birds/m <sup>2</sup> at the end of the rearing phase are considered ideal, for brown hybrids it would be 9-13 birds/m <sup>2</sup> at the end of rearing.	
BENEFITS	
Adequate stocking densities during rearing reduce the risk of feather pecking in the laying phase by enabling pullets to perform natural behaviours. This improves pullet welfare, including health. It also increases economic benefits for the farmer (lower mortality rates).	

High stocking densities during rearing are a risk factor for feather pecking behaviour during laying. For white hybrids, stocking densities of 10-15 birds/m<sup>2</sup> at the end of the rearing phase are considered ideal, for brown hybrids it would be 9-13 birds/m<sup>2</sup> at the end of rearing. Research has shown that rearing pullets at stocking densities higher than 21 birds/m<sup>2</sup> led to plumage damage due to feather pecking in 50% of the observed flocks already during the rearing phase. By reducing losses due to feather pecking, these lower stocking densities can also be economically profitable.

## ON-FARM APPLICATION

### System approach

- Consider limiting stocking density during rearing.
- Calculate the space allowance for pullets in relation to their demands on the whole environment (including air quality), their age, live weight, health and their needs to express certain behavior.



Pullets in a barn kept at adequate stocking density (Source: WUR)

### Evaluation

- Check if each pullet is able to express its natural behaviour such as: feeding and drinking, wing flapping, dust bathing, foraging, perching, resting/sitting, preening.

## FURTHER INFORMATION

Guide on best management practice for the welfare of pullets:

[https://ec.europa.eu/food/system/files/2021-06/aw\\_platform\\_plat-conc\\_guide-welfare-pullets\\_0.pdf](https://ec.europa.eu/food/system/files/2021-06/aw_platform_plat-conc_guide-welfare-pullets_0.pdf)



## 1.1.16. Air quality and thermal environment

PROBLEM	APPLICABILITY BOX
After hatching, chicks need to be housed at an appropriate temperature. Whole-house heating for brooding can be energetically demanding and costly.	<b>Theme</b> Animal husbandry, environmental enrichment <b>Keywords</b> Brooding, thermal environment, feather pecking <b>Context</b> Prevention of feather pecking <b>Application time</b> During the brooding period <b>Required time</b> Roughly 4 weeks, may stay for longer as non-heated shelters <b>Period of impact</b> Improved welfare during brooding period and reduced risk of feather pecking throughout rearing and lay <b>Equipment</b> Dark brooders <b>Best in</b> Pullet rearing facilities <b>Target audience</b> Farmers, farm advisors
SOLUTION	
Spot heating using dark brooders which more closely emulate maternal care, providing shelter and warmth.	
BENEFITS	
Use of dark brooders is less energetically demanding and may prevent the development of feather pecking leading to improved welfare during rearing and later in life.	
PRACTICAL RECOMMENDATIONS	
Dark brooders are hot plates placed at the bird level, which can be used as an alternative to heating the whole barn. Dark brooders contain flaps, creating an enclosed, dark area for chicks to retreat to for rest, as light is often provided for the full 24-hour period. Spot heating creates a temperature gradient, allowing chicks to choose a temperature zone in which they feel comfortable. Behaviour should be monitored during the first couple of days following placement to ensure the chicks have found and are using the dark brooders. Huddling and stress calls are indicators of the chicks being too cold. Appropriate measures should be taken to avoid chicks from wandering too far from the heat source during the first week of life.	

## ON-FARM APPLICATION

### System approach

- When using dark brooders as a heat source for day-old chicks, the room temperature should be 20-24 ° C, and the temperature under the brooders should be 30-34 ° C.
- The floor of the rearing house should be at the appropriate temperature before adding litter to avoid condensation, resulting in moist litter, and before placement of the chicks to avoid cold stress.



Inside view of a dark brooder where the lid is lifted (Source: Tina Bøje Clausen)



A rearing barn with dark brooders (Source: Tina Bøje Clausen)

## FURTHER INFORMATION

Check the following videos for further instructions (Danish).

- <https://www.youtube.com/watch?v=30yhFowKb2o>
- <https://www.youtube.com/watch?v=vvMazKU2XoA>
- <https://www.youtube.com/watch?v=cBcfkCs30sM>

The second part of this review article on the benefits of dark brooders contains a discussion on possible reasons why dark brooders are not widely used commercially.

Sirovnik, J. Riber, A.B. 2022. Why-oh-why? Dark brooders show long-term positive effects on chicken welfare, but why are they still not widely used? Animals. 12, 1276. <https://doi.org/10.3390/ani12101276>

The following webpage contains additional materials, including a guide (in Danish):

<https://okologi.dk/viden-om-oekologi/landbrugsproduktion/hoens-og-kyllinger/velfaerd-for-hoens-og-kyllinger/giv-kyllingerne-en-tryg-start-med-kunstige-kyllingemoedre/>



### 1.1.17. Beak trimming

PROBLEM	APPLICABILITY BOX
<p>Beak trimming is one of the most frequently applied practices in the world to prevent feather and skin damage due to pecking behaviour of the hens. However, as part of the living tissue is removed, beak trimming causes pain and discomfort. On the other hand phasing out of this practice could lead to high mortality due to injurious pecking if insufficient measures are taken to prevent injurious pecking.</p>	<p><b>Theme</b> Animal husbandry</p> <p><b>Keywords</b> Beak trimming, infrared method, laying hens</p> <p><b>Context</b> Transition to and operating cage-free housing systems for laying hens Not allowed for organic flocks</p> <p><b>Application time</b> Application at the hatchery</p> <p><b>Period of impact</b> Direct pain is caused, but if applied correctly, no lasting discomfort</p> <p><b>Equipment</b> Infrared beak trimming carrousel</p>
SOLUTION	<p>Management problems should be identified, and best practices adapted to their context should be progressively applied. In the meantime, if beak trimming is used, ensure that it is done at the hatchery with IR equipment, properly set to reduce discomfort to a minimum.</p>
BENEFITS	<p>Although the application of beak trimming causes discomfort and pain to the chicks, it may prevent skin lesions of other birds, even leading to increased mortality, later in life. Proper beak trimming will restrict pain and discomfort to a minimum.</p>
PRACTICAL RECOMMENDATIONS	<ul style="list-style-type: none"><li>As beak trimming is a painful measure, masking problems caused by insufficient housing and management, it may be an acceptable solution for the short time in situations where the risk for injurious pecking is still too large to omit beak trimming. For the long term, the aim should be to be able to keep laying hens with intact beaks without injurious pecking problems.</li></ul>

- As beak trimming is a painful measure, masking problems caused by insufficient housing and management, it may be an acceptable solution for the short time in situations where the risk for injurious pecking is still too large to omit beak trimming. For the long term, the aim should be to be able to keep laying hens with intact beaks without injurious pecking problems.

- The earlier beaks are trimmed, the less abnormalities they will develop. Trimming before 10 days of age most likely will not cause permanent pain.
- IR-treated chicks may have difficulty starting to drink when arriving at the rearing farm. A slightly higher environmental temperature and higher water pressure can help them through the first period.



Left: 15 weeks old pullet with IR-trimmed beak  
Right: 15 weeks old pullet with intact beak  
(Source: WUR)

## ON-FARM APPLICATION

### Application of beak trimming

- If beak trimming is carried out, it should be done with the infrared method (IR) on newly hatched chicks at the hatchery.
- Thorough instructions for the personnel should be given as to how the machinery should be set. Variation in chick size should be limited to a minimum to prevent chicks from being treated too much or too little (thus: chicks from older and younger parent stock should not be mixed, preferably the machine should be adjusted to each batch of chicks).
- The application of IR should be just enough to remove the sharp tip but not removing too much of the tip. Removing more than 1/3 of the tip (measured from nostril to end of the tip) may cause permanent damage (formation of neuromas).

### On-farm approach:

- Management of hens with intact beaks is requiring additional knowledge and skills as how to prevent injurious pecking behaviour. Therefore, one should be careful with eliminating beak trimming during the transition phase from cages to cage-free systems. Farmers are advised to first learn the skills of keeping hens in cage-free systems before taking the next step of keeping birds with intact beaks.

## FURTHER INFORMATION

More information on beak trimming:

<https://www.poultryhub.org/all-about-poultry/health-management/beak-trimming>

## 1.2. Best Practices for laying hens

An overview of the Best Practices identified for laying hens and their domains can be found in Table 3.

**Table 3.** Best Practices identified for laying hens with references to the draft Best Practices based on the scientific literature review.

Domain	Key words Best Practices
<b>1. Choice of housing system</b>	Tier design, access to a free-range area
<b>2. Choice of genetics</b>	Adaptation to system, use of space
<b>3. Training of farmer and staff</b>	Training, responsibilities
<b>4. Inspection and stockmanship</b>	Minimize feather pecking,
<b>5. Welfare assessment</b>	Protocols, apps
<b>6. Laying hen health</b>	Red mites, helminth- and bacterial infections
<b>7. Feeding equipment and feeding</b>	Feeding space, sufficient protein, diatomaceous earth
<b>8. Drinking equipment</b>	Disinfection, light near drinkers
<b>9. Enrichment</b>	Enriched verandas, enrichment materials
<b>10. Litter</b>	Provision, quality
<b>11. Perches</b>	Perching space, quality, ramps
<b>12. Nests</b>	Seclusion, platforms, smothering
<b>13. Lighting</b>	Intensity, quality, dimming
<b>14. Free-range and covered veranda</b>	Early access, provision of shelter and enrichment, stocking density
<b>15. Stocking density</b>	Limit stocking densities
<b>16. Air quality and thermal environment</b>	Temperature, ventilation



## 1.2.1. Choice of housing system

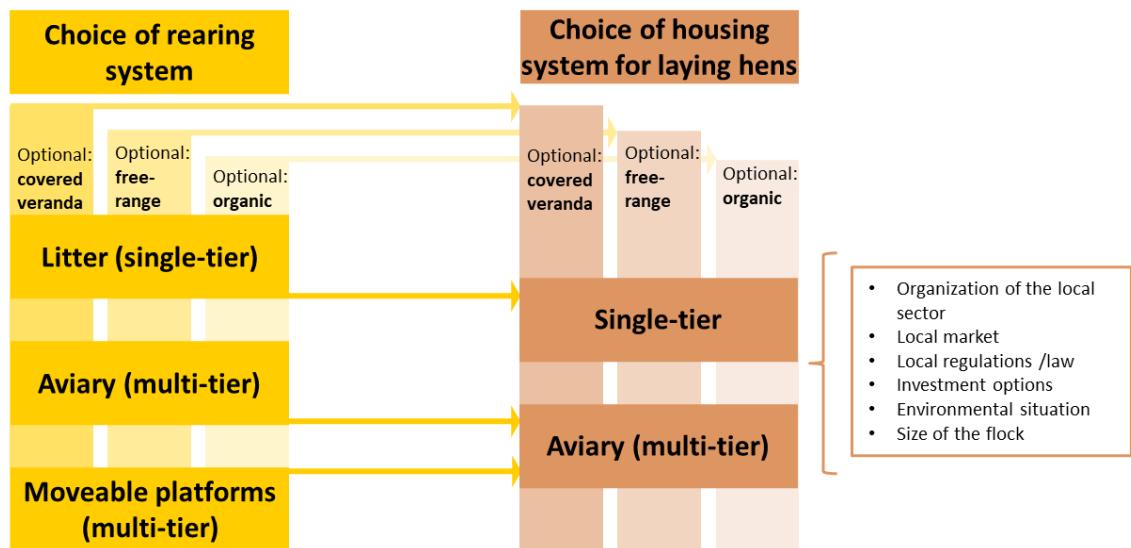
PROBLEM	APPLICABILITY BOX
A mismatch in housing systems between the rearing and the laying phase is likely to result in birds that are not well adapted to the housing system in which they will be housed at the laying farm.	<b>Theme</b> Animal husbandry <b>Keywords</b> Housing system, management, laying hens <b>Context</b> Transition from rearing to laying farm <b>Application time</b> Both during rearing and laying period <b>Period of impact</b> Mainly during the laying period <b>Equipment</b> Housing system design <b>Best in</b> Barn, free range and organic systems <b>Target audience</b> Farmers, farm advisors
SOLUTION	
There should be a match between housing systems during the rearing and the laying phase. Pullets reared in floor and single-tier systems should go on to produce in single-tier systems. Pullets reared in multi-tier systems should go on to produce in multi-tier systems. Pullets destined for free range or organic systems should have exposure to daylight already during the rearing period. Providing these pullets with free range access already during the rearing period will benefit their range use during the laying period.	

If birds are already used to the type of housing system that they will produce in as adult laying hens, this benefits their adaptability to the system. This is especially important for birds that will be housed in multi-tier systems, as birds have to learn to navigate through this complex three-dimensional system and find the different resources (feed, water, nests, perches, litter) on the different tiers of the system.

## PRACTICAL RECOMMENDATIONS

- Birds that are destined to produce in single-tier systems, should be reared in floor housing systems or single-tier systems.
- Birds that are destined to produce in multi-tier systems, should be reared in a multi-tier system.
- Birds that are destined for free range or organic system benefit from exposure to daylight and free range access already during the rearing period.
- A transfer from the rearing farm to the laying farm before or at 17 weeks of age allow the birds to get used to the laying farm environment before the onset of egg production.
- A good communication between rearing company and laying hen farmer is essential to ensure a seamless transition from rearing farm to laying farm.
- Laying hen farmers are encouraged to visit their flock during rearing. At least once is strongly recommended, but multiple times is preferable.
- Birds that are destined to produce in single-tier systems, should be reared in floor housing systems or single-tier systems.
- Birds that are destined to produce in multi-tier systems, should be reared in a multi-tier system.
- Birds that are destined for free range or organic system benefit from exposure to daylight and free range access already during the rearing period.
- A transfer from the rearing farm to the laying farm before or at 17 weeks of age allow the birds to get used to the laying farm environment before the onset of egg production.
- A good communication between rearing company and laying hen farmer is essential to ensure a seamless transition from rearing farm to laying farm.
- Laying hen farmers are encouraged to visit their flock during rearing. At least once is strongly recommended, but multiple times is preferable.

Overview of factors influencing the choice of a particular laying hen housing system. Laying hens should be reared in a system similar to that in the later laying phase to facilitate adequate adaptation.



### ON-FARM APPLICATION

Laying hen farmers are strongly encouraged to discuss the topic of the similarity of the rearing system to the laying system with their rearing company.

### FURTHER INFORMATION

Video Laying Hen Welfare Forum <https://www.humphreyfeedsandpullets.co.uk/poultry-performance-centre/the-importance-of-a-seamless-transition-for-a-pullet-between-the-rearing-and-laying-houses>

Guide on the Best Management Practices for the welfare of pullets (2021) [https://food.ec.europa.eu/system/files/2021-06/aw\\_platform\\_plat-conc\\_guide-welfare-pullets\\_0.pdf](https://food.ec.europa.eu/system/files/2021-06/aw_platform_plat-conc_guide-welfare-pullets_0.pdf)

Janczak, A. M. and A. B. Riber (2015). "Review of rearing-related factors affecting the welfare of laying hens." Poultry Science.

## 1.2.2. Choice of genetics

PROBLEM	APPLICABILITY BOX
<p>Various brown and white commercial layer hybrids can show large differences in performance and behaviour in cage-free systems. The freedom of choice of the farmer is often limited by consumer demands regarding egg colour (brown or white eggs) or egg size.</p>	<p><b>Theme</b> Genetics</p> <p><b>Keywords</b> Genetics, breeding, behaviour, performance</p> <p><b>Context</b> Transition to and operating cage-free housing systems for laying hens</p> <p><b>Application time</b> All year round</p> <p><b>Required time</b> Time needed to make an informed choice</p> <p><b>Period of impact</b> Rearing period, laying period</p> <p><b>Best in</b> All cage-free housing systems for laying hens: barn, free range, and organic production</p> <p><b>Target audience</b> Farmers, farm advisors</p>
SOLUTION	
<p>To promote high levels of welfare in pullets and laying hens, genetic hybrids adapted to cage-free housing systems should be reared. Contact your breeding company/chick provider for more detailed advice on genetics.</p>	
BENEFITS	
<p>A genetic hybrid well-adapted to the cage-free system will show a good use of the three-dimensional housing environment, will respond calmly to humans walking through the flock and will not show feather pecking or cannibalistic pecking towards group mates. Furthermore, it will show an excellent technical performance, that corresponds with the management guide provided by the breeding company.</p>	

Mix (White and Brown) flock. Source: Ecovalia.



## PRACTICAL RECOMMENDATIONS

Some general behavioural differences between brown and white hybrids are listed below. These may be considered when choosing the hybrid for your system. Please be advised that within brown and white hybrids, large differences may exist in performance and behaviour of the specific breeds. It is advised to contact your local breeding company or rearing company for more specific advice.

Brown flock. Source: Best Practice Hens.



	Brown hybrids	White hybrids
<b>Egg colour (egg shell)</b>	Brown	White
<b>Ability to navigate in three-dimensional space</b>	Moderate	Very good
<b>Flightiness / docility</b>	Docile birds, not flighty	Flighty birds
<b>Response to humans</b>	Approach / stay in place	Avoid / fly up
<b>Distance between birds</b>	Small, tendency to flock together	Large, tendency to disperse

## ON-FARM APPLICATION

### Evaluation

- Keep records of daily flock inspections and flock performance.
- Evaluate the records together with your breeding company/chick supplier.
  - Decide whether you want to stay with the present hybrid strain or whether you want to house a different hybrid strain for the next flock.

## FURTHER INFORMATION

Hy-Line Brown Alternative Systems Management Guide (2021): <https://www.hyline.com/filesimages/Hy-Line-Products/Hy-Line-Product-PDFs/Brown/Brown%20Alt/BRN%20ALT%20COM%20ENG.pdf>

ISA Management Guide – Alternative production environments (2020): <https://cpif.org/wp-content/uploads/2014/04/ISA-Alternative-Productions-Management-Guide-copy.pdf>

Lohmann Breeders - Management Guide Alternative Systems – Management Recommendations for Barn, Aviary & Free-Range Systems: [https://lohmann-breeders.com/media/2022/06/LB\\_eMG\\_Alternative-Haltung\\_Printversion\\_EN\\_06.21\\_V01-21\\_high.pdf](https://lohmann-breeders.com/media/2022/06/LB_eMG_Alternative-Haltung_Printversion_EN_06.21_V01-21_high.pdf)



### 1.2.3. Training of farmer and staff

PROBLEM	APPLICABILITY BOX
<p>The care for pullets and laying hens in cage-free housing systems places high demands on farmers and staff. Caretakers who have only experience with managing hens in cages are often not sufficiently trained for this new task. Therefore, problems may arise particularly during the transition phase from cages to cage-free systems.</p>	<p><b>Theme</b> Training of farmer and staff, animal husbandry</p> <p><b>Keywords</b> Farmer, personnel, caretaker, education, laying hens, and pullets.</p> <p><b>Context</b> Transition to and operating cage-free housing systems for pullets and laying hens</p> <p><b>Best in</b> All cage-free housing systems (barn, free-range, organic production) for pullets and laying hens</p> <p><b>Target audience</b> Farmers, farm advisors, policy makers</p>
SOLUTION	<p>Farmers and staff having the daily responsibility for pullets and laying hens in cage-free systems need to receive appropriate training, tailored to the specific cage-free system and adapted to the context of the farmer.</p>
BENEFITS	<p>Competent handling and management of hens in cage-free systems improve production performance, animal health and welfare. This leads to economic benefits and job satisfaction.</p>

PRACTICAL RECOMMENDATIONS
<p>Farmers need to ensure that they and their staff, who have the daily responsibility for the pullets and laying hens in cage-free housing systems, have the necessary knowledge and skills in good management procedures regarding these systems. They need to have a proper understanding of the welfare, including the health and the behaviour, of pullets and laying hens. These skills can be</p>

acquired and maintained by appropriate training, tailored to the cage-free housing system in place (barn, free-range, organic production).

Training should cover the following aspects:

- How to comply with relevant legislation
- How to recognize normal and positive behaviour and signs of good health
- How to recognize abnormal behaviour and signs of disease
- How to quickly take effective corrective measures
- How to seek additional help from experts (e.g. veterinarian, feed advisor) if necessary



Veterinarian training the Caretakers. Source: Fair Poultry.

### ON-FARM APPLICATION

#### System approach

- Depending on the local situation, adequate trainings are offered by chambers of agriculture, integrations, breeding- and barn equipment companies, farmers' associations and others. Contact these local organizations for more information.

#### Evaluation

- Farmers should keep records of their own training and staff training.
- Make sure everyone is up-to-date trained.



## 1.2.4. Inspection and stockmanship

PROBLEM	APPLICABILITY BOX
Delayed detection of system malfunctioning, disease or unwanted behaviour can lead to negative welfare consequences and significant production losses. This situation can be worsened during the transition phase from cages to cage-free housing systems.	<b>Theme</b> Animal husbandry <b>Keywords</b> Welfare, production, health, feather pecking, floor eggs <b>Context</b> Transition to and operating cage-free housing systems for laying hens <b>Application time</b> Twice daily (minimum) <b>Required time</b> 1 hour (minimum) <b>Equipment</b> Scales, ammonia test strips, and light or other environmental meters (optional) <b>Best in</b> All cage-free housing systems: barn, free-range and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
BENEFITS	
PRACTICAL RECOMMENDATIONS	

Walk through the house in a pattern that allows for visual inspection of all areas (including the wintergarden if present). Do this at least twice daily (more often when birds are young). Observe the distribution of hens within the house and look for any sick, injured or dead birds. Pause for a few minutes to allow birds to relax and resume their activities. Note any abnormal behaviour. Listen for signs of respiratory illness. Pick up and inspect individual hens' bodies and plumage conditions. Look for signs of parasites or indications of head or vent pecking. Check the condition of the hen's eyes, skin, beak, legs, feet and claws. Monitor the condition of the litter, feed and water consumption and hen body weights. Ensure all automatic supply and ventilation systems

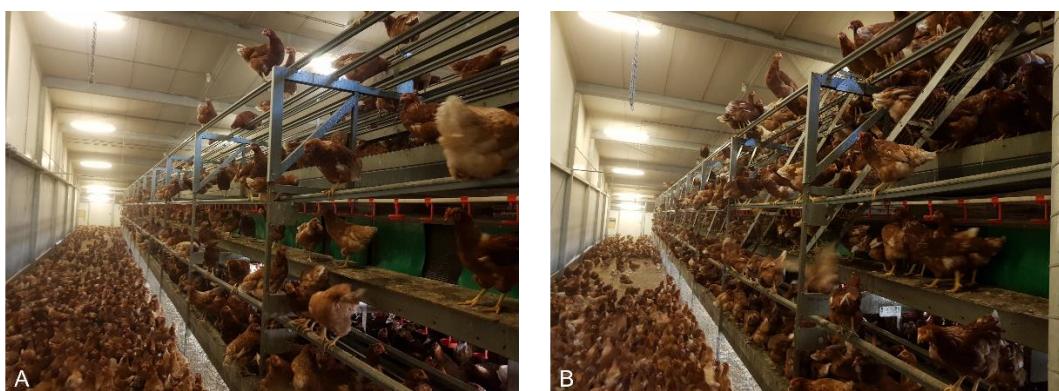
are functioning properly. In multi-tier systems, all levels should be inspected. Varying the time, route or personnel can help birds become more robust to human presence.



Demonstrating handling of a hen. Source: Fair Poultry



Flock inspection. Source: Fair Poultry



Poor distribution of hens within the house (left). Correct distribution of hens within the house (right). Source: Fair Poultry

### ON-FARM APPLICATION

- Train the staff to ensure they are familiar with the daily routine and checklist. Inspections performed by two different people each day increase the likelihood of detecting conditions requiring attention.

### FURTHER INFORMATION

Checklist example: <https://bestpracticehens.eu/wp-content/uploads/2022/10/Checklist-daily-house-inspection-Hens-EN.pdf>

Bestman, M., Heijmans, J., van Middelkoop, K., Ruis, M. Poultry Signals - A practical guide for poultry-oriented management. Roodbont Publishers. Zutphen, Netherlands. 112 p.  
[https://www.roodbont.nl/en/poultry/poultry-signals/100-286\\_Layer-Signals](https://www.roodbont.nl/en/poultry/poultry-signals/100-286_Layer-Signals)



## 1.2.5. Welfare assessment

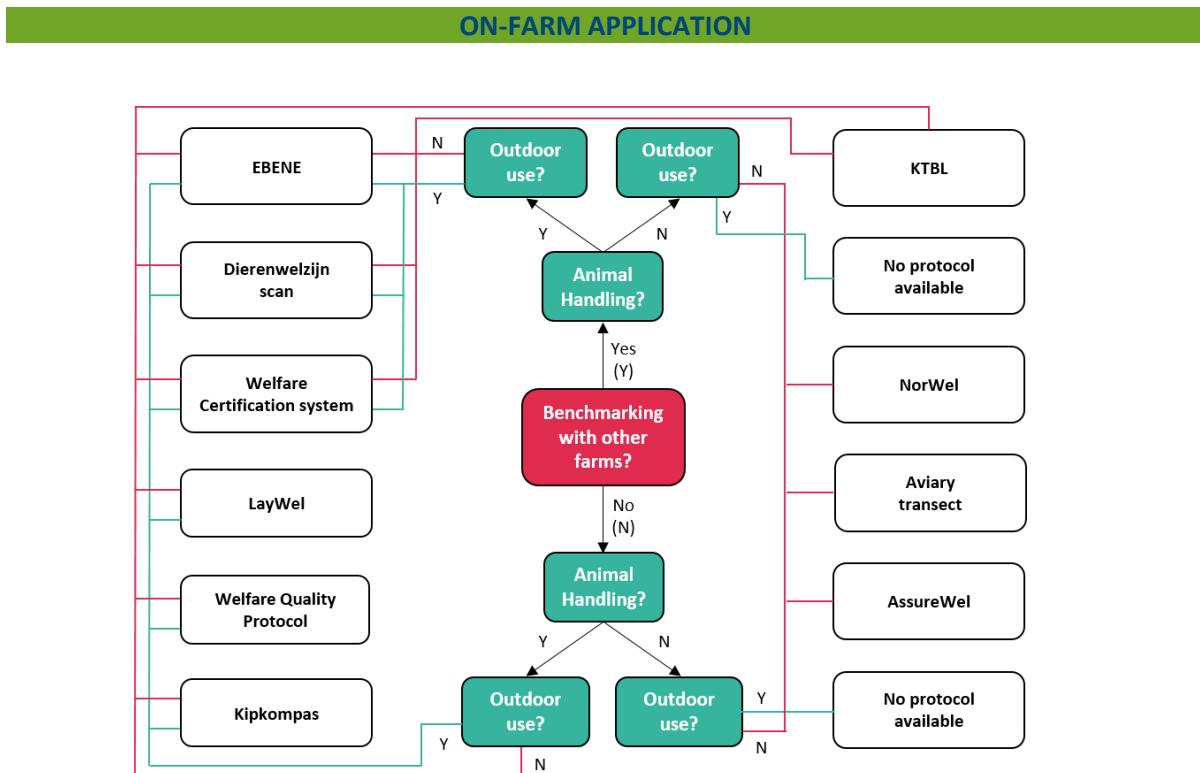
### How to decide which protocol to use for assessing the welfare of laying hens in cage-free systems?

PROBLEM	APPLICABILITY BOX
<p>The current pullet and laying hen welfare assessment protocols used in the EU each have their own focus, duration, and application, making it hard to choose the protocol that best meets the expectations and limitations of the user.</p>	<p><b>Theme</b> Animal husbandry</p> <p><b>Keywords</b> Welfare assessment, laying hens, pullets, protocols, decision tree</p>
SOLUTION	Context
<p>A decision tree, based on three main practical considerations, helps the user choose the most appropriate method in line with particular goals, expectations and limitations.</p>	<p>Transition to and operating cage-free housing systems for laying hens</p>
BENEFITS	Required time
<p>User satisfaction and quality of the outcomes depend to a large extent on applying the laying hen welfare assessment protocol which is most appropriate to the individual farm or organization unit.</p>	<p>Depending on protocol, number of flocks and outdoor option</p>
PRACTICAL RECOMMENDATIONS	Period of impact
<p>The decision tree uses branches to select one (or more) welfare assessment protocols that best suit the user's needs (Figure 1):</p>	<p>After completion of the protocol</p>
	Equipment
	<p>Paper and pen or app compatible devices (if applicable)</p>
	Best in
	<p>Pullet rearing, laying phase; all cage-free housing systems: barn, free-range and organic production</p>
	Target audience
	<p>Farmers, farm advisors</p>

1. **Has the user the intention to compare results with other farms?** Benchmarking is useful to obtain an insight in one's own farm status with other comparable (anonymous) farms. By choosing 'yes', only benchmarking protocols will be listed.
2. **Is the user prepared to handle animals for physical inspection?** Most tools require animal handling and most options will be listed if this option is chosen.

3. **Include outdoor use indicators in the assessment?** Protocols with specific parameters will be proposed if the user is interested in using outdoor ranges (e.g. free-range, organic systems or covered veranda).

Decision tree laying hen welfare assessment protocols. The tree starts with 'Benchmarking' (central red square).



The decision tree is available to any farmer or stakeholder involved with the welfare assessment of laying hens or pullets.

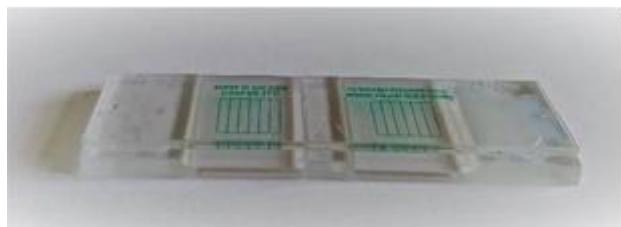
## FURTHER INFORMATION

- Assurewel: <http://www.assurewel.org/>
- Aviary transect (coming soon)
- Dierenwelzijnscan: <https://www.dierenwelzijnscan.be/>
- EBENE: <https://organic-farmknowledge.org/tool/39330>
- Kipkompas: [www.fairpoultry.com](http://www.fairpoultry.com)
- KTBL: <https://www.ktbl.de/themen/tierschutzindikatoren-junghennen>
- LayWel: <https://www.laywel.eu/>
- NorWel method (coming soon)
- Welfare Certification system: <http://www.animalwelfair.com/es/>
- Welfare Quality Protocol: <http://www.welfarequalitynetwork.net/en-us/reports/assessment-protocols>



## 1.2.6. Laying hen health

PROBLEM	APPLICABILITY BOX
Cage-free housing systems expose hens to manure that can lead to higher worm infection.	<b>Theme</b> Animal husbandry, Farm management
<b>SOLUTION</b>	<b>Keywords</b> Laying hens health, worms, parasite control, monitoring, and evaluation, laying hens
Between flocks the barn should be cleaned thoroughly to remove all manure. Worm eggs are very persistent against most disinfectant products used. Therefore, the poultry house is preferably heated. This technique is developed against Poultry Red Mites and kills remaining worm eggs as well.	<b>Context</b> Transition to and operating cage-free and outdoor housing systems for laying hens
During the production cycle parasitic monitoring is strongly recommended. Since not every type of worm is visible macroscopically during post-mortem examination (such as the damaging <i>Capillaria spp.</i> ), faecal egg counts are favourable over post-mortem worm detection. Deworm if levels exceed a set threshold level.	<b>Application time</b> Worms' year-round
<b>BENEFITS</b>	<b>Required time</b> Collecting a faeces sample takes 15 minutes per house. Analysing time depending on the laboratory
Monitoring worm infection prevents a sudden negative impact of a high worm burden and minimizes necessary treatments reducing residues in eggs and environment.	<b>Period of impact</b> Any age: worm infections usually start from 20 weeks of age
<b>PRACTICAL RECOMMENDATIONS</b>	<b>Equipment</b> Microscope and Mc Master analysis equipment for worm egg count
Perform a worm egg count every 4 weeks on a freshly mixed manure sample of at least 50 droppings. Five of these should be caecal droppings since the caeca harbour specific type of worms. The analysis is done by the Mc Master technique that is routinely performed in most laboratories. Deworm if egg counts per gram faeces (EPG) exceed: Capillaria EPG>50; Ascaridia/Heterakis EPG>500-1,000.	<b>Best in</b> All cage-free housing systems: barn, free-range and organic production
	<b>Target audience</b> Farmers, farm advisors



Mc Master Counting chamber. Quantification of the worm eggs infection. Source: Fair Poultry.



Left: The hen's faeces provide a lot of information on (proglottids of tapeworm visible), Middle: caecal droppings, Right: Regular droppings. Source: Fair Poultry.

## ON-FARM APPLICATION

### System approach

- Faeces monitoring of worms should be implemented as a management practice at regular intervals; for coccidiosis, at 2-week intervals at 3-5-7 weeks of age during rearing and at 18-20-22-24-26-28 weeks of age at the start of production, and for worms, at 16-20-24-28 weeks during the start of production, and thereafter, at 4-6-week intervals.
- Faeces monitoring is both qualitative and quantitative.
- During the round: by removing excess litter the amount of worm eggs will be reduced.
- Between rounds: Clean the house thoroughly with warm water and soap before disinfection.

## FURTHER INFORMATION

On YouTube, one can easily find training material on how to perform faecal egg counts. The technique is the same for all species, although most films concern livestock and horses. The McMaster technique is the same, but the type of worms and their cut-off values are different. For a detailed practical video go to: <https://www.youtube.com/watch?v=ZptZZ1jigxM>

A practical guide for parasitic diagnostics is Veterinary Clinical Parasitology by Anne M Zajac (author) and Gary A Conboy (author). 7<sup>th</sup> edition.

For more information about Thermokill: <https://vaneckbv.nl/en/products-services/red-mite-control>



## 1.2.7. Feeding equipment and feeding

PROBLEM	APPLICABILITY BOX
Laying hens must be provided with sufficient amount of nutritious feed to produce properly. In cage-free housing systems, it may be difficult for some birds to access the feeder and feed without competition. Nutritional imbalances increase the risk of production diseases and feather pecking.	<b>Theme</b> Animal husbandry <b>Keywords</b> Laying hen, housing, feeding equipment and feeding <b>Context</b> Transition to and operating cage-free housing systems for laying hens <b>Best in</b> All cage-free housing systems for laying hens: barn, free range, and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
In cage-free housing systems, the feed has to be provided in such a way that it is easily accessible for all hens of the flock. In addition to a sufficient amount of feed, it is important to pay attention to a balanced nutrient composition.	
BENEFITS	

An adequate and well-balanced diet supports the egg-laying performance and health of the hens. Laying hens fed an adequate diet will also have a lower risk of developing feather pecking and cannibalism.

### PRACTICAL RECOMMENDATIONS

Insufficient feeder space and feeding frequency may result in frustration, aggression, and uneven hen bodyweights across the flock. Supply at least 10 cm of feeding space per hen as required by EU legislation. This ensures that hens can eat with minimal competition. It is recommended to feed the hens 6-7 times per day. The last feeding should be run ½-2 h before the light is switched off in the barn to ensure that the hens have all the necessary nutrients for egg production. Feeding times should not be set during the time the hens lay their eggs, so they will not be attracted away from the nest boxes. In addition, block feeding is advised, where two feeding times follow shortly after each other. Birds that have not been able to eat the first time will get access the second time, as the birds that fed during the first time are less eager. If feed hoppers are used, they should be turned two times per day to destroy feed clusters. Feed hoppers should not

be too close to each other so that the hens can access the whole feeding space. It is recommended that the decision to change to another feed phase should not be determined by bird age but by body weight, feed intake, egg yield and egg weight. Mashed feed instead of pellets should be fed to lower the risk of feather pecking. In addition, feeding sufficient protein of good quality is recommended to mitigate the risk of feather pecking. For specific advice on diet formulation, contact your feed supplier.



Hens feeding. Source: WUR.

## ON-FARM APPLICATION

### System approach

- Provide at least 10 cm of feeding space per hen.
- Apply 6-7 feeding times per day depending on hen behaviour (all birds should eat with minimum competition); apply block feeding.
- Provide mashed feed with sufficient protein of good quality to decrease the risk of feather pecking.
- For specific advice on diet formulation, contact your feed supplier.

### Evaluation

- Assess the behaviour of the hens at feeding: if the birds stand in line to reach the feeder after it has been filled, then it is filled too rarely.
- Monitor the body weight and production performance of the hens and compare the results with the breeding company's standards.

## FURTHER INFORMATION

Council Directive 1999/74/EC; minimum feeding space: article 4.1 b) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31999L0074>

Youtube video on Drinking and feeding equipment (available on EN, PT, ES; BE, DE, PL and FR):  
<https://youtu.be/Bx5z3I4YLrl>



## 1.2.8. Drinking equipment

PROBLEM	APPLICABILITY BOX
<p>During the transition from rearing to laying phase, hens may experience stress and difficulty adapting to new housing conditions, including new drinking equipment, which may affect their welfare and productivity.</p>	<p><b>Theme</b> Animal husbandry</p>
<p><b>SOLUTION</b></p> <p>Preparing pullets during the rearing phase for housing conditions, including drinking equipment, they will encounter during the laying phase will facilitate the transition.</p>	<p><b>Keywords</b> Laying hens, pullets, drinking equipment</p>
<p><b>BENEFITS</b></p> <p>Less stress and a quicker adaptation of the hens to (new) drinking equipment after the transition to the laying phase will improve the welfare of the hens and decrease problems related to water intake.</p>	<p><b>Context</b> Transition and operating cage-free housing systems for laying hens</p>
<p><b>PRACTICAL RECOMMENDATIONS</b></p> <ul style="list-style-type: none"><li><b>Prepare drinkers at least 4 h before arrival of the hens:</b> disinfect drinker lines and other equipment, flush the lines and refill with clean fresh water, check the pressure (back and front of the house) and test (individual) nipples for the presence of water and absence of leaks.</li><li>Position drinker lines <b>above slatted floors</b> (to prevent wet litter) <b>and in front of nest boxes</b> (to attract hens to the nest boxes).</li><li>Light intensity near the drinking lines should be around <b>20 lux</b>.</li><li>Hens with intact beaks tend to have more difficulty drinking from nipple drinkers and spill more water. A correct type of drinker, correct positioning and cups underneath the drinkers can help and prevent spilling.</li></ul>	<p><b>Application time</b> All year round</p> <p><b>Period of impact</b> Both during the rearing and laying phase.</p> <p><b>Equipment</b> Drinking equipment</p> <p><b>Best in</b> All cage-free housing systems: barn, free-range and organic production</p> <p><b>Target audience</b> Farmers, farm advisors</p>

- Prepare drinkers at least 4 h before arrival of the hens:** disinfect drinker lines and other equipment, flush the lines and refill with clean fresh water, check the pressure (back and front of the house) and test (individual) nipples for the presence of water and absence of leaks.
- Position drinker lines **above slatted floors** (to prevent wet litter) **and in front of nest boxes** (to attract hens to the nest boxes).
- Light intensity near the drinking lines should be around **20 lux**.
- Hens with intact beaks tend to have more difficulty drinking from nipple drinkers and spill more water. A correct type of drinker, correct positioning and cups underneath the drinkers can help and prevent spilling.



Hens drinking on drinking equipment example. Source: Ecovalia.

### ON-FARM APPLICATION

**System approach:** ensure alignment in the management of the rearing and laying farm.

**Evaluation:** Check drinking equipment daily and register water intake on flock level.

### FURTHER INFORMATION

EU guidelines: [https://ec.europa.eu/food/system/files/2021-06/aw\\_platform\\_plat-conc\\_guide-welfare-pullets\\_0.pdf](https://ec.europa.eu/food/system/files/2021-06/aw_platform_plat-conc_guide-welfare-pullets_0.pdf)

Management guide of the HSI: <https://www.hsi.org/wp-content/uploads/2020/10/Management-Guide-for-cage-free-hens.pdf>

Youtube video on Drinking and feeding equipment (available on EN, PT, ES; BE, DE, PL and FR):  
<https://youtu.be/Bx5z3I4YLrl>



## 1.2.9. Enrichment

PROBLEM	APPLICABILITY BOX
<p>It is recommended to provide environmental enrichment routinely and preventively to reduce the risk of feather pecking and improve hens' health and productivity. Hens housed without enrichment during the rearing period may be unprepared to take advantage of the enrichment even if accessible during the laying period.</p>	<p><b>Theme</b> Environmental enrichment <b>Keywords</b> Enrichment materials, welfare, feather pecking <b>Context</b> Transition to and operating on cage-free housing systems for laying hens <b>Period of impact</b> During the whole laying period <b>Equipment</b> Environmental enrichments <b>Best in</b> All cage-free housing systems for laying hens <b>Target audience</b> Producers, Farm Advisors</p>
SOLUTION	<p>Provide the same, sufficient and diverse environmental enrichment to promote hens' behaviour, in the rearing phase and during the laying period.</p>
BENEFITS	<p>Environmental enrichments improve bird health and welfare during the rearing and laying periods. The aim of different enrichment materials is to: 1) Increase the amount of time birds spend actively: standing, walking, running, jumping, and dustbathing; 2) Increase foraging behaviours, providing the opportunity to seek and peck at other materials in their environment, reducing the risk of injurious pecking towards other birds; 3) Reduce the number of aggressive interactions between birds and creating environments in which birds can escape from confrontation and find safe refuges.</p>

### PRACTICAL RECOMMENDATIONS

- Provide adequate environmental enrichment during rearing and lay to reduce the risk of feather pecking
- The type of enrichment material is important: pet toys, for instance, do not lead to the benefits mentioned above, while the materials listed below do. Effective enrichment include: a) straw and shaving bales to jump on, to create low barriers and partitions within

larger spaces, and provide a substrate to peck at (i. ex., alfalfa hay in bales); b) perches and platforms at different levels to support different behavioural uses during the day and night, including refuge from other birds (i. ex. perches with grip/wood as perch material; c) novel food for pecking (i.e. scattered grain); d) pecking blocks – some may incorporate nutritive value or beak blunting effects (i. ex. pumice stone); e) a range of pecking objects (i.e. bunches of rope or twine); f) dustbathing boxes; and g) covered verandas or “winter gardens” to provide additional space, litter, and access to natural daylight in housing systems where range access is not available or may be restricted for periods of time; h) in free range systems use of the range encouraged by a high percentage of sheltered areas.

- The types of enrichment should target the behavioural needs of the birds. Replace enrichment variants that are not used well by the birds with alternatives!



Left: Dried alfalfa bale provides entertainment, diversifies feeding and is suspended from a rope to prevent spillage. Right: Perches allow birds to withdraw from other birds and to rest and preen their feathers during the day and night. Source: Fair Poultry.

## ON-FARM APPLICATION

### **System approach**

Relatively low-cost enrichments promoting resilience:

- Structural enrichments suited to hens' locomotor and flying skills (perches, different height levels of the housing constructions) are needed to optimize skeletal development.
- Good light helps in optimal navigation within commercial housing systems to prepare birds for specific types of adult non-cage housing environments.
- Enrichments enhancing immune function through the application of mild stressors promote adaptability (variation in routines and routes taken of farm staff during inspection rounds, variation in colour of clothing).



Hens' entertainment, with dried alfalfa bale. Source: Ecovalia

#### FURTHER INFORMATION

Lohmann Tierzucht, 2011. Management Empfehlungen für die Aufzucht von Legehennen in Boden-, Volieren- und Freilandhaltung. Lohmann Tierzucht. <http://docplayer.org/13901122-Management-empfehlungen-fuer-legehennen-in-boden-volieren-und-freilandhaltung.html>  
(German)

<https://www.compassioninfoodbusiness.com/media/6207569/welfare-issues-table-laying-hens.pdf>

Youtube video on Enrichement and natural behaviour in alternative housing systems (available on EN, PT, ES; BE, DE, PL and FR): <https://youtu.be/3GQ8UgZdi5M>



## 1.2.10. Litter

PROBLEM	APPLICABILITY BOX
<p>The provision of litter in cage-free housing systems allows the hens to engage in natural behaviours and reduces the risk of feather pecking. However, often the litter is wet and of poor quality, which spoils its positive effects. In laying hen houses, too much litter can also lead to an increased number of floor-eggs.</p>	<p><b>Theme</b> Animal husbandry</p> <p><b>Keywords</b> Pullet, laying hen, housing, substrate, bedding, feather pecking</p> <p><b>Context</b> Transition to and operating cage-free housing systems for laying hens</p> <p><b>Best in</b> All cage-free housing systems for pullets and hens: barn, free range, and organic production</p> <p><b>Target audience</b> Farmers, farm advisors</p>
SOLUTION	<p>An adequate amount of high-quality litter with a high absorption capacity should be provided on solid floors in all cage-free housing systems. Throughout the rearing and laying phase, the litter quality needs to be monitored and corrective measures are recommended if the litter is not dry and friable anymore.</p>

BENEFITS

The provision of high-quality litter reduces the risk of feather pecking by enabling the birds to perform natural behaviours, such as foraging, scratching, and dustbathing. Litter also absorbs faeces on a solid floor, which is positive for the health of the birds.

PRACTICAL RECOMMENDATIONS

Upon the arrival of the flock, the solid floor should be covered with a thin layer of litter. Assess the quality of the litter during the daily inspection rounds: is it dry, friable, and flaky? Especially cold drafts may cause wet litter and also make the birds more vulnerable to disease. Leakages of waterlines and drinkers may also cause wet litter. Stimulating the scratching behaviour of the hens by scattering a little amount of feed or whole grain in the litter area helps keep it dry and friable. Another option is to use automatic litter scrapers, which ensure that the litter stays at an optimal depth and prevents faecal built-ups. In the laying phase, too much litter can lead to floor-

eggs. In the first weeks after placing a new flock, the scrapers can be moved frequently to prevent hens from developing the habit of laying floor eggs.

## ON-FARM APPLICATION

### System approach

- Provide a thin layer of litter on the solid floor of the cage-free housing system. A commonly used substrate are wood shavings. Consider rapeseed or barley straw (crushed, heat treated, pelleted, and then granulated) as litter, as these substrates have a high absorption capacity.
- Prevent cold drafts and leakages of waterlines and drinkers, which may cause wet litter.
- Stimulate scratching behaviour in the birds by providing small amounts of feed or whole grain in the litter.
- Use automatic litter scrapers to keep the litter at an optimal depth, which prevents faecal built-ups and floor-eggs.
- Run the scrapers frequently in the first weeks after the arrival of a new flock to prevent hens from developing a habit of laying floor-eggs.
- Remove wet litter and/or add fresh litter during the rearing and laying phase if necessary.



Dry, friable wood shavings as litter substrate for laying hens (Source: UU)



Automatic litter scraper (Source: UU)

### Evaluation

- Assess the litter quality during daily inspection rounds: it should be dry, friable, and flaky.

## FURTHER INFORMATION

Maintaining litter quality during lay:

<https://www.featherwel.org/featherwel/litter/maintaininglitterduringlay.html>



### 1.2.11. Perches

#### PROBLEM

If opportunities for perching are thwarted during rearing, adult laying hens will have more difficulties to move around in complex systems, which will increase the risk for floor laying. Perches are essential for roosting at night, resting during the day, and to get away from other birds. Perch unavailability could cause frustration or restlessness, leading consequently to animal welfare problems.

#### SOLUTION

Provide pullets with access to raised perches during the first 7 days of life at the latest. Perches at rearing and production facilities should be as similar as possible to facilitate the transition to the production house.

#### BENEFITS

The early use of perches leads to better skeletal development and muscle growth, higher flexibility, better accuracy in flights and jumps between levels, a reduction in aggression and feather pecking within the flock. Laying hens well trained to use perches during rearing have lower prevalence of floor eggs.

#### PRACTICAL RECOMMENDATIONS

Pullets and laying hens are highly motivated to perch. Pullets will learn to use easily accessible perches without assistance. Provide sufficient linear perch space for all birds to roost (at least 12 cm/pullet or 15 to 18 cm/hen), as this will promote an increased use of perches at night.

Control the temperature of the perch area. Perches should be positioned to facilitate the

#### APPLICABILITY BOX

##### Theme

Animal husbandry, Perches.

##### Keywords

Perch utilization, perch preferences, perch design, perch balance, animal welfare laying hens and pullets, housing

##### Context

Transition to and operating cage-free housing systems for pullets and laying hens

##### Application time

Provide pullets with access to raised perches during the first 7 days at the latest

##### Period of impact

Throughout the rearing and productive life of the hens

##### Equipment

Design and number of adequate perches, in the rearing and laying facilities

##### Best in

All cage-free housing systems for pullets and hens: barn, free range, and organic production

##### Target audience

farmers, farm advisors

movement of birds underneath, and there should be enough vertical space above the perch to allow the birds to stand in a normal posture. Perches must not be placed above the litter area. Hens prefer higher perches within one tier and on upper aviary tiers to rest at night. The preferred perch shape is rectangular with rounded edges or mushroom-shaped, and this shape should be the same during the rearing and the laying periods. Round or oval-shaped perches are less favourable because they provide a poorer grip. Some perch designs, especially round metal perches, require skills that hens need to develop during the rearing phase. Consider perches made of durable material and without sharp edges that could injure hens or workers. Covering standard round metal perches with a soft polyurethane material can reduce keel bone fractures and deviations.



Example of an oval-shaped perch (left picture) and round perch in a multitier system (right picture). Source: Fair Poultry.

## ON-FARM APPLICATION

### System approach

Perch access during the rearing period leads to animals with better physical condition and better ability to navigate in complex aviary systems, provides an ideal place to roost at night, and is a getaway option for individuals being harassed. Improved resting opportunities and behavioural options imply better welfare and health.

### Evaluation

Quantitative evaluation: assess the number of hens that use perches, average usage time/hen, and observe the reduction of welfare problems associated with the absence of perches.

## FURTHER INFORMATION

Scientific Opinion on welfare aspects of the use of perches for laying hens. EFSA (2015): <https://www.efsa.europa.eu/en/efsajournal/pub/4131>

Welfare of laying hens on farm. EFSA (2022): <https://www.efsa.europa.eu/en/efsajournal/pub/7789>



## 1.2.12. Nests

PROBLEM	APPLICABILITY BOX
The lack of suitable nests can lead to competition and frustration among hens. Eggs laid outside nest boxes are a major management problem and can increase the risk of cloaca pecking. Smothering in nests can cause mortality.	<b>Theme</b> Animal husbandry, housing design <b>Keywords</b> Seclusion, platforms, smothering, competition, floor eggs <b>Context</b> Transition to and operating cage-free housing systems for laying hens <b>Application time</b> Throughout entire laying period <b>Period of impact</b> Entire laying period <b>Equipment</b> Rollaway nests with flaps or curtains (ideally) <b>Best in</b> All cage-free housing systems: barn, free-range and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	Fewer broken or dirty eggs. Less time collecting floor eggs. Decreased competition, frustration and scratches among hens. Lower mortality from smothering, stress and risk of secondary infections from injuries.
BENEFITS	
PRACTICAL RECOMMENDATIONS	Nests should be evenly distributed throughout the house and should be easily accessible. Platforms in front of nests in multitier systems can help improve access. Flaps or curtains should be provided on the nests to provide hens with a dark and secluded location to lay their eggs.  The ventilation in the house should be adequate to prevent drafts, accumulation of hot air, or condensation within the nests. The lining of the nests should allow for scratching behavior while allowing dust to fall through (e.g. perforated AstroTurf). Rollaway nests help prevent broken or dirty eggs. If birds are relatively young when they arrive at the laying facility, it may be beneficial to prevent them from accessing the nests for a period to prevent hens from sleeping and soiling in the nests. Boxes should be opened at least 3 days prior to laying their first eggs to allow hens to learn to navigate in a new environment and to become accustomed to the nests. Similarly, closing nests at night can discourage birds from using nests for resting. If smothering in the nests is an

issue, opening nest covers at corners of a row (making them unattractive) or blocking certain nests and corners can help. Further, increased walking of the house can reduce the fear of humans and thus the risk of panic leading to smothering.



A system with platforms in front of the nests and strategically placed water lines. Source: WUR.

### ON-FARM APPLICATION

#### System approach

- Drinker lines in front of a row of nests can help stimulate hens to go to the nests.

#### Evaluation

- Quantitative evaluation – successful design and management of nests can be assessed by counting the number of floor eggs laid.

### FURTHER INFORMATION

Humane Society International – Management guide for the care and housing of cage-free egg laying hens in Vietnam: <https://www.hsi.org/wp-content/uploads/2020/10/Management-Guide-for-cage-free-hens.pdf>



### 1.2.13. Lighting

PROBLEM	APPLICABILITY BOX
Even the best lighting system can give poor results if it is not managed well.	<b>Theme</b> Lighting, laying hens <b>Keywords</b> Light, management, laying hens <b>Context</b> Management of light in laying hen houses <b>Application time</b> Complete production period <b>Required time</b> Daily check of a few minutes <b>Period of impact</b> Year round <b>Equipment</b> Lighting equipment, dimming equipment <b>Best in</b> Non cage systems, with special attention to aviary systems
SOLUTION	Good light management comprises not only the setting of day and night length, but also the setting of dimming phases and proper additional management.
BENEFITS	Good light management will result in proper use of the system, a minimal number of floor eggs and calm birds.
PRACTICAL RECOMMENDATIONS	<ul style="list-style-type: none"><li>● Lights hanging above aisles should provide at least 20 lux of light on the litter area, should preferably light the entrance of the nest boxes (so birds are able to inspect the entrance) and the first part of the litter area underneath the elevated floors.</li><li>● Additional lights underneath the system will prevent floor eggs. They can be switched on in the morning and can be switched off at the end of the afternoon.</li><li>● Lights in the aviary system will encourage birds to use these areas and will attract them to the feeders. For stepwise dimming purpose it could be advantageous to have separate on-off switches for each level.</li><li>● Both at the start and end of the day there should be a dimming phase to enable the birds to adjust to the new situation. Dimming can be done by slowly reducing the light intensity of the lights, but it can also be done by stepwise switching off lights, starting with the lower positioned lights and ending with the highest positioned lights.</li></ul>

- Lights hanging above aisles should provide at least 20 lux of light on the litter area, should preferably light the entrance of the nest boxes (so birds are able to inspect the entrance) and the first part of the litter area underneath the elevated floors.
- Additional lights underneath the system will prevent floor eggs. They can be switched on in the morning and can be switched off at the end of the afternoon.
- Lights in the aviary system will encourage birds to use these areas and will attract them to the feeders. For stepwise dimming purpose it could be advantageous to have separate on-off switches for each level.
- Both at the start and end of the day there should be a dimming phase to enable the birds to adjust to the new situation. Dimming can be done by slowly reducing the light intensity of the lights, but it can also be done by stepwise switching off lights, starting with the lower positioned lights and ending with the highest positioned lights.

- Especially at the end of the day it is important to apply a good dimming schedule to allow the birds to find their roosting places. For that, dimming should start with the bottom lights, followed by higher placed lights and ending with the lights on the ceiling, all in a duration of about 30 minutes. It is recommended to have some small lights on the ceiling above the aviary systems, that turn on 15 minutes before dimming starts and turn off 15 minutes after the last lights have dimmed.
- For newly housed flocks it is good to apply the dimming by hand the first few days to help and train the birds to find their roosting places. This training can be done by increasing the lights a bit and restart the dimming for birds that have not yet managed to get off the litter floor. Repeating the dimming a few times will encourage the last birds to get into the system and find the top levels to roost.
- If young birds lay many eggs onto the wire floors in the morning, this problem can be solved by having an hour of very dim light per day before the actual light period starts. This will allow these birds to find the nest boxes without disturbing the still sleeping hens



Left: Daylight entrances can also be managed to control the amount of light entering the henhouse Right: An example of a bad light distribution: no good lighting of the litter causing a too dark situation with risk for floor eggs, and sun beams causing very bright spots, attracting birds with high risk for smothering. Source: WUR.

### ON-FARM APPLICATION

#### Evaluation

- Light intensity can be checked with a lux meter at bird height, measuring between light sources directing the measuring cell towards the ceiling
- Light distribution can be checked by looking for very bright or dark spots.

### FURTHER INFORMATION

<https://www.featherwel.org/featherwel/managementhealth/thehouseenvironment.html>



## 1.2.14. Free-range and organic systems

PROBLEM	APPLICABILITY BOX
Free-range housing systems require a different management compared to indoor systems. The transition phase to free-range and a possible lack of experience of the farmer can put pressure on production results.	<b>Theme</b> Animal husbandry, Farm management <b>Keywords</b> Free-range, organic production, animal health and welfare <b>Context</b> Transition to and operate on free-range and organic systems for laying hens <b>Best in</b> Free-range and organic systems <b>Target audience</b> Farmers and advisors
SOLUTION	
BENEFITS	Have a differentiated production system entirely in line with consumer demand, a high level of animal welfare, a good future, and market-oriented production. Depending on the local market, it may be more viable for farmers to switch to organic production than to a barn system. Besides, in the face of global needs and climate change, it is a more sustainable production system with lower dependency on external inputs and a system that respects ecosystem cycles as much as possible.

### PRACTICAL RECOMMENDATIONS

1. Have the necessary skills in good management procedures and understanding the welfare of pullets and laying hens, including health and behavioural needs.
2. The work schedules should be adapted to the needs of the birds.
3. More systematization and automatization are recommended for larger housing systems with higher production rates. The design of the facilities will vary depending on the final approach of the farm project.

4. Ensure that the farm design allows easy access to outdoor spaces, provides access to natural light linked with a uniformed lighting design and guarantees a continuous night-time rest period of at least 8 hours, adequate temperature and ventilation.
5. Plan to include a covered veranda.
6. In organic production, it is necessary to have land associated to produce their feed (from 1 January 2023, at least 30%)
7. Apply an effective biosecurity protocol to prevent infections and design a good vaccination program. Ensure that the veterinarian and farm advisor have experience in outdoor systems for better advice.
8. Depending on farm size, stocking density and marketing channels, consider selecting appropriate genetics considering behavioural differences.
9. Provide a pullet rearing system as similar as possible to the later housing system for layers. In the case of different systems, specific training of farmers and staff will be required.



Left: Laying hens in a free range with good cover and forage diversity. Source: Best Practice Hens.

Right: Hens reared in wooden houses in remote rural areas and adapted to the landscape. Source: UlleCo farms.

#### FURTHER INFORMATION

EU Regulation 2020/464 laying down certain rules for the application of Regulation (EU) 2018/848 of the European Parliament and of the Council as regards the documents needed for the retroactive recognition of periods for the purpose of conversion, the production of organic products and information to be provided by Member States <https://eur-lex.europa.eu/legal-content/NL/TXT/?uri=CELEX:32020R0464>

Organic production Platform hosts a wide range of practical knowledge and tools: <https://organic-farmknowledge.org/>.



## 1.2.15. Free range design and management

PROBLEM	APPLICABILITY BOX
<p>One of the main problems in transitioning to systems with outdoor access is management change, mainly in the outdoor area.</p>	<p><b>Theme</b> Animal husbandry, Farm management</p>
<p>The outdoor area should be a fundamental part of the housing system. Its proper management will depend on the practical application and integration of knowledge of animal behaviour, animal husbandry, agronomy, and natural resource management adapted for each context.</p>	<p><b>Keywords</b> Free-range, organic production, animal health and welfare</p>
<p>Production systems with outdoor access manage an integrated system, directly linking animal production, landscape, and society, usually rural. Besides, they are recognised as offering high levels of animal welfare. Good outdoor management supports landscape diversification, promotes biodiversity, improves animal welfare and health, and contributes to a more sustainable production system.</p>	<p><b>Context</b> Transition to and operate on free-range and organic systems for laying hens</p> <p><b>Best in</b> Free-range and organic systems</p> <p><b>Target audience</b> Farmers and advisors</p>

PRACTICAL RECOMMENDATIONS
<ul style="list-style-type: none"><li>• Free range areas for birds shall be covered mainly with vegetation. The rotation of the outdoor plot planning is essential to promote access to new foraging areas, guarantee good pasture and soil management, and offer rest times to the plots. It is also imperative at a sanitary level.</li><li>• Enrich the outdoor area with natural cover to reduce the risk of predation and to promote natural chicken behaviour. It is also recommended to cross ropes in some outdoor areas and hook up some materials that reflect sunlight to make the viewing area of the bird of prey more difficult. In the case of mammals (like foxes), an electrified fence should be placed. The presence of a shepherd dog is also advisable in both cases. There seems to</li></ul>

be a higher range of use in small and medium-sized flocks (< 9000 hens, in organic, no more than 3000 hens per flock).

- Promote foraging behaviour by environmental enrichment. Take note that supply of additional feed is only allowed in the covered veranda (not in the free range).
- Faeces monitoring for worms and coccidiosis should be implemented as a management practice at regular intervals (monthly) and it is recommended to supply diatomaceous earth in the diet to reduce worm and parasite burdens in organic systems.
- Plan to include a covered veranda to avoid risks of contact with wild birds and their droppings during outbreaks of avian influenza or during long periods of unfavourable weather conditions.
- Consider the use of mobile houses to integrate rotational grazing in the farm.

## ON-FARM APPLICATION

### System approach

- Adopt a frequent and regular daily routine of the pullets and hens, environment, and automated systems to detect potential problems early. Create a routine checklist.

### Evaluation

- If you opt for organic production, the farm will receive annual audits to supervise performance and to analyse compliance with European regulations and thus receive the guarantee certificate.

## FURTHER INFORMATION

EU Regulation 2020/464 laying down certain rules for the application of Regulation (EU) 2018/848 of the European Parliament and of the Council as regards the documents needed for the retroactive recognition of periods for the purpose of conversion, the production of organic products and information to be provided by Member States <https://eur-lex.europa.eu/legal-content/NL/TXT/?uri=CELEX:32020R0464>

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### 1.2.16. Covered veranda

PROBLEM	APPLICABILITY BOX
Indoor housing of laying hens does not allow them to experience outdoor climate.	<b>Theme</b> Covered veranda, animal welfare <b>Keywords</b> Covered veranda, laying hens, housing system <b>Context</b> Transition to and operating non-cage housing systems for laying hens <b>Required time</b> Daytime access or permanent <b>Period of impact</b> all lifecycle <b>Equipment</b> Roof, sidewalls, water lines, litter, perches <b>Best in</b> All cage-free housing systems for laying hens: barn, free range, and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
A covered veranda may be a solution to provide hens with possibilities to experience outdoor climate.	
BENEFITS	
A covered veranda provides hens with additional environmental enrichment and the possibility to experience outdoor climate, without being exposed to precipitation and predation.	
PRACTICAL RECOMMENDATIONS	
<ul style="list-style-type: none"><li>• A covered veranda can be opened for the hens at daytime. Permanent access is a possibility, provided the influence on the indoor climate (draft, wet litter) is sufficiently managed.</li><li>• The width of the covered veranda should be about 3 meters, making it possible to use machinery to remove litter and clean the area.</li><li>• Roofs may be an extended roof of the house. Also, light-permeable material can be used, making the covered veranda brighter.</li><li>• Provision of nipple drinkers and perches is advised. Also, roughage can be supplied on the covered veranda.</li><li>• Popholes should be large enough to prevent dominant hens from guarding the passing through of other birds.</li></ul>	

- In addition: litter management is important (prevent wet litter on the veranda); side/front walls should be constructed in a way that predators/pests cannot enter the veranda/the barn etc.



A traditional covered veranda with a solid roof and sidewalls of wire mesh. In this situation, the sidewalls can be rolled up to give hens access to the free-range area. Source: WUR.



A covered veranda with a transparent roof, will result in a brighter environment. Source: WUR.



## 1.2.17. Stocking density

PROBLEM	APPLICABILITY BOX
Laying hens in cage-free systems may be housed at higher stocking densities (within legal limits) to compensate for potential economic losses during the transition phase to cage-free housing systems. However, if too many laying hens are kept in a too limited area, they are not able to (fully) engage in natural behaviours, even in non-cage housing systems.	<b>Theme</b> Animal husbandry <b>Keywords</b> Laying hen, space requirement, housing <b>Context</b> Transition to and operating non-cage housing systems for laying hens <b>Best in</b> All non-cage housing systems for laying hens: barn, free range and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
The maximum stocking density for laying hens must not exceed 9 hens/m <sup>2</sup> (barn, free-range) or 6 hens/m <sup>2</sup> (organic systems) usable area in the hen house as required by EU law. Lower stocking densities can be considered to reduce the risk of feather pecking.	
BENEFITS	

Adequate stocking densities reduce the risk of feather pecking by enabling the laying hens to perform natural behaviours. This improves hen welfare, including health.

### PRACTICAL RECOMMENDATIONS

The maximum number of laying hens that can be kept in a given housing system on a given farm according to the legal requirements (barn, free-range: 9 hens/m<sup>2</sup>; organic systems: 6 hens/m<sup>2</sup>) can usually be found in the construction documents of this system, which are provided by the housing equipment company. This number must be considered when ordering new hens. Practical experiences indicate that stocking densities lower than 9 hens/m<sup>2</sup> reduce the risk of feather pecking. By reducing losses due to feather pecking, these lower stocking densities can also be economically profitable.



A: Laying hens in an aviary kept at 9 hens/m<sup>2</sup>. B: Covered veranda with a normal stocking density. C: Abnormally high stocking density, birds are unable to move. Source: Fair Poultry.

## ON-FARM APPLICATION

### System approach

- Adequate stocking densities always need to be combined with an adequate dimensioning of other resources (e.g. adequate feeder space, perch length, nest area and enrichment) (see EFSA Welfare of Laying Hens, 2023).

## FURTHER INFORMATION

Council Directive 1999/74/EC; indoor stocking density barn, free-range: article 4.4 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31999L0074>

Commission implementing regulation (EU) 2020/464; indoor stocking density organic production: annex IV, 3. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0464&from=EN>

Hennovation: Guidelines Feather Pecking; stocking density p. 21  
[https://www.fawec.org/media/com\\_lazypdf/pdf/Guidelines\\_Feather\\_Pecking.pdf](https://www.fawec.org/media/com_lazypdf/pdf/Guidelines_Feather_Pecking.pdf)

EFSA, 2023, Welfare of Laying Hens on Farm  
<https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2023.7789>



## 1.2.18. Air quality and thermal environment

PROBLEM	APPLICABILITY BOX
Inappropriate air quality and inadequate thermal regulation (excessive cold or heat) in the laying hen house may affect hen welfare (e.g. disease, mortality and stress) and productivity.	<b>Theme</b> Animal husbandry <b>Keywords</b> Laying hens, air quality, thermal regulation <b>Context</b> Transition and operating cage-free housing systems for laying hens <b>Application time</b> All year round, seasonal variation <b>Required time</b> Depending on the on-farm situation, after correct assessment: immediately <b>Period of impact</b> Depending on the size of the flock(s)/housing <b>Equipment</b> Air ventilation, heating and cooling equipment <b>Best in</b> All cage-free housing systems for laying hens: barn, free-range and organic production <b>Target audience</b> Farmers, farm advisors
SOLUTION	
Ventilation should provide sufficient fresh air to the birds and a suitable climate. A temperature range between 18 and 22° C in the laying hen house is recommended.	
BENEFITS	
Provision of clean, fresh air and a suitable temperature range may prevent common welfare problems such as the development of diseases, poor litter quality, poor hen health and a decrease in egg production.	
PRACTICAL RECOMMENDATIONS	
<ul style="list-style-type: none"><li>● Regarding ventilation in the laying hen house: a minimum air exchange rate of 0.7 m<sup>3</sup>/h/kg live bird is recommended.</li><li>● Furthermore, it is recommended to keep the house temperature between 18 and 22 ° C. Temperatures below and above this range will require hens to spend energy on thermoregulation and less on egg production.</li><li>● Additionally, special care should be paid to the removal of excess moisture (improves litter quality and laying hen health), the removal of dust from the atmosphere (helps to prevent disease), maintaining a sufficient oxygen supply and the removal of harmful gasses such as NH<sub>3</sub>.</li></ul>	

Action is strongly recommended if temperature related behavioural changes occur:

- **Feed intake:** lower temperatures may increase hen feed intake due to an increased maintenance requirement. Similarly, at higher temperatures, hens may decrease feed consumption.
- Under cold conditions, hens may **ruffle their feathers outwards** to trap heat and/or (in extreme circumstances) may start **shivering** to keep warm.
- At high temperatures, hens will **increase and deepen respiration rates (panting)** and **hold their wings away from the body** to increase evaporation (Figure 1). Furthermore, hens may look for **cooling** to lose excess heat (e.g. shade, cool places and surfaces).



Hen trying to cool by panting (open beak, quick and heavy breathing) and holding wings away from the body. Source: ILVO.

## ON-FARM APPLICATION

### System approach

- Air quality and thermal regulation can be applied directly on-farm provided that appropriate equipment is present. Consultation with an expert is recommended for better applications and results.

### Evaluation

- Based on visual cues (e.g. behaviour of the hens) and measurable parameters (air quality, temperature, feed and water intake, egg production, ...).

## FURTHER INFORMATION

ISA Management Guide: alternative production systems: <https://cpif.org/wp-content/uploads/2014/04/ISA-Alternative-Productions-Management-Guide-copy.pdf>



## 1.2.19. Keeping laying hens with intact beaks

PROBLEM	APPLICABILITY BOX
Beak trimming is one of the most employed practices in the world to prevent feather and skin damage due to pecking behaviour of the hens. Injurious pecking behaviour can be induced by many factors, e.g. feed, climate, gut health, light, rearing conditions, transition from rearing to laying house. Preventing this behaviour comes down to finding a fine balance between all these factors and requires skills and experience in keeping hens in cage-free systems.	<b>Theme</b> Animal husbandry <b>Keywords</b> Intact beaks, management, laying hens <b>Context</b> Transition to and operating cage-free housing systems for laying hens with intact beaks <b>Application time</b> Both during rearing and laying period <b>Period of impact</b> Mainly during the laying period <b>Equipment</b> Foraging material, good food, climate control <b>Best in</b> Barn and free-range systems for laying hens <b>Target audience</b> Farmers, farm advisors
SOLUTION	
Management problems should be identified, and best practices adapted to their context should be progressively applied.	
BENEFITS	
A balanced set of management measures and continuous monitoring of the behaviour of the flock will prevent the onset of injurious pecking. This will ensure a good feather cover, low mortality and optimal production parameters.	
PRACTICAL RECOMMENDATIONS	
<ul style="list-style-type: none"><li>● It is recommended not to safe on the cost of well reared pullets. Feather pecking can already start in the rearing period. Most likely it will then continue during lay. Rearing flocks that are not performing feather pecking, have a high chance they will not do so during lay. Therefore a well reared flock will earn itself back.</li><li>● Well-reared pullets have had ample foraging material of good quality to direct their pecking behaviour to, possibly additional roughage and pecking stones, a good quality feed with as much as possible a constant composition, fresh climate and good health.</li></ul>	

- Stress due to the transition from rearing to laying house should be minimized. This means management should be as similar as possible (e.g. same feeding times, same light schedule) and preferably the housing system should be very similar.
- In the laying period hens should be provided with roughage and pecking stones. Litter should be dry and friable, draft should be minimized as well as heat stress.
- Feed is one of the major factors influencing pecking behaviour. Feed should be of good quality and the composition should be as constant as possible. Each change of feed composition is a risk for the onset of injurious pecking.
- Pelleted feed should be prevented, as this will increase the risk for injurious pecking behaviour. Meal or crumbs are preferred feed forms. Selective eating and de-mixing of the feed should be prevented, as this will result in a nutritional imbalance in the chickens, leading to an increased risk for outbreaks of injurious pecking. Make sure the feeder is emptied by the birds once a day. Setting two feeding times close to each other will allow all birds to eat (the first time the strong birds eat, the second time the weaker birds).
- At the start of lay, frequent flock walks should be made to collect mislaid eggs. Hens tend to lay eggs where there already is an egg, and outside the next boxes there is more chance for egg-laying birds to be pecked at the cloaca, there is more chance for cloaca pecking and cannibalism to develop in flocks with higher percentages of mislaid eggs.
- Light should be evenly distributed throughout the house, with the resting areas being slightly dimmer and the foraging areas being slightly brighter. Direct sunbeams should be avoided as these may cause smothering or feather pecking.
- Parasites may induce pecking behaviour, so maintain a high hygiene standard and take measures to keep parasite infestations low.
- Listen during your daily flock walk to the noise of the birds. Calm sounds are OK, but hard squeaks may be an indication of birds being pecked.

### ON-FARM APPLICATION

#### **On-farm approach:**

- Management of hens with intact beaks is requiring additional knowledge and skills as how to prevent injurious pecking behaviour. Therefore, one should be careful with eliminating beak trimming during the transition phase from cages to cage-free systems. Farmers are advised to first learn the skills of keeping hens in cage-free systems before taking the next step of keeping birds with intact beaks.
- Often light intensities are reduced to prevent injurious pecking. However, this will make birds more fearful, which can lead to increased pecking behaviour. Reduction of light or applying red light should be seen as last resort if no other measures seem to work against injurious pecking.

- Regular flock walks to check on (feather) condition of the birds is recommended. For this more information see practice abstract on *practical health and welfare assessment protocol for pullets and laying hens in cage-free systems*.



Hens flock with intact beak. Source: Fair Poultry

#### FURTHER INFORMATION

More information on how to keep laying hens with intact beaks can be obtained from various websites:

- <http://www.assurewel.org/layinghens.html>
- <https://www.featherwel.org/featherwel/>

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