

## D 5.5 End-users materials for the EIP-AGRI website

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<b>Lead beneficiary for this deliverable:</b>	Xavier Manteca (UAB)
<b>Editor:</b>	Lisa van Dijk
<b>Author(s):</b>	Network facilitators
<b>Quality Reviewer:</b>	Jessica Stokes

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## **Introduction**

The Hennovation project demonstrated the potential of innovation led by producers and industry (on-farm, during transport and at the abattoir) through the establishment of innovation networks that proactively searched for and utilized new ideas to make their business more efficient and sustainable. The networks initially tackle two particular issues of concern in the production chain: injurious pecking and the transport and use of end-of-lay hens. 19 innovation networks were mobilized at different levels of the production chain, local, national and European level in five countries (United Kingdom, Sweden, The Netherlands, Spain and The Czech Republic) These networks were supported by science driven-actors, such as veterinary surgeons, farm advisors and scientific researchers, and market-driven actors, such as those that buy eggs e.g. retailers, packers, food processors, and those certifying egg production e.g. farm assurance companies and certification schemes.

The on-farm networks, 15 in total, focussed on various aspects that are known to have influence on injurious pecking. Injurious pecking is a problem that has many risk factors and the networks tested a variety of innovative ideas. The off-farm networks, four in total, focussed on various aspects that are relevant for catching and transport of End-of-Lay hens.

Alongside product or technical innovation (e.g. new design of trolleys for depopulation, new type of litter material to reduce stress and encourage natural behaviour or the use of alpacas in organic systems to reduce predation), a variety of often less expected and sometimes unintended 'soft' innovations also emerged through these networks. These were related to protocol or process (e.g. a new way of monitoring Poultry Red Mite infestation and new relationships between production chain actors, for example the pullet rearers). The details on the innovative ideas tested and the results can be found in deliverable D2.1 (Report of tested on-farm tested solutions) and D3.1 (Report of tested off-farm solutions).

Based on the innovative ideas tested by the innovation networks 38 Practice Abstracts and an additional five technical notes were developed by the network facilitators for use on the EIP-AGRI website. Although not include in the deliverables, Technical Notes were developed as an extended Practice Abstract on topics of shared interested to the Hennovation innovation networks

All PAs are available in the EIP-AGRI common format (excel sheet) and these have been submitted directly to the Project Officer.

### *List of Hennovation Technical Notes*

<b>TN#</b>	<b>Hennovation Technical notes</b>
1	TN01 Monitoring Poultry Red Mite (available in English and Spanish)
2	TN02 A superior method of depopulating end-of-lay hens from enriched (colony) cages
3	TN03 Reducing prefation of free ranging hens
4	TN04 Finally you have decided to cook hen!
5	TN05 Novel range cover options within an organic system

*List of Hennovation Practice Abstracts*

<b>PA #</b>	<b>Hennovation Practice Abstracts</b>
1	PA 1 Light in the laying hen houses
2	PA 2 Feather scoring as a management tool to reduce injurious feather pecking in flocks with intact beaks.
3	PA 3 Adjustments of stocking density according to outside air temperature during transport of end-of-lay hens.
4	PA 4 Improving the catching and transporting of Laying hens to Slaughter at the End -of-Lay by adding value to hen meat.
5	PA 5 Chick rearing conditions crucial to prevent later feather pecking.
6	PA 6 How to keep laying hens with intact beaks - learning together.
7	PA 7 An easy monitoring method to improve control of Poultry Red Mite in laying hen flocks
8	PA 8 Critical points during catching and transport of end of lay hens
9	PA 9 Selection criteria for laying hen litter
10	PA 10 Litter for laying hens: rape seed straw and fibre hemp straw
11	PA 11 Climate checklist to reduce injurious feather pecking in laying hens
12	PA 12 Measures to suppress poultry red mite populations in henhouses
13	PA 13 Use of a spinosad to prevent red mites
14	PA 14 Unifying the dress code on farms reduces stress in laying hens
15	PA 15 Use of a cost-benefit tool to improve the business performance of egg production enterprises
16	PA 16 Evaluating innovations for on-farm use
17	PA 17 Influence of crate lids on welfare of hens
18	PA 18 Factors affecting dead on arrival (DOA) during hens' transport
19	PA 19 Influence of handling on injuries during hen transport
20	PA 20 Glossy objects motivate the hens to redirect unwanted feather pecking behaviour.
21	PA 21 Maximise range behaviour and foraging by planting cover crops
22	PA 22 Positive effects of oats in the laying hen diet
23	PA 23 The benefits of providing roughage to laying hens
24	PA 24 Laying hens want to dust bath in peat
25	PA 25 The shade created by the trees around the farm improves the microclimate.
26	PA 26 Mesh on the floor helps newly placed laying hens adjust to aviary systems.
27	PA 27 Reducing the risk of injury when transferring hens at the end of lay from furnished cages to transport lorries
28	PA 28 Evaluating commercial innovations
29	PA 29 Monitoring of poultry red mite using measuring traps: an easy, cheap and effective method.
30	PA 30 Monitoring poultry red mite allows you to anticipate and optimise treatment.
31	PA 31 Sand may be an easier litter material for wet conditions
32	PA 32 Can sand litter maintain better feather cover?
33	PA 33 Monitoring the impact of feed additives to improve the gut-health of laying hens.
34	PA 34 Maximise ranging behaviour by planting trees
35	PA 35 Methods to reduce predation of free ranging hens
36	PA 36 Recommendations for using alpacas as guardians of free range hens
37	PA 37 Comparison of different ways to measure ammonia levels in the laying hen shed
38	PA 38 Risk assessment of each flock at end-of-lay reduces losses

## **Hennovation Practice Abstracts**

### **PA 1 Light in the laying hen houses**

Lighting in layer hen houses influences egg production and plays a role in the prevention of injurious feather pecking. With the phasing out of incandescent lights, farmers are looking for alternative light sources that are efficient and suitable to install in various housing systems. LED-lights are durable, shockproof and low in energy use. Although they have a flat rate current which doesn't flicker, the electronic dimming may produce flickering. This can cause stress to the hen, which can lead to feather pecking. Dimming should therefore be done without flickering or with very high flicker frequency. Small size LEDs can fit easily into aviary or colony systems. By combining various types of LED or putting a coating on the light tube, many colours of light can be produced and even the UV spectrum is possible. The most common LED tubes produce white light, but a warmer light (max 3000K) is advised for egg producing animals; and for rearing pullets a cooler light (4000-6000K). When buying LED pay attention to:

- The armature for LED is resistant to high pressure water cleaning and high concentrations of ammonia
- Make sure the dimming electronics of your LED light is either flat rate current or very high in flicker frequency.
- Select a water and ammonia proof type of LED with durable electronics.

Licht in leghennenstallen is van belang voor de eiproductie en speelt een rol bij de preventie van beschadigend pikgedrag. Ter vervanging van de gloeilamp zoeken pluimveehouders naar alternatieve lichtbronnen, die energiezuinig zijn en toepasbaar in verschillende houderijsystemen. LED-lampen zijn duurzaam, schokbestendig en laag in energieverbruik. Hoewel ze werken op gelijkstroom, kan het elektronisch dimmen wel degelijk een flikkering veroorzaken. Dit kan leiden tot stress bij de hennen en daardoor tot verenpikken. Het dimmen dient daarom zonder flikkering of met een hele hoge flikkerfrequentie te gebeuren. Klein formaat LED-lampen passen gemakkelijk in voliëresystemen of koloniehuisvesting. Door verschillende LEDs te combineren of een coating om de lamp aan te brengen, kunnen vele kleuren licht geproduceerd worden en is zelfs het UV spectrum mogelijk. De meest gangbare LED-lampen produceren wit licht, maar een warmer licht (max 3000K) wordt eadviseerd voor leggende dieren; en voor opfokhennen wordt een koeler licht geadviseerd (4000-6000K). Let bij het kopen van LED op:

- Het armatuur voor de LED moet bestand zijn tegen hoge druk waterreiniging en hoge concentraties ammoniak
- Let erop dat de dim-elektronica van de LED-verlichting ofwel via gelijkstroom werkt ofwel een hele hoge flikkerfrequentie.
- Kies een water en ammoniak bestendig type LED met duurzame elektronica.

### **PA2 Feather scoring as a management tool to reduce injurious feather pecking in flocks with intact beaks.**

As infrared beak treatment is a painful procedure, there is increasing consumer demand for eggs from hens with intact beaks. Several EU countries have put legislation in force to ban beak trimming. Where an outbreak of feather pecking occurs, flocks with intact beaks tend to have more feather damage. Poor feather cover leads to higher feed consumption, higher costs, and mortality due to injury and cannibalism. Feather scoring a flock regularly makes sure you detect pecking damage as soon as possible and can help prevent further damage by stopping this unwanted behaviour. The sooner feather pecking is detected, the higher the chance you can stop it. Feather pecking has been occurring for some time before bald spots become visible. Scoring on a regular basis will facilitate early detection of injurious pecking and allows you to act before problems arise. Follow these steps to detect early signs:

- Pick birds up to inspect the back and base of the tail. Pay attention to missing or damaged feathers (not caused by moulting).
- Inspect the cloacal area to detect early signs of vent pecking.
- Watch bird behaviour and listen out for squawks that occur when feathers are pulled.

Omdat de infra-rood snavelbehandeling een pijnlijke ingreep voor de dieren is, is er een groeiende vraag naar eieren van onbehandelde hennen. Verschillende landen hebben het snavelbehandelen via wetgeving verboden. Bij een uitbraak van verenpikken hebben leghennen met hele snavels doorgaans meer veerschade. Slechte bevedering leidt tot hogere voerconsumptie, hogere kosten en uitval als gevolg van verwondingen en kannibalisme. Het regelmatig beoordelen van de bevedering van een koppel zorgt ervoor dat pikkerij schade zo snel mogelijk ontdekt wordt en kan helpen om meer schade te voorkomen door het stoppen van dit ongewenste gedrag. Hoe eerder verenpikkerij ontdekt wordt, hoe groter de kans is dat dit gedrag kan worden gestopt. Verenpikken treedt al een tijdje op als er kale plekken zichtbaar worden. Door op regelmatige basis de bevedering te beoordelen kan verenpikkerij in een vroeg stadium ontdekt worden en kan actie ondernomen worden voordat er daadwerkelijk problemen optreden. Volg de volgende stappen om vroege signalen van verenpikkerij te ontdekken:

- Pak hennen op om de rug en de staartaanzet te inspecteren. Let op missende en beschadigde veren (niet veroorzaakt door rui).
- Inspecteer de cloaca regio om vroege signalen van cloacapikken te ontdekken.
- Let op het diergedrag en luister of kreten te horen zijn, die hennen slaken als veren uitgetrokken worden.

### **PA 3 Adjustments in stocking density according to outside air temperature during transport of end-of-lay hens.**

Looking back over records of transport-related mortality for end-of-lay hens (collected by the State Veterinary Administration Authority of the Czech Republic) revealed a significant increase in mortality for journeys that were carried out when average outside temperature was colder than  $-2\text{ }^{\circ}\text{C}$  (1.13% vs 0.51% for journeys carried out under outside temperatures above  $-2\text{ }^{\circ}\text{C}$ ). Council Regulation (EC) No 1/2005 lays down minimum floor areas that shall be provided to poultry transported in containers. However, this Regulation permits adjustments according not only to the weight and size of the birds but also on their physical condition, the weather and the likely journey time. A simple measure that has proven to be effective in other countries and resulted in a decrease in mortality due to cold stress during transport is an increase (typically by 8-15%) in stocking density during transport in very cold weather, and a decrease in hot weather. Therefore, the transporter should consider:

- The expected outside temperature during transport and adjust the loading density accordingly
- Increasing the stocking density for journeys carried out in cold weather - particularly in conditions where the birds are poorly feathered, low weight, the weather is wet or windy and/or the journey is long.
- Monitoring levels of mortality to suggest adjustments to subsequent loads.

### **PA 3 Úprava hustoty nakládky v závislosti na venkovní teplotě během přepravy nosnic na jatky**

Na základě retrospektivní analýzy záznamů Státní veterinární správy České republiky o úhynech nosnic v souvislosti s jejich přepravou na jatky byl zjištěn více než dvojnásobný nárůst úhynů v době, kdy průměrná teplota vzduchu při přepravě klesla pod  $-2\text{ }^{\circ}\text{C}$  (1,13 % vs 0,51 % při teplotě nad  $-2\text{ }^{\circ}\text{C}$ ). Nařízení Rady (ES) č. 1/2005 stanoví minimální plochu, která má být při přepravě drůbeží v kontejnerech zajištěna. Zároveň však umožňuje tyto hodnoty upravit v závislosti nejen na hmotnosti a věku, ale i na tělesném stavu, povětrnostních podmínkách a předpokládané délce trvání cesty. Jednoduchým opatřením, které se v jiných státech osvědčilo a vedlo ke snížení úhynů v důsledku chladového stresu, je zvýšení (zpravidla o 8 až 15 %) hustoty nakládky pro přepravu při velmi nízkých teplotách a snížení hustoty nakládky při vysokých venkovních teplotách. Přepravce by tedy měl zajistit:

- informace o očekávané teplotě vzduchu během přepravy a odpovídající přizpůsobení hustoty nakládky
- zvýšení hustoty nakládky pro přepravu při nízkých teplotách, a to zejména pokud mají být přepravovány nosnice menší hmotnosti a hůře opeřené, počasí je deštivé a větrné a/nebo přeprava trvá déle
- sledování úrovně mortality při přepravě a z toho vyplývající odpovídající úpravy při dalších přepravách

#### **PA 4 Improving the catching and transporting of laying hens to slaughter at the end of lay by adding value to hen meat.**

At the end of their laying period the hens are removed from the barn to be slaughtered for human consumption or killed within the building. This event has the highest risk of suffering in the hen's life. After the laying period the hens, particularly if housed in furnished cages, are fragile and need to be handled carefully to avoid injuries such as bone breakage. All hens, regardless of housing system, are frightened by human handling. The work of catching hens is hard, dusty, noisy and often stressful. Hence, this is a critical event both for birds and the people involved. Depopulation of the poultry barn imposes a cost on the farmer for the catching crew and transport, and the birds represent low value as the price for the meat/carcass is very low. Therefore, there is virtually no financial room for animal welfare investments at this stage. A solution may be to create a larger financial margin by increasing the value of the hen meat. This may be done by informing potential users such as local government, who use large quantities of food, about the advantages of hen meat and how to prepare it. For example, hen meat is safe and tasty, and to use it reduces food waste, addressing one of our global issues. With an increased demand and use of hen meat, its value increases and that allows farmers to invest in animal welfare improvements. This can simultaneously benefit worker welfare when depopulating the barns. When the industry develops new, modern products made from hen meat, this will attract today's consumers to a larger extent than just raw hen meat.

I slutet av värpperioden måste hönsen flyttas ifrån höns huset och blir antingen slaktade eller avlivas i höns huset för att sedan skickas till destruktion. Vid hanteringen riskerar hönsen att utsättas för lidande. Efter värpperioden är hönsen, särskilt burhönsen, sköra och behöver hanteras mycket försiktigt för att inte skadas och tex få benbrott. Alla höns, oavsett inhysningssystem, skräms av att hanteras. Arbetet med att fånga hönsen är tungt, dammigt, bullrigt och ofta stressigt. Att tömma höns huset innebär kostnader för lantbrukaren och hönorna har ett mycket lågt slaktvärde. Pga det finns det mycket litet utrymme för investeringar i förbättrat djurskydd vid denna fas av produktionen. En möjlig lösning skulle kunna vara att öka värdet av höns köttet. Detta skulle kunna göras genom information till potentiella användare, tex kommuner som använder stora mängder livsmedel, om fördelarna med höns kött och hur man tillagar det. Exempelvis är höns kött av hög livsmedelshygienisk kvalitet, smakar gott och att använda det innebär minskat matsvinn, vilket är en av de stora globala utmaningarna just nu. En ökad efterfrågan av höns kött skulle öka köttets värde och medge investeringar för tex förbättrat djurskydd. Detta skulle samtidigt gynna arbetsmiljön när höns husen töms. Om branschen skulle utveckla nya moderna produkter av höns kött kunde det attrahera dagens konsumenter mer än bara rått höns kött.

### **PA 5 Chick rearing conditions are crucial to prevent later feather pecking**

During early life chicks explore and learn about aspects of their environment. Behavioural patterns are formed and shaped. For instance, they learn what is edible and what is not, where to find food and water. In nature, the mother hen is an important model for the chicks, but under farm conditions it is the caretaker who is responsible for arranging things in a way that pecking behaviour develops as it should. That there are adequate materials for chicks to direct this behaviour towards. For example, if the flooring material is not attractive for pecking and scratching, the chicks may direct pecking towards other objects in the environment, such as feathers of other chicks. This can lead to feather pecking problems in later life. The floor material provided to the chicks is one of the single most important management strategies to establish normal ground pecking and scratching behaviour. Provide chicks with good quality floor material, such as sawdust, wood shavings or sand, which is kept dry, loose and manipulable. This will positively occupy the chicks in scratching, pecking, foraging and dustbathing behaviour. To prevent feather pecking in later life, provide additional resources regularly like grain or additional litter material from an early age (one-day old) to motivate the chicks to ground peck.



## **PA 6 How to keep laying hens with intact beaks - learning together**

Farmers are required to adapt management as market developments lead to an increase demand for eggs from hens with intact beaks. Years ago, organic farmers faced this challenge, and now manage intact beaked flocks successfully. Individual farmers learn by trial and error, and improve management step by step. A dramatic increase in knowledge transfer is achieved when farmers form study groups to share best practice. Organic farmers found choosing the right genotype, providing ample space and housing design to promote natural behaviour, creating foraging interest through scattering cereal, and providing roughage and enrichment protein sources such as alfalfa are key. Co-operation between hatching companies, advisors, researchers, rearers and farmers started. Farmers learned to recognize the early signs of injurious pecking, and started to observe hen behaviour. Forming study groups, willingness to share knowledge, involvement of researchers, advisors and industry stakeholders, and contact between rearers and laying hen farmers, can stimulate and speed up the process of learning how to successfully manage intact beaked flocks.

Pluimveehouders moeten leren hoe ze onbehandelde koppels kunnen houden, omdat marktontwikkelingen leiden tot een verhoogde vraag naar eieren van onbehandelde hennen. Jaren geleden stonden Nederlandse biologische pluimveehouders voor dezelfde uitdaging en houden nu succesvol hennen met hele snavels. Individuele biologische pluimveehouders leren door vallen en opstaan en verbeteren het management stap voor stap. Een sterke toename in kennis uitwisseling is bereikt toen pluimveehouders studiegroepen vormden en de beste oplossingen met elkaar deelden. Biologische pluimveehouders ontdekten het belang van het kiezen van het juiste type dier, verstrekken van veel ruimte en het huisvestingssysteem om natuurlijk gedrag te stimuleren, het stimuleren van scharrelgedrag door graag te strooisel en ruwvoer te verstrekken en kwalitatief goede eiwitten in het voer. Samenwerking tussen broederijen, voorlichters, onderzoekers, opfokkers en pluimveehouders begon. Pluimveehouders leerden de allereerste signalen van verenpikken maatregelen te herkennen en begonnen naar het diergedrag te kijken. Deelname aan studiegroepen, bereidheid om kennis en ervaring te delen, betrokkenheid van onderzoekers, adviseurs en sectorvertegenwoordigers, en contact tussen opfokkers en legpluimveehouders kunnen het proces van succesvol houden van onbehandelde hennen stimuleren en versnellen.

### PA 7 An easy monitoring method to improve control of poultry red mite in laying hen flocks.

Poultry red mite *Dermanyssus gallinae* (PRM) is the most common ectoparasite in laying hen farms worldwide, causing considerable economic farm losses and reduced hen health and welfare. This blood sucking parasite needs blood to fulfil its lifecycle. The mites are difficult to control as they hide, rest, digest and mate in cracks and crevices near the hens. The current available poisons will only target a small proportion of the mite population as it will not reach mites deep in the cracks and crevices. Therefore, preventative measures and monitoring are key to control red mite. Use a tube trap or the Rick stick as an easy monitoring tool. The trap is made of a 10cm long PVC tube (outer  $\varnothing = 18$  mm) with a 12 cm long round wooden stick ( $\varnothing 14$  mm) inside. A small screw in the middle of the wooden stick prevents the hens taking out the wooden stick. Place the traps under the perches fixed with a zip-tie. Check, score and subsequently clean the stick with a small brush and record the findings of each trap every week. Below is an example of a scoring system you can use: score 0 = no mites, score 1 = some single mites, score 2 = more mites, score 3 = a lot of mites, score 4 = too many mites. Flocks scored with higher numbers of mites are more difficult to control. Act when a score is higher than 2.

Score 1: weinig bloedluizen



Score 2: meerdere bloedluizen



Score 3: veel bloedluizen



Score 4: zeer veel bloedluizen



### **PA 7 Een eenvoudige monitoringsmethode om vogelmijt/bloedluis in leggestallen beter te beheersen**

De vogelmijt/bloedluis *Dermanyssus gallinae* (PRM) is wereldwijd de meest voorkomende ectoparasiet op legpluimveebedrijven en kan bij grote aantallen leiden tot aanzienlijke economische verliezen en hebben een negatief effect op de diergezondheid en het dierwelzijn. Vogelmijt is een bloedzuigende parasiet die bloed nodig heeft om zijn levenscyclus te volbrengen. Een vogelmijtbesmetting is moeilijk te beheersen omdat ze zich in gaten en kieren in de buurt van de slaapplaats van de hennen verstoppen, rusten, het bloed verteren en paren. De huidige beschikbare acariciden (middelen tegen spinachtigen) hebben een korte nawerkingstijd waardoor slechts een klein gedeelte van de populatie bestreden wordt. De mijten in gaten en kieren worden waarschijnlijk niet bereikt. Preventieve maatregelen en het monitoren van de vogelmijtpopulatie zijn daarom de belangrijkste onderdelen bij het beheersen van vogelmijt. Om een vogelmijtpopulatie in een legpluimveestal te monitoren en om het effect van een preventieve of curatieve bestrijding te bepalen kan gebruik worden gemaakt van een zogenaamde pvc-buis-val of de Rick stick. De val is gemaakt van 10 cm lange PVC buis (outer  $\varnothing = 18$  mm) met daarin een 12 cm lang rondhout ( $\varnothing 14$  mm). Een kleine schroef in het midden van het rondhout voorkomt dat de hennen het rondhout uit de val verwijderen. De val moet onder de zitstok worden geplaatst met behulp van trekbandjes. Bekijk de valletjes wekelijks, bepaal de score, maak de val schoon met een kleine kwast en registreer de bevindingen van elke genummerde val. Hieronder een voorbeeld van een scoringsysteem: score 0 = geen mijten, score 1 = enkele individuele mijten, score 2 = meerdere mijten, score 3 = veel mijten, score 4 = heel veel mijten. Neem maatregelen bij een enkele waarneming van score 2. Bij een hogere score is het moeilijk om de vogelmijtpopulatie te beheersen.

### **PA 8 Critical points during catching and transport of end of lay hens**

Losses due to injury or resulting in death that are sustained during depopulation and transport are variable, and high levels reduce the sustainability, profitability and credibility of industry and reflect practices detrimental to bird welfare. The following are the main critical points in the procedure where steps can be taken to prevent or minimise losses:

#### On farm

- Measure bird condition in advance
- preparation (feed withdrawal, culling unfit birds)
- Catching (method, training of crew, care with handling)
- Loading (design of container, stocking density, care with handling)

#### On the road

- Transport (care with driving, adjusting curtains, minimising duration)

#### Lairage

- Monitoring thermal stress (adjust spacing of stacks, provide shelter/fans, minimise waiting time, provide drinking water)
- Bird handling (care when removing module/stack from lorry; care if using live shackling)

Addressing all these points will minimise losses, thereby improving sustainability and profit as well as improving bird welfare and satisfying consumer expectations. Much like HACCP (Hazard analysis and critical control points), routine evaluation and application of control measures will lead to the benefits indicated above. It is important all parties communicate with each other.

### **PA 9 Selection criteria for laying hen litter**

To reduce the risk of injurious feather pecking, dry and friable litter is vital. With many different types of litter substrate available, farmers find it difficult to identify the best litter for the hens, farmer and farm economics. A group of farmers together with a veterinarian developed a checklist to help prioritise the litter options that were available to them.

When choosing litter substrate, they recommend you consider:

- Availability
- Affordability
- Manipulability by the laying hen
- Food safety (presence of Dioxins, Salmonella)
- Moisture absorption capacity
- Not causing lesions
- Reducing ammonia

### **PA9 Selectie criteria voor strooisel voor leghennen**

Om het risico op beschadigend pikgedrag te reduceren is droog en rul strooisel van groot belang. Doordat er vele verschillende soorten strooisel beschikbaar zijn, vinden pluimveehouders het lastig om de juiste soort te kiezen, die het beste is voor zowel de kip, de pluimveehouder en bedrijfseconomie. Daarom heeft een groep legpluimveehouders samen met een dierenarts een checklist ontwikkeld om een eerste selectie te maken uit de beschikbare soorten strooisel.

Bij het kiezen van het juiste strooisel adviseren zijn om het strooisel te beoordelen op:

- Beschikbaarheid
- Betaalbaarheid
- Manipuleerbaarheid door de kippen
- Voedselveiligheid (kans op Dioxines, Salmonella)
- Vocht-absorptie capaciteit
- Veroorzaakt geen huidbeschadigingen
- Reduceert bij voorkeur ammoniak

**PA 10 Litter for laying hens: rape seed straw and fibre hemp straw**

To reduce the risk of injurious feather pecking, dry and friable litter is vital. With many different types of litter substrate available, farmers find it difficult to identify the best litter for the hens, farmer and farm economics. Using a checklist developed by a group of layer hen farmers and a veterinarian, another farmer group identified that cut rape seed straw and cut fibre hemp were the most promising types of litter from their shortlist. Cut rape seed straw was chosen because it is readily available, affordable, manipulable, with no known adverse health effects, and has good absorptive capacity. Fibre hemp also most likely has an improved absorption of moisture and leads to a reduction of ammonia when compared to regular types of litter e.g. wheat straw, rape seed straw. Using 3-5cm long substrate, the farmers found no difference in hen behaviour, clinical well-being or feather pecking when using these two types of litter.

**PA 10 Strooisel voor onbehandelde leghennen: geen welzijnsverschil tussen koolzaadstro en vezelhennepestro.**

Om het risico op beschadigend pikgedrag te reduceren is droog en rul strooisel van groot belang. Doordat er vele verschillende soorten strooisel beschikbaar zijn, vinden pluimveehouders het lastig om de juiste soort te kiezen, die het beste is voor zowel de kip, de pluimveehouder en bedrijfseconomie. Een groep legpluimveehouders hadden met behulp van de checklist gemaakt door een groep legpluimveehouders en een dierenarts (PA10) een shortlist gemaakt waarbij gehakseld koolzaadstro en vezelhennepestro als meest veelbelovende strooiselsoorten naar voren kwamen. Gehakseld koolzaadstro was gekozen, omdat het makkelijk verkrijgbaar, betaalbaar en manipuleerbaar is, geen negatieve gezondheidseffecten heeft en een goede absorberende capaciteit heeft. Vezelhennepestro heeft waarschijnlijk een beter vochtabsorberend vermogen en leidt mogelijk tot minder ammoniak uitstoot vergeleken reguliere strooiselsoorten, zoals tarwe- of raapzaadstro. De pluimveehouders vonden geen verschil tussen beide strooiselsoorten met een lengte van 3-5 cm.

## PA 11 Climate Checklist to reduce injurious feather pecking in laying hens

Stressful situations, like changes in feed, bad climate, and disease problems, can be a trigger for feather pecking. To help with this, a group of laying hen farmers developed a checklist as an awareness monitoring tool of the climatic situation in a laying henhouse. Their checklist is shown below:

### Do

- Walk throughout the whole facility and observe the behaviour of the laying hens and feel the airflow.
- By making your cheek a little wet with water you can feel the air flow alongside your cheek.
- Check the climate advice on the Klimaatplatform:  
<http://www.wageningenur.nl/nl/show/Klimaatplatforms-Varkens-en-Pluimveehouderij.htm>

### Check and act - *The climate checklist*

#### A bad climate

- The end of the facility is not visible - Tip: adjust the ventilation
- Humid - Tip: elevate the temperature
- There is a big difference between the temperature sensors - Tip: check the sensors
- Streaming or watery eyes
- Gasping hens - Tip: add an extra fan
- Wet litter
- Narrow space between roof and housing system - Tip: suspend "boxes" to the ceiling to obtain an airflow in the top of the facility
- Dead hens - A bad climate may cause an E. coli infection
- The facility is exposed to the wind attack causing too much vacuum pressure - Tip: adjust the place of the vacuum pressure meter
- Cold airflow
- Animal care taker start sweating when walking through the laying hen facility
- Large difference between day and night temperature with changes of weather conditions (temperature or wind direction)

#### A good climate

- There is a clear sight in the laying hen facility/ the end of the facility is visible
- Dry air
- Hens are equally spread in the compartment
- When you come outside the facility, you smell "fresh"
- Drafts are absent in the facility
- The vacuum pressure meter is adjusted at 20 Pa
- With climate control during the winter only 1/3 of the valves are operable
- A good climate can be shown by a test using smoke during the empty period between two production periods

## PA 11 Klimaat checklist om pikkerij bij leghennen te beperken

Stressvolle situaties, zoals veranderingen in voeding, slecht klimaat, of ziekten, kunnen een aanleiding zijn voor schadelijk verenpikgedrag. Een groep legpluimveehouders heeft een checklist ontwikkeld om elkaar bewust te maken van de klimatologische situatie in een pluimveestal en daarmee de mogelijkheid te bieden om schadelijke verenpikgedrag te voorkomen. Hun checklist wordt hierna getoond.

### Doen

- Loop 's avonds door de stal en kijk naar het gedrag van de hennen en voel de luchtstromen. Door je wang nat te maken voel je de luchtstromen langs je wang.
- Bekijk het klimaat advies van het Klimaatplatform:  
<http://www.wageningenur.nl/nl/show/Klimaatplatforms-Varkens-en-Pluimveehouderij.htm>

### Controleer en verbeter - de Klimaatchecklist

#### Een slecht klimaat

- Je kunt het eind van de stal niet zien - Tip: Pas de ventilatie aan
- Vochtig? Tip: verhoog de temperatuur
- Grote verschillen tussen temperatuurvoelers - Tip: controleer de voelers
- Tranende ogen
- Hijgende kippen - Tip: plaats er een ventilator bij
- Nat strooisel?
- Te weinig ruimte tussen dak en huisvestingssysteem - Tip: plaats "bakken" aan het plafond om de luchtstromen ook bovenin te krijgen
- Dode hennen - Een slecht klimaat kan een E. coli infectie bij de hennen veroorzaken
- Wind staat op de stal waardoor er teveel onderdruk komt - Tip: beoordeel de plaats van de onderdrukmeter
- Koude luchtstromen
- Dierverzorger zweet bij lopen door de stal
- Grote temperatuurverschillen tussen dag en nacht of bij een weersomslag (temperatuur of windrichting)

#### Een goed klimaat

- Het is helder in de stal. Je kunt het eind van de stal zien
- Droge lucht
- Kippen zijn gelijkmatig verdeeld over de afdeling
- Je ruikt "fris" als je uit de stal komt
- De stal is tochtvrij.
- De onderdrukmeter is afgesteld op 20 Pa
- Bij de winterregeling van het klimaat is 1/3 van de kleppen bediend
- Een goed klimaat kun je aantonen door het laten uitvoeren van een rookproef tijdens leegstand



## PA 12 Measures to suppress poultry red mite populations in hen houses

A pest in laying hen husbandry that is currently hard to control is poultry red mite (*Dermanyssus gallinae*). It is a blood-sucking mite that occurs worldwide and has a negative impact on animal health, welfare and production. In laying hen husbandry, the right conditions are often present for a rapid pest population growth; there is enough food (hen blood), the right temperature is present and there are enough places to hide from being eaten by the laying hens. Measures to suppress red mite population growth are (see also henhub.eu):

- Dispose of manure daily
- Keep the temperature below 19°C
- Vacuum or clean dust monthly
- Clean and remove dried manure from the egg protection plates and from the aeration
- Treat the housing system with liquid silica
- Treat the housing system with soap and / or green soap with ethanol
- Consider using Q-perches
- Treat the housing system with repellents (including repellent essential oils)
- Treat the housing system with attractive essential oils
- Apply natural enemies (predatory mites)

## PA 12 Maatregelen en mogelijkheden om de groei van een vogelmijt (bloedluis)plaag te beperken.

Een plaag in de legpluimveehouderij die momenteel moeilijk te bestrijden is, is *Dermanyssus gallinae* (Vogelmijt of bloedluis). Dit is een bloedzuigende mijt die wereldwijd voorkomt en een negatieve invloed heeft op diergezondheid, dierenwelzijn en productie kengetallen. In een legpluimveestal zijn vaak de juiste omstandigheden aanwezig om de plaagpopulatie snel te laten groeien; er is voldoende voedsel (bloed van de hennen), de juiste temperatuur is aanwezig en er zijn voldoende verstoppplaatsen om niet te worden opgegeten door de leggen. Maatregelen waarmee de vogelmijt (bloedluis) populatiegroei onderdrukt kan worden zijn (zie ook henhub.eu):

- Voer dagelijks mest af
- Houd de staltemperatuur onder de 19 °C
- Verwijder of zuig maandelijks de stof weg
- Reinig en verwijder mestkoeken van de eierbeschermplaten en de beschermplaten van de beluchting
- Behandel inventaris met toegelaten vloeibaar silica
- Inventaris behandelen met zeep en/of groene zeep met spiritus (mits toegelaten)
- Q-perch
- Inventaris behandelen met toegelaten afstotende middelen (inclusief afstotende etherische oliën)
- Inventaris behandelen met toegelaten aantrekkelijke etherische oliën
- Uitzetten van natuurlijke vijanden (roofmijten)

### **PA 13 Use of a spinosad to prevent red mites**

Red mite (*Dermanyssus galinae*) is one of the major health problems in laying hens. Infestations of this ectoparasite increases stress levels in laying hens and may seriously impact on health. Moreover, a red mite infestation worsens the working conditions of the staff. There are several ways to prevent against red mites, including regular cleaning, adjustment of housing systems, specific poisons or heat-mediated destruction. However, most of them are not compatible with hen's being presence in the cage at the time of application. Recently, a new insecticide has been introduced into the Czech market. This agent (spinosad) should be very specific for the control of red mites and unharmed to hens. Spinosad is effective at all stages of the red mite life cycle. Spinosad has a different mode of action requiring adaptation to two receptors instead of one, making it hard for the red mite to survive. Spinosad remains in the environment for 14 days, twice as long as the red mite cycle from egg to adult, thus mites newly hatched from the egg should be eliminated. There are no known adverse effects on hens so spinosad can be sprayed when the hens are present in the housing. There are also no spinosad residues on the produced eggs. Spinosad is a promising treatment for red mites.

### **PA 13 Využití spinosadu v boji proti čmelíkům**

*Dermanyssus galinae* (čmelík) představuje jeden z hlavních zdravotních problémů v chovu nosnic. Závažné manifestace ektoparazita zvyšují u nosnic hladinu stresu a mohou závažně poškodit zdraví nosnic. Čmelíci se živí výhradně krví, což vede k anémii nosnic a riziku přenosu některých bakterií a virů. Navíc jsou velké infestace parazity spojeny s diskomfortem pracovníků v chovu nosnic. Existuje několik možností v boji proti čmelíkům. Ty zahrnují pravidelnou očistu klecí a okolí, úpravu klecí, použití akaricidů nebo např. teplem zprostředkovaná destrukce. Většina z nich není slučitelná s přítomností nosnic v kleci v době aplikace. Nedávno byl na český trh uveden nový insekticidní přípravek. Aktivní substancí je spinosad, vznikající při fermentaci mikroorganismu *Saccharopolyspora spinosa*. Tato látka je velmi specifická v kontrole čmelíků a nevykazuje mezidruhovou či environmentální toxicitu. Je efektivní na všechny lezoucí stadia čmelíků – dospělce, nymfy i larvy. Mechanismus účinku spočívá v alteraci nikotinových a GABA kanálů vedoucí k neuronální excitaci. Spinosad neinterferuje se známými vazebními místy jiných nikotinových nebo GABAergních insekticidů jakými jsou neonicotinoidy, fiproliny, avermektiny nebo cyklopieny. Rozdílem je nutnost adaptace čmelíka na dva receptorové mechanismy, což snižuje riziko vzniku rezistence. Čmelíci mají 7denní životní cyklus, a jelikož je aktivita spinosadu v prostředí 14 dní, nově vylíhnutí čmelíci jsou rovněž eliminováni. Spinosad nemá vedlejší účinky na nosnice a může být aplikován i v přítomnosti nosnic v kleci, i během snůšky. Nezanedbává rezidua na vejcích. Spinosad se zdá být nadějným prostředkem v boji proti čmelíkům.

#### **PA 14 Unifying the dress code on farm reduces stress in laying hens**

Practical experience of organic farmers showed that different overclothes of individual employees of the farm, and external visitors such as veterinarians, employees of state veterinary supervision, and other breeders, suppliers, and transporters, can alarm hens, leading to an increase in stress. When foreign people enter the henhouse, the farmers have noticed that hens react with stress, fear and panic when the visitor is dressed in a different overcoat colour than is usually used by regular keepers on that farm (e.g. veterinarian white coat). Hens quite quickly get used to keepers who enter the sheds on a regular basis in the same clothing, which leads to less fear, panic and stress when they enter the henhouse. Based on the observation of these farmers, panic provoked by foreigners can lead to a decrease in laying, increase in feather pecking, deaths and overall decrease in welfare of the hens. Unifying the dress of all employees and all external visitors (including veterinarians, suppliers, and transporters) may therefore decrease the levels of stress and in turn increase laying and egg quality, feather cover and the overall welfare of the hens. It is recommended that all external visitors enter the hen houses and ranges dressed in an overcoat and wellies that is typical of that farm.

#### **PA 14 Jednotný systém oblékání na farmách snižuje stres u nosnic**

Praktické zkušenosti organických farmářů ukázaly, že řád v oblékání jednotlivých zaměstnanců farmy a externě příchozích návštěvníků, jako jsou soukromí veterinární lékaři, zaměstnanci státního dozoru, jiní chovatelé, dodavatelé technologií či přepravci, může značně snížit úroveň stresu u nosnic. Nosnice reagují stresem, strachem, úlekem kdykoli, kdy do chovných prostor vstoupí cizí osoba, zvláště pokud má odlišnou barvu oblečení, než kterou používají zaměstnanci farmy (např. veterináři v bílém plášti). Ustájené nosnice si rychle zvykají na ošetřovatele, kteří se o ně starají, což vede později ke snížení frekvence úleků, paniky, stresu při vstupu farmářů do prostor, kde jsou nosnice chovány. Panika vyvolaná cizí osobou může u nosnic, dle zkušeností farmářů, vést ke snížení kvality či kvantity snášky, zhoršení klování pění, častějším úhynům a celkově sníženému welfare nosnic. Unifikace převlečení jednotlivých zaměstnanců farmy, ale i externě příchozích návštěvníků jako jsou veterinární lékaři, dodavatelé a přepravci, může snížit frekvenci plašení nosnic, stres a ve výsledku zvýšit kvalitu snášky, opeření a celkového welfare nosnic. Je proto doporučitelné, aby externě příchozí návštěvníci farmy, resp. prostor, kde jsou nosnice ustájeny vstupovali pouze v oblečení, které je typickým oblečením zaměstnanců, a toto oblečení bylo pro všechny návštěvníky farmy sjednoceno.

**PA 15 Use of a cost-benefit tool to improve the business performance of egg production enterprises**

Optimising the output and physical performance of laying hens is essential to business success. Performance can be measured in several ways e.g. the number of eggs produced, the number downgraded, average egg weight, feed intake and flock mortality. The relative importance of these indicators varies according to prevailing market conditions. A cost-benefit tool has been developed to be used as a basis for decision-making in egg production. The tool (in Microsoft Excel) allows a series of 'what if' changes to be made. The program then calculates the financial implications of these changes based on a gross margin and a net margin per bird. The gross margin takes account of variable costs such as feed and stock, the net margin includes fixed costs such as buildings. To ensure that the output is fully relevant, current prices for eggs, pullets and compound feed are entered to begin with. You can then use the program to assess the financial effects of reduced feed wastage, lower downgrading of eggs and increased average egg weight or the financial impacts of changing production cycle length. You can evaluate these key factors individually or together. The results can be used to calculate the likely impacts of changes to inputs or management, identifying the key factors for business success.

## PA 16 Evaluating innovations for on-farm use

Innovation networks allow farmers to develop practical solutions to current problems, but the ideas generated must be carefully evaluated to ensure their impact. An evaluation system can help guide network groups and facilitators through the innovation process step by step. This enables the best ideas to be identified quickly and developed, and those less appropriate or relevant at the time can be eliminated or postponed. A generic system enables a wide range of different problems and solutions to be investigated, not restricted to poultry nor indeed livestock farming.

Key to the decision-making process at an early stage is:

- A review of previous developments in the same subject area
- Compliance with legislative issues (including ethical, environmental and health and safety)
- Consideration of key third-party dependencies
- Technical feasibility of the innovation
- Risks of the innovation
- An initial, broad assessment of any capital (purchase) costs

A computer-based evaluation system has been developed (but all parts can be printed). The design allows up to three potential solutions to the same problem to be compared alongside one another. This makes it easier to compare the different approaches and to determine the relative merits of each.

### PA 17 Influence of crate lids on welfare of hens

In some cases, up to 30% of live birds arriving at the slaughterhouse have one or more broken bones. The origin of these lesions includes: the reduction in bone strength due to mineral deficiency during lay, the methods used to remove birds from their housing and trauma associated with transportation from the farm to the processing plant. This can have an impact on earnings gained from sold hens. End-of-Lay hens are often transported in crates (about 10 hens per crate) in trucks with about 6,000 to 10,000 animals. Broken plastic crates can cause different types of injuries; therefore they are often replaced as soon as the damage is noticed, but the damage is not always clearly visible on the lids. The sliding door, even if not visibly damaged, can be tougher to move when they are older and workers usually use more strength to move them. This can lead to very sudden, fast, and not fully controlled movement of the door and a part of the hens' body can get unintentionally stuck there or injured. Replacing lids that are problematic for workers could both decrease the number of injuries caused to hens in the transport and related operations stage, and improve workers wellbeing. This would decrease the number of confiscated hens or their body parts during official veterinary inspection, reducing waste and increasing the earning gained by the farmer.

V některých případech může na jatky dorazit až 30 % ptáku se zlomeninou jedné nebo více kostí. Příčinou těchto zlomenin může být mimo jiné snížení množství kostní hmoty z důvodu nedostatečného příjmu minerálních látek během snášky, způsob, jakým se ptáci vyndávají z klecí, a mnoho dalších potenciálních způsobů vzniku zranění během přepravy z chovu k zpracování. Tato zranění mají samozřejmě dopad na zpeněžení prodaných kusů. Slepice po ukončení snášky jsou často přepravovány v bednách (většinou okolo 10 slepic na přepravku) ve vozidlech, která jsou určena pro 6 až 10 tisíc slepic. Zničené či polámané plastové části přepravek mohou způsobit různé typy zranění a jsou velmi často nahrazovány hned, jakmile je poškození pracovníky odhaleno. Bohužel v některých případech, zvláště co se týče vík, není poškození na první pohled zřejmé. Posuvná dvířka na víku přepravky, i pokud nejsou viditelně poškozena, mohou být hůře manipulovatelná a zasekávat se, pokud jsou dlouho používaná. To vede k tomu, že pracovníci musí vyvinout větší sílu, aby je posunuli, a tento náhlý, rychlý a nedostatečně kontrolovaný pohyb dvířek může vést k neúmyslnému přivření křídla nebo jiné části těla slepce a vzniku zranění. Výměna vík přepravek, které se zdají pracovníkům problematické, by mohla snížit procento zranění způsobených během transportu a souvisejících činností a zlepšit tak i práci zaměstnanců. To by také snížilo procento konfiskovaných slepic nebo částí jejich těl během veterinární prohlídky na jatkách, což by snížilo množství vedlejších živočišných produktů a zvýšilo výnosy chovatelů.

## PA 18 Factors affecting dead on arrival (DOA) during hen transport

Slaughterhouses in some regions have average percentage of hens' dead on arrival (DOA) between 0.3 and 2.3%, but this could be easily affected by one problematic delivery where dead on arrival is 10%. Hens at the end of lay are one of the most affected and vulnerable times of life.

Risk factors for dead on arrival hens are:

- Condition of the loaded hens including length of restrictions of food and water intake
- Manipulation during catching and loading
- Social stress in newly formed transport groups
- Transport distance – mortality is lowest on short distances upto 100km
- Extremely warm or cold weather during transport

Therefore, make sure:

- Transporters should always check the condition of hens before loading
- Birds with visible abnormalities in behaviour and appearance are not accepted for transport. For example, birds with reddish skin without feathers are more likely to die during transport, and even when they survive the birds aren't suitable for processing as they are characterised as unsuitable for human consumption.
- Birds are transported to the nearest slaughterhouse possible. Dead on arrival could be more than two times higher after transport from more than 100km away.
- Transport is postponed during extreme weather conditions.

V některých oblastech dosahuje procento slepic uhynulých během přepravy (DOA – dead on arrival) na jatky mezi 0,3 až 2,3 %. Ale data týkající se průměrných úhynů mohou být jednoduše zkeslena například jednou problematickou zásilkou, kde může být DOA až 10 %. Slepice po ukončení snášky jsou v tomto případě jednou z nejnáchylnějších a také nejčastěji postižených kategorií drůbeže.

Jako rizikové byly označeny:

- kondice/stav přepravovaných slepic, zahrnující i dobu, po kterou bylo před přepravou omezeno krmení a napájení
- zacházení se zvířaty během chytání a nakládání
- sociální stres způsobený ustanovením nových skupin ptáků
- vzdálenost přepravy – úmrtnost je nejnižší při krátkých vzdálenostech do 100 km
- extrémně teplé nebo chladné počasí během přepravy

Z těchto důvodů:

- by měli dopravci vždy před zahájením přepravy zkontrolovat výživný a zdravotní stav slepic.
- by se ptáci, kteří mají viditelné narušené chování nebo vypadají nestandardně, neměli vůbec přepravovat. Například ptáci, kteří mají vypadané peří a v těchto místech zarudlou kůži, mají vyšší pravděpodobnost úhynu během přepravy. I pokud přepravu přežijí, velmi často nejsou vhodné pro další zpracování a jsou označeny jako nevhodné pro lidskou spotřebu.
- by se měli ptáci přepravovat na nejbližší jatky, kde je možné jejich porážení a zpracování. DOA může být až dvakrát vyšší, pokud jsou ptáci přepravováni na vzdálenost větší než 100km.
- by měla být přeprava odložena, pokud jsou teplotní podmínky nevhodné (extrémně vysoká nebo nízká teplota).

### PA 19 Influence of handling on injuries during hen transport

Up to 5.2% of hens or their body parts are confiscated during official veterinary inspections in slaughterhouses. The most common causes are peritonitis and cachexia, but haematomas and fractures are also a significant problem which decreases economic profitability in this sector. Rough handling can cause haematomas and fractures on the animals. Personnel at the slaughterhouse and employees of the transporter have training according to EU legislation and practical experience with manipulation of animals daily. However, personnel on farms are not required by legislation to be as qualified and the manipulation of adult hens is in some cases only at the end of the lay period.

Therefore, we recommend personnel who load animals into the crates on farm should:

- Catch the hens around their body together with their wings and avoid catching them by their legs and neck
- Put them into the crates gently
- Be sanctioned where they perform nonstandard handling of hens that can lead to injuries
- Be rewarded for correct handling of hens
- Take an official training course in handling hens

V některých oblastech je na jatkách během veterinární prohlídky konfiskováno až 5,2 % poražených slepic nebo jejich částí. Nejčastější příčinou těchto konfiskací je zánět dutiny tělní a vyhublost, ale krváceniny a zlomeniny jsou také významným problémem a mohou snížit zisky v tomto odvětví.

Hrubé zacházení se zvířaty může způsobit vznik krvácenin a zlomenin. Personál na jatkách a zaměstnanci přeprave procházejí školením a kurzy dle evropské legislativy a mají praktické každodenní zkušenosti s manipulací se zvířaty. Avšak pro zaměstnance chovatele nejsou požadavky na kvalifikaci v legislativě tak detailně rozepsány a v některých případech se dostanou k manipulaci s dospělými slepicemi až na konci snášky. Proto tedy doporučujeme, ať personál, který nakládá slepice do přepravek v chovu:

- chytá slepice kolem těla spolu s křídly a vyhne se chytání zvířat za nohy a krk.
- dává zvířata do přepravek opatrně.
- dostane předem stanovenou sankci, když zachází se slepicemi nestandardně.
- je za správnou manipulaci s drůbeží odměněn.
- absolvuje certifikovaný kurz a školení pro zacházení s drůbeží.



**PA 20 Glossy objects motivate laying hens to redirect unwanted feather pecking behaviour.**

Farmers face many challenges in preventing and controlling feather pecking in laying hens. One of the causes of feather pecking is a lack of entertainment on large farms which often comes hand in hand with a higher stocking density and inability to adequately satisfy hens natural need to explore and forage for food. One way to reduce the frequency of feather pecking is to provide safe and non-toxic toys for laying hens to explore and manipulate. Farmers have found using small hinged objects, with a shiny (silver) surface at the end are attractive enough to redirect the hens feather pecking away from another hen and towards these objects. A glossy (silver) surface significantly increases the interest and use of these toys by hens. Take these things into consideration when adding objects to enrich the hen house:

- Toys must be made of durable and non-toxic material. E.g. a glossy silver stick, possibly with a rounded end or a ball at the end
- The object must be made of a solid material that will resist the pecking by the hens
- Periodically change where you place these toys to keep the environment novel and interesting

**PA 20 Předměty s lesklým povrchem motivují nosnice k přesměrování nežádoucího klování peří.**

Farmáři čelí mnoha výzvám v boji proti nadměrnému klování peří v chovech nosnic. Jednou z příčin klování peří je na podněty chudé prostředí velkých farem, často také ruku v ruce s vyšší hustotou osádky a nemožností dostatečného uspokojení nosnic v přirozené potřebě explorační a vyhledávací potravy v substrátu. Jednou z cest, jak snížit četnost nežádoucího klování peří, je poskytnutí bezpečných a netoxických předmětů či pomůcek vhodných ke klování nosnicemi. Lesklý (stříbrný) povrch významně zvyšuje u nosnic zájem o tyto předměty. Farmáři již dříve zjistili, že použití menších zavěšených předmětů, s menším lesklým (stříbrným) povrchem na konci těchto předmětů, vede k přesměrování nežádoucího klování peří nosnic a zvyšuje tak welfare nosnic:

- Tyto pomůcky musí být vytvořeny z odolného a netoxického materiálu. Např. lesklá stříbrná tyčinka, případně se zaobleným koncem nebo s kuličkou na konci.
- Úvaz předmětu musí být zhotoven z pevného materiálu, který odolá případnému klování nosnic.
- Důležitou praxí je také periodické umísťování těchto předmětů do prostor, kde jsou nosnice chovány, aby byl plně využit prvek náhody / překvapení, jakožto důležitého prvku obohacení prostředí nosnic, jako takového.

## PA 21 Maximise range behaviour and foraging by planting cover crops

On commercial farms hens do not need to forage to obtain food and if this highly motivated behaviour is not satisfied injurious feather pecking can start, causing pain and distress in the flock. Feather pecking also leads to a loss of production, disease and mortality. Encouraging hens outside to forage is an important prevention measure. For this, hens want the protection of a canopy. Grants are available for farmers to plant trees however, many farmers are not at liberty to do this due to the permanency of trees which conflicts with tenancy agreements or other land use. A simply, practical solution is using cover crops.

What are the main benefits of Jerusalem Artichokes?

- Easy to establish and quick growing
- Hardy in winter lasting 3-5 years
- Can fit into a mixed farm rotation
- Increases biodiversity
- Provides foraging opportunities and sources of protein
- Improves soil structure and fertility

How can farmers make use of this cover crop?

- Tubers are live when delivered in Spring and must be sown asap (within 24 hours)
- Planted 2 feet apart in late April provides 6 feet of cover by late Summer
- Plough ground and hand sow artichoke bulbs in, pull springtine cultivator through ploughing to mix and roll in (can cultivate, sow and heel in but easier with a tractor)
- Protect young emerging plants for 8 weeks when plants are strong enough to withstand hens foraging bottom leaves
- Thin out tubers to expand the area



### **PA 22 Positive effects of oats in the laying hen diet**

From practical experience inclusion of around 10-20 % of oat in the diet of laying hens is suggested to be beneficial. Research also suggested less cannibalism and better plumage condition in hens that have been fed diets containing oat. Oats contain different nutrients which are beneficial to hens, as well as including fibre. Providing hens with larger particle sizes of oats, or whole oats, has shown positive effects on the gizzard and gut, and less need for hens to increase their fibre intake from other sources like feathers. Often commercial layer feed contains some oats but this might be finely grained. Therefore, adding more coarse oats to the hen's diet can be beneficial. Scatter whole oats in the litter in the henhouse to increase interest and foraging activity of the hens. Practical experience has found a positive effect on plumage conditions of hens that have been offered whole oats everyday on farm. Incorporate this into your routine management to improve fibre intake, nutrition and foraging variety and reduce feather pecking and eating of feathers.

### **PA 22 Positiva effekter av havre i dieten till värphöns**

Från praktisk erfarenhet har man funnit att det kan vara fördelaktigt att ha ca 10-20 % havre i dieten till värphöns. Forskning har också funnit indikationer på att det blir mindre kannibalism och bättre fjäderdräkt hos höns som får havre i dieten. Havre innehåller olika näringsämnen som kan vara bra för hönsen men även fibrer. Om hönsen får helhavre, eller havre som inte är alltför finfördelad, kan det ge positiva effekter på ex krävan och mag-tarmsystemet. Detta leder också till ett minskat behov för hönorna att få i sig fibrer från andra källor som ex fjädrar. Ofta innehåller vanligt kommersiellt hönsfoder havre men den kan vara finfördelad och det kan därför vara bra att ge extra havre. Om man sprider helhavre i ströbädden kan det också leda till ökad aktivitet och födosök och på gård har man noterat bättre fjäderdräkt hos höns som fick daglig tillgång till helhavre i ströbädden. Ett tips kan därför vara att ge extra havre för att reducera risken för fjäderplockning genom ett ökat fiberintag och mer variation i foderintaget.

### **PA 23 The benefits of providing roughage to laying hens**

Giving laying hens access to roughage provides them with the opportunity to forage which will help reduce the risk of feather pecking. In addition, fibre in the hens' diet is good for the condition of the plumage and positive for gut health. In organic production, there is a requirement that the birds are provided roughage in the henhouse or in the winter garden during the season they do not go outside and have access to vegetation on the pasture.

There are many ways in which roughage can be provided to the hens. For example, straw, hay, lucerne and also root vegetables are used. Farmers report that straw is generally appreciated by the hens. If you want to provide it in the henhouse, hay nets attached to the wall are an easy, effective option. However, many farmers prefer to provide it in the winter garden where there is more space. Grass can also be provided e.g. as hay or silage (use short pieces of grass to avoid gizzard impaction and remove silage that has not been consumed before it goes bad). Another option is temperature treated and chopped Lucerne. This has an additional health and hygiene benefit.

### **PA 23 Fördelar med att ge grovfoder till värphöns**

Tillgång till grovfoder ger värphöns ökade möjlighet till aktivitet genom födosök vilket kan minska risken för fjäderplockning. Det erbjuder också ökat intag av fibrer vilket kan ha positiva effekter på fjäderdräkt och mag-tarm hälsa. Inom ekologisk produktion bör hönsen få tillgång till grovfoder och särskilt under den tiden när de inte har tillgång till bete i rasthagarna.

Olika typer av grovfoder som kan användas och som uppskattas av hönsen är ex halm, hö, lusern och även rotfrukter. Om man vill ge det i inne i hönsuset kan man ex använda höhäckar eller mindre balar annars är det vanligt att man ger det på verandan där det kan vara mer utrymme för ex större balar. Gräs kan man ge ex både i form av hö och ensilage. Det kan vara bra att ge mer kortstråigt för att undvika förstoppning i krävan och överblivet ensilage bör tas bort innan det blir dåligt. Ett annat alternativ från smittskyddsperspektiv kan vara värmebehandlad och hackad lusern.

### **PA 24 Laying hens want to dustbath in peat**

Dustbathing is a behaviour performed by hens to keep their plumage in a good condition. Under semi natural conditions it is usually performed in the middle of the day every second day. One bath in general takes around 30 minutes to perform and is carried out in a dry and dusty substrate containing particles which can get into the feathers. The hen shuffles her body and feathers into the substrate to get the dust in between the feathers. Excessive feather fats adhere to the dust and are then shaken off. This helps to make the plumage water resistant with a good insulating capacity and removes ectoparasites.

Hens have both a functional and behavioural need to access dustbathing material to keep their plumage in good condition. When given a choice, hens chose peat to dustbath in. Wood shavings are probably too large to enter the feathers and reach the skin of the bird. Peat is the one type of litter that is most efficient in reducing the excess fats on the hen's feathers. Hens are highly motivated to use peat. They are willing to work to get access to peat to dustbathe in. Consider adding peat to your henhouse or winter garden. Particularly during the season when hens are unable to access the outdoors to create their own dustbathes on the range.

### **PA 24 Sandbadningsmaterial till värphöns**

Sandbadning är ett beteende som utförs av fjäderfä som ett sätt att hålla fjäderdräkten i gott skick. Under semi- naturliga förhållanden sandbadar höns vanligtvis mitt på dagen varannan dag. Ett bad tar i allmänhet cirka 30 minuter och utförs i ett torrt och dammigt substrat som innehåller partiklar som kan komma in i fjäderdräkten. Genom att utföra specifika rörelser kommer partiklarna in bland fjädrarna och överflödiga fetter fäster vid partiklarna och skakas sedan av. Detta bidrar till att göra fjäderdräkten mer vattentät och med god isolering. Man tror också att sandbad hjälper till att ta bort ectoparasiter.

Höns har både en funktionell och beteendemässigt motivation till att ha tillgång till ett material som är lämpligt för sandbadning. Höns som fått välja mellan olika typer av strömaterial valde att bada i torv. Det kan bero på att ex kutterspån som också användes troligen var för stora för att komma in i fjädrarna och nå fågelns hud. Torv har också visat sig vara effektivt för att minska överflödiga lipider på fjädrarna och höns har också visat att de är villiga att arbeta för att få tillgång till torv för att bada i. Det är därför viktigt att ge höns tillgång till ett bra sandbadningsmaterial som har de rätta egenskaperna som hjälper fåglarna att hålla fjäderdräkten i gott skick, särskilt under perioder när de inte kan gå ut och välja sitt eget sandbadningsmaterial.

### **PA 25 Shade created by trees and hedgerows improves the microclimate of the farm.**

Heat discomfort and distress along with the deterioration of other microclimate factors can lead to increased stress, decreased laying, feather pecking and increased mortality in laying hens. The sun's direct thermal effects, brightens up walls, roofs, concrete and paving. These areas then radiate heat back into their environment.

A hedgerow around a hen range can reduce the heat load on the laying hens during hot summer days, and can help reduce the ambient temperature in unconditioned areas to safeguard the overall microclimate and thermal comfort of the laying hens. Direct shielding and evaporation of steam from the surface of the leaves, may decrease the temperature in hen houses up to 2 to 5 °C.

A hedgerow consisting of deciduous or coniferous trees, bushes, and hedges helps with temperature management inside the hen house and out on the range, and will encourage more hens out to forage.

How to make best use of tree planting:

- Plant trees in the immediate vicinity of the hen houses, ideally between 9 to 15 metres from the buildings
- Consider new tree planting when planning the construction of new houses
- Use appropriate species for this purpose, which include oak (Quercus), alder (Alnus), rowan (Sorbus), plane (Platanus), and pine (Pinus).
- Regularly check and maintain trees and hedgerows

### **PA 25 Stín tvořený dřevinami okolo farmy zlepšuje mikroklima farmy.**

Tepelný diskomfort v podobě zvýšených teplot, spolu se zhoršením dalších mikroklimatických faktorů na farmě, kde jsou nosnice chovány, vedou ke zvýšenému stresu, zvýšenému problému s klováním peří, a mohou vést od nižší snášky, až ke zvýšenému úhynu nosnic. Slunce svými přímými tepelnými účinky rozpaluje stěny i střechy farem, ale taky asfalt, beton, dlažbu. Tyto plochy pak sálají teplo zpět do svého prostředí. Živý plot okolo haly určené k chovu nosnic může snížit tepelné zatížení nosnic nejen během horkých letních dnů a může pomoci snížit teplotu prostředí v neklimatizovaných prostorách, a lépe tak zabezpečit celkové mikroklima farmy a tepelný komfort nosnic. Přímým stíněním, ale také odpařováním páry z povrchu listů, mohou být teploty prostor stíněných stromy, či keřů, až o 2 až 5 °C nižší. Živý plot tvořený listnatými či jehličnatými stromy, keřy, živými ploty, může pomoci s managementem teplot uvnitř farem.

Jak nejlépe využít výsadby dřevin:

- Je vhodné plánovat výsadbu stinných dřevin v bezprostředním okolí těchto budov (nejvýše do 9 až 15 metrů od farmy).
- Zvažte výsadbu nových stromů při plánování výstavby nových farem.
- Vhodnými dřevinami pro tento účel se jeví např. tyto rody: dub (Quercus), olše (Alnus), jeřábina (Sorbus), platan (Platanus), borovice (Pinus).
- Důležitá je pravidelná kontrola a údržba těchto dřevin.

**PA 26 Mesh on the floor helps newly placed laying hens adjust to aviary systems.**

Hens that are not used to aviary systems spent more time in the first few days of being placed on the ground in the aviary hall. This creates overcrowding and competition over feed and water, which becomes a risk for feather pecking which can lead to cannibalism. Farmers with older types of aviary systems use mesh to encourage more birds to access the higher areas which spreads the birds out, reducing stocking density and making sure all hens get access to feed and water. For the older systems, this method is not only financially, but also time effective. Using mesh in this way will reduce overcrowding, competition over feed and water, feather pecking, and improve the overall welfare of new laying hens. Plastic mesh located between 2 to 10 centimetres above the ground at the bottom of the aviary, motivates hens to use the higher aviary floors. Ideally, the grids of the mesh should not be larger than 1 cm or so to avoid a limb going through the mesh. After a few days, the hens will be used to the higher aviary floors, and the mesh can be removed so they have access to the entire space again.

**PA 26 Pletivo pomáhá urychlit návyk nově naskladněných nosnic na technologii.**

Farmáři využívající starší typy voliérových systémů řešili problém s nežádoucími jevy, souvisejícími se zápolením nově naskladněných nosnic o vodu a krmivo. Převážná část nosnic, která nebyla zvyklá na novou technologii, trávila více času v prvních hodinách a dnech na zemi v hale voliérového typu. Tím vyvstával problém nejen s nedostatkem místa pro všechny nově naskladněné nosnice, ale také následný problém zápolení o krmivo a vodu, což zhoršuje problém klování peří a může vést až ke kanibalismu. Pro starší systémy je uvedený způsob řešení, nejen finančně, ale také časově ne příliš náročný. Tento management zajistí snížení frekvence nežádoucího zápolení o krmivo, vodu, sníží frekvenci klování peří a zlepší tak celkové welfare nově naskladněných nosnic. Plastové pletivo, běžně komerčně dostupné, strategicky umístěné do spodní části voliéry, dva centimentry až 10 centimetrů nad zem, motivuje nosnice k tomu, aby využily vyšších pater voliérové technologie a rozprostřeli tak svou masu na větším prostoru. Ideálně by použité pletivo nemělo mít mřížky větší než 1 cm, resp. tak velké, aby si v ní nosnice nemohla zaklínit končetinu. Po několika dnech je možno opět pletivo odstranit a nosnice tak budou mít k dispozici celý prostor haly a mnohem rychleji si navyknou na využití vyšších pater voliérové technologie.

### **PA 27 Reducing the risk of injury when transferring hens at the end of lay from furnished cages to transport lorries**

At the end of lay hens are removed from furnished cages and carried upside down by their legs in bunches of about 3 birds per hand to the transport containers outside the house. Birds find this experience frightening / unpleasant and the human catchers must walk long distances, becoming tired. The birds are also at risk of injury during the process. Bring the transport drawers inside the house on trollies so that birds can be placed directly from the cages into the transport drawers. Special narrow trollies were developed to carry 4 standard drawers but also fit inside the house and dock securely with the module. The catchers liked the new system and damage to the birds was reduced.

Take the following into consideration:

- Make sure the trollies will fit inside the house and have robust wheels/castors to work on grids.
- Ensure any equipment (e.g. motors) is protected from damage by trollies.
- Provide level ground/platforms to ensure smooth transfer.
- Use methods of working that prevent wings or heads becoming trapped during loading and transfer.
- Other solutions such as split modules or stacking crated on wheeled dollies are possible.



## **PA 28 Evaluating commercial innovations**

In some cases, an effective idea developed by a group of farmers may have wider commercial opportunities where the output could be sold to other farmers. This could be arranged by the group of farmers who developed the idea, or alternatively by a company that is a specialist in the field. Commercial innovations could consist of a product or an item which is developed and sold as a solution to a problem, such as reducing feather loss or combatting red mite. Alternatively, the offer could be a service provided by specialists, for example to improve biosecurity or flock health. As with all innovations, its impact must be carefully evaluated to ensure that the solution is likely to be appropriate and cost-effective. Completing a thorough evaluation at this stage is particularly important if significant start-up costs (e.g. manufacturing processes) are likely to be required to bring the idea to the market. Hennovation has developed an evaluation approach which consists of a series of steps to ensure a logical decision-making process. These include analysis of market size, competitor activity, legal issues and development issues. Prospective commercial returns should be assessed over a period of up to five years. This can help to indicate the levels of sales required for commercial success.

## PA 29 Monitoring of poultry red mite using measuring traps: an easy, cheap and effective method

Effective control of poultry red mite should first include regular monitoring on farm. Monitoring and rapid action against red mite prevents an infestation increasing and getting out of control. Using measuring traps enables practical monitoring on commercial farms. An example of this is the tube trap. This trap consists of a 10cm PVC tube with an external diameter of 18-20mm and a wooden stick of 12cm long and 14-15mm diameter. A small screw or a nail in the middle of the stick prevents the stick from falling out.

Tips for setting up the traps:

- Use between 15 and 20 traps per hen building
- Distribute the traps randomly in the different passageways and all levels, especially the middle and bottom levels
- Avoid placing the traps at the air inlet points
- Place each trap underneath the perches

Evaluate each trap weekly by removing the wooden stick from the PVC tube and score each trap according to the following scale:

- 0: Trap without any mites
- 1: Trap with loose red mites, not yet forming clusters
- 2: Trap with one or more small groups of red mites
- 3: Trap with one or more large groups of red mites
- 4: Trap with the stick full of mites

Clean the stick with a cloth, paper or a brush, put it back into the PVC tube and back into place for the next weeks monitoring.

Monitoreo del ácaro rojo con trampas cualitativas: un método fácil, barato y eficaz

El control eficaz del ácaro rojo debe incluir en primer lugar un monitoreo regular en la granja. El monitoreo y una actuación rápida frente al ácaro previenen el aumento y descontrol de la infestación. Las trampas cualitativas permiten un monitoreo práctico en granjas comerciales. Como ejemplo, se pueden utilizar fácilmente el método de llamado trampa de tubo. Una trampa consiste en un tubo de PVC de 10cm con un diámetro externo de 18-20 mm y un palo de madera de 12 cm de largo y 14-15 mm de diámetro. Un tornillo pequeño o un clavo a mitad del palo evita que el palo caiga.

Consejos de aplicación de las trampas:

- Utilizar entre 15 y 20 trampas por nave
- Distribuir las trampas de manera aleatoria en los diferentes pasillos y todos los pisos, especialmente los pisos del medio y de abajo
- Evitar colocar las trampas en los puntos de entrada de aire
- Colocar cada trampa por debajo de las perchas con la ayuda de unas cintas
- Después de colocar las trampas, la evaluación de cada trampa se hace semanalmente, cada 7 días

Sacar el palo de madera de la funda de PVC y anotar el score según la escala propuesta siguiente:

- 0: Trampa sin ningún ácaro
- 1: Trampa con algún ácaro suelto, aun no forman agrupaciones
- 2: Trampa con una o varias agrupaciones pequeñas de ácaros
- 3: Trampa con una o varias agrupaciones grandes de ácaros
- 4: Trampa con todo el palo lleno de ácaros, las agrupaciones se tocan

Limpiar la trampa con un trapo o un cepillo y volver a ponerla dentro de la funda de PVC donde se volverá a llenar de ácaros

### **PA 30 Monitoring poultry red mite allows you to anticipate and optimise treatment**

The treatment against red mite is usually done too late on commercial laying hen farms. The more severe the infestation, the more difficult it is to control and treat. Monitoring with traps allows you to easily measure the number of red mites on your farm. You should start treatment when the traps show one or several small groups of mites (score 2). If you find traps which exceeds one or more large groups of red mites (score 3) serial treatments with a one or two-week interval should be administered to reduce the infestation. Once the treatment is applied, the traps allow you to evaluate the effectiveness of the treatment and re-apply a treatment if and where necessary.

### **PA 30 El monitoreo del ácaro rojo permite anticipar y optimizar el tratamiento**

En granjas, el tratamiento frente al ácaro rojo se hace generalmente demasiado tarde. Cuanto más grave es la infestación, más difícil es su control y tratamiento. El monitoreo con trampas nos permite cuantificar fácilmente la presencia de ácaros en la granja. Es recomendable tratar cuando las trampas muestran puntuaciones de 2 (trampas con una o varias agrupaciones pequeñas de ácaros). Una vez aplicado el tratamiento, las trampas nos permiten evaluar la efectividad del tratamiento y volver a plantear un tratamiento si necesario. Si la puntuación de las trampas supera el 3 es posible que nos tengamos que plantear varios tratamientos seriados separados por una o dos semanas de intervalo para poder combatir la infestación.

### **PA 31 Sand may be an easier litter material for wet conditions**

It is expensive and time consuming to keep most types of litter dry and friable, particularly in wet weather. Traditional materials like straw, woodchip and shavings need frequent topping up and may need to be partially removed and/or rotavated. A material that is free-draining and does not clump could provide a solution. Thus, a UK farmer network in a high rainfall area tried kiln-dried sand as a litter material to see whether it would be easier to manage. They found that sand became friable again if there was temporary capping. It did not need topping up, thus saving time and other costs. There were no downsides in terms of floor eggs or second quality eggs. On one farm, the birds appeared to eat the sand but did not suffer any problems from doing so.

Practical recommendations:

- Make sure the sand is not contaminated and is dry when laid
- Kiln dried sand is expensive and might not be cost-effective. Cheaper builder's sand could be an option if laid during dry weather.
- A depth of 5cm might be better than the 10cm trialled
- Because sand is not manipulable and as interesting for birds to forage in, provide foraging enrichments such as straw in racks, hanging rope to keep birds occupied to prevent feather pecking.

### **PA 32 Can sand litter maintain better feather cover?**

It is very important to have good, friable litter at all times to reduce the risk of feather pecking, but most types of litter become capped in wet weather.

A material that is free-draining could provide a solution. Kiln dried sand is porous and unlikely to clump together, and was therefore trialled in free-range houses in a high rainfall area of the UK.

Benefits of using sand are as follows:

- Feather cover is linked to litter quality. Sand-based litter showed better weekly scores for quality, % friable and does not need topping up
- Feather cover declined less with age on sand
- Farmers reported better air quality in colonies kept on sand

Practical recommendations:

- Although sand may make litter management easier, it is still important to inspect litter frequently
- Farmers reported that estimating the proportion of the litter area that has friable litter was easy to do and helps them manage the litter
- Feather cover should be systematically monitored using a standard scoring scheme
- Because sand is not manipulable and therefore initially is less interesting for birds to forage in, provide foraging enrichments such as straw in racks, hanging rope to keep birds occupied to prevent feather pecking, particularly during the first few weeks.

**PA 33 Monitoring the impact of feed additives to improve the gut-health of laying hens.**

Nutrition is key to bird health and welfare, and can influence injurious feather pecking. For example, the content and ratio of protein, minerals, energy and fibre have all been shown to affect the incidence of severe feather pecking. Introducing a probiotic into the feed can help to promote gut health. For example, Bactocell can survive throughout the gut and play an important role in microflora balance, intestinal system maturity and digestive efficiency. Two farmers found treating flocks with Bactocell had a positive impact on bird health and welfare, in terms of a healthier gut, resisting disease challenges affected by non Bactocell treated flocks, holding egg production and lower levels of mortality. Bactocell more than paid for itself in maintaining bird health and egg production, and reduced treatment costs and labour associated with treatment. The farmers are now rolling out the use of Bactocell across the rest of the flocks. You can assess the impact of introducing a feed additive on the health and welfare of your laying hens by monitoring and analysing production data, hen behaviour, and feather cover. Carrying out post mortems and gut histopathology can further strengthen your findings by supporting on farm observations.

### PA 34 Maximise ranging behaviour by planting trees

Managing each flock without an outbreak of injurious feather pecking is a major challenge. In commercial farms laying hens do not need to forage to obtain food, but if this motivation is not satisfied, injurious feather pecking can start, causing pain and distress to other hens. Injurious feather pecking is also associated with loss of production, disease and in some cases mortality.

Encouraging as many hens out to range as possible is one of the most important strategies farmers can take to promote normal foraging behaviour to reduce injurious feather pecking. As a prey species descended from jungle fowl hens require the shelter and protection of tree canopy to encourage confident and extensive use of the range. A tree canopy is the ideal natural environment and grants are available to support farmers to plant trees to create natural, jungle like environments for hens.

What are the main benefits of planting trees on the range?

- Better bird distribution and ranging behaviour
- Improve welfare outcomes
- Increase environmental performance
- Improve water infiltration
- Increase biodiversity
- Reduce soil erosion
- Improve soil structure and fertility

For further information on tree varieties, how to plant, design ideas and grants available in the UK go to:

[www.woodlandtrust.org.uk/publications/2014/04/tree-planting-for-free-range-poultry/](http://www.woodlandtrust.org.uk/publications/2014/04/tree-planting-for-free-range-poultry/)



### **PA 35 Methods to reduce predation of free ranging hens**

Free range systems for laying hens are becoming more popular due largely to their perceived welfare benefits for the hens. However, producers report high mortality levels (e. g. some report 30% mortality) which is totally unsustainable. Producers highlight predation as one of the main causes of death. Beyond the direct effects of a predator attack, a network of farmers reported that their hens appear tense and agitated after an attack, reluctant to access the outdoor area for several days afterwards. Furthermore, farmers think the rate of feather pecking is related to the occurrence of predator attacks. Enriching the outdoor area with trees and other types of shelters decrease the risk of attack. However, the predators readily target the hens that go outside the protected areas. Farmers reported that roosters are not efficient enough against predators and trained guard dogs can cause injuries and even kill birds with playful behaviour or aggression. Having alpacas on a farm to share the outdoor area with the hens successfully reduces the number of attacks from predators.

### **PA 35 Métodos para combatir los ataques por depredadores en gallinas camperas o ecológicas**

Las gallinas ponedoras alojadas en sistemas camperos o ecológicos son cada vez más populares. Sin embargo, los productores reportan niveles de mortalidad de gallinas altos los cuales son totalmente insostenibles. Por ejemplo, algunos ganaderos reportan tasas de mortalidad del 30% en gallinas camperas. Los ganaderos destacan la depredación como una de las principales causas de muerte. Más allá de los efectos directos de los ataques depredadores, las gallinas parecen más tensas y agitadas después de un ataque y se muestran reacias a acceder al patio exterior durante varios días después del ataque. Además, los productores indican una posible relación entre la incidencia de picaje y la frecuencia de los ataques de las aves. El enriquecimiento de la zona exterior con árboles y otros tipos de refugios (naturales o artificiales) disminuyen el riesgo de ataque por depredadores. Sin embargo, los depredadores atacan fácilmente a las gallinas que salen del área protegida. Otras estrategias para prevenir los ataques de los depredadores se han planteado, como la inclusión de gallos o de perros entrenados. Los gallos no son lo suficientemente eficaces contra los depredadores. Los perros entrenados pueden causar lesiones e incluso matar algunas gallinas como resultado de un comportamiento de juego o agresivo. La presencia de alpacas en una granja, compartiendo la zona exterior con las gallinas puede reducir exitosamente el número de ataques de depredadores.



### **PA 36 Recommendations for using alpacas as guardians of free range hens**

Alpacas are territorial, with males gathering and defending females within their territories. Alpacas are also typically aggressive toward predators and appear to readily bond with other animals and protect them.

When introducing alpacas to a free-range laying hen system:

- Use young male alpacas (between 1 and 3 years old) that have been correctly socialised with people and hens.
- Alpacas are highly sociable animals and should not be introduced as a single animal.
- Alpacas do not need training to protect the range, but an adaptation period of around 3 weeks to get them use to their new surrounding is needed to boost their confidence.
- Provide daily positive, friendly interaction with the alpacas - give them food, gently touch them and check they do not have any health problems.
- Manipulate the alpacas with a headcollar once a week. This will allow you to easily catch the animals when necessary (i.e. for treatment or to move the alpacas to another paddock)
- Clean and fresh water and roughage should be provided ad libitum. A male alpaca may cost around 500-700 euros/animal to keep, depend on the type of fibre the animal has and the country.
- Provide a comfortable roofed shelter.
- Costs associated with looking after the alpacas are the roughage based diet, mineral and vitamin supplements, toenail trimming, vaccination, worming, and shearing once a year.

### **PA 36 Algunas recomendaciones sobre las alpacas cuando se utilizan como animales de protección de gallinas camperas**

Las alpaca's son territoriales, con los machos defendiendo las hembras en sus territorios. Las alpaca's son típicamente agresivas hacia los depredadores y parecen relacionarse fácilmente con otros animales y protegerlos. Se recomienda el uso de alpaca's machos jóvenes (entre 1 y 3 años de edad) que hayan sido correctamente socializados con personas y gallinas. Las alpaca's son animales altamente sociables y de ningún modo se introduce un solo animal. Las alpacas no necesitan entrenamiento para proteger los otros animales con los que comparten el territorio. Sin embargo, necesitan un período de adaptación de alrededor de 3 semanas para perder el miedo y sentirse más seguros en su nuevo entorno. La interacción diaria positiva y amistosa entre el ganadero y las alpacas es esencial: dar algo de comida, tocarlos suavemente y comprobar si los animales no tienen ningún problema de salud. Una vez a la semana las alpacas deben manipularse con un cabezal para que se acostumbren. Esto permitirá al granjero agarrar fácilmente los animales si es necesario (por ejemplo para aplicar algún tratamiento o para mover las alpacas de un recinto a otro). Una alpaca macho puede costar alrededor de 500-700 euros / animal, pero esto puede variar dependiendo del tipo de fibra que el animal tiene y el país. Una zona cubierta y cómoda es necesaria para proteger las alpacas del frío pero sobretodo del calor. El agua limpia y fresca y el forraje deben ser proporcionados ad libitum. Normalmente hay pocos costes asociados con el cuidado de alpacas: una dieta basada en forraje, algunos suplementos de minerales y vitaminas, recortar las pezuñas, vacunación y desparasitación anuales. Sin embargo, tenga en cuenta que las alpacas deben esquilarse una vez al año. Excepto en el Reino Unido, los esquiladores profesionales de alpaca's son escasos y la esquila puede convertirse en un evento estresante.

### **PA 37 Comparison of different ways to measure ammonia levels in laying hen shed**

Good air quality is important for hen and human caretaker's physical welfare. One component of air quality is ammonia. When climatic conditions are less favourable, more management is needed to maintain a good indoor climate. Farmers found an electronic device for measuring ammonia levels in the shed was easy and practical to use. The data gathered gave comparable results to other more conventional and time-consuming methods, such as detection tubes. However, farmers are good at estimating ammonia levels just by using their own senses if the assessment is done soon after entering the shed. Therefore, to increase awareness of the actual ammonia levels it is useful to assess using your senses and compare with the electronic device reading. Altogether, this suggests that an electronic device could be useful as a measuring tool to assess levels of ammonia in a shed, but also using your senses can be an accurate indicator. Thus, using an electronic device and your senses in combination can increase your knowledge about the levels in the shed and provide an indication of when actions should be carried out to improve air quality.

### **PA 37 Jämförelse av olika sätt att mäta ammoniaknivåer i stallet**

Bra luftkvalitet i stallet är positivt både för hönsen och för den person som sköter hönsen. En komponent av luftkvaliteten är ammoniak. Under perioder när utomhusklimatet gör det svårare att ha ett bra inomhusklimat kan extra skötselåtgärder behövas. Lantbrukare provade en elektronisk ammoniakmätare som var enkel och praktisk att använda. Vid jämförelse av mätningar med reagensrör som var mer tidskrävande, visade de olika metoderna liknande värden. Man provade även att uppskatta ammoniaknivån i stallet subjektivt när man först kom in och det stämde också rätt väl överens med de uppmätta värdena. Det verkar därför som att det går att använda de olika metoderna som komplement till varandra. Både de objektiva och subjektiva mätningarna kan ge en ökad medvetenheten om ammoniaknivåerna i stallet och vara till hjälp vid bedömning om några skötselåtgärder behöver sättas in för att förbättra luftkvaliteten.

**PA 38 Risk assessments for each flock at end-of-lay reduces losses**

The number of birds which die during the period from catching to hanging on the slaughter line after transport is commonly called dead-on-arrival (DOA). The proportion of birds which die depends on several established risk factors which include the feather cover and body weight of the birds, the journey duration/distance and the climatic conditions. Adjustments can be made to mediate the risks of DOA if they are identified in advance. There should be a planning meeting, based on data supplied by the producer regarding housing system, bird age, weight and feather cover together with a knowledge of the weather forecast and journey distance. This can inform the stocking rate on the lorry and whether the birds need to be handled with extra care and be processed immediately on arrival. Vulnerable flocks should 'jump the queue'. Adopting a planning meeting to identify and manage risks is proven to reduce the levels of DOA and rejects particularly if this is linked to driver and catcher training and the outcomes are shared with all parties. Everybody involved in the depopulation and transport process should communicate with each other. Producers should cull unfit birds, evaluate feather cover and weigh a random sample of at least 50 birds.

**Hennovation Technical Notes**