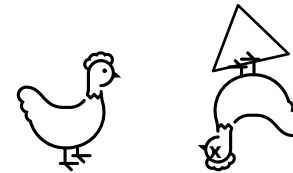
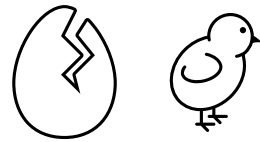


Advances in improving chicken welfare from hatch to slaughter



Mona F. Giersberg

Animals in Science and Society, Department Population Health Sciences, Faculty of Veterinary Medicine, Utrecht University, The Netherlands

Overview

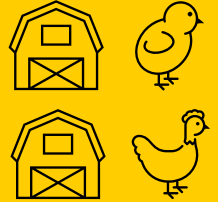
In the hatchery

- Hatchery processing



On-farm

- Sensor-based activity tracking
- CV tracking



Alternative hatching systems

- Providing light, feed and water
- On-farm hatching



At the slaughterhouse

- Automated assessment of welfare indicators

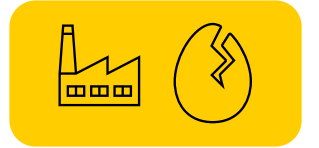


Best Practices

- Bridging science and practice



Hatchery processing

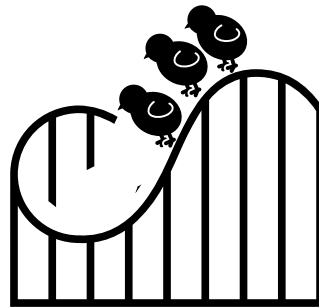


Chicks are exposed to 3 main determinants of the processing line in commercial hatcheries:

- Drop height
- Conveyor belt speed
- Acceleration

Physical stressors

- Traumatic injury



Mental stressors

- Discomfort
- Disorientation
- Loss of predictability and controllability



<https://www.pasreform.com/en/solutions/5/chick-handling/43/automatic-chick-and-shell-separator>

Hatchery processing – experimental procedures



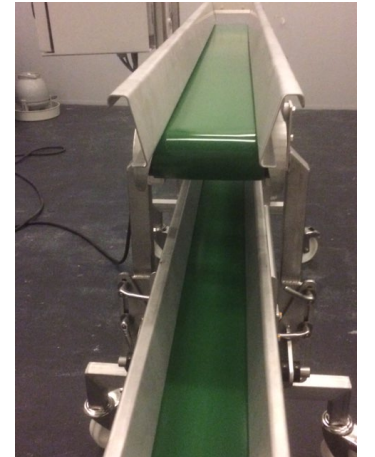
Effects of 3 processing factors were tested separately

- Drop height: 0, 200, 280, 360 mm (14 m/min speed, no acceleration)
- Speed: 0, 14, 20, 27 m/min (200 mm drop height, no acceleration)
- Acceleration: 0, 0.1, 0.2 g (200 mm drop height, 14 m/min speed upper belt)

N = 14 day-old Ross 308 chicks/processing factor and increment

Indicators:

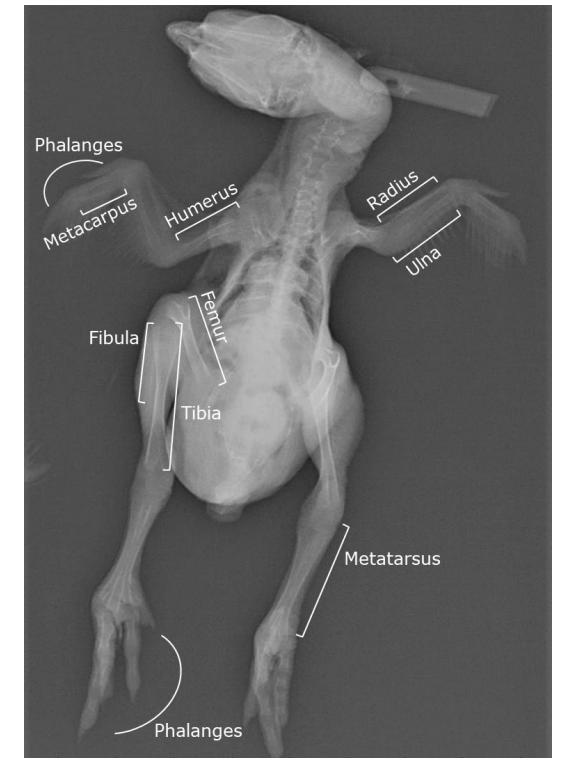
- Righting test (before and after the run)
 - Orientation and posture (before and after the drop)
 - Bruises and injuries
 - Postmortem radiographic images
- } Mental stressors
- } Physical stressors



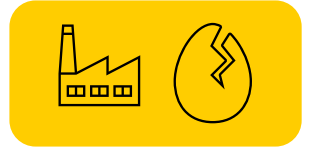
Hatchery processing - results



- Righting time <4 s
- Orientation change
 - drop height 200 mm vs. 360 mm, $F_{2,39}=7.06$, $P<0.01$
- Posture change
 - drop height 200 mm vs. 280, 360 mm, $F_{2,39}=31.99$, $P<0.01$
 - speed 14, 20 m/min vs. 27 m/min, $F_{2,39}=11.12$, $P<0.01$
- No bruises or injuries



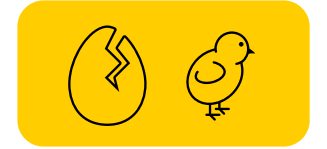
Hatchery processing - conclusions



- Treatments on the conveyor belt did not seem to affect the chicks' physical health
- With a drop height of 280 mm or at a speed of 27 m/min most chicks did not manage to regain their initial body position on the belt
- Controllability: may be preferred to be able to recover one's posture

Scope for discomfort and (short-term) welfare impairment, if commercial systems are operated with considerably larger drop heights and at higher speeds.

Alternative hatching systems



Three hatching environments

HH: conventional hatchery-hatching

- No light, feed and water in the hatcher
- Transport of day-old chicks

HF: hatchery-feeding, HatchCare (HatchTech, NL)

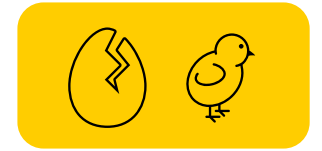
- Light, feed and water provided in the hatcher
- Transport of day-old chicks

OH: on-farm hatching, X-Treck (Vencomatic, NL)

- Light, feed and water available
- Transport of eggs (ED 18)



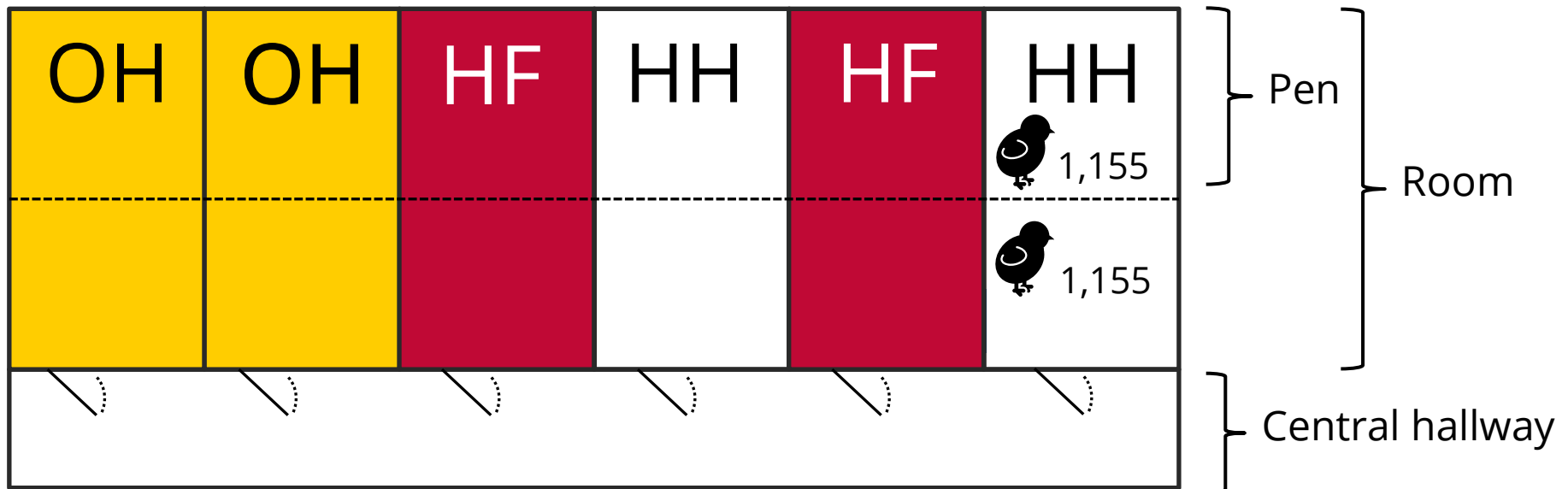
Alternative hatching systems - experiments



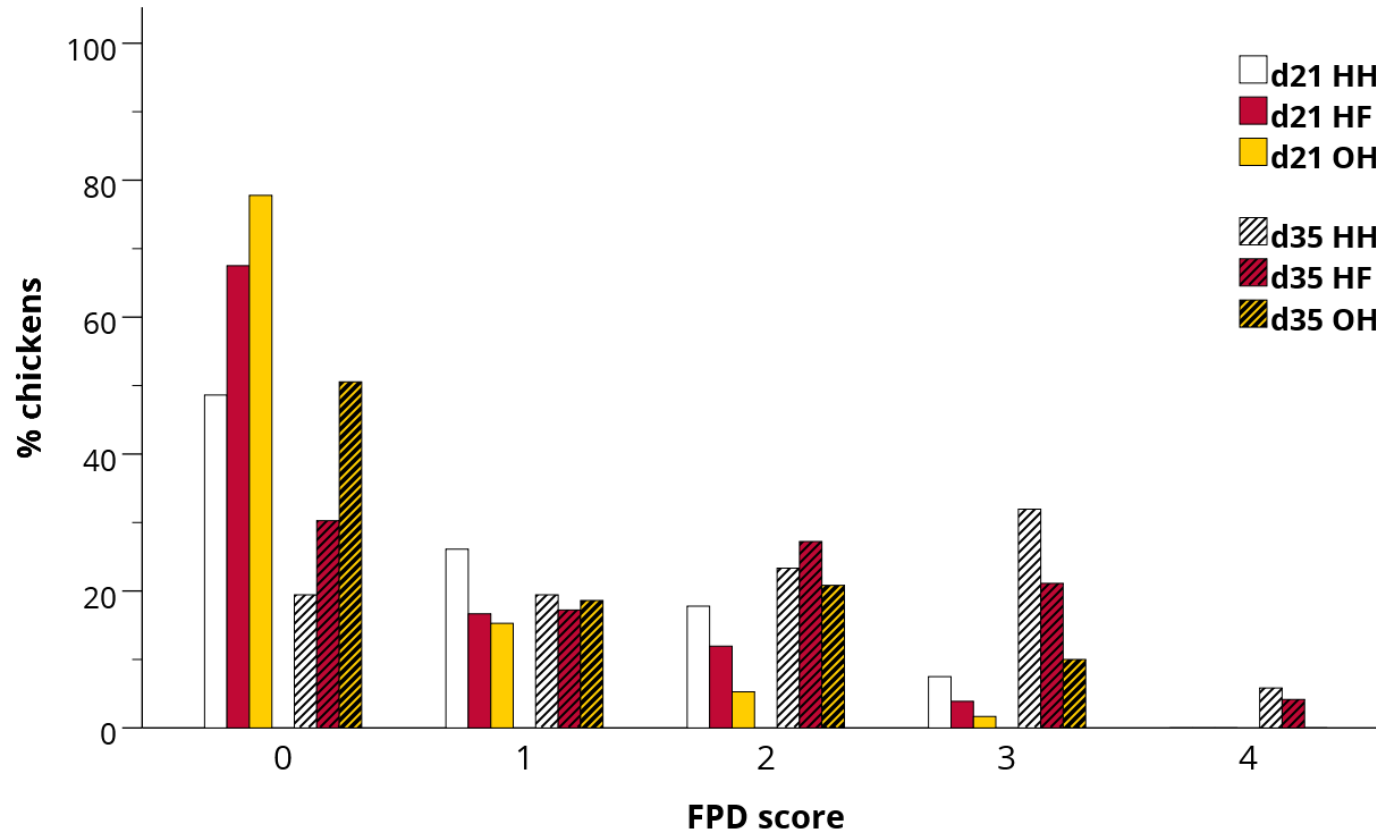
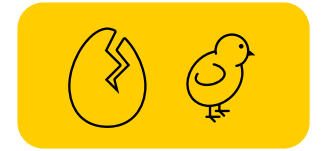
Experimental Poultry Centre, Geel (BE)



- Three consecutive batches
- Ross 308 chickens; 20.5 chickens/m²
- Environmental indicators, animal-based welfare indicators, behavioural indicators (fear tests)



Alternative hatching systems - results



Hatching system:

$$F_{4,44}=3.05, P<0.05$$

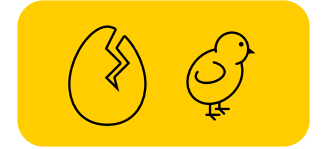
Age:

$$F_{4,44}=62.98, P<0.001$$

OH > HF > HH



Alternative hatching systems - conclusions



- Animal-based welfare indicators and fear tests
 - FPD: $OH > HF > HH$, $d21 < d35$
 - Other indicators: $OH = HF = HH$, $d1/4/21 \neq d21/35$
- System comparison
- FPD: differences in litter moisture? Body weight?
- Other indicators: only age effects
- More subtle effects on mental welfare? Physiological stress indicators?

Interested in the full paper?

On welfare:



Poultry Science

Available online 23 December 2020, 100946

In Press, Corrected Proof



Effects of hatching system on the welfare of broiler chickens in early and later life

Mona F. Giersberg ^{*,†} , Roos Molenaar ^{*}, Ingrid C. de Jong [‡], Carol Souza da Silva [‡], Henry van den Brand ^{*}, Bas Kemp ^{*}, T. Bas Rodenburg ^{*,†}

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<https://doi.org/10.1016/j.psj.2020.12.043>



On performance:



Poultry Science

Available online 23 December 2020, 100953

In Press, Corrected Proof



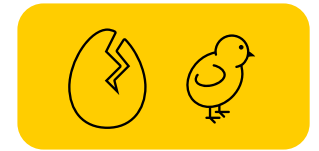
Day-old chicken quality and performance of broiler chickens from 3 different hatching systems

Carol Souza da Silva ^{*}, Roos Molenaar [†], Mona F. Giersberg ^{†,‡}, T. Bas Rodenburg ^{†,‡}, Johan W. van Riel ^{*}, Kris De Baere [§], Iris Van Dosselaer [§], Bas Kemp [†], Henry van den Brand [†], Ingrid C. de Jong ^{*,†}

Show more

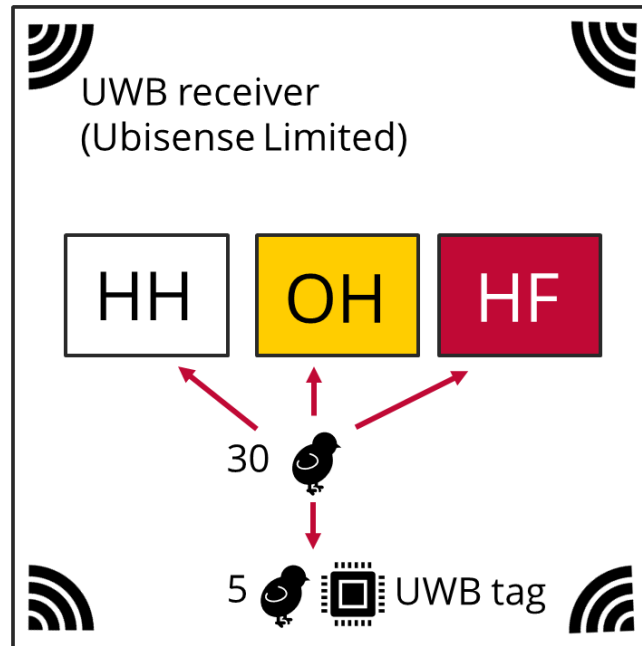
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<https://doi.org/10.1016/j.psj.2020.12.050>



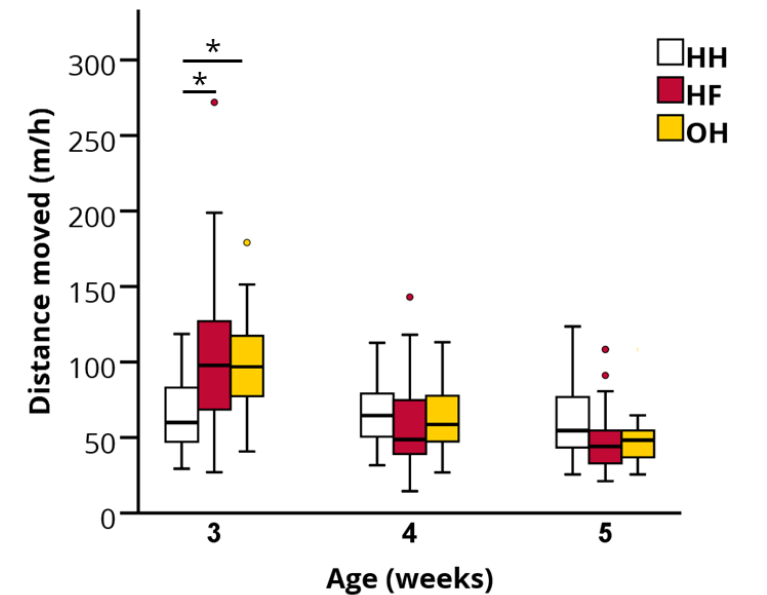
健康畜禽
Healthy Livestock

Sensor-based activity tracking



TrackLab
software
(Noldus)

- ✓ UWB tracking, coordinates of tags attached to the birds, d15-d34
- ✓ distance moved (m/h)



Computer vision tracking

- Developing a computer vision algorithm for tracking laying hen position and behaviour on the individual level within groups
- Genetic & environmental intervention strategies
- Reduce harmful behaviours
- Promote positive social interactions



AI & Animal Welfare Lab

- Improve animals' lives in practice by using the full potential of AI
- Contribute to solving a societal challenge
- Serve as a research and education hub in collaboration with public and private partners



Utrecht
University

AI Labs

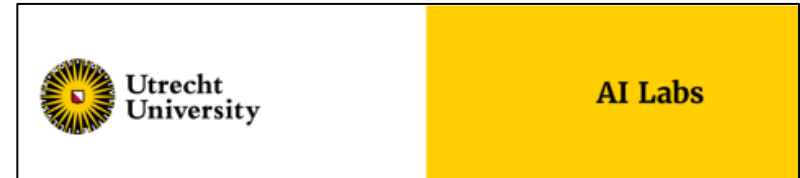


'The animal at the centre'



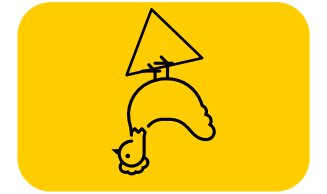
AI & Animal Welfare Lab

- Reliably measure and monitor welfare indicators over time
- Combining different types of routinely collected data
- Development of early warning systems
- AI methods: landmark localization, computer vision, transfer learning



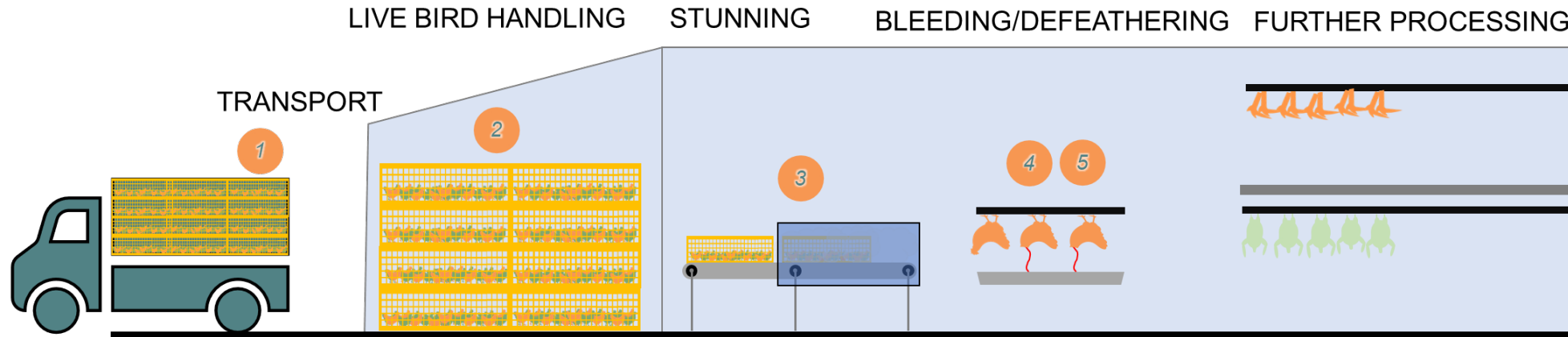
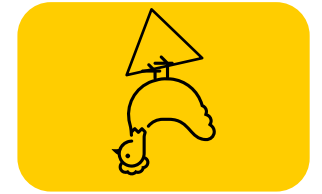
At the slaughterhouse

- Assessing and improving animal welfare by automated monitoring and feedback at different stages of the production chain
- Linking data collected on farms to animal welfare indicators automatically measured at the slaughterhouse
- Various technologies at different pilots



Post doc Nienke van Staaveren

At the slaughterhouse

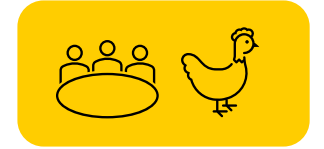


Name
ChickenCheck Hockburn
Tech provider
CLK
What does it measure?
Hockburns



Name
ChickenCheck Footpad
Tech provider
CLK
What does it measure?
Footpad lesions

Best Practices – bridging science and practice



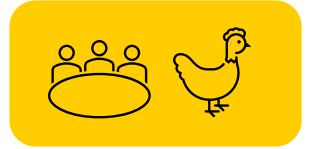
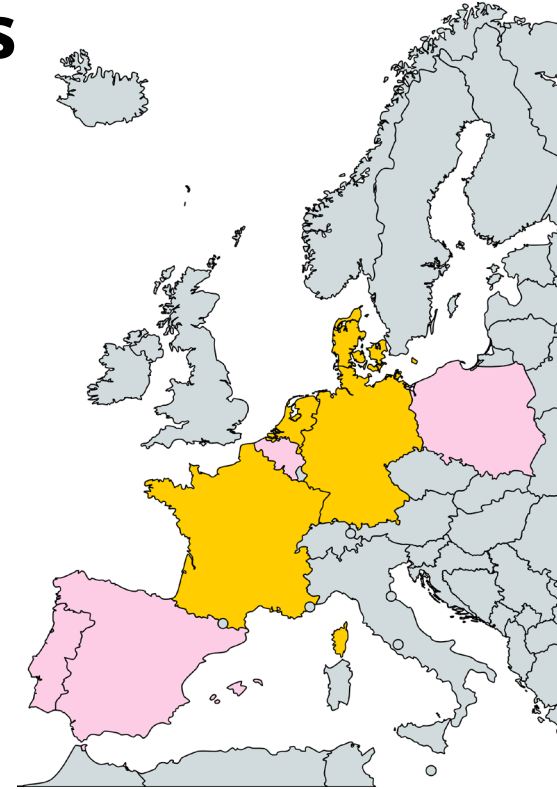
- In the EU: furnished cages or cage-free housing systems for laying hens
- Furnished cages: limited space and behavioural opportunities
- Variation in the uptake of cage-free systems among EU countries



The Best Practice Hens project aims to help egg producers by providing practical guidelines on how to transition to cage-free systems

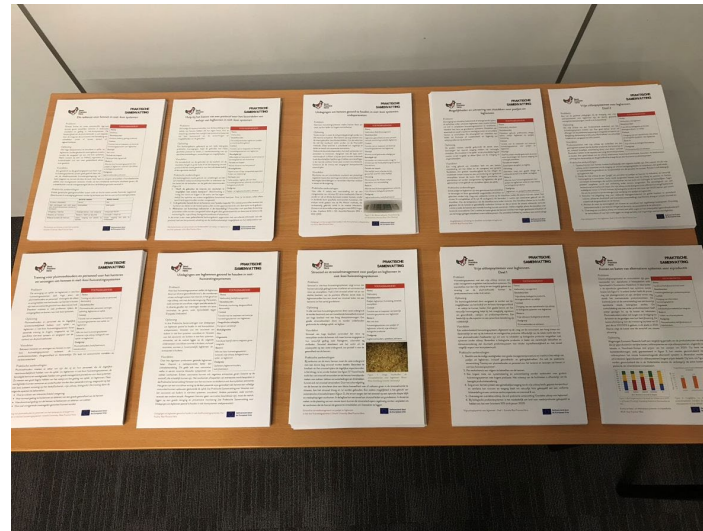
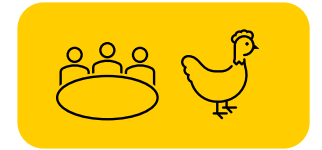
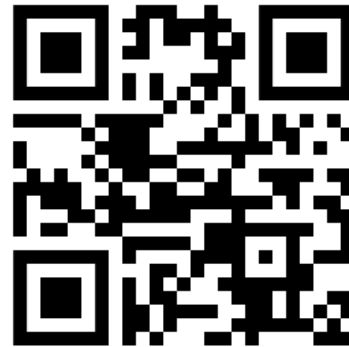
Best Practices – methods and results

- Combining input from experts from
 - 'Cage-free countries' (DK, NL, DE, FR)
 - 'Target countries' (ES, PT, PL, BE)
- Review of the scientific literature, sources of technical information
- Interviews experts from the egg industry and governments (cage-free countries)
- Local situation (target countries)
- Discussion with stakeholders at EU level



Final set of 31 Best Practices for keeping pullets (15) and laying hens (16) in cage-free systems

Best Practices – dissemination



Thank you!

Collaborators

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Bas Rodenburg
Nienke van Staaveren
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**Utrecht
University**

Sharing science,
shaping tomorrow