

Damaging behaviour in laying hens
Research
Risk factors
Preventive measures

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- Research in the past
- Research in the present
- Research in the future

- Risk factors
- Early detection
- Preventive measures & Curative measures



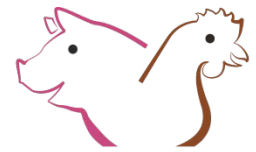
Damaging behaviour (DB) in laying hens

- Injurious pecking behaviour
 - Aggressive pecking
 - Feather pecking
 - Cannibalism
 - Vent pecking
 - Toe pecking



Aggressive pecking mostly occurs in small groups

Most problematic are the other types of pecking under practical flock sizes



GROUPHOUSENET

Damaging behaviour (DB) in laying hens

- ❑ Likely occurs as a consequence of selection on egg production traits
- ❑ From 20-30 eggs per laying cycle to over 300 eggs per laying cycle
- ❑ This changes feed requirements – henceforth feeding related behaviour, feed efficiency, FCR and importantly **foraging motivation**

- ❑ DB may thus be a risk which is present in all commercially bred laying hens
- ❑ However, not all flocks or all commercial laying hens develop DB
- ❑ This makes it difficult to predict, control and prevent



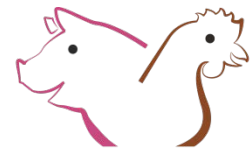
Research on feather pecking



individual

Social environment

Farm environment

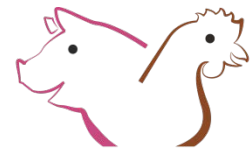


GROUPHOUSENET

Research in the past

- ❑ Individual predisposition for becoming a pecker as a victim
- ❑ Genetic predisposition
 - ❑ Selection on FP: Kjaer
 - ❑ Selection on group survival: Muir et al; Peeters et al; Bijma et al
 - ❑ Some commercial hybrids/pure lines more pecky than others
- ❑ Correlated behaviour and (neuro)physiology of individual birds (Kops, 2014)
 - ❑ i.e. fear as a young and FP as adult (Rodenburg et al., 2004)
 - ❑ personality traits
 - ❑ coping style (Korte et al., 1997; 1998)
 - ❑ social exploration (Riedstra et al., 2002)
 - ❑ foraging motivation (de Haas et al., 2010)





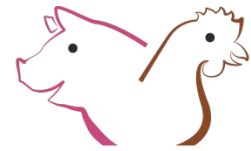
GROUPHOUSENET

Research in the past

- ❑ Social environmental conditions – from individual to flock
- ❑ Group size (larger flock more at risk; Bilcik and Keeling, 1999)
- ❑ Density (higher density more at risk; Zimmerman et al., 2006)
 - ❑ Co-effect of a few individuals who can peck a lot of others
 - ❑ Social transmission of DB (not been proven, yet...)
- ❑ Group composition (Estevez's lab; Campderrich et al., 2017)
 - ❑ Brown birds peck white birds (Uitdehaag et al., 2011)
 - ❑ Brown birds more sensitive to social conditions (de Haas et al., 2013, 2014)
 - ❑ Some individuals influence whole group (de Haas et al., 2012)
 - ❑ Mixing brown and white seems promising in some countries (Austria)



Research in the past



GROUPHOUSENET

- ❑ Other environmental conditions – mostly on group or flock level
- ❑ Lack of litter, current and previous environment (Nicol et al., 2013)
 - ❑ Early life conditions – **REARING!**
 - ❑ Brooding – natural day and night rhythm – inactive chicks can hide away from active pecking chicks (Jensen et al., 2006; Gilani et al., 2014)
- ❑ Light intensity
 - ❑ High light intensity = high risk (Kjaer and Vestergaard, 1999)
 - ❑ Day light – natural eye development (ongoing research)
- ❑ Nutrition
 - ❑ Insoluble fibres enhance feeding time and reduce onset of DB (van Krimpen et al., 2009)
 - ❑ Feed changes; type of feed (mashed or pelleted; Lambton et al., 2010)



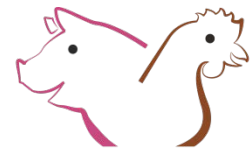
Research in the present



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- ❑ On individual and group level
- ❑ Epigenetic effects – can influence behaviour of chickens (Jensen et al., 2014)
 - ❑ Stress in parents? (de Haas et al., 2014a)
 - ❑ Nutrition parents? (de Haas et al., 2017a)
- ❑ Gut conditions
 - ❑ Microbiota composition: predetermining? Consequence of feather eating? (PhD work ongoing **Jerine Van der Eijk** with **Bas Rodenburg**, WUR, NL)
 - ❑ Feather eating – need for fibres? (Harlander et al., 2007; 2009)
 - ❑ Tryptophan depletion - PhD work **Patrick Birkl**, **Alexandra Harlander's** lab, Guelph, Canada)
- ❑ Nutrition
 - ❑ Amino acid profile and gut health (PhD work ongoing **Annemarie Mens** with **Marinus van Krimpen**, **Rene Kwakkel** – WUR, NL – collaboration with de Heus and Ter Heerdt hatchery)
 - ❑ Feed changes; type of feed (mashed or pelleted) (Lambton et al., 2010)
 - ❑ Feed formulation – pecking food, food for non beak trimmed food





GROUPHOUSENET

Research in the future

- ❑ Following individuals in a group – precision livestock farming
 - ❑ Why do certain birds develop DB?
 - ❑ Why do certain flocks develop DB?
 - ❑ Early detection – use production data for detection
 - ❑ Early early detection – in ovo/pre-hatch

- ❑ Social genetics
 - ❑ Behavioural genetics
 - ❑ Indirect social genetic effects (taking into account the effect group mates have on performance of an individual) (Ellen et al., 2008)

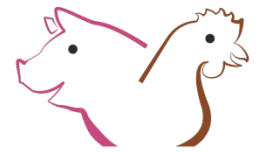
- ❑ Nutrition – gut health
 - ❑ Insect feeding (Marco Ruis; WUR, Jasper Heerkens; Aeres)
 - ❑ Gut-brain axis...



Risk factors for feather pecking

- ❑ On-farm risk factors associated with DB (mostly FP)
 - ❑ Litter restriction, litter quality, type of litter, litter disruption
 - ❑ Density, local density (i.e. locking chicks in the aviary; enriched cages)
 - ❑ Unpredictable environment – cause fear and stress
 - ❑ Changes in feed, housing type

- ❑ Early detection
 - ❑ Downy feathers are eaten
 - ❑ Enrichment is eaten faster than usual
 - ❑ Feather damage visible
 - ❑ Screams hearable during routine checks
 - ❑ Cannibalised or pecked birds
 - ❑ Changes in mortality, feed intake, water intake, growth, egg production
 - ❑ Floor eggs
 - ❑ Uneven distribution of birds (climate conditions)



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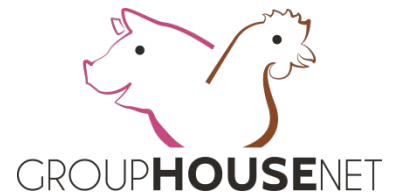


Risk factors for feather pecking

- ❑ Preventive measures
 - ❑ Obtain good litter quality
 - ❑ Improve/optimize early life conditions
 - ❑ Stimulate foraging from an early age (litter, substrate, grain, pecking blocks, alfalfa, range use, covered veranda)
 - ❑ Brooder provides shelter to hide
 - ❑ Enough perches
 - ❑ Feeding regime (block feeding = not much research done though)
 - ❑ Optimize (gut)health
 - ❑ Reduce fear and stress (rooster in flock helps, radio, various enrichment)
 - ❑ More measures the better (Lambton)
 - ❑ Study are inconsistent in prevention measures (Jung and Knierim 2018)



Preventive measures



Review article

Are practice recommendations for the prevention of feather pecking in laying hens in non-cage systems in line with the results of experimental and epidemiological studies?



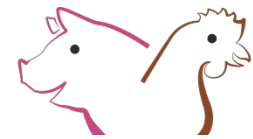
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Preventive measures



L. Jung, U. Knierim

Applied Animal Behaviour Science 200 (2018) 1–12

Table 4
Identified recommendations with number of recommended factors either confirmed by epidemiological or experimental studies with at maximum one opposite or non-significant result or being contentious or not confirmed or not yet investigated.

No.	Reference	System ^a	Number of recommended factors			
			Confirmed Rearing	Confirmed Laying	Contentious/not confirmed/not investigated	Total
1	AssureWel project (no year)	No information	3	13	7/3/6	32
2	Bassett (2009)	No information	1	12	4/2/2	21
3	Big Dutchman International et al. (2004)	Non-cage	0	4	6/0/2	12
4	Defra (2005)	No information	5	9	5/3/2	24
5	FAWAC (2011)	Barn/alternative	0	7	4/1/0	12
6	Klosterhalfen (2010)	No information	8	10	5/1/3	27
7	Laves (2013)	No information	15	22	10/0/14	61
8	Lohmann Tierzucht (2011)	Non-cage	2	5	6/0/0	13
9	Lugmair et al. (2005)	Non-cage	8	18	7/1/5	39
10	Macey (2009)	Organic	6	13	8/0/6	33
11	Michael (2013)	No information	3	4	4/0/1	12
12	Pickett (2008)	No information	7	15	4/2/2	30
13	Staack et al. (2010)	Organic	7	11	5/2/5	30
14	Thiele and Pottgüter (2008)	Barn, free-range	0	2	2/0/0	4
15	University of Bristol (2013)	Non-cage	8	13	7/2/7	37

^a Information as provided in the recommendations.



Preventive measures

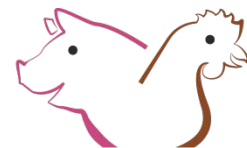


Table 5

Proposed preventive factors for rearing concerning feather pecking from different recommendations which have been confirmed in epidemiological or experimental studies with at maximum one opposing result. Factors in bold have been confirmed in at least two studies, figures are presented as far as available.

Preventive factors for rearing		Recommendations (numbered according to Table 4)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Management	Good expert knowledge	✓			✓		✓			✓		✓	✓			✓
	Regular check of hens	✓	✓		✓		✓	✓		✓		✓	✓	✓		✓
	Low stocking density (birds/m ² ground surface)						18 ^a	35 ^b			10 ^b				13	
	Sufficient uniformity in weight	✓			✓		✓	✓	✓	✓	✓		✓			✓
	Low sound level				✓											
	Adjusted management^c						✓	✓		✓	✓		✓	✓		✓
	Provision of enrichment material such as pick blocks, strings, vegetables, baskets, hay bales						✓	✓		✓	✓		✓	✓		✓
	Familiarization of hens with people				✓		✓	✓					✓			✓
	Use of dark brooders in rearing										✓					
	Different barn areas (levels)							✓		✓			✓			
Litter	Provision of dry litter on the floor					✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Perches	Sufficiently high perches						✓		✓							
Light	Uninterrupted light period (hours)						8									
	Daylight						✓							✓		
Feed and water	Mash instead of pellets						✓							✓		✓
	Feeding ad libitum					✓	✓									



Preventive measures

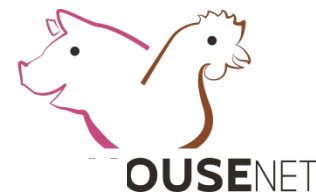


Table 6
Proposed preventive factors for laying concerning feather pecking from different recommendations which have been confirmed in epidemiological or experimental studies with at maximum one opposing result. Factors in bold have been confirmed in at least two studies, figures are presented as far as available.

Preventive factors for laying		Recommendations (numbered according to Table 4)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Management	Use of pullets without FP in rearing				✓			✓		✓	✓		✓			
	Rearing own pullets	✓	✓													
	Regular check of hens		✓	✓	✓		✓	✓	✓	✓			✓	✓		✓
	Low sound level			✓												
	Prevention of diseases	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓		✓	✓
	Presence of cockerels										✓		✓			
	Early placement before 20 Weeks								18	18					17	
	Adjusted management^a	✓	✓				✓	✓	✓	✓	✓			✓	✓	✓
Housing	Familiarization of hens with people				✓		✓	✓					✓	✓		✓
	Provision of enrichment material such as pick blocks, strings, vegetables, baskets, hay bales	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓		✓
	Different levels	✓						✓		✓			✓			
Litter	Provision of dry litter	✓	✓			✓	✓	✓		✓	✓		✓	✓		✓
	Provision of straw hay				✓		✓	✓		✓			✓	✓		
Perch	Sufficient litter height (cm)					10		1-2								
	Sufficiently high perches (cm)	50				✓				35			70			40
Light	Perch with grip/wood as perch material							✓		✓						
	No flickering light							✓		✓						
Nest	Nests without lighting	✓		✓				✓	✓	✓	✓			✓	✓	✓
	Spelt as nest material					✓		✓		✓						
Feed and water	Mash instead of pellets	✓	✓					✓	✓	✓	✓		✓	✓		✓
	Sufficient drink places/hen			1/10				✓	✓	1/10	0.9/1			✓	✓	✓
Free range	Roughage feeding	✓	✓				✓	✓		✓	✓		✓	✓		✓
	High use of range	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓		✓
	Encouraging hens to go outside	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓		✓
	High percentage of sheltered areas	✓	✓		✓		✓	✓		✓	✓		✓	✓		✓



Good guidelines available online

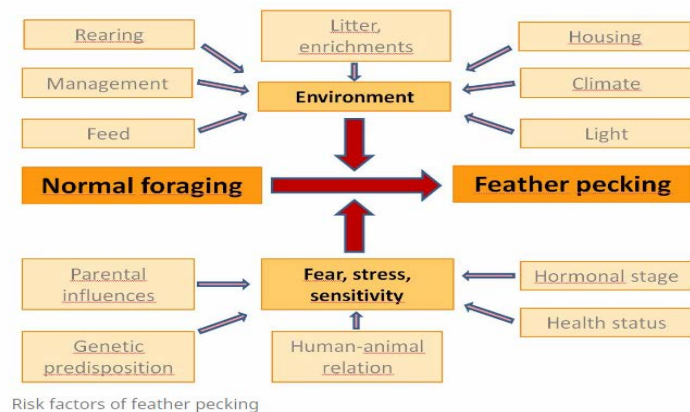
www.henhub.eu (EU)

www.hennovation.eu (EU)

www.featherwell.org (UK)

<http://www.lalf.de> (German)

[Fjerpilningsnøgle](#) (Dansk)

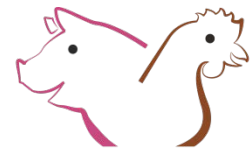


[A guide to the practical management of feather pecking & cannibalism in free range laying hens. Defra, 2005](#)

[Animal welfare on organic farms. Fact sheet series reducing the risk of feather pecking for laying hens in organic egg production.](#) Produced in consultation with the ECOA Animal Welfare Task Force, February 2009

[Controlling feather pecking & cannibalism in laying hens without beak trimming.](#) Pickett H., October 2009. Compassion in World Farming.



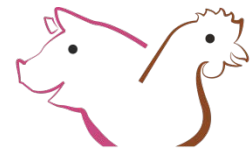


GROUPHOUSENET

Risk factors for feather pecking

- ❑ Curative measures
 - ❑ Very difficult to stop the behaviour once it has occurred
 - ❑ Dimming light or using red light to calm the birds in severe cases
 - ❑ Provide enrichment (in different forms)
 - ❑ Enrich the range/veranda/aviary
 - ❑ Pay extra attention to floor eggs
 - ❑ More routine controls
 - ❑ Check health conditions – optimize health (vit, min etc.)
 - ❑ Take out severely pecked birds – treat with aversive spray





GROUPHOUSENET

Controlling & predicting is still difficult

- Irradical behaviour
- Difficult to predict
- Under some conditions in flocks yes – other condition uncertain
- Even under organic conditions DB occurs

For the future

- Focus on early predictors!
- Make use of farm data (past flocks, good and bad flocks)
- Gut health and feed formulation
- PLF
- Social behaviour genetics! Breeding for nice birds

Thank you for your attention

