Health and welfare in organic egg production

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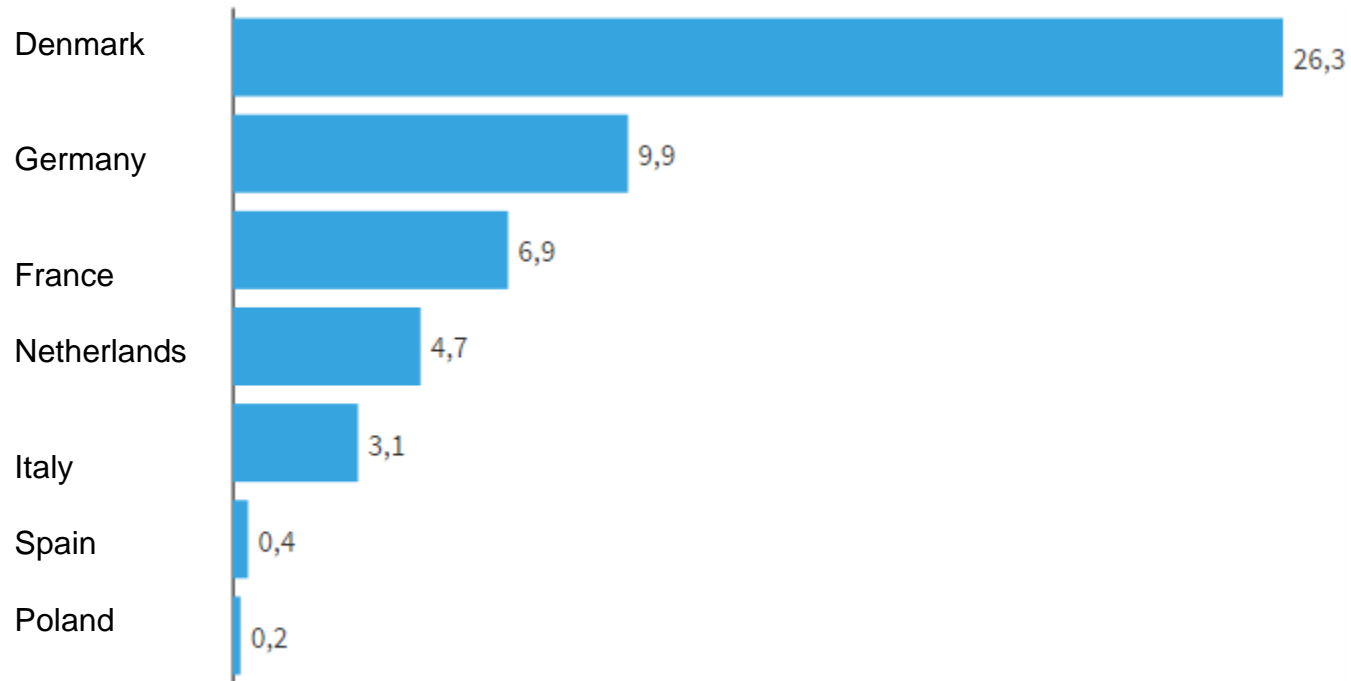
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% of organic laying hens per country (2015)

Country	%
Denmark	26,3
Germany	9,9
France	6,9
Netherlands	4,7
Italy	3,1
Spain	0,4
Poland	0,2

Door Boerderij.nl   Gemaakt met Localfocus   Bron: Europese Commissie

Total: 15 million organic laying hens (=4,2%)

EU standards organic egg production (European Regulation EC No 834/2007)

- No beak trimming

- Max group size 3000

- 6 hens / m²

- Perches, nest boxes

- Free range area 4 m² / hen

- 95% organic feed

- Regulation for rearing hens

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Animal welfare - feather pecking

- Indicator for reduced welfare

- Prevalence FP in Dutch flocks reduced from 71% (Bestman & Wagenaar 2003) to 32% (Bestman & Wagenaar 2014)

- Rearing period (Bestman et al 2009)

- Use of the free range area (Green et al 2000; Bestman & Wagenaar 2003; Bestman et al 2017)

Feather pecking and rearing

Risk factors (Bestman et al 2009):

• Higher density during weeks 1-4

• Absence of daylight weeks 7-17

Predictability FP rearing to laying period (Bestman et al 2009):

• No FP damage in rearing – 71% no FP damage in lay

• FP damage in rearing – 90 % FP damage in lay

Feather pecking and free range area

- Higher % of hens go out – less feather pecking (Green et al 2000; Bestman & Wagenaar 2003)

Higher % goes out if:

- Higher degree of cover/shelter (Bestman & Wagenaar 2003; Zeltner & Hirt 2003)
- Smaller flocksize (Appleby & Hughes 1991; Bubier & Bradshaw 1998; Hirt et al 2000; Bestman & Wagenaar 2003)
- Younger age at arrival on the farm (Bestman & Wagenaar 2003)

Higher % of trees – less feather pecking (Bright et al 2016)

Free range area with cover - higher animal welfare

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More Avian Influenza risk birds seen in free range areas with < 5 % woody cover
(Bestman et al, 2018)

Animal health - mortality

- Mortality in Dutch flocks reduced from 15-21% < 2010 (n=37) to 8% in 2012/2013 (n=42) (Leenstra et al 2014)

Production data diff systems NL

N flocks	Organic	Free range	Barn	Cage
2008/2009[1]	14	38	132	62
2009/2010	23	59	154	94
2010/2011	29	54	190	62
2011/2012	42	62	225	22
2012/2013	42	49	174	11
Age at slaughter (weeks)				
2008/2009	77	72	75	86
2009/2010	76	74	78	80
2010/2011	74	76	77	81
2011/2012	75	80	82	89
2012/2013	76	77	82	89
% egg production (per hen housed)				
2008/2009	78.8	86.8	87.5	88.2
2009/2010	84.4	88.4	88.6	89.4
2010/2011	86.9	87.6	89.1	89.4
2011/2012	88.2	88.5	88.8	89.4
2012/2013	88.0	88.8	89.3	89.9
Feed conversion kg feed/kg eggs				
2008/2009[1]	2.55	2.35	2.28	2.05
2009/2010	2.51	2.27	2.21	2.02
2010/2011	2.34	2.24	2.18	2.04
2011/2012	2.40	2.31	2.21	2.03
2012/2013	2.29	2.22	2.17	2.00
Mortality (%)				
2008/2009	15.4	11.9	11.2	9.2
2009/2010	20.9	13.3	11.1	8.4
2010/2011	13.1	11.6	8.8	10.2
2011/2012	9.1	10.9	10.0	10.2
2012/2013	7.9	9.7	9.0	8.8

Animal health - mortality

- Mortality in Dutch flocks reduced from 15-21% < 2010 (n=37) to 8% in 2012/2013 (n=42) (Leenstra et al 2014)

Causes:

- Infectious diseases (*Erysipelotrix, Pasteurella*)
- Predation 4 % (Bestman 2016)
- Genotype x environment?

Improvements:

- Professional skills of farmers & vets
- Hygiene
- Vaccinations

Animal health - endoparasites

- Higher fecal egg count in case of outdoor access
  (Permin et al 1999)

- Less *Ascaridia galli* in case of earlier outdoor access
  (Thapa et al 2015)

- Less *Ascaridia galli* in case of higher % Hens Out
  Sherwin et al 2013)

  Free range: trouble maker or part of solution?

FreeBirds 2018-2020

- Rol van uitloop in worm besmettingen
- Per bedrijf: 6 grondmonsters, 7x10 buitenmest en 7x10 binnenmest
- 14 vd 21 bedrijven bezocht
- Nauwelijks wormeitjes in uitloopgrond
- Mestmonsters: 68-76% Ascaridia
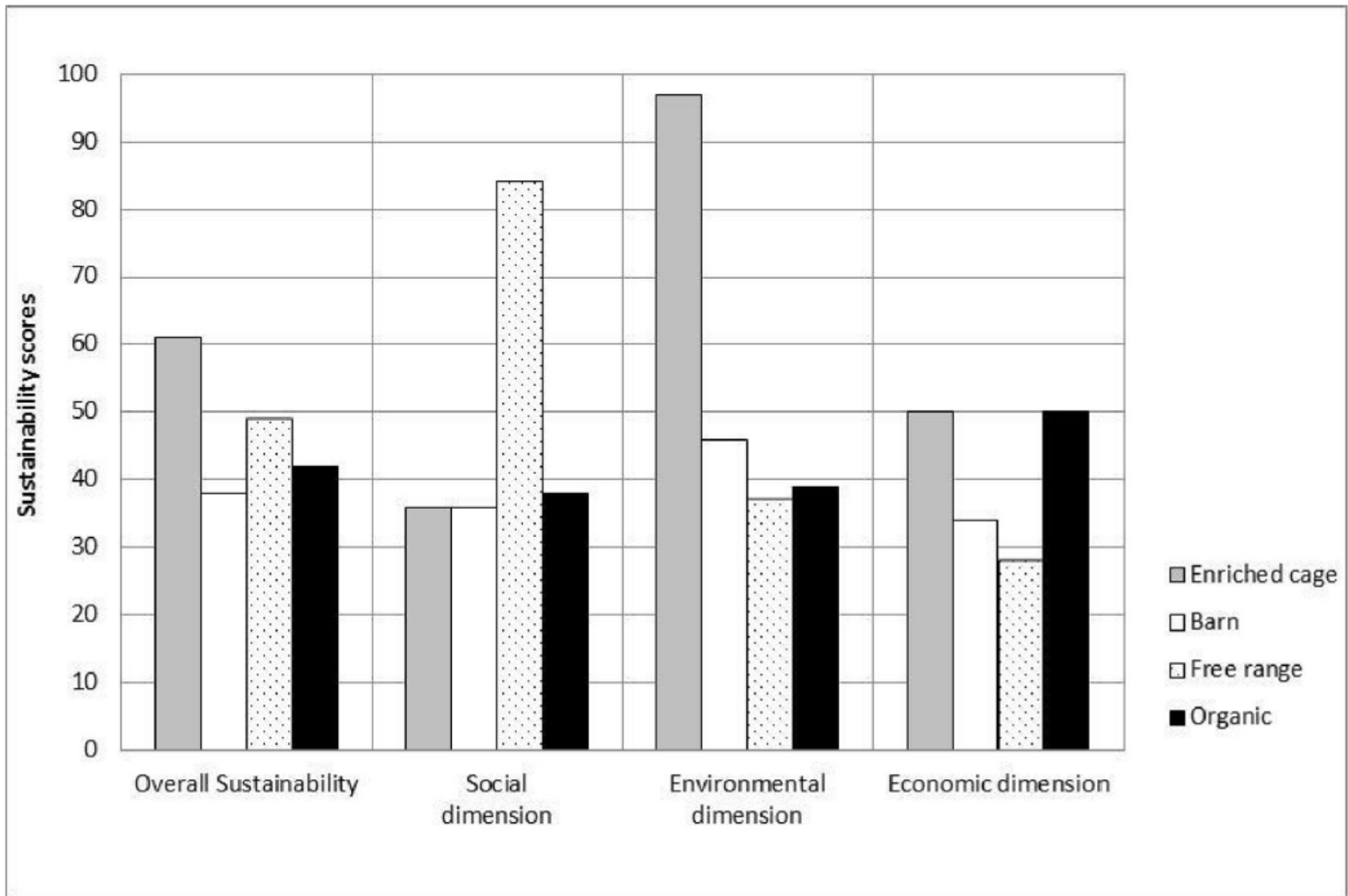- Mestmonsters: 14-26% Heterakis

Environmental aspects

- Sustainability aspects different egg production systems
  (van Asselt et al 2015)

Sustainability egg production NL

(van Asselt et al 2015)

Sustainability egg production NL

(van Asselt et al 2015)

Indicator	Enriched cage	Barn	Free-range	Organic
Dioxins (pg TEQ $_{WHO05}$/g egg fat)	0.07	0.07	0.32	1.08
Percent *Salmonella*-infected farms	8.1%	4.5%	3.1%	3.5%
Total square meters per laying hen (indoors and outdoors)	0.06	0.11	4.11	4.17
Percent mortality > 20 wk	8%	10%	12%	15%
Percent increase in shelled egg turnover per year per hen housing type	0%	−29.3%	76.6%	1.3%
Global warming potential (CO_2-equivalents g/kg egg)	2,235	2,685	2,754	2,533
Emission of NH_3 (kg/hen placed/year)	0.03	0.09	0.09	0.315
Energy use (MJ/kg egg)	20.7	23.2	23.8	20.8
Direct and indirect land use (m^2/kg egg)	3.21	3.70	4.02	6.69
Production costs (Eurocents/egg)	106	118	131	208
Farmer revenue price (Eurocents/egg)	92	99	109	192

Environmental aspects

- Sustainability aspects different egg production systems (van Asselt et al 2015)

Accumulation of N and P from manure in free range area:

- Laying hens pee 5 times more P than vegetation can take up (Dekker et al 2012; Bestman 2015)

- Balance with 250 instead of 2500 hens / ha (Niekerk & Leenstra 2014)

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Ecological footprint organic poultry feed (Dekker et al 2010)

Organic principles

Organic 3.0 (Arbenz et al 2017)

- Minimized environmental pollution
- High animal welfare
- Efficiency in resource utilization

Feeding the world in 2050 (El-Hage Scialabba et al 2014)

- Both conventional and current organic not sustainable enough
- Lower consumption of animal products
- No concentrates / human-edible feed stuffs for animals
- Either grass (ruminants) or residues/by products (pigs & poultry)

Current state of knowledge of welfare

Animal Welfare = quality of life as perceived by the animal and besides so-called physiological needs they also need to exercise certain natural behaviours (Bracke & Hopster 2006)

Behavioural needs, priorities and preferences (Weeks & Nicol 2006):

- Increased space, perching, nesting, foraging, dustbathing
- Add (features of) Free range area?

Chickens just as cognitively, emotionally and socially complex as most other birds and mammals in many areas (Marino 2017)

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Cognition, emotion and .. in chickens

(Marino 2017)

- Recognizing completely occluded objects
- Numerical abilities
- Perception of time intervals
- Episodic memory
- Reasoning and logical inference
- Self-control
- Self-assessment
- Communication
- Referential communication
- Discriminating among individuals
- Perspective-taking and social manipulation
- Social learning
- Emotion: fear, anticipation, decision making, cognitive bias, empathy, personality

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- Consequences for how we keep animals?

Conclusions

- Organic egg production high(est) potential for animal welfare

- Importance of free range area for welfare

- Environmental impact higher than other systems

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Perspectives

Future egg production systems with respect to animal welfare, health and environment:

- real or covered free range area?

- Combined land use?

- Progress on environmental aspects may not lead to less animal welfare

Questions?