



Gut parasite infections and free-range use in organic laying hens

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Why talk about gut parasites in laying hens?

Gut parasites found in 70-100 % of ORG/FR-flocks (Jansson et al., 2010; Kaufmann et al., 2011; Thapa et al., 2015)

Gut parasites may cause

- Reduced health/welfare by itself or as a vector
- Increased feed conversion

Use of anthelmintics may lead to

- Residues in eggs and environment
- Resistance in parasites, making anthelmintics less effective



Risk factors for gut parasites

- Contact with manure or litter inside hen house (Permin et al., 1999; Jansson et al., 2010)
- Previous flocks (Permin et al., 1999; Jansson et al., 2010)
- Free-range?? Wild birds? Earth worms?

Free-range is essential part of organic production

Parasite eggs survive >2 years (Thapa et al., 2017)

Free-range: risk or part of prevention/solution?

Free-range use and gut parasites

Study	How many flocks included	Country	Prevalence parasites (=ascarids) in relation to free-range
Bari et al., 2020	307 hens in 9 exp flocks	Australia	No differences between hens with different ranging patterns
Sibanda et al., 2020	9,375 hens in 5 comm flocks	Australia	Rangers more often infected than stayers
Grafl et al., 2017	79	Austria	Ascaridia ORG/FR > barn Heterakis ORG/FR < barn
Thapa et al., 2015	50	8 EU countries	Earlier pasture access less Ascaridia
Sherwin et al., 2013	19	UK	Higher % hens out less parasites More m ² FR/hen less parasites
Jansson et al., 2010	169	Sweden	ORG/FR = barn
Permin et al., 1999	16	Denmark	ORG/FR > deep-litter

Research question: is there a relation between parasite infections and ...

- Intensity of range use
- Anthelmintic treatments
- Health, % of lay at 60 weeks, % mortality till 60
- Range management: shadow, adding litter or soil cultivation top 10 cm



Parasitological parameters for soil and manure

1. Proportion of samples being positive for ascarids
2. Mean number of ascarid eggs/gram sample material
3. Proportion of samples being positive for Capillaria
4. Mean number of Capillaria eggs/gram sample material



Methods

Total 40 flocks in Sweden, Netherlands and Italy

Organic since > 10 years

Sampling if hens > 45 weeks old and > 3 months range access

Sampling as long as possible after anthelmintic treatment

6 soil samples at 5, 20 and 50 m from hen house

7x10 outdoor droppings > 50 m from hen house

7x10 indoor droppings

McMaster protocol for worm egg counts



Flock information (mean)

	All	Sweden	NL	Italy
Number of flocks	40	10	20	10
Genotype		1 brown 9 white	17 brown 3 white	6 brown 1 white 3 other
Hens/farm	11,714	19,435 ^a	11,496 ^{ab}	4,430 ^b
Hens/flock	3,384	6,186 ^a	2,771 ^b	1,770 ^b
Age of FR in years	16	18	15	14
Age of hens in weeks	62	66	62	60
% Hens out - farmer	51	31 ^a	48 ^a	76 ^b



Exact results will be available after publication

Feel free to ask m.bestman@louisbolk.nl to keep you informed when the full paper is available for sharing.

Limitations of this study

- Large differences between
 - countries in prevalence, genotypes, deworming
 - and within flocks parasitological parameters
- Small sample size (10-20 flocks/country)

➔ No(t able to detect) relations between parasites and ...

- Range use
- Deworming
- Health & production
- Range management



Prevalence of parasites

Manure

- Prevalence of ascarids comparable with other studies

(Thapa et al., 2015; Permin et al., 1999; Sherwin et al., 2013; Grafl et al., 2017)

- Prevalence of Capillaria comparable with other studies

(Jansson et al., 2010; Grafl et al 2017; Permin et al., 1999; Wuthijaree et al., 2017)

Soil

- 1st study Capillaria in free-range soil
- Few ascarid eggs in soil, while others found 100 %
(Heckendorn et al., 2009)
- Litter 2700 eggs/gram
(Maurer et al., 2009)



Risk of free-range relatively low

Deworming, health & production

Deworming

- Statistical vs practical significance: prevalence in Dutch/Italian flocks
- Parasite free 1 or 2-4 week(s) after deworming (Tarbiat et al., 2016a; Höglund and Jansson, 2011)
- Less parasite eggs after tailor-made approach (Tarbiat et al., 2016b)

Relation parasite eggs with health & production

- No relation with mortality (Gauly et al., 2008; Sherwin et al., 2013; Wongrak et al., 2015)
- No relation with production (Gauly et al., 2007; Sherwin et al., 2013)

Management of the free-range

Our study:

- Too few eggs in soil; Capillaria eggs only in Italian soil
- Soil treatments not evenly distributed across locations



Other studies

- Naturally infected soil: no effect of mowing (Heckendorn et al., 2009)
- Experimentally infected soil: ascarid eggs disappeared faster from gravel and wood chips, than from soil (Maurer et al., 2020)



Conclusions

- Ascarid and Capillaria infections widespread
- Nearly no ascarid eggs in soil, high prevalence Capillaria eggs in Italian soil
- Free-range risk relatively low compared to indoor conditions?
- Effectiveness of current deworming practice?
- Relation parasite eggs with health & production?

 Room for tailor-made approaches aiming at reduced use of anthelmintics

Questions?



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