

Förderung der Tiergesundheit und des Tierwohls ökologischer Legehennen in Europa

Promoting good health and welfare in European organic laying hens

FKZ: 11OE020

Projektnehmer:

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Gefördert durch das Bundesministerium für Ernährung und Landwirtschaft aufgrund eines Beschlusses des Deutschen Bundestages im Rahmen des Bundesprogramms Ökologischer Landbau und andere Formen nachhaltiger Landwirtschaft.

Die inhaltliche Verantwortung für den vorliegenden Abschlussbericht inkl. aller erarbeiteten Ergebnisse und der daraus abgeleiteten Schlussfolgerungen liegt beim Autor / der Autorin / dem Autorenteam. Bis zum formellen Abschluss des Projektes in der Geschäftsstelle Bundesprogramm Ökologischer Landbau und andere Formen nachhaltiger Landwirtschaft können sich noch Änderungen ergeben.

Abschlussbericht

Zuwendungsempfänger Universität Kassel Fachgebiet Nutztierethologie und Tierhaltung Nordbahnhofstr. 1a 37213 Witzenhausen	Geschäftsstelle Bundesprogramm Ökologischer Landbau Förderkennzeichen: 2811OE020 Zuwendungsbescheid vom: 22.09.2011 Zuletzt geändert am: 14.10.2014
Vorhabenbezeichnung Förderung der Tiergesundheit und des Tierwohls ökologischer Legehennen in Europa	
Laufzeit des Vorhabens 01. Oktober 2011 bis 31. Dezember 2014	
Berichtszeitraum 01. Oktober 2011 bis 30. Juni 2015	
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Witzenhausen, 30.06.2015



I. Kurze Darstellung

1. Aufgabenstellung

The general aim of this project was to promote good health and welfare in European organic laying hens.

The objectives of the project were to identify management strategies that promote animal health and welfare in European organic laying hens.

The following hypotheses have been investigated:

- Health and welfare problems, such as feather pecking, cannibalism, keel bone and foot lesions, as well as endo- and ectoparasite infestation levels are affected by a combination of housing factors, feed, hygiene and other management factors, hen genotype and (alternative) therapies. All these factors may have considerable impacts on mortality and performance and may directly or indirectly interact with each other.
- Design and management of the free range influences how well and evenly it is used by the hens. Range use also affects environmental impacts, e.g. emissions.

By adopting an epidemiological approach, important risk factors can be identified which will help to recommend efficient prevention and treatment strategies in order to secure good hen health and welfare and lower environmental impacts.

2. Voraussetzungen, unter denen das Vorhaben durchgeführt wurde

Das Vorhaben wurde im Rahmen des ERA-Net CORE Organic II durchgeführt.

3. Planung und Ablauf des Vorhabens

Most parts of the project were carried out according to the planning. Some deviations are elucidated at the end of this chapter.

The common cross-sectional design of the whole project comprised the following:

114 flocks distributed over 8 countries were included in the observational study. The flocks were visited twice at similar age periods (at peak of lay, i.e. at 29-47 weeks and at end of lay, i.e. at 52-73 weeks of age). Thus, the recordings were conducted in two seasons in each flock, spring/summer and autumn/winter. The following data were recorded during interviews, direct on-farm measurements and from farm documentation:

- Systems description (housing system, outdoor areas)
- Flock description (flock size, current age and weight, beak status, genotype)



- Management of free range areas
- Feeding management (feed composition, feeding regime, percentage of organic feed, provision of roughage, declaration of feed mill or NIRS analysis if farm-mixed rations)
- Health management (hygiene measures, disease prevention, veterinary and other treatments)
- Other management factors (litter management, provision of occupational material etc.)
- Pullet rearing (rearing system, health management, access to outdoor areas, age and weight at change to laying unit)
- Production and mortality figures
- Further animal related measures in WP1-WP4: parasite infestation levels, range use, plumage condition, skin lesions, food pad lesions and keel bone deviations

A common recording protocol was developed based on results and methodological recommendations from the previous two EU-projects LayWel and Welfare Quality®. Within a three-day workshop (project workshop 2), scientists or technicians from all countries were trained to use the protocol in a uniform manner. On-farm training and reliability testing with 14 to 16 assessors (one to two per country) is problematic on commercial farms as hens might be affected by handling and this might negatively influence the future of the whole flock. In Sweden there was the possibility to carry out training and reliability testing in both one organic and one conventional cage system. Assessments including bird handling were carried out in the cage system, as possible negative effects on performance would be restricted to the hen group in one cage, and not affect the complete flock. The major part of training and testing was successful. For those criteria for which acceptable agreement could not be reached in the very limited time of the workshop, we performed additional training and testing with photos online after the workshop, or merged those scores which turned out to be difficult to differentiate before analysis. Two rounds of inter-laboratory tests ensured comparability of ascarid egg counts and counts of coccidian oocysts.

Flocks in the different countries were selected according to common guidelines with respect to specific farm characteristics and criteria for independent samples were determined (agreed in project workshop 1): flocks needed to be managed by different farm managers to be regarded as independent, recruitment of several flocks on the same



farm or under the same management was obviated. The number of flocks recruited and visited in the participating countries is presented in Table 1.

Table 1: Numbers of organic laying hen flocks recruited and visited

Country	Contribution according to proposal		Recruited	Data collected at peak of lay	Data collected at end of lay	Flocks with data from parasitological autopsy
	Farm visits	Flocks for Autopsies				
Germany	20	10	26	22	19	8
Denmark	15	15	15	15	15	13
United Kingdom	10	10	12	12	11	2
Netherlands	10	2*	10	8	8	1
Austria	20	10	25	25	25	10
Italy	14	7	15	15	15	7
Sweden	10	5	9	9	9	9
Belgium	8	8	8	8	8	6
TOTAL	107	67	120	114	110	56

* according to proposal 5, reduced in agreement with the WP1 leader, the project coordinator, the CORE Organic secretary and the Dutch funding body

A Microsoft Access 2010 database to enter the data of all five work packages and instructions for data entry were developed and circulated. Data were processed in a standardised way in all WPs, based on a prototype database. They were analysed using multivariate statistical analysis (e.g. logistic regression or general linear models) with the factor 'flock' as random variable nested within country. The outcome variables were based on random samples of birds in samples of flocks or, in WP2, on repeated samples of the same flocks regarding range use and characteristics. Statistical approaches were aligned between WPs within a two-day workshop on modelling relationships between the independent variables relating to management and housing, and the dependent variables reflecting bird health and welfare, and the impact on the external environment (project workshop 3), and further in a number of Skype meetings, telephone and email exchanges.

The fourth project workshop and the scientific workshop took place from 26th to 27th August 2014 in Vienna. Preliminary results of the different WPs were evaluated with all partners with regard to future joint recommendations (workshop 4) and solutions for remaining problems with the data base and necessary refinements of the data set were discussed. This was followed by an open scientific workshop with partners of the EU-



project LowInputBreeds (FiBL Switzerland) and a veterinarian from the Veterinary University of Vienna.

Coordination of the project was achieved by clear common guidelines on project execution as detailed above, through the four project workshops that served coordination, training and scientific discussion between project partners and regular Skype meetings. This coordinated approach fostered the integration of results of the different WPs.

During the project, work package leaders changed in WP1 (Denmark), WP2 (UK) and WP3 (Netherlands). Furthermore, several additional researchers and PhD students were involved in the project which raised the number of contact persons to 19 persons apart from the German partner, and considerably increased work expenditure of the project coordinator (University of Kassel, Germany).

In WP1, the following changes had to be made compared to the original plan: Two rounds of inter-laboratory reliability testing had been necessary to reach agreement between the laboratories on the quantification of helminth eggs. This was done by circulating sets of 10 samples, standardised for ascarid EPG to the partner laboratories. Due to persisting differences in counts for two laboratories, we adjusted the faecal egg counts obtained from these laboratories. Furthermore, a change in the number of samples per flock was decided. It was estimated that the accuracy achieved by examining 15 samples per flock would differ only to a minor degree from the estimate achieved by examination of 20 samples per flock. This assumption was supported by resampling from a Danish dataset obtained by examination of an organic layer flock. The sample size of flocks for the autopsies had to be reduced in the Netherlands as unforeseen problems with getting carcasses from the slaughterhouse occurred. Consequently, birds had to be killed by a veterinarian which significantly increased the costs, reducing the sample size covered by the available budget from five to two. The reduction was discussed with the CORE Organic II secretary and agreed on with the WP 1-leader and the coordinator. The sample size for the autopsies were further reduced due to unannounced termination of the production, which meant that at the end of the study the total sample size of hens that underwent post mortem worm count was 56 flocks instead of 70 flocks in the original plan.

In WP2, there were two deviations from the original plan: Rating the plant cover and counting of hens and droppings resulted in good impressions of the distribution of hens in the outdoor run and the intensity of use. Assessment of feather distribution on the range, on other hand turned out not to be a reliable measure and was thus excluded



from the protocol. Furthermore, the weights of droppings were not reliably or accurately collected in all countries, and were consequently not taken into account in the investigation of manure deposition.

4. Wissenschaftlicher und technischer Stand, an den angeknüpft wurde

Organic egg production generally accounts only for a relatively low proportion of overall egg production, but has substantially increased over the last years (e.g. Verbeke 2013, Schaack 2015) and already gained considerable significance in some member states, for example Denmark (Oliver et al. 2009). One reason for the increasing popularity of animal production systems that offer outdoor access, including organic systems, is the growing general discontent of consumers with conventional intensive farming practices (Kijlstra et al. 2009). The outdoor range can contribute to the well-being of poultry. For instance, associations between increased use of an outdoor area and lower levels of feather pecking have been found (e.g. Bestman and Wagenaar 2003, Nicol et al. 2003, Lambton et al. 2010). However, the use of the outdoor range differs between farms and the range is often used only by a small proportion of the hens (Winckler et al. 2004, Hegelund et al. 2005, Reiter et al. 2006). Hens that do go outside often stay close to the poultry house (Fürmetz et al. 2005). Studies have shown that it is possible to improve the use of the outdoor area by providing shelters and other structuring elements (Hegelund et al. 2005, Van de Weerd and Elson 2006, Van de Weerd et al. 2009). These findings suggest a complex interaction between system design, management and ranging behaviour.

A critical challenge for the further development of organic egg production is the ability to document a high level of animal health and welfare. Currently there are a number of health and welfare problems which need to be addressed (Knierim 2006, Van de Weerd et al. 2009). For instance, feather pecking can be seen in 50-90% of the flocks (Bestman and Wagenaar 2003, Hörning et al. 2004, Staack et al. 2008a). Moreover, organic egg production is being criticised for a relatively high mortality caused by infectious diseases and cannibalism (Borell and Sørensen 2004).

Endoparasitic infection is widespread in organic poultry production. *Heterakis gallinarum* e.g. were found in 89% and *Ascaridia galli* in 84% of free-range flocks, including organic farms, in a British study (Sherwin et al. 2013) and Jansson et al. (2010) found an ascarid prevalence of 77 % for free-range and organic farms in Sweden. Gauly et al. (2007) observed an increase in feeding combined with a decrease in moving in *A. galli* infected laying hens compared to uninfected hens, indicating a higher nutritional need. The caecal worm *Heterakis gallinarum* is smaller in size and virtually apathogenic by itself,



but may serve as the intermediate host for the protozoan parasite *Histomonas meleagridis* which causes the disease 'blackhead', a disease which can lead to very high flock mortality due to the lack of treatment possibilities (Stokholm 2010).

The occurrence or intensity of feather pecking in a flock is considered a measure for the amount of stress birds are experiencing or have experienced earlier in their life. Stress is the result of different housing and management factors having single or combined detrimental effects on birds. Although a considerable amount of work already has been done on feather pecking (e.g. reviewed by Sedlačková et al. 2004, van Krimpen et al. 2005, Kjaer and Bessei 2013, Nicol et al. 2013, Rodenburg et al. 2013), it is still a major health and welfare threat. Feeding management, in particular, determines to what extent hens are offered the nutrients they need and how much time they are occupied with functional pecking behaviour. In 2017, EU regulations will obligate organic poultry farmers to use rations based on 100% organic feed ingredients. This will have a major impact on the organic laying sector across Europe.

Injuries due to cannibalism have also been found in organic flocks. One study found on average 23% of injured hens (Staack et al. 2008b). Cannibalism has highly significant consequences for welfare and performance, but is less well investigated than feather pecking. However, the underlying mechanisms are very likely similar between the two abnormal behaviours (Yngvesson 2002).

Fractures and deviations of the keel bone are also an increasing welfare concern in non-cage systems. Reported prevalences of keel bone fractures in end of lay birds range from 10% to 65% in single-tier systems with or without access to pasture (Nicol et al. 2006, Niebuhr et al. 2008). Another common problem in laying hens housed in non-cage systems are foot pad lesions. They have been found in 40% of hens per flock in single-tier systems with or without access to pasture (Niebuhr et al. 2009). Being associated with considerable pain for the birds, these multifactorial health problems impair animal welfare significantly and show that housing and management are not well adapted to the birds' physiology and behaviour.

In general, for most poultry health and welfare problems, a level of fundamental knowledge is available from experimental investigations. For a better understanding of the multifactorial nature of these problems on farm, the number of epidemiological studies has increased in recent years. However, the number of epidemiological studies concerning health and welfare in organic layer farms is very limited (Simoneit et al. 2012). Therefore, there is a lack of information regarding the actual status of health and welfare and regarding influencing factors under European organic conditions.



5. Zusammenarbeit mit anderen Stellen

Work packages 1 to 4 have been managed by the following persons and institutions:

WP1 (parasites): Jan Tind Sørensen and Ricarda Greuel Engberg, Aarhus University, Denmark

WP2 (range use): Alice Willett, ADAS, United Kingdom

WP3 (feather and injurious pecking): Monique Bestman, Louis Bolk Institute, The Netherlands

WP4 (other health problems): Knut Niebuhr, University of Veterinary Medicine Vienna, Austria

Further partners involved in the project: Paolo Ferrari, Fondazione CRPA Studi e Ricerche onlus, Italy, Stefan Gunnarsson, Swedish university of Agricultural Sciences, Sweden and Frank Tuytens, Institute for Agricultural and Fisheries, Belgium.



II. Eingehende Darstellung

1. Verwendung der Zuwendung und des erzielten Ergebnisses im Einzelnen, mit Gegenüberstellung der vorgegebenen Ziele

Achievement of Milestones:

No	Milestone name	Planned month ¹	Actual month ¹	Means of verification
M1	Project workshop 1	2	2	Guidelines for flock acquisition and detailed work plan including contingency plan agreed
M2	Recording protocols	8	9	Full recording protocols described and agreed between participants
M3	Flocks recruited	9	14	Flocks for cross sectional study recruited
M4	Project workshop 2: Assessor training	9	9	Three days training workshop for all people involved in data recording was held, acceptable assessor agreement reached
M5	Prototype database	11	17	Prototype database developed and circulated
M6	Data recorded	25	30	On-farm data collection and autopsies finalised
M7	Databases developed	28	37	Databases for analyses in WP1-WP4 developed
M8	Project workshop 3	29	29	Statistical models agreed
M9	Analyses finalised	32	38 ²	Analyses in WP 1- 4 finalised
M10	Project workshop 4 and scientific workshop	33	35	Results from different WPs synthesised, discussed in closed project and open scientific workshop, recommendations agreed
M11	Reporting	May 2015 ³	May 2015	Final report submitted to CORE Organic II secretary

¹ Measured in months from the project start date (month 1), ² in WP4, analysis is still ongoing, ³ originally 36, extension until end of May 2015 granted

Additional comments

Milestone 2: Recording protocols

The recording protocols were developed by the responsible WP-leaders. As this task was more time consuming than expected and needed a lot of discussion between participants, we first focused on accomplishing those parts needed for the peak of lay farm visits. The protocols for the end of lay farm visits were finalised with some delay, but before second visits began.



In the course of data collection, some need for refinement was identified and additions implemented.

Milestone 3: Flock recruitment

Flock recruitment took longer than expected in one country. In two other countries, re-recruitment of further farms was necessary due to drop outs.

Milestone 5: Prototype database

Finalizing of the very complex and large data base was delayed due to technical problems with the software.

Milestone 6: Data recorded

Data collection was delayed due to delays in farm recruitment in one country and due to drop outs in further two countries. Autopsies were delayed in some countries as flocks were slaughtered later than expected (and still examined) or were slaughtered early without informing the research partner or moulted and had to be replaced by other flocks, originally not foreseen for sections of gastrointestinal tracts.

Milestone 7: Database developed

Database development turned out to be much more time consuming than expected due to technical problems and complexity of the data set. This added up to the existing delay with data collection and the development of the prototype data base.

Milestone 9: Analyses finalised

Due to the problems with the data base and refinements/correction which turned out to be necessary, analyses were delayed.

Milestone 10: Project workshop 4 and scientific workshop

The final workshop was held two month later than originally planned due to delays in data analysis.

Milestone 11: Reporting

The final report has been submitted to the CORE Organic II secretary in accordance with the granted extension until end of May, 2015.



Achievement of Deliverables:

No	Deliverable	Nature	Dissemination level ¹	Planned delivery month ²	Actual delivery month ²
D0.1	Assessment protocol	Protocol	INT	8	9
D0.2	Prototype database	Prototype	INT	11	17
D0.3	Annual project update	Report	PU	16 ³	16
D0.4	Mid-term report	Report	CO	20	20
D0.5	Annual project update	Report	PU	28 ³	28
D1.1	Database WP 1	Database	INT	28	33
D2.1	Database WP 2	Database	INT	28	37
D3.1	Database WP 3	Database	INT	28	34
D4.1	Database WP 4	Database	INT	28	34
D0.6	Status quo benchmarking article	Paper	PU	32 ⁴ +3 ⁵	Draft circulated
D1.2	Parasite article	Paper	PU	36+3 ⁵	Final draft circulated
D2.2	Range use and environment article	Paper	PU	36+3 ⁵	Draft circulated
D3.2	Harmful pecking article	Paper	PU	36+3 ⁵	Draft circulated
D4.2.	Health disorder article	Paper	PU	36+3 ⁵	In preparation
D0.7	Prototype national leaflet	Leaflet	INT	35+3 ⁵	May 2015
D0.8	National leaflets	Leaflet	PU	36+3 ⁵	June 2015
D0.9	Final report	Report	PU	36+3 ⁵	May 2015

¹ PU = Public; INT= Internal (Restricted to other project participants); RE = Restricted to a group specified by the consortium; CO = Confidential, only for members of the consortium, ² Measured in months from the project start date (month 1), ³ The deadline of the annual project update was extended to January 2013 (project month 16) by the CORE Organic II secretary, ⁴ Postponed after D1.2, D2.2, D3.2 and D4.2 as results from these four papers were planned to be accumulated in D0.6, ⁵ An extension of 3 month has been granted.

Due to difficulties with the database, analyses for the different work packages have been delayed. Currently, one paper is ready for submission, three are under revision for submission and one is in preparation:

D1.2: The scientific paper on endoparasites is ready for submission.

D2.2: The publication on range use is under final revision for submission.

D3.2: The publication on feather and injurious pecking is under final revision for submission.

D4.2: The publication on other health problems is in preparation.



D0.6: In the last workshop it was decided to include results from all WPs in this publication, it was consequently postponed after D1.2, D2.2, D3.2 and D4.2. The publication is to be circulated to all co-authors in the pre-final version.

D0.7 and D0.8: The recommendation leaflet has been agreed upon and translated into the national languages.

2. Wichtigste Positionen des zahlenmäßigen Nachweises

Jahr	2011	2012	2013	2014	INSGESAMT
Betrag lt. Finanzplan 9/14	11.689,25	68.500,65	79.779,69	68.625,33	228.594,92
Übertrag aus Vorjahr		-1.809,95	2.426,56	-2.236,37	
Summe Gesamt	13.499,20	64.264,14	84.442,62	67.862,57	230.068,53
<i>Monate</i>	3	12	12	9	36
Personal	13.374,95	61.788,84	74.116,47	60.514,18	209.794,44
Wissenschaftliche Mitarbeiterin EG13	13.374,95	49.594,53	51.616,09	51.617,82	166.203,39
Techn. Mitarbeiterin	0,00	12.194,31	8.612,55	203,61	21.010,47
Studentische Hilfskräfte	0,00	0,00	13.887,83	8.692,75	22.580,58
Vergabe von Aufträgen	0,00	0,00	697,05	1.499,40	2.196,45
Sonstige Verwaltungsausgaben	124,25	757,16	2.658,13	1.221,53	4.761,07
Reisekosten Summe	0,00	1.718,14	6.242,75	4.627,46	12.588,35
Gegenstände > 410 €	0,00	0,00	728,22	0,00	728,22

3. Notwendigkeit und Angemessenheit der geleisteten Arbeit

The prevalence ranges found confirmed a need for improvement on some farms. The transnational cooperation made a sample size of 114 organic layer farms possible and provided variation for analysis of beneficial and risk factors.

The expected research results will be of interest for farmers, advisors and the scientific community.

All partners provided high inputs in relation to the resources available for this project that allowed to collect a unique European database. Future data analyses additional to those that could be undertaken in the limited framework of this project would be worthwhile.



4. Voraussichtlicher Nutzen, insbesondere die Verwertbarkeit des Ergebnisses im Sinne des fortgeschriebenen Verwertungsplans

The recommendations compiled in leaflets for farmer and advisors, provided in all national languages of the countries involved in the project, are expected to positively contribute to the health and welfare situation of European organic laying hens. Information about the project also has been and will be provided through publications in farmer magazines (see II 6). Through scientific publications and presentations at conferences, the gained knowledge is spread amongst the scientific community. Furthermore, the project directly intensified the exchange between laying hen experts among Europe. The revealed differences in organic hen husbandry and management between the participating countries may stimulate the discussion about the interpretation of the European regulation on organic production

5. Während der Durchführung des Vorhabens dem ZE bekannt gewordener Fortschritt auf dem Gebiet des Vorhabens bei anderen Stellen

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6. Erfolgte oder geplante Veröffentlichungen des Ergebnisses nach Nr. 6

Stakeholder in all participating countries became aware of the project during farm recruitment. The participating farmers received information about the health and welfare situation in the assessed flocks (status of parasite infestation and benchmarking for the hen based parameters) after both or the second visits.

Recommendation leaflet have been developed on reduction/prevention of parasite burden, feather and injurious pecking, keel bone deviations and foot pad lesions and good range use in English and national languages of all project partners.

Articles:

Brenninkmeyer, C. (2014) Projekt HealthyHens – Förderung der Tiergesundheit und des Tierwohls ökologischer Legehennen in Europa. In: Wie rund ist das Öko-Ei? Dokumentationsband der 21. Witzenhäuser Konferenz. kassel university press, Kassel, Germany.

Ferrari P., Ferrante V. (2014) Salute e benessere nell'allevamento biologico, Professione Avicunicoltore, n. 5, Le Point Veterinaire Italie.

Hansen, J. Forskere forbedrer velfærden og sundheden hos økologiske høns. 1/3-2012. <http://dca.au.dk/aktuelt/nyheder/vis/artikel/forskere-forbedrer-velfaerden-og-sundheden-hos-oekologiske-hoens/>



Hansen, J. Scientists improve health and welfare of organic laying hens. 1/3-2012.
<http://dca.au.dk/en/currently/news/show/artikel/scientists-improve-health-and-welfare-of-organic-laying-hens/>; thereafter cited here:

<http://www.thepoultrysite.com/poultrynews/25037/scientists-improve-health-welfare-of-organic-laying-hens>

<https://www.ja.dk/Sider/Nyhed.aspx?nid=3750> (in Danish, 7/3-2012)

Hinrichsen, L.K. and Sørensen, J.T. (2015) HealthyHens – Sundhed og velfærd hos øko-høns (in Danish, HealthyHens – health and welfare in organic hens). P. 60-63 in “Ny viden. Resultater fra forskningsprogrammerne Organic RDD and CORE organic, 2012-2015” by ICROFS Skovsbøl, Ulla (eds)

Niebuhr, K. (2011): Haben es Bio-Hühner gut? (in German, translated title: Are organic hens fine?) BIO AUSTRIA 6/11, 24.

Presentations / Interviews:

Bestman, M.: presentation of project highlights at the Organic food and farming fair on the 21st of January in Zwolle, NL

Brenninkmeyer, C.: Presentation of preliminary national project data at the 21st Witzenhäuser conference on organic egg production, 3rd to 7th December 2013

Gunnarsson, S.: Project presentation 5 oct 2012 – national seminar for poultry vets, consultants and stakeholder (approx. 40 persons)

Gunnarsson, S.: Project presentation 17 oct 2012 – Nordic seminar for organic consultants and organic egg farmers (approx. 20 persons)

Gunnarsson, S.: presentation for organic egg producers in Vigingstad (26.11.2014; about 35 farmers) about ranging behaviour, outdoor runs and endoparasites

Gunnarsson, S.: presentation for organic egg producers in Alevasta (5.12.2014; about 20 farmers) about ranging behaviour, outdoor runs and endoparasites

Hinrichsen, L.K. 10. april 2015: Indvoldsorm påvirker dødelighed hos høns (In Danish, “Endoparasites affects hen mortality”). Interview in Økologi og Erhverv

Niebuhr, K.: Presentation of preliminary national project data in two presentations at national meetings (producer organisation, veterinarians)

Upcoming presentations:

Bauer, C., Brenninkmeyer, C., Hirzmann, J., Maksimov P. and Knierim, U.:
 Gastrointestinalhelminthosen bei Legehennen in deutschen Öko-Betrieben. Poster with German worm burden results for presentation at the DVG Parasitology conference, 29. June – 1. July 2015 in Stralsund, Germany



Gunnarsson, S. et al.: presentation of project results at the conference of the International Society for Animal Hygiene (ISAH), 7-11. June 2015 in Kosice, Slovakia

Heerkens, J.: workshop with laying hen farmers from NL and BE based on the results of HealthyHens

Scientific articles in preparation / submitted:

Bestman, M., et al.: Feather pecking and cannibalism in organic laying hens based on data of 107 flocks from 8 European countries

Brenninkmeyer, C. et al.: Production conditions and correlation between main health and welfare outcomes in organic egg production in eight European countries

Thapa, C. et al.: Prevalence and magnitude of helminth infections in organic laying hens (*Gallus gallus domesticus*) across Europe

Willet, A. et al.: Use of the free range in organic laying hens in eight European countries.

Articles for farmers / advisors / decision makers in preparation:

Brenninkmeyer, C. / HealthyHens consortium: Publication of the project results in the upcoming CORE organic newsletter

Heerkens, J.: Publication of the project results in the CCBT (Coordination Centre Applied Research and Information for Organic Agriculture) newsletter

Willet, A.: Article on range use in organic laying hens based on the project results

Furthermore, data from the HealthyHens project is used in PhD theses which will be published: The following PhD students used / are using data from HealthyHens: Lisa Jung (Germany), Jasper Heerkens (Belgium/Netherlands), Lena Katharina Hinrichsen (Denmark), Sundar Thapa (Denmark)

The thesis of Lena Katharina Hinrichsen already is publically available and is being uploaded to Organic Eprints:

Kontrol af indvoldsorm kan reducere dødeligheden I den økologiske ægproduktion (In Danish, Control of endoparasite can reduce mortality in organic egg production), by Lena K. Hinrichsen (<http://anis.au.dk/aktuelt/nyheder/vis/artikel/kontrol-af-indvoldsorm-kan-reducere-doedeligheden-i-den-oekologiske-aegproduktion/>)



List of publications available on organic eprints

Gunnarsson, Stefan (2012) Healthyhen - Studie av hälsa och djurvälstånd hos ekologiska värphöns i Europa. [HealthyHen - Epidemiology of health and welfare in European organic laying hens.]

Gunnarsson, Stefan (2012) Healthy hen - för att förbättra hälsa och djurvälstånd hos ekologiska värphöns i Europa. ["HealthyHen - Promoting good health and welfare in European organic laying hens." Presentation of the HealthyHen project.]

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Anlage 1: Kurzfassung

zum Projekt Förderung der Tiergesundheit und des Tierwohls ökologischer Legehennen in Europa (HealthyHens, FKZ 2811OE020)

Ziel des europäischen Forschungsprojektes HealthyHens war es, für die ökologische Legehennenhaltung Managementstrategien zu identifizieren, die zu Tiergesundheit und Wohlbefinden beitragen. Dazu wurden auf insgesamt 114 Betrieben in den Ländern Belgien, Dänemark, Deutschland, Italien, Niederlande, Österreich, Schweden und Vereinigtes Königreich umfangreiche Daten erhoben. Der Endoparasit *Ascaridia galli* wurde in allen Ländern auf fast allen Betrieben, bei im Durchschnitt 68 % der Hennen gefunden. Heterakis-Würmer waren mit 32 % etwas weniger verbreitet. Nur ein signifikanter Einflussfaktor auf den Wurmbefall konnte identifiziert werden: je länger die tägliche Zugangszeit zum Grünauslauf, desto geringer war der Befall mit Ascaridien. Pickschäden an Gefieder und Integument waren bei im Schnitt 40% bzw. 21% der Hühner festzustellen. Auch hier waren Betriebe mit besseren Zugangszeiten zum Auslauf, nämlich täglichem Zugang unabhängig von Wetter und anderen Umständen, geringer betroffen. Darüber hinaus gab es weniger Gefiederschäden mit zunehmendem Proteingehalt im Futter und weniger Pickverletzungen, wenn innerhalb des Legedurchgangs Scharrmaterial nachgestreut oder ausgewechselt wurde. Der Anteil Hühner im Grünauslauf war höher, je kleiner die Herde und je größer die Auslaufläche je Huhn war. Außerdem wirkten sich Hecken und künstliche Schutzvorrichtungen positiv auf den Anteil Hühner im Auslauf und die Verteilung der Hühner im Auslauf aus. Aufgrund der Ergebnisse konnten Empfehlungen an Bio-Legehennenhalter in wichtigen Punkten fortgeschrieben werden. Ein Merkblatt für die Praxis wurde erstellt.

