Systems development: quality and safety of organic livestock products

Proceedings of the 4th SAFO Workshop
17-19 March 2005, Frick, Switzerland

Edited by
M. Hovi, M. Walkenhorst and S. Padel

SAFO Sustaining Animal Health and Food Safety in Organic Farming
A European Commission funded Concerted Action Project

Sustaining Animal Health and Food Safety in Organic Farming (SAFO)

Co-ordinator:	Mette Vaarst (Danish Institute of Animal Science, Denmark)
Steering Committee	Malla Hovi (The University of Reading, England)
	Susanne Padel (The University of Aberystwyth, Wales)
	Albert Sundrum (The University of Kassel, Germany)
	David Younie (Scottish Agricultural College, Scotland)

Edited by:	Malla Hovi, Micheal Walkenhorst and Susanne Padel
Publication date:	July 2005
Printed in:	The University of Reading
ISBN:	07049 9851 3

Organic egg production in Finland – animal health, welfare and food safety issues

A. Virtala[1], U. Holma[2], M. Hovi[3], M. Hänninen[1], T. Hyyrynen[1], L. Rossow[4], H. Kahiluoto[5] and A. Valros[2,6]

[1]University of Helsinki, Faculty of Veterinary Medicine, [2]University of Helsinki, Institute for Rural Research and Training Mikkeli Unit, [3]University of Reading, Veterinary Epidemiology and Economics Research Unit, [4]National Veterinary and Food Research Institute, [5]MTT Agrifood Research Finland, Ecological Production, [6]University of Helsinki, Research Centre for Animal Welfare

Introduction

Maintaining high welfare status and allowing birds access to natural behaviour and outdoors are particular challenges in organic egg production. Feather pecking, foot problems, external parasites and poor utilisation of outdoor areas have been recognised as problems in organic layer systems (Lampkin 1997, Berg 2001, Kjilstra *et al.* 2003). Inexperience might cause imbalances in feed rationing due to the absence of synthetic amino acids and use of home-grown feed (Gordon and Clarke 2002, Zollitsch and Baumung 2004). Furthermore, birds in free range systems have potentially greater exposure to bird or human pathogens than birds in systems with no outdoor access. Good stockmanship and experience in free range systems have been identified as keys to high welfare status in organic poultry systems (Bestman 2001). Thus, organic egg production poses major challenges for producers in countries like Finland, where free range egg production is not common; where climatic conditions limit both outdoor access and building design; and where biosecurity and exclusion of zoonotic pathogens from the food chain has been one of the main aims of conventional egg production.

One of the main objectives of the current study was to identify risk factors for potential problems in animal welfare and food safety on organic layer flocks in Finland. In addition, the aim was to establish potential solutions, suitable for Finnish conditions, to identified risks. In this presentation, the core findings of the descriptive statistics concerning management traits of the farms, their pastures and outside access for the hens, factors affecting health control on the farms, laboratory results of the faecal samples as well as post mortem results will be presented. The results (e.g. prevalence of cannibalism, red mites and campylobacters and absence of salmonella) will be compared to other studies in other countries and to the general disease status of non organic egg production in Finland.

Materials and methods

A total of 20 out of 23 commercial organic layer farms (in excess of 80% of all commercial Finnish organic farms) took part in the research. One flock per farm was chosen and flocks were visited twice (19 farms in Aug-Oct of 2003 and 17 farms in March-Apr of 2004). Data were collected through observation and by interviewing the producer, using a semi-structured interview guide. Laying hen welfare was estimated using environment-based and animal-based methods. Environment-based measures included ANI 35L-2001 -laying hens (Bartussek, 2001), housing environment and litter moisture and animal-based measures hen scoring (20-50 hens/flock, all together 911 hens) (Gunnarsson *et al,* 1995), hen body weight and flock-level fear of humans. Fresh faecal samples were collected from the floor for analysis of campylobacter and salmonella bacteria (5-50 samples per farm) and for internal parasite identification (4-10 pooled samples per farm). Samples were cultured for

Campylobacter spp. using both direct culturing on selective blood-free medium (modified charcoal cefoperazone deoxycholate agar) and by enrichment in Bolton broth. The egg samples were enriched in Bolton broth and after incubation in microaerophilic atmosphere on mCCDA plates. Gastrointestinal parasite eggs and oocysts were studied by flotation. For the prevalence study of poultry red mites *(Dermanyssys gallinae),* six cardboard traps per henhouse were placed into the walls of a henhouse for 2-3 days as described by Höglund *et al.* (1995). In addition, 10 untreated eggs/flock were collected for campylobacter and salmonella studies. Altogether, 38 dead hens from 12 farms were examined pathologically through post mortem.

Results

The Finnish organic egg producing farms, visited by the project, had been in organic production for an average of four years (Table 1). Approximately half of the flocks had less than 1,000 hens; and none of the flocks was greater than 3,500 hens.

Table 1 General information and management practices on 20 organic layer farms in Finland (80 % of all Finnish organic egg producers).

Variable	N[1]	Median	Min – Max	% of farms	95 % CI[2] for the %
Number of hens in the henhouse	20	1066	92 – 2666	N/A[3]	N/A
Henhouses with 1000-2666 hens		N/A	N/A	45	35 – 50
Henhouses with 92- 999 hens				55	50 – 65
Using at least some used hens for food	19	N/A	N/A	11	5 – 16
Estimate of mortality (%/month)	20	0.5	0 – 3.9	N/A	N/A
Years in poultry farming	19	5	1 – 34	N/A	N/A
Years producing organic eggs	20	4	1 – 14	N/A	N/A

[1] N=Number of farms with data
[2] Hypergeometric 95 % confidence interval for the percentage, taking account that in Finland there were altogether 23 organic egg producing farms that sell eggs to consumers through egg packaging companies or food shops in 2003-2004
[3] Not applicaple

Of the farms, 15-25 % had an outdoor area less than 2 m^2/hen. On 26-42 % of the farms, the farmer reported that access to outdoor area was offered for less than 120 days per year. Additionally, the producers on 17-44 % of the farms estimated that less than 50 % of the birds used the outdoor areas (Table 2).

Table 2 Outdoor area provision and management and farmer estimates of outdoor use and access by hens on 20 organic layer farms in Finland (80 % of all Finnish organic egg producers).

Variable		N[1]	Median	Min – Max	% of farms	95 % CI[2] for the %
Size of outdoor area/hen	< 2 (1.3-1.8) m^2	20	N/A[3]	N/A	20	15 – 25
	2-2.999 m^2				50	40 – 60
	3-3.999 m^2				20	15 – 25
	4-4.999 m^2				5	0 – 5
	> 5 m^2				5	0 – 5
Roughly estimated proportion of birds using the outdoor area (estimated by the farmer)		18	35	7 - 95	N/A	N/A
	7-25 %		N/A	N/A	33	22 – 44
	26-50 %				28	17 – 33
	51-75 %				28	17 – 33
	76-95 %				11	6 – 17
Time when access to the outdoor area is offered (farmer report)		19	132	0 - 240	N/A	N/A
	< 120 days/year		N/A	N/A	37	26 – 42
	120-149 days/year				37	26 – 42
	150-180 days/year				21	16 – 26
	> 180 days/year				5	0 – 5
Outdoor area rotated during the outdoor period		20	N/A	N/A	10	5 – 10
Outdoor area rotated annually between all flocks		19	N/A	N/A	5	0 – 5

[1] N=Number of farms with data
[2] Hypergeometric 95 % confidence interval for the percentage, taking account that in Finland there were altogether 23 organic egg producing farms that sell eggs to consumers through egg packaging companies or food shops in 2003-2004
[3] Not applicaple

Only 0-10 % or 0-15 % of the farmers had recognized endoparasites or ectoparasites, respectively, in their flocks. However, 42-77 % or 48-90 % of the flocks were *Nematoda* spp. positive or red mite positive (caught with traps), respectively (Table 3). The post mortem results are biased since only 60 % (12 farms) sent some hens for *post mortem* and 42 % of the hens came from one particular active farmer. However, red mites were detected on 33-75 % of these farms sending hens for *post mortem*, which corresponds well with the trap results from all farms. Some hens that had died due to cannibalism were diagnosed from 33-67 % of these 12 farms.

Of the flocks, 71-90 % were *Campylobacter* spp. positive, the fall and spring results did not differ significantly between the seasons. The most common species detected was *C. jejuni*. Two of the farms were campylobacter-negative both in autumn and spring. Campylobacter

positive egg shell sample was detected once. Salmonellas were not detected either from fecal samples or eggs.

Table 3 External and internal parasites and *Campylobacter* and *Salmonella* prevalences on 20 organic layer farms in Finland (80 % of all Finnish organic egg producers), based on faecal sampling (endoparasites, *Campylobacter* and *Salmonella*) and trapping (red mites).

Variable		**N[1]**	**% of farms**	**95 % CI[2] for the %**
Red mites	*In fall 2003*	17	59	48 – 71
	In spring 2004	10	70	50 – 90
Endoparasites in fall 2003		19		
Nematoda			53	42 – 63
Coccidia	*Eimeria spp.*		84	79 – 90
Endoparasites in spring 2004		17		
Nematoda (any of the three below)			65	53 – 77
Coccidia	*Eimeria spp.*		94	94 – 100
Campylobacter spp.	*In fall 2003*	19	84	79 – 90
	In spring 2004	17	77	71 – 88
Salmonella spp. Both in fall 2003 and spring 2004		20	0	0 – 0

[1] N=Number of farms with data

[2] Hypergeometric 95 % confidence interval for the percentage, taking account that in Finland there were altogether 23 organic egg producing farms that sell eggs to consumers through egg packaging companies or food shops in 2003-2004

Discussion

The parasitic and cannibalism results compare well with results found in free range/organic poultry in Denmark (Permin et al. 1999), back yard flocks or alternative systems in Sweden (Höglund *et al.*, 1995), hens in alternative systems in UK (Green *et al.*, 2000) and organic laying hens in the Netherlands (Bestman and Wagenaar 2003). However, there is clear need in transferring this information to the farmers, as parasite levels can be reduced and welfare of hens increased through management practices.

Campylobacter jejuni colonizes commonly the intestines of wild birds and poultry. The results of this study suggest that organic laying hens are more often colonized by campylobacters than conventionally reared chickens in Finland, as some Finnish studies estimate approximately 4 % contamination levels in flocks when sampled at the point of slaughter. *Campylobacter* colonization did not appear to lead to contamination of egg shells, as only one sample was positive of a total of 36 samples studied. Campylobacters on egg shell surface are not likely to survive, as they are sensitive to dryness. These facts together indicate that the risk of transmission of campylobacters on eggs to consumers is small. Intestinal

colonization by campylobacters may lead to contamination of meat at slaughter as seen commonly in chickens. Meat of used organic hens is not commonly used as food decreasing the possibility of meat to transmit campylobacter infection to humans.

It was apparent in this study that outdoor access for laying hens is problematic under the Finnish climatic conditions. As the current EU Regulation requires outdoor access for one third of the birds life (KTTK 2005), including the rearing period, which is often spent entirely without outdoor access, it will be difficult for the Finnish layer producers to fulfill this requirement, particularly for birds that come into lay in during the autumn months. The EU Regulation does, however, allow reduced outdoor access due to climatic conditions, mainly as a temporary measure. When the climatic conditions limit the outdoor access on a more permanent basis, as in the Finnish climatic conditions, other solutions that allow access to natural behaviour need to be sought, for instance, in the form of winter gardens and verandahs.

Acknowledgments
This study was financed by the Finnish Ministry of Agriculture and Forestry.

References

Bartussek, H. (2001) Animal needs index for laying hens. ANI 35-L/2001 – laying hens. June 2001. Bal Gumpenstein. 30 pp.
Berg, C. (2001). Health and welfare in organic poultry production. Acta Veterinaria Scandinavica S95: 37-45.
Bestman, M. W. P. (2001). The role of management and housing in the prevention of feather pecking in laying hens. In: Human Animal relationship: stockmanship and housing in organic livestock systems. Proceedings of the 3rd NAHWOA Workshop, 79-88.
Bestman, M.W.P., Wagenaar, J.P. (2003). Farm level factors associated with feather pecking in organic laying hens. Livestock Production Science 80: 133-140.
Gordon, S.H., Charles, D.R. (2002). Niche and organic chicken products - their technology and scientific principles. Nottingham University Press, Nottingham, United Kingdom, 320 pp.
Green, L.E., Lewis, K. Kimpton, A., Nicol, C.J. (2000). A cross sectional study of the prevalence of feather pecking in laying hens in alternative systems and its associations with management and disease. Veterinary Record 147: 233-238.
Gunnarsson, S., Odén, K., Algers, B., Svedberg, J. and Keeling, L. (1995). Poultry health and behaviour in a tiered system for loose housed layers. Report 35. Department of Animal Hygiene, Faculty of Veterinary Medicine, Swedish University of Agricultural Sciences, Skara, Sweden. 112pp.
Höglund, J., Nordenfors, H. & Uggla A. Prevalence of the Poultry Red Mite, *Dermanyssys gallinae*, in Different Types of Production Systems for Egg Layers in Sweden. Poultry Science (1995) 74:1793-1798.
Kijlstra, A., Groot, M., Roest, J.v.d., Kasteel, D., Eijck, I. (2003). Analysis of black holes in our knowledge concerning animal health in the organic food production chain. Wageningen UR, 55 pp.
KTTK ((2004). Luomueläinmäärien yhteenveto 2003 – 2004 (Database of organic animal production). [online]. [cited 25.4.2005]. Available at: http://www.kttk.fi.
Lampkin, N., ed. (1997). Organic poultry production. Final Report to MAFF.
Permin, A., Bisgaard,M., Frandsen, F., Pearman, M., Kold, J. & Nansen, P. Prevalence of gastrointestinal helminths in different poultry production systems. British Poultry Science (1999) 40:439-443
Zollitzch, W. and Baumung, R. (2004) Protein supply for organic poultry: options and shortcomings. In: Organic livestock farming: potential limitations of husbandry practice to secure animal health and welfare and food quality. Proceedings of the 2nd SAFO Workshop; 153-159.