Animal welfare and food safety: danger, risk and the distribution of responsibility

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Abstract

Increased animal welfare may pose risks for public health, such as increased bacterial, viral or parasitic infections or an increased level of environmental contaminants in the food product. Examples include Campylobacter in organic boilers, Toxoplasma in pigs and poultry meat and Mycobacterium paratuberculosis in milk. Concerning environmental contaminants it is known that free-foraging laying hens will produce eggs that contain higher dioxin levels than hens kept in cages. Furthermore, outdoor chickens are considered to play an important role in the case of Avian flu outbreaks. This review indicates that it is possible to tackle each of the issues mentioned. Risk management is not only a responsibility of the government, but also should be divided amongst the participants in the food chain, including the consumer. To this end it is important that transparency about risks be maintained and optimal communication employed.

Introduction

Animal friendly production systems may create new or reintroduce old risks in relation to public health. There is a great deal of differentiation between the possible adverse public health aspects that have been described with animal friendly production systems, of which some are related to food safety of the product and others to direct transfer of microbial agents between farm animals and humans. Some of the risks are due to poorly designed systems and therefore can be prevented, whereas others reflect a fundamental conflict between an attitude of zero tolerance towards public health risks and the wish to keep animals under natural and high welfare conditions that are inherently less controllable from a hygienic point of view. Other risks arise because the environment is no longer “natural”, for instance due to historic pollution (dioxins).

To date, food safety issues associated with organic farming have been considered as a delicate issue and little attention has been paid to methods dealing with such dilemmas. In this paper we intend to highlight possible solutions and will illustrate this with recently described examples.

Materials and methods

We identified food safety issues related to organic animal farming by assessing a number of databases. The Web of Science was assessed using the key words “organic”, “animal friendly” and “food safety”, using the advanced search option. Papers related to animal husbandry were selected and specific food safety issues

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were isolated. Subsequently repositories such as “Organic Eprints” or the “EFSA Journal” were studied for further papers related to the identified food safety issues.

Food safety issues were tabulated and type and source of risks were described. A proposed responsibility towards management of risks in the food chain were assigned to various players in the food chain.

Results

Table 1. Public health concerns associated with animal friendly production systems

Type	Animal Husbandry	Source	Risk Management
Campylobacter	Poultry, pigs	Outdoor run, contact with wild fauna	Monitoring, decontamination, consumer education
Avian influenza	Poultry	Contact with wild birds, humans (farm hygiene)	Monitoring, temporary indoor keeping, vaccination
Toxoplasma	Pigs, poultry	Outdoor run, farm cats, rodents	Monitoring, farm management, post harvest decontamination, consumer education
Mycobacterium paratuberculosis	Dairy cattle	Faeces infected cows, pasture	Monitoring, farm management
Dioxins	Poultry (eggs)	Polluted outdoor run	Monitoring, farm management

The literature search revealed several issues where concerns were expressed regarding public health. Food safety in relation to animal welfare has not yet received much attention in the peer reviewed literature, and for each subject often no more than a few references were found. Examples of concerns that were identified are shown in table 1. Concerns associated with *Trichinella*, *Salmonella* and *Yersinia*, for instance, were not included in the table. The types of dangers, source and management are depicted in the table and will be shortly described in the following paragraphs.

Providing chickens outdoor access may increase the risk of poultry becoming infected with *Campylobacter* because of contact with wild fauna, an infected stable or outdoor run. Once a *Campylobacter* infection has been established on a farm it is very difficult to eradicate it because of the nature of the environment, i.e. the outdoor run cannot be cleaned. Engvall (2001) showed that almost 100% of the organically farmed flocks in Sweden might be infected with Campylobacter, compared with only 10% of the conventionally reared flocks. Danish and Dutch studies confirmed these findings

(Heuer et al., 2001; Rodenburg et al., 2004). It should be noted that Campylobacter is not a direct health problem for chickens. Campylobacteriosis in humans is considered a serious food-borne disease and in past decades many actions have been taken to reduce *Campylobacter* in poultry production systems. Organic (broiler) chickens should be monitored at slaughter so that farmers can investigate whether intervention programs are able to decrease the infection rate. Postharvest decontamination (freezing, high pressure) of meat can be performed between slaughter and retail stages in the food chain. Consumers should be educated to properly cook their meat and maintain proper kitchen hygiene.

Avian influenza, especially the H5N1 type, is considered to be an important pathogen for humans. Mutations of the virus may cause a worldwide influenza epidemic. Migratory birds are thought to play a role in the transfer of disease to farmed poultry. Poultry that are partially housed outside are considered to be at high risk for contracting infection from infected migratory birds. Poor hygiene management on animal friendly farms may also play a role in transfer of viral infection. Regular on-farm monitoring, temporarily keeping chickens inside, and vaccination are possible measures to control avian flu.

Toxoplasmosis is a disease caused by the protozoan parasite *Toxoplasma gondii*. A primary infection with *T. gondii* during pregnancy can lead to serious and sometimes fatal disease of the fetus or newborn. Individuals with latent infection may develop chronic ocular toxoplasmosis leading to visual impairment. Undercooked meat has been considered the main source of infection. The great changes in animal production hygiene have resulted in a significant decrease of the rate of Toxoplasma infection of pork meat. However, the introduction of animal friendly production systems may lead to a reemergence of Toxoplasma infections in pigs (Kijlstra et al. 2004) and poultry. Monitoring of farms and adjustment of farm management can play an important role in the control of Toxoplasma infections. Farms with a known positive Toxoplasma status should have their meat decontaminated, e.g. by freezing. Consumers should be educated to properly cook their meat and prevent cross contamination during meat handling in the kitchen.

Mycobacterium avium subsp. *paratuberculosis* (MAP) is the cause of a severe incurable gastroenteritis in ruminants, also known as Johne`s disease. The mycobacterium responsible for paratuberculosis in ruminants has long been suspected to have a role in chronic inflammatory bowel disease in humans, especially Crohn`s disease. Transfer to humans is thought to occur via milk products, since the bacterium is resistant to pasteurization. Although the paratuberculosis situation in Dutch organic herds does not seem to differ from that found in conventional herds (Kijlstra 2005), it is mandatory to keep monitoring the prevalence so that measures can be taken if the seroprevalence starts to rise again. Consumers can do little about prevention of contact with the bacterium and therefore the responsibility lies with the farmers, milk factories, and government.

Dioxins are considered the most toxic substances in the human food chain. Exposure to dioxins occurs via the ingestion of animal products, including eggs. For dioxins in eggs a maximum limit has been set. It is forbidden to sell eggs when their dioxin level exceeds 3 pg TEQ/g egg fat. The dioxin content of eggs from free-foraging chickens is much higher than that observed in chickens kept in wire cages (Kijlstra et al. 2007). It is assumed that uptake of soil, insects and worms leads to bioaccumulation of dioxins in egg fat. A monitoring program in combination with farm management can prevent eggs with increased dioxin levels from entering the market. Responsibility lies with

producers, egg packaging stations, and retailers to insist that only eggs participating in such control programs enter the market. Consumers should be aware of these quality assurance programs.

Discussion

In the transition to improved animal welfare systems it is necessary not only to make a good inventory of possible risks and to communicate them well, but also to differentiate them concerning responsibility. Some risks are inherent to the choice of keeping animals in a more natural environment and could be judged as an inherent responsibility of the consumer, whereas others may need a further refinement or adjustment of the housing or farm management system used.

Governments with an ambition to develop a transition to animal friendly farming systems should be aware of the fact that veterinary dogmas and zero risk tolerance for public health are implemented as a norm without any further differentiation. In this view, public health should not be seen as an exclusive responsibility of the government.

In the dilemma between animal welfare and food safety we should not simply deal with communication of food safety aspects to the consumer, but also should try to provide the relevant background of types and sources of the risks and relate them to the distribution of responsibility among the various players in the field.

Conclusions

Organic animal farming is associated with a number of concerns in relation to public health and food safety.

Responsibility with regard to food risk management depends on the type of danger and should be divided amongst the players in the food chain.

The ability to accept responsibility for the prevention of food-borne disease is important and communication of risks should be optimized.

References

Engvall, A., 2001. May organically farmed animals pose a risk for Campylobacter infections in humans? Acta veterinaria Scandinavica. Supplementum. 95: 85–87.

Heuer, O.E., K. Pedersen, J.S. Andersen & M. Madsen, 2001. Prevalence and antimicrobial susceptibility of thermophylic Campylobacter in organic and conventional broiler flocks. Letters in Applied Microbiology. 33: 269–274.

Kijlstra, A., O.A. Eissen, J. Cornelissen, K. Munniksma, I. Eijck & T. Kortbeek, 2004. Toxoplasma gondii infection in animal-friendly pig production systems. Investigative Ophthalmology and Visual Science. 45: 3165–3169.

Kijlstra, A., 2005. No difference in paratuberculosis seroprevalence between organic and conventional dairy herds in the Netherlands. In: Enhancing animal health security and food safety in organic livestock production, Proceedings 3rd SAFO workshop, 16–18 September 2004, Falenty. Edited by M. Hovi, J. Zastawny and S. Padel. ISBN: 0704998505 pp 51–56.

Kijlstra, A., Traag, W.A. & Hoogenboom, L.A.P. 2007. Effect of flock size on dioxin levels in eggs from chickens kept outside. Poultry Science. 86: 2042-2048.

Rodenburg, T.B., M.C. Van Der Hulst-Van Arkel & R.P. Kwakkel, 2004. Campylobacter and Salmonella infections on organic broiler farms. NJAS – Wageningen Journal of Life Sciences. 52: 101–108.