Enhancing animal health security and food safety in organic livestock production

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Edited by
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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)

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Foreword

Sustaining Animal Health and Food Safety in Organic Farming (SAFO) is a European Commission funded project, with the objective to contribute to improved animal health and food safety in organic livestock production systems in existing and candidate member countries of the European Union. Workshops form a central part of the SAFO activities. This volume, with the contributions from the 3rd SAFO Workshop at the Institute of Grassland and Wetlands in Falenty, Poland in September 2004, is one in a series of five proceedings published during the lifetime of the project (2003-2006). Electronic versions of the proceedings are available at the SAFO web-site at http://www.safonetwork.org/.

Animal health security, the role of zoonotic diseases and the risk of environmental contaminants in organic livestock produce were the key issues discussed in Falenty. Allowing livestock access to outdoors is a fundamental principle in organic farming. Such access is seen as part of the animal's freedom to natural behaviour and can be argued to offer substantial health benefits to animals. Outdoor access, however, also allows access to potential environmental contaminants, contact with other livestock or wildlife with different disease status and with vectors and fomites that may be carriers of zoonotic diseases. Interesting research papers were presented on the level of toxoplasmosis in organic pigs, paratuberculosis in organic cattle and campylobacterial carriage in organic layers. Mycotoxin and dioxin contamination of organic livestock produce and the control of heavy metal contamination in organic systems were also discussed. The papers and the discussions at the workshop suggest that the link between higher risk for zoonoses and environmental contamination and outdoor access and other organic management practices is not a straightforward one and that the risks are not necessarily greater in organic systems. However, it is clear that monitoring of zoonoses and contaminants is just as important in the organic as in the conventional animal production context.

In this workshop, generous time was reserved for presentations about the development of organic livestock production in the new and emerging EU countries. A wealth of information about the strides forward and the problems and difficulties encountered was produced by the delegates. The presentations highlighted barriers to such development including the lack of a domestic market for organic produce and, at the farm level, the need for improvements in veterinary and hygiene management and for major investments to bring farm buildings up to the standards required in EU 2092/91. On the other hand, most of the new countries, while still developing organic livestock systems, see great potential in them, particularly in preserving rare breeds and vitalising rural communities in areas that appear particularly suitable for organic animal production.

Malla Hovi, Jan Zastawny and Susanne Padel

Reading, January 2005

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Our special thanks goes to Mirosław Rojek and this family who welcomed us on their farm for our visit during the Workshop.

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Part A:
Animal health security in organic livestock production

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Animal health security – is it important on organic farms?

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Introduction

Farm level animal health security, or biosecurity and bio-containment, could be defined as the sum of the management measures to reduce the risk of introducing new disease agents to the farm or of allowing existing disease agents cause financial or health and welfare damage in the herd/flock. Animal health security, just like plant health security, can also be considered in a wider context, e.g. at national level.

An example of farm level biosecurity could be the strategy, with which a cattle farm approaches the bovine viral diarrhoea virus (BVDV). A farm that does not have the infection in the herd, i.e. has a naïve herd that has no immunity to the virus, can implement good animal health security by closing the herd, bringing in no live animals onto the farm, avoding contact with neighbouring cattle and implementing reasonable cleanliness and disinfection for visitors who come in direct contact with the stock – or the farm can maintain continuous vaccination routines to protect the stock. A farm that has an ongoing infection of the BVDV can implement health security, or bio-containment, by culling the potential persistently infected animals and by vaccinating the herd to reduce the clinical symptoms, such as poor fertility.

Animal health security measures are used worldwide to reduce the impact of contagious disease in livestock and to limit the spread and risk from zoonotic diseases to the human population. Zoonotic diseases that used to be major public health problems, such as bovine tuberculosis and brucellosis, and many other livestock diseases have been eradicated in most European countries by using animal health security measures, often at both national and farm level.

This paper will discuss animal health security in relation to food safety and welfare management in organic livestock systems, with special reference to the situation in the UK.

Animal health security

National level challenge matters

Organically managed animals in any one country are part of the national herd or flock and are likely to share the same overall disease status with regard to contagious diseases as the national herd/flock. Similarly, they face the same disease challenges as the rest of the national herd/flock.

In spite of many international, co-operative efforts to control the most serious livestock diseases and the EU's own animal disease policies, the control of a number diseases, including zoonoses, has been left to the national governments to decide upon. This means that the national herd/flock disease status can vary markedly between the different EU countries. Tables 1 and 2 show some of the differences in national health status of cattle and pigs in relation to the most prevalent endemic and zoonotic diseases in these species.

Table 1: Health status of the national cattle herd in selected European countries in 2001, in relation to selected infectious diseases.

Country	Brucella abortus	Bovine TB	IBR	Para TB	BVD	Enteric salmonella
UK	(+)	++	+++	+++	+++	+++
NL	-	(+)	+++	+++	+++	+++
France	++	(+)	+++	+++	+++	+++
Germany	-	(+)	++	++	++	++
Spain	+	+	+++	+++	+++	(+)
Greece	+	(+)	+	+	+++	-
Austria	(+)	(+)	(+)	n/a	n/a	n/a
Finland	-	-	-	+	+	(+)

Source: World Organisation for Animal Health, 2002
IBR = Infectious bovine rhinotracheitis
Para TB = paratuberculosis; Johne's disease
BVD = Bovine viral diarrhoea
- = never recorded or country is officially free of disease
(+) = sporadic occurrence
+ = herd outbreaks are rare and are enumerated
++ = herd outbreaks are common and are enumerated
+++ = disease is endemic (not enumerated)
n/a – data not available

Table 2: Health status of the national pig herd in selected European countries in 2001, in relation to selected infectious diseases.

Country	CSF	Aujetzky's disease	TGE	PRRS	AR	Trichinella
UK	-	-	+++	+++	+++	-
NL	-	+	-	+++	+++	+
France	-	+	+++	+++	+++	+
Germany	(+)	-	-	+++	+	(+)
Spain	+	+	n/a	+++	+	(+)
Greece	-	-	-	-	-	-
Austria	-	-	n/a	-	n/a	n/a
Finland	-	-	-	-	-	?

Source: World Organisation for Animal Health, 2002
CSF = Classical swine fever
TGE = Transmissible gastroenteritis
PRRS – Porcine respiratory and reproductive syndrome
AR = Atrophic rhinitis

Farm level health security

At farm level, each farm needs to take its own decisions on health security measures, depending on both the national and local disease challenge and, most importantly, on the existing disease status of the herd/flock on the farm. It has been demonstrated that it is particularly important to tailor individual farm health security measures according to the existing disease status of the stock, in order to guarantee financial sustainability of the investments required (Stott *et al.*, 2003).

As the national and on-farm disease and challenge status is important and the potential animal health security measures are numerous and, in most cases, disease-sensitive (see Table 3), decision making at farm level is complicated, i.e. the situation does not lend itself easily to one-rule fits-all approaches.

Table 3: List of typical animal health security measures promoted in the literature for cattle and sheep systems (the list was compiled for a UK research project looking at farmer and veterinary attitudes and perceptions with regard to farm-level biosecurity; Hovi *et al.*, in preparation).

1. Maintaining a closed herd/flock (i.e. no purchased stock, or if so, stock are quarantined and tested).
2. Using a 4week quarantine for purchased stock, including rams and bulls
3. Purchasing animals from herds/flocks with known disease status
4. Preventing contamination of livestock by farm visitors
5. Preventing contamination of livestock by users of public footpaths
6. Preventing contamination of livestock by people and vehicles using public roads
7. Preventing contamination of stock by delivery and pick-up vehicles.
8. Implementing strict disinfection measures for essential visitors (vets, shearers, AI technicians etc.)
9. Preventing contact of own stock with stock from neighbouring farms
10. Preventing access of own stock to contaminated surface water
11. Not using relief/assistant stock-people who are in contact with livestock from other herds/flocks
12. Minimising access of own stock and animal feed to wildlife, vermin, pets that may transmit cattle/sheep disease
13. A period of statutory standstill for livestock on farms that have bought/brought in animals
14. Membership of commercial herd/flock health schemes (e.g. Premium Cattle Health Scheme or Sheep and Goat Health Scheme)
15. Establishing disease free zones with neighbouring farms within suitable geographic boundaries.
16. Implementing routine blood or other diagnostic disease screening at purchase.
17. Vaccination

Barriers to improved animal health security at farm level in the UK

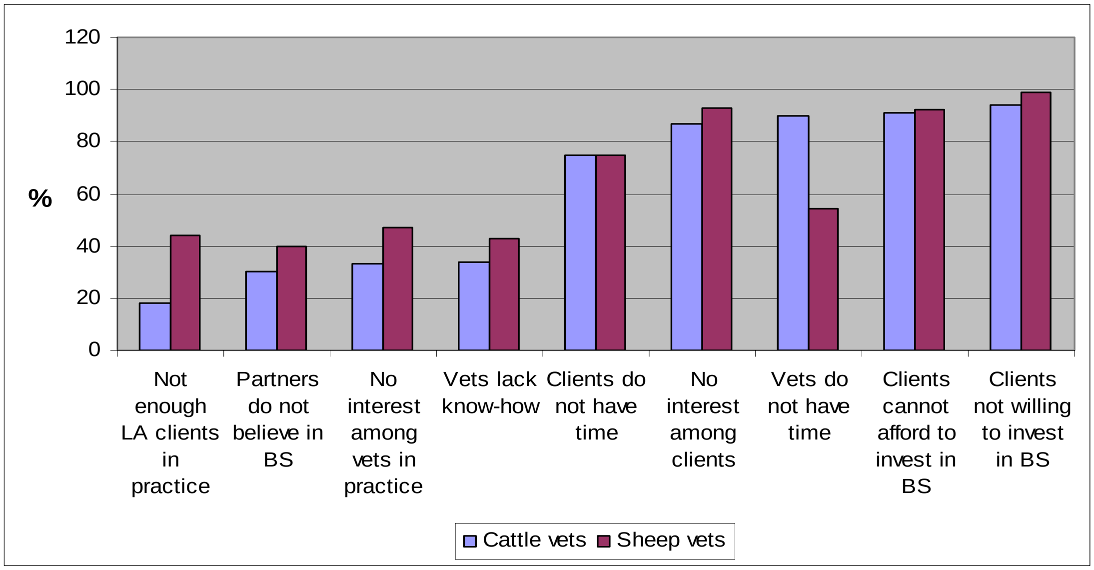
The relatively good animal disease situation in some European countries, when compared with others, is obvious (see Table 1 and 2). While there is very little published data on the actual farm health security levels in the different countries, livestock farming practices that have an impact on health security differ significantly between countries. For instance, the absence of live markets for livestock in many countries is likely to contribute to improved overall health security, when compared with countries where livestock markets are commonly used for both store and end sales of animals. Livestock farming practices, the structure of livestock production systems and the prevailing health security ‘culture’ and attitudes among farmers are also likely to have an impact on the level of animal heath security in any one country or region.

The foot and mouth disease epidemic of 2001 in the UK demonstrated that farm level health security on sheep and cattle farms was not adequate to prevent the spread of contagious diseases in general. A series of surveys have been carried out since, to identify the main barriers to the implementation of improved farm level animal health security on cattle and sheep systems in the UK. The results of these surveys suggest that, while economic considerations are important, there are also strong attitudinal barriers to improving on-farm animal health security (Hovi *et al.*, in preparation). Farmer focus group studies showed that farmers feel threatened by other operators who threaten impact security and feel that their own efforts are wasted in the absence of action by others (Table 4). The farm veterinarians, surveyed with a postal questionnaire, felt that lack of interest and money amongst the clients was the main reason for not promoting improved health security (Figure 1). However, in excess of 50% of the veterinarians indicated that they did not have time to promote health security. Even more worryingly, in excess of 30% of the veterinary respondents felt that veterinarians did not have adequate know-how, interest or confidence in promoting animal health security among their clients.

Table 4: Drivers and barriers to improved animal health security among UK cattle and sheep farmers, as identified in a farmer focus group study involving eight focus groups from Scotland, England and Wales (Hovi *et al*., in preparation).

	Drivers	Barriers
Perceived	Image and future of farming Improved health and welfare Improved profits	No benefits in the absence of action by others (outside the farming community) Efficacy of measures questionable *per se* Loss of autonomy/freedom
Referent-related	Other farmers' support and collaboration	No trusted sources of advice outside other farmers Authorities seen as necessary actor, but not trusted

Figure 1: UK veterinary perception of the constraints to increased veterinary involvement in promoting animal health security on sheep and cattle farms (combined percentage of respondents who felt that the issue was important or very important; LA = large animal; BS = animal health security).



Organic livestock production and animal health security

What do the regulations say?

Organic farm assurance legislation in the European Union (EU Regulation 209291 and 1804/99) does not say much about animal health security. General farm biosecurity, in terms of disinfection and cleanliness and contact with animals from neighbouring herds or flocks, is hardly mentioned. Animal movement from farm to farm is partially addressed by the basic organic farming principles that assume closed, sustainable production cycles and require minimisation of animal transport. However, there is a fairly generous allowance for bringing in breeding and/or replacement animals or to reconstitute or expand herds and flocks, allowing for stratified livestock production systems, where animals move from farm to farm regularly. The rules regulating the origin of bought or brought-in stock on organic farms are not adequate to constitute barriers to disease, unless individual certification authorities implement such barriers for animals coming from conventional farms (see Box 1). In the UK, none of the six certification bodies involved in livestock certification require routine quarantine and testing procedures for incoming stock (personal communication with the certification bodies).

Box 1: The text of the Council Regulation 1804/1999 Annex Paragraph 3.1.3, referring to brought- or bought-in stock on organic farms.

Council Regulation 1804/1999 Annex Paragraph 3.1.3

"Where livestock is obtained from units not complying with this Regulation [1804/1999], special attention must be paid to animal health measures. The inspection authority or body may apply, depending on local circumstances, special measures, such as screening tests, and quarantine periods."

Is organic farming a special case with regard to animal health security?

The reasons behind the 'light touch' approach to animal health security in the organic regulation may be a consequence of an expectation that the requirement for closed production cycles would exclude animal movements to a minimum (i.e. slaughter stock), thus removing the main health security threat (i.e. movement of live animals onto farms) from the organic systems. The wording of the Paragraph 3.1.3 of 1804/99 Annex (see Box 1) also suggests that animals from other herds and flocks with organic status would carry a smaller health risk than those coming from non-organic systems. There is, however, very little proof that organic farms would have any higher or lower prevalence of endemic disease or better or poorer resistance to exotic epizooties than conventional, national herds and flocks. Within the current understanding, it is probably safe to say that the external disease challenges facing organic livestock farms are likely to be the same as those facing similar, local conventional farms.

In addition to this background challenge, organic farms have certain specific challenges that relate to organic production standards:

- Firstly, the requirement for maximisation of pasture use in ruminants and the requirement to maintain free-range systems for poultry and pigs expose organic stock to added health security challenges when compared with their conventional counterparts. This is particularly true for the monogastric systems, some of which have extremely high biocontainment and biosecurity levels in intensive, conventional production systems (e.g. fully ventilated and isolated poultry houses and specific pathogen free piglet production).
- Secondly, the organic standards make vaccine use, one of the most popular animal health safety or biocontainment measure, particularly in poultry and sheep production, available for organic producers only on risk assessment basis.
- Thirdly, scarcity of replacement stock with organic status may lead to situations where it is difficult to match the importing and exporting herds'/flocks' disease status, particularly when the remaining derogations regarding conventional animals being brought to organic systems are phased out.
- The subclinical or hidden nature of some infections, like with the BVD, is often addressed in conventional systems with blanket immunisation programmes that would not be acceptable in organic systems. This can be particularly detrimental, from the point of view of biocontainment, with infections like the BVDV, where the agent is immunosuppressive and weakens the animal's defences against other pathogens.

Is there a need for improved animal health security regulations for organic certification?

While the results of the UK study do not reflect the attitudes of organic farmers in particular, or organic farmers in general in the rest of the EU, it is likely that the attitudinal and perceived barriers to improved animal health security are universal, particularly among cattle and sheep producers. While joint effort by all operators and stakeholders is needed in many countries, in order to improve farm animal health security, both at farm and national level, it is unlikely that stricter biosecurity rules, incorporated in the EU regulations on organic livestock production will be helpful. The differing overall disease challenges and differing production systems, with differing existing biosecurity levels will make standard development a difficult task, with unworkable standards as the end result.

There is, however, a need to ensure that lack of appropriate animal health security does not jeopardise animal health and welfare on organic farms. For each country, this poses different challenges. For the UK situation, some of these challenges and suggestions for approaches to meet the challenges are listed below:

- There is a need to accept the value-laden nature of health security issues at farm and veterinary level. As long as the overall perceptions of outcomes among these groups are negative, any 'best practice' recommendations are unlikely to lead to significant uptake.
- There is a need to 'learn' to market livestock without disease transmission and with minimal transport. In the UK, the organic certification bodies have, up till now, forced the producers to avoid live animal markets. There is, however, a worrying development towards 'organic' livestock markets, with no additional animal health security measures to those implemented in conventional markets, which are know to cause disease spread and pose a major risk for disease spread. The certification bodies need to either implement quarantine practices and inspection procedures for these practices or abandon the live market systems. The latter development would additionally benefit animal welfare by preventing transport and mixing of stock from many sources under stressful conditions.
- The 'closed herd/flock'-concept that is implied in the organic regulations, as part of the closed production cycle concept, is not working on organic farms. In some cases and systems, maintenance of closed herds/flocks is not feasible (e.g. stratified meat production systems in extensive conditions) but, in most situations, establishment of closed chains, if not herds/flocks, with verified and uniform disease status, is possible. The organic certification systems should encourage this.
- While vaccine use has become a major part of biosecurity and biocontainment (e.g. salmonella and other vaccine use in free range layer systems in the UK), this development should be resisted in the organic systems as unsustainable. Many vaccines, in the future, are likely to contain genetically modified organisms, making them unavailable for organic producers. Vaccine use, now and in the future, needs to be based on farm-specific risk assessment.
- Organic stockmen need to be aware, perhaps even more so than their conventional counterparts, of their herd's/flock's on-going disease status with regard to contagious diseases. Knowledge-based and financially sound animal health and animal health security planning can only be carried out when the current status is taken into account. Again, certification authorities can have a major impact in this area by demanding health plans (statutory on organic farms in the UK) that transparently demonstrate the current health status of a herd/flock.

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References:

Stott, A. W., Lloyd, J., Humphry, R. W. and Gunn, G. J. (2003) A linear programming approach to estimate the economic impact of bovine viral diarrhoea (BVD) at the whole-farm level in Scotland. *Preventive Veterinary Medicine*, 59: 51-66.

The 2001 foot and mouth disease outbreak in the UK – the organic movement's response

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Introduction

Foot and mouth disease is more feared for the control methods implemented than for the disease itself. It is not only a biological entity, it is always political – with the slaughter policy rooted in British Imperial history – and it is always macro-economic.

The 2001 outbreak in Britain was characterised by, amongst others, an inadequate and mistaken initial response; mistaken diagnosis; scientific and political intrigue; failure to tackle the 'real' epidemic; the battle over vaccination; legal challenges and no coherent 'organic movement' response

During March and April 2001, Elm Farm Research Centre (EFRC) was very active in pulling together and presenting the case for the use of vaccination, alongside the use of slaughter. During this period we assembled scientific evidence to support the seeking of a Judicial Review of the government's slaughter policy; we published information about vaccination; we set up two widely used websites on the outbreak; and attended meetings at 10, Downing Street to brief the Prime Minister. We also organised a conference that launched a widely based demand for a full public inquiry into the outbreak. (*The Need to Inquire and Learn: In Search of Truth. 13th June 2001*)

The dynamic of the outbreak

Timescale

The first case was confirmed on 20th February 2001, and the outbreak peaked at 299 confirmed cases per week on 27th March. By 24th April, confirmed cases had dropped to 77 cases per week, and this had tailed off to around 25 cases per week by May to July. The last 4 cases were confirmed on 25th September.

Affected premises

The outbreak primarily affected the North and West of England, South of Scotland and parts of Wales. There were 2,026 infected premises - possibly up to 1/3 of these were found not to have been infected by subsequent laboratory tests. A further 4,762 were categorised as dangerous contacts and 3369 as contiguous premises (i.e. contiguous to either infected premises or dangerous contacts). Giving a total of 10157 premises affected.

The slaughter

A total of 6,456,000 animals were slaughtered. A breakdown of the slaughter by type of stock and reason for slaughtering is presented in Table 1.

Table 1: Breakdown of stock slaugheterd during the 2001 foot and mouth disease outbreak in the UK.

Basis of slaughter /groups	Infected premises	Dangerous contacts	3km cull	Suspected	Welfare grounds
Sheep	968,000	991,000	1,360,000	109,000	1,821,000
Cattle	301,000	198,000	82,000	13,000	166,000
Pigs	22,000	50,000	68,000	3,000	308,000

In addition to the laughter numbers presented in Table 1, 4,000 other animals (deer, goats) were slaughtered for control; 3,000 other animals under Livestock Welfare Scheme and possibly 1.2 million suckling lambs.

It should be noted that the Department for Food and Rural Affairs (Defra) is still processing and reanalysing information and a final total and analysis has not yet be reached.

The cost

The total bill for compensation was approximately £11.0 billion. This comprised of compensation and other payments to farmers of £1.4 billion; direct eradication and control costs of £1.3 billion; other public sector costs £0.3 billion. The cost to agriculture, the food chain and supporting industries was £0.6 billion.

But 49% of the total bill - £5.4 billion - is attributed to lost revenue in tourism and its supporting industries. The resultant impact on GDP of all factors adds a further £2.0 billion

Why did this happen as it did?

It is difficult to unravel a complex event that had impacts in a multitude of ways on many people such as the FMD outbreak. Moreover, the government's decision to hold separate and partial enquiries has served to reduce and not enhance the clarity of assessment; therefore the weight given to the factors discussed below are based on a more subjective perspective arising from personal involvement than would be the case had there been in existence an undisputed and definitive public report. So the following should be read with that caveat in mind.

The inadequate and mistaken initial response

Under EU rules a government FMD contingency plan, regularly updated, should be lodged with the EU Standing Veterinary Committee. However, we have concluded that an adequate contingency plan was either not in existence or was ignored.

There was a delay in identifying the first outbreak compounded by further delay in imposing a movement ban. This ban itself was not implemented in a rigorous way with poor logistical planning and implementation.

A national movement ban was imposed five days after the first case was suspected but three days after a ban on exports. This encouraged substantial movements of livestock during this period. It is possible that an effective and immediate ban on transport of susceptible animals - necessary for control - would have considerably limited spread.

The time from diagnosis to slaughter was, for the first few weeks of the outbreak considerably longer than acceptable. This will have contributed substantially to spread. Slaughter to disposal was also unacceptably long - increasing the risk of spread. Disposal by either burial or burning will have contributed to spread, particularly because of the very large numbers of animals requiring disposal. The logistical problems of the diagnosis, slaughter and disposal placed an enormous strain on government departments and the government's agents. The workload and emotional stress inevitably had a profound impact on human resources, possibly leading to the reported (in the press) inadequate application of bio-security procedures or even negligence occurring in the slaughter and disposal of animals.

Mistaken diagnosis

There is evidence of mistaken diagnosis in the field – mainly in sheep. This compounded delays in the confirmation of disease through laboratory analysis. Consequently, partial and often erroneous information about the spread was input into the disease management models resulting in significant errors in the culling policy.

Scientific and political intrigue

This occurred in a number of forums - between modellers and vets and between the Science Group established by the government's chief scientist and the Ministry of Agriculture (MAFF) – all of which was fuelled by political panic over the impending general election campaign and its results.

A number of influential bodies had their own agendas. We saw disingenuity from IAH Pirbright on the issue of vaccination; the National Farmers Union's positioning and most critically the over reliance on flawed modelling by the government's science group. This factor was second only to the failure to impose a rigorous movement ban in the errors that marked this epidemic.

As a result the conditions under which MAFF and other agencies were operating were intolerable and conducive to neither effective strategy development nor effective monitoring and evaluation. The specific factors were:

- Political pressure caused by the imminent local and national elections
- Farming lobby pressure on government from the NFU (not well representative of farming and food interests)
- Meat export trade and national FMD-status lobbying of government to enable continued international trade
- Inadequate information on the actual movement of livestock and the course of the outbreak made it all but impossible to provide reliable predictive models and track the likely spread of the disease.
- The compensation scheme militated against achieving farmer support for a vaccination strategy. The way in which a compensation policy would work with vaccination was not established, even though the EU proposals covered the trading of products from vaccinated animals.

The 'real' epidemic was not fought

It is fundamental to establishing an effective FMD control policy to recognise that transmission of the virus is partly controllable and partly uncontrollable. Controllable factors include movements of animals, animal products and humans; bio-security and disinfection measures. Uncontrollable factors include airborne spread and wildlife transmission.

An effective control policy also depends on information on the efficiency of the control measures put in place over the course of the outbreak. In our view, none of the controllable factors - including bio-security measures on and between farms, disposal sites and other premises (milk collection, feed lorries, transport of carcasses to disposal sites), were effectively dealt with at the start of the outbreak and were inconsistently managed throughout, whilst key uncontrollable factors were misunderstood leading to the application of inappropriate policies.

The FMD type O virus is not effectively spread by wind. There was one primary source and a movement ban and isolation would have been effective, especially if it had been backed up by ring vaccination.

The advice to implement a strategy of 'pre-emptive culling' was similarly flawed. Such a strategy had not been previously used anywhere for FMD control, with the exception of limited use in Greece. As far as we are aware, no protocols had been agreed that would guide the selection of this policy, furthermore, neither the feasibility nor the economic nor environmental impact seems to have been considered.

The army was not fully and effectively deployed at the start of the outbreak. The inadequacy of MAFF's logistical and resource planning ability to implement the chosen eradication policy was clear within two weeks and became very evident when the army was finally deployed.

The extent of the failure of the control policy can be seen in the fact that in the 1968 outbreak, where the epidemic was windspread, there were 2364 cases with 442,000 animals slaughtered. In 2001, where it was spread by movements and people: there were 2026 cases with over 6,500,000 animals slaughtered

Vaccination could have been an important tool in the fight against the spread of foot and mouth disease in 2001

A number of organic organisations, spurred on by Elm Farm Research Centre, led the pro-vaccination campaign.

It was accepted in the control strategy of the EU Standing Veterinary Committee. Intense international research and development on FMD, coupled with the prevalent risk of FMD in Europe prompted the Animal Health and Welfare Committee of the EU to develop a strategy on emergency vaccination against FMD. The Committee met through 1998/99 and reported in March 1999. The proposals covered issues of trading of products from vaccinated animals. This strategy seems to have been ignored throughout the outbreak.

‘New’ vaccines were safe and effective but this was not acknowledged by MAFF, or by Pirbright. There was misinformation to prevent demand for use, a refusal and/or delay in validating ‘farm’ tests, a refusal to press OIE on “vaccinate and live”. There were limited stocks of vaccine in the country.

This was despite the fact that ring vaccination is a well-known strategy for FMD control and is accepted within the EU Veterinary Committee Emergency Strategy. It was eventually successfully used in the Dutch outbreak. It has been used worldwide, generally with success.

Lessons learnt from control of FMD (and specifically the pandemic O1 strain) were not fully taken into account in the science advice to government.

Legal challenges

Legal challenges to the Government's handling of the epidemic were initiated by EFRC – supported by Peter and Juliet Kindersley and other concerned farmers who took steps to seek a Judicial Review of MAFF's FMD control strategy with the aim of getting the use of vaccination properly considered. This spurred on injunctions to prevent the cull on specific farms. Such opposition was met with bullying and intimidation at farm level. The Animal Health Act, which has been made law since the outbreak, would now prevent such legal opposition.

The organic movement's response

There was no coherent organic movement response. With conflicting interest groups, there was no unified position or attempt to get one. The little response that there was, was not helped by 'organic' vets in UK or Europe. There was some support for vaccination and for our position from some organic bodies. There were some proposals for homoeopathy trials and some 'illegal' use of homoeopathy, but little evidence of its effect. Many organic farmers sought to protect livestock but some did not.

Elm Farm Research Centre: our role and position

We found that organic theory/Howard's anecdotes were unhelpful faced with this crisis. We were the first to act against slaughter and issued our position statement. We were instrumental in gathering the scientific information presented in the Judicial Review over failure to vaccinate.

We developed the case for vaccination and assisted the legal team activated to fight the Judicial Review. We established an information Website – with 36,000 hits per day at the height of the epidemic. We set up and manned a telephone helpline.

We launched an active campaign for a Public Inquiry to investigate the lessons that could be learned from this outbreak.

We did receive some support from the Prime Minister, Tony Blair, for vaccination but we found some meetings held with him and his advisors to be misleading in their intentions.

The position of the Elm Farm Research Centre encompassed the following issues:

- A rigorously enforced movement ban and bio-security;
- Letting the disease run its course in mildly affected sheep in remote areas and limited contact;
- Slaughter only affected animals on welfare grounds;
- Strategic use of vaccines; and
- Use epidemic to test homoeopathy.

However, we most actively pushed for effective bio-security measures and the strategic use of vaccination.

We believe that even the narrowest employment of the vaccination tool - where all vaccinated. animals are eventually destroyed (an option we do not primarily support) - would have significantly reduced the damage of the outbreak (to the farming, other rural and tourist sectors). As happened in Holland, this use of vaccination allows the slaughter of animals and disposal of carcasses to be carried out in a planned and orderly way. A proportion of animals would have to have been slaughtered in situ and disposed of quickly nearby. But the massive pyres burning for days and the disposal pits that have blighted the countryside would have been avoided.

Implications for the organic sector

Organic theories and the coherence of the organic sector were found to be woefully inadequate in the face of this FMD outbreak. There was no cogent response to the outbreak and was even disagreement amongst the organic organisations about the role of vaccines and the slaughter policy. It is essential that a consensus on theory and practice be developed within the organic sector on these kinds of disease outbreaks.

However, this FMD outbreak demonstrates the danger of accepting the conventional framework – especially when that framework is not what it claims to be. Many organic organisations accepted the slaughter policy and the pre-emptive culling policy because they did not assess the facts e.g. that the spread was not primarily windborne and did not consider them though the organic perspective regarding the relationship we should have to animals.

Similarly, there was a failure to grasp the wider economic and social implications within a policy framework set by conventional thinking and goals.

Discussions over such things as campylobacter, e coli and salmonella in the context of food safety reveal that this lesson has probably not been learnt by the organic sector. We seem too ready to accept the proposal that these problems are best dealt with at farm level, when in fact they are more problematic in other parts of the food chain. In this way we too readily accept the agenda and perceptions of, e.g. environmental health and food safety agencies, rather than arguing that they should focus attention and action where it really matters – processing and kitchen hygiene.

In the UK, at least it is not at all clear that government and industry thinking has learnt the lessons of the FMD outbreak. It would be a monumental folly if the organic sector were similarly negligent.

Source material:

Woods, A. (2004), A Manufactured Plague, The History of FMD in Britain. Earthscan. London, UK.
Anderson, I (2002), FMD 2001, Lessons to be learnt, Enquiry Report. HMSO, London, UK
National Audit Office (2002), Report upon the 2001 FMD Outbreak. HMSO, London,UK
Defra (2004), FMD cases, www.defra.gov.uk/footandmouth
www.warmwell.com
EFRC Bulletin and special FMD report, www.efrc.com and Elm Farm Research Centre, Newbury, UK

Bioland position paper on foot and mouth disease

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Introduction

During the foot and mouth disease (FMD) epizootic in Great Britain and the Netherlands in 2001, a public discussion about culling and eradication policy began in Germany, like in many other European countries. The public felt concerned about the high number of culled and burnt healthy animals. Especially organic farmers and other breeders were worried about their livestock in case of an outbreak of FMD in Germany. There was a shortage of specific information about FMD, the legal situation and the legislative competence of the authorities. The culling policy of the EU was criticized by large parts of the society, such as consumers, farmers and even experts. Unrealistic demands for vaccination were made and rebellious reactions were announced. It was even suggested to treat FMD infected animals with homoeopathic or other alternative therapies.

Facing this situation, Bioland e.V, together with other German organisations of organic farmers, held a workshop to which experts in animal diseases were invited as well as politicians and active farmers. The aim of the workshop, on one hand, was to express the concerns of the farmers to the responsible officials in the administration and to the specialists on disease control. On the other hand, there was a desire to work out a strategy for organic farming organisations to help their members to protect themselves, as far as possible, in the on-going epidemic.

It was soon obvious in the discussion, that organic farmers would not get any special rights in the control procedures. The way to avoid disaster was to act carefully and to use any possible means to prevent the epizootic. As a conclusion of the workshop, measures were suggested to make the future of livestock in organic farming more safe against epidemics. This paper summarises the information that was given to farmers by Bioland during and after the epidemic.

Information on foot and mouth disease in cattle and pigs

The following instructions and advice have been given out by Bioland to its producer members.

Background information

Foot and mouth disease (FMD) is one of the most dangerous epidemics. It has to be reported immediately, because it is most contagious and it causes great suffering in the animals and high economic losses.

Apart from Northern America, Australia and the European Union, FMD occurs all over the world.

FMD is controlled by the government, and treatment of infected animals is strictly forbidden. Every suspicion of an infection with FMD has to be reported to the authorities immediately. In Germany, this is the main strategy to prevent the spread of FMD amongst livestock holdings.

Because of its general aims, organic agriculture has a great advantage in preventing contagious epidemics:

- Animal welfare terms, which improves resistance against disease;
- Closed farm cycles, with own offspring for breeding;
- Home-grown ecological feed; and
- Limited transport of animals.

However, the presence of public on many organic farms, such as clients of farmshops, direct marketing or farm events, increases the risk of spreading diseases by careless visitors. The advantages in organic farming should consequently be used to decrease the risk of infection. They should also be considered in the planning of the further development of the farm.

In controlling the disease, vaccination can only be an emergency measure. Extensive vaccination as a prevention against FMD is not appropriate in today's situation:

- vaccinated animals can be infected and can spread the virus unidentified;
- there is no vaccine covering all known strains of the FMD virus;
- trading is restricted, because vaccinated farm animals cannot be exported; and
- six-monthly European-wide vaccinations are prohibitively expensive.

Regional vaccinations are a possibility, in case of acute risk of infection with FMD and if the virus strain has been identified. These vaccinations can be carried out to prevent further spreading of the disease and to protect the animals of a region. The permission has to be granted for the whole region by the state veterinary authority and the federal ministry of agriculture. In case of acute FMD outbreaks and insufficient culling capacity, emergency vaccinations can be ordered. It needs to be noted that the vaccinated animals will have to be culled as well at a later stage. Ring vaccination, as a preventive measure, leads to restricted trading in a whole region for a long period of time. According to the EU-legislation, products of vaccinated animals cannot be traded freely.

Measures of prevention on the farm

The basics of protection against FMD starts on the farms. Every farm should try to take as many of the following measures as possible:

- Keep the public out of the animal buildings and away from the animals as far as possible;
- Don't let unknown people enter the buildings or get in contact with the animals;
- Be aware of people coming from endemic FMD areas (tourists);
- Aim to have a closed herd/flock;
- Only buy new animals if necessary and only from reliable farms of the region;
- Improve the hygiene of the farm, the animal houses and the feed;
- Don't try to diagnose or cure unknown diseases of the animals by yourself;
- Optimize feeding and housing of the animals;
- Prevent the contact to other animals in the pasture;
- Don't feed kitchen garbage or souvenirs of visitors to livestock; and
- Control rodents on the farm.

Behaviour and measures in case of an outbreak

- Follow the instructions of the veterinary authority (don't undermine the morale of disease control efforts);
- Provide your visitors with information („We are sorry but...");
- Close the farm for foreigners and foreign vehicles;
- Cancel public farm events;
- Create a corridor for visitors to the farm shop;
- Clean and disinfect vehicles and shoes of visitors that have to enter the farm;
- Have ready the facilities for cleaning (water hose, high pressure), for disinfection (dispenser, tub for shoes and drive through tub for tires), and proper disinfectant;
- Unavoidable visitors (Veterinarian, Inseminator) have to be provided with farm's own clothes and shoes;
- Put up the mailbox outside of the farm area;
- Use the bull instead of artificial insemination if possible;
- No purchase of animals;
- Sell as few animals as possible, using separate buildings for shedding;
- Don't visit other farms. If you do, take a shower and change your clothes and shoes afterwards;
- No meetings of farmers;
- Regional vaccinations only with the permission of the veterinarian authority, granted by the ministry of agriculture (stringent restriction of trade afterwards, according to the EU legislations); and
- Try to apply a permission to vaccinate animals of genetically high value, such as rare breeds.

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Organic farming and animal health: protecting livestock

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Introduction

Modern methods of animal breeding are aimed mostly at achieving high efficiency. The goal is realized through the selection and subjecting to further breeding of individuals with genetic high quality and applying fodder with high concentration of nutrients that fulfill the high production requirements. Very fast changes that are introduced into farm environment, particularly in soil-plant-animal system, favor the imbalance in natural regulation mechanisms of animal organisms and may negatively influence their health and efficiency.

This paper presents a personal view of the authors on the role of organic farming and alternative medicine in positive health promotion.

Problems with conventional systems

The most dangerous interactions are associated with narrow, reduced to 2-3 elements, mineral fertilization that may cause changes of nutrient contents in plants, soil sterility, displacement of trace elements from soil, elimination of herbs from pasture sward as well as accumulation of toxic substances in a case of over-fertilization. Widely applied chemical means for plant protection may be a cause of animal's intoxication (25, 27). Furthermore, the remains or metabolites of these substances may be transferred to animal organisms along with the fodder and then to human organism being a final link in the nutritional chain. Experiments with application of dichlorodiphenyltrichloroethane (DDT) may be the example of such interactions (5, 6). This commonly applied mean for plant protection appeared to be very dangerous compound for human and animal health, as well as very stable and resistant in natural environment. Its remains are still detected both in the soil and animal tissues and even in mother's milk (Table 1) (16).

Table 1: Content of chloro-organic insecticides (in mg/ml) in cow's milk in 1993-1999 (n=35). [Pietrzak-Fiećko *et al.*, 2000].

Statistical measures	γ-HCH	DDE	DDD	DDT	∑-DDT
Minimum	0,00004	0,00004	0,00004	0,00004	0,00011
Maximum	0,00182	0,00293	0,00046	0,00304	0,00460
Mean	0,003	0,0009	0,0001	0,00004	0,0014
S	0,0004	0,0007	0,0001	0,0006	0,0011
V	144,15	76,35	103,94	153,86	77,13

S – standard deviation; V – variability coefficient

Among factors that invoke significant health disturbances is the industrialization of farm environment where animals are fed with fodder produced in industrial context, containing synthetic equivalents of nutrients as well as substances stimulating animals growth and efficiency. Particular danger is associated with the attempts of application of non-natural fodder being a by-product of agricultural and foodstuff industry. Poultry fodder intoxication with dioxin in Belgium or feeding the cows with meat and bone meal containing infectious factors called “prions” and leading to so-called “mad cow disease”, can serve as examples (18, 19).

Mistakes in animal feeding, particularly during fodder preparation, ration formulation and feeding technology, particularly in the case of high-efficiency animals, soon lead to imbalances and damage to an organism’s homeostasis, leading to sub-clinical and clinical disease states. High protein levels that lead to high gains or higher efficiency may lead to elevated concentration of ammonia and hydrogen sulfide that irritate mucous membranes and favor the diseases of respiratory tract, at decreased digestibility caused, for instance, by improperly balanced nutritional rate.

Design of livestock housing, based on high efficiency and ergonomics and constant indoor life for livestock with limited or no access to fresh air and sunlight and limited movement are, among others, the reasons of difficult parturition, fertility problems, disturbances in mineral transformations, as well as, in the occurrence of many diseases. Due to economical reasons, making large groups of animals originating from different sources, often leads to stress and spread of infectious diseases. These interactions lrsf yo treatments with synthetic medicines, antibiotics and other pharmaceutics, which in turn may lead to harmful residues in human food chain. Numerous studies prove that remains of antibiotics are detected in cow’s milk purchased from individual farmers and large farms in the past (Table 2 and Table 3) (13, 14, 17).

Table 2: Tests of milk referring to β-lactam antibiotics and inhibition substances. [Krzyżanowski *et al.*, 1992]

Milk origin	Number of tested samples	Presence of inhibition substances				Concentration of β-lactam antibiotics (in j.m./ml)
		Number of positive samples	%	Including β-lactam antibiotics		
				Number of positive samples	%	
Cumulative milk from individual farms	5049	793	15,71	524	10,38	0,008-0,017
Milk from Centers of Milk Purchase	39	13	33,33	8	20,51	

Can organic farming help?

The above mentioned threats associated with conventional animal husbandry have increased consumer interest in livestock products originating from organic farming. Besides financial benefits associated with selling the foodstuff, animals supply natural manure that is valuable for ecological plant production. This is an additional advantage of such closed systems.

Table 3: Percentage of purchased milk with residues of antibiotics and inhibition substances. [Pikul *et al.*, 2001].

Miesiąc	Concentration of β-lactam antibiotics			Presence of inhibition substances		
	1998	1999	2000	1998	1999	2000
I	0,0	0,0	0,0	0,7	1,8	0,7
II	0,0	0,0	0,0	0,0	4,7	0,0
III	1,0	0,0	0,0	1,8	3,0	0,3
IV	0,0	0,0	0,0	2,3	1,0	0,4
V	0,3	0,4	0,0	4,7	0,0	0,0
VI	0,0	0,0	0,0	5,8	0,8	0,5
VII	0,0	0,0	0,0	0,0	10,6	0,0
VIII	0,5	0,7	0,0	0,5	1,2	0,0
IX	0,0	0,0	0,0	1,4	1,3	2,8
X	0,0	0,0	0,0	6,9	0,0	0,0
XI	0,0	0,0	0,0	10,8	1,2	0,0
XII	0,0	0,8	0,0	5,2	0,6	0,0
Średnia	0,1	0,1	0,0	3,1	2,3	0,4

Achievement of high-quality animal-origin foodstuff under conditions of organic farm depends mainly on proper farm conditions created for given-species of animals. Therefore, tending to maintain natural environmental conditions that should take into account animal’s basic requirements and behavior patterns, should be a prime rule. In other words, one should thrive to create conditions that guarantee high level of health and immune status and enables the production of high quality food stuffs.

Therefore, disease prevention should be one of the basic rules of organic livestock production. Creation of living environment, similar to natural conditions in which particular species live, favors the achievement of high natural resistance to infectious factors that occur in the environment. Acccess to fresh air should be a basic norm. Exercise and access to sunlight decreases the risk of skeletal disease, fertility disturbances, as well as it positively affects the “animal’s mental life”.

Balance between efficiency and possibility of fulfilling the animal’s nutritional requirements, taking into account both maintenance and production needs, is another important element of disease prevention. However, one should remember that fodder originating from own farm is a basis of animal’s feeding under conditions of organic farm. Therefore, genetic potential of particular individuals determining the efficiency by possibilities of fulfilling the nutritional requirements on a base of own fodder, should be properly selected during herd organizing and forming. Thus, animals with very high efficiency, requiring large amounts of concentrated fodder of industrial origin in their nutritional rates, cannot be used in organic farms. Feeding taking into account the specificity of digestion and metabolism processes, as well as balancing of nutritional rates, should ensure proper availability of particular components, which in turn determines proper animal's condition and efficiency. Long period of feeding with colostrum and mother's milk, influencing the development of young organism, plays an important role. Addition of herbs positively affects the animal's health, particularly during periods of elevated morbidity risk (7, 9, 26). Biologically active substances amay help the course of digestive processes and, on the other hand, stimulate the immune system through stimulation of natural resistance mechanisms (8).

Does alternative medicine have a role?

In a case of health problems, maintenance and feeding system should be analyzed at first instance, in order to find factors that might negatively influence the stock. Organic standards require the use of naturally originated medicines, herbal preparations and homeopathic agents to be used as the first course of action for prophylaxis and therapy(2, 11). Both own experience and literature data point out to the efficiency of such treatments (1, 12, 24). However, it is worth mentioning that good knowledge on the form of applied medicines and manner of their storage and dosage ensure safe and efficient therapy with homeopathic remedies (11). Insufficient and shallow knowledge of these topics may be the reason for complications or even failure during treatment. Other biological curing methods may be applied in prophylaxis, including probiotics, i.e. properly chosen bacteria strains that naturally occur in an organism. That type of prophylaxis finds its widest application in pig, poultry and cattle production (10, 20, 21, 23).

Bacteria contained in probiotics settle the digestive tract and make the development of disease-forming flora difficult. This largely eliminates the risk for occurrence of indigestion and diarrhea. Another example of unconventional methods of animal prophylaxis and treatment is application of propolis and biostimulation during therapy of mastitis, as well as application of charcoal as an additive to fodder for poultry (3, 4, 15).

However, it should be strongly stressed that above mentioned prophylactic practices and disease treatment methods require longer application and that it takes a longer time for medical effects to become visible than with conventional, allopathic medicine. Therefore, all available therapy methods being in accordance with obligatory veterinary rules should be applied for every case of direct threat of animal's life and to reduce suffering. Application of allopathic medicines requires prolonged withdrawal periods for foodstuffs from treated animals.

References:

1. Anetzhofer J.: Die Behandlung von Endometritiden mit homoopathischen Arzneimitteln. Biolog. Tiermed., 5, 10, 1988
2. Biologiczna apteka weterynaryjna. Stowarzyszenie EKOLAND, Warszawa 1993
3. Dudko P. Niekonwencjonalne metody eliminacji stanów podklinicznych mastitis u bydła I. Biostymulacja krów szczepem corynebacterium uberis 22. Medycyna Wet., 50, 170, 1994
4. Dudko P., Kurpisz M.: Nieantybiotykowe sposoby eliminacji stanów podklinicznych mastitis. II Skuteczność leczenia w zasuszeniu antybiotykami i propolisem. Medycyna Wet., 52, 462,1996
5. Environmental Health Criteria 21, DDT and its deratives. WHO, Geneva, 1982
6. Falandysz J. Ocena narażenia środowiska na trwałe i toksyczne związki halogenoorganiczne. Roczn. PZH, 47, 41, 1996
7. Gajęcki M.: Profilaktyczne zastosowanie preparatów zielarskich u macior w okresie okołoporodowym. Praca hab. AR-T Olsztyn 1988
8. Grela E. R., Sembratowicz I., Czech A.: Immunostymulacyjne działanie ziół. Medycyna Wet., 54, 152,1998
9. Grela E.R., Czech A., Baranowska M.: Efektywność dodatku ziół w odchowie prosiąt Ann. Univ. Mariae Curie-Skłodowskla sec. EEE., 9, 249, 2001

10. Grela E.R., Semeniuk W.: Probiotyki w produkcji zwierzęcej. Medycyna Wet., 55, 222,1999
11. Homotoksykologia weterynaryjna z elementami homeopatii. Instytut Psychosomatyczny, Warszawa, 1999
12. Jaśkowski J. M.: Torbiele jajnikowe u krów i stosowana terapia z uwzględnieniem preparatów antyhomotoksycznych. Biol. Medycyna Wet., 1, 16,1997
13. Krzyżanowski J., Łopuszyński W., Krakowski L., Szczubiał M.: Mleko przeznaczone do spożycia w świetle badań laboratoryjnych. Medycyna Wet., 49, 24,1993
14. Krzyżanowski J., Szczubiał M., Krakowski L., Łopuszyński W., Sieradzki J.: Badania nad występowaniem antybiotyków Beta-laktamowych i innych substancji hamujących w mleku dostarczanym do Punktów Skupu Mleka przez rolników indywidualnych. Medycyna Wet., 48, 84, 1992
15. Majewska T., Zaborowski M.: Węgiel drzewny w żywieniu kurcząt brojlerów. Medycyna Wet., 59, 81, 2003
16. Pietrzak-Fiećko R., Tomczyński R., Smoczyński S.: Pozostałości insektycydów chloroorganicznych w mleku ludzkim i zwierzęcym. Medycyna Wet., 56, 715, 2000
17. Pikul J., Cais-Sokolińska D., Kroll J., Chudy S.: Występowanie substancji hamujących oraz jakość mikrobiologiczna i cytologiczna mleka surowego. Medycyna Wet., 57, 803, 2001
18. Piskorska-Pliszczyńska J.: Dioksyny i związane z nimi zagrożenia zdrowia. Medycyna Wet., 55, 491, 1999
19. Polak M.P., Żmudziński J.F.: BSE w Europie – dane epizootyczne. Medycyna Wet., 57, 228, 2001

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Working Group Report: Implementing health security on organic farms

Compiled by G. Smolders

It was recognized that the current EU regulation for organic farming already has a general requirement for farm level planning, including health planning that should include health security planning. It was felt that this requirement was not specific enough and its relevance was seen as questionable, as health planning is not included in a framework for management.

Formal health planning was seen as the main means of implementing improved health security on organic farms. The following main points were made:

- In most EU countries, there is no clear and specific requirement for animal health security on organic farms. In the UK, a requirement for a farm specific health plan is implemented in the regulations, but the wording of the requirement does not focus on health security ("pattern of health building", "reduced dependency on conventional veterinary medicinal inputs"). In Finland, there is a template for a farm specific health plan, including records and residues, but no actions are included. In Norway, there is a checklist for farmers to check health management and planning. It includes sampling of feed. In the Netherlands, on both conventional and organic dairy farms there is a requirement for chain quality management, including regular farm inspections on animal welfare and health by a veterinarian and record keeping of diseases and treatments by the farmer.
- On organic farms the onus should be on prevention rather than treatment. If this was made clear in the planning process, a level of animal health security would be introduced 'automatically'.
- Health management should be implemented for the whole farm, not only on for diseased animals. Health dos not start with treatment but with breeding, crop rotation and feeding, animal handling, housing etc. On the other hand, aims could appear more realistic if plans focus on a few topics at the time.
- A health plan should be farm specific and dynamic, with in reasonable time-limited goals. These goals should be part of the inspection procedure and should be transparent as the potentially improved health status of the farm. Initially, there would be a wide range of health statuses on farms, with 'good' and 'bad'. It was suggested that certain health standards would need to be made necessary for farms to be eligible for certification, in the long run.
- Implementing and checking a health plan takes time and money, both for the farmer and the certification body. Cost of veterinary involvement will rise if all treatments must be administered by a veterinarian. In some countries, this is already the case, in most countries it is not. The benefits these additional costs bring, must be made transparent: does health planning produce better economic results; better animal welfare and higher prices of products?
- Health planning, in most cases, requires paperwork, which is disliked by farmers. Record-keeping should, therefore, be kept simple. Farmers should be motivated to keep records by demonstrating direct advantages for him, either economic, animal welfare or less trouble and labor with diseased animals.
- Some participants felt that health plans would work better as an educational tool for farmers and other stakeholders, rather than an obligatory measures.

- Some participants felt that health plans should only include regulations and requirements relating to contagious and zoonotic disease. Most farmers do not know the status of these diseases on their farm. These diseases should be monitored on all farms. It is also obvious that these requirements should be country-specific, reflecting the differing endemic disease situation in different countries.
- Some participants felt that the introduction of HACCP on farms would be helpful. In some countries, research is already looking at the potential and difficulties of obligatory HACCP at farm level.
- It was also felt that, while it is better to motivate farmers positively to keep animals in good health, sanctions must be possible. In the UK, a farm can loose its certificate if veterinary and animal health standards are not met or animal welfare problems are left unaddressed.

Part B:
Zoonotic diseases in organic farming

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Infectious diseases treatment in Poland as an element of public health protection

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Zoonoses and legislation

Infectious diseases of animals in Poland are regulated by the Act of 11th March 2004 on animal health protection and treatment of infectious diseases of animals (Dz. U. No 60, item. 625). They are defined as "diseases of animals caused by infectious factors, which in relation to character, manner of formation and propagating oneself are threat to the health of animals or people".

The threat to people are diseases originating from animals i.e. zoonoses. Zoonoses in historic meaning, according to R. Virchow, are infectious diseases that were transferred from domestic animals to people. In modern definition (1959, 1967), according to WHO, zoonoses are diseases and infections transferred in natural way from vertebrate animals to people. Infectious factors can be viruses, bacterium, funguses, protozoan, worms, arthropods (l). In 2 annexes, the Polish veterinary law divides these diseases according to the duty of treatment - 27 diseases (annex 2) and the duty of registration - 47 diseases (annex 3).

The annex 2 to the act mentions more diseases than Decree 82/894 of 21th December 1982 about notifying infectious diseases in the European Community. This Decree qualifies way of treatment (procedures, time-limits, kind of delivered information) in the case of confirmation and eradication of certain diseases. In general, it mentions 18 diseases, except BSE and scrapie, that are placed on OIE list A. These are:

1. Foot and mounth disease (Dec. 85/511, Dec. 90/423, Dec.91/42)
2. Rinderpest (Dec. 92/119)
3. Contagiosus bovine pleuropneumonia (Dec. 92/119)
4. Bluetongue (Dec. 92/119)
5. Swine vesicular disease (Dec. 92/119, Dec. 73/53)
6. African swine fever (Dec. 80/217)
7. Hog cholera, Clasical swine fever (Dec. 80/217, Dec. 80/1095)
8. Porcine enterovirus encephalomyelitis (Dec. 92/119)
9. Highly pathogenic avian influenza, prev. Fowl plague (Dec. 92/40)
10. Newcastle disease (Dec. 92/66)
11. African horse sickness (Dec. 92/35
12. Vesicular stomatitis (Dec. 92/119)
13. Peste des petits ruminants (Dec. 92/119)
14. Rift valley fever (Dec. 92/119)
15. Lumpy skin disease (Dec. 92/119)
16. Sheep and goat pox (Dec.92/119)
17. Infectious haematopoetic necrosis (Dec. 92/53)
18. Bovine spongiform encephalopathy (BSE) (Dec. 999/2001, Dec 2000/374. Dec. 2000/418)

The diseases mentioned in both annexes are correspondent to OIE lists A and B.

The basic Union law dealing with zoonoses is Decree 92/117 of 17th December 1992 on the matter of protective activities directed against definite zoonoses relative to their infectious factors responsible for infections and poisonings of animals and food of animal origin. It mentions two groups of diseases:

1. tuberculosis caused by Mycobacterium bovis, brucellosis and its infectious factors, salmonellosis, trichonosis, campylobakteria.
2. echinococosis, listeriosis, rabies, toxoplasmosis, yersiniosis and other zoonoses.

Currently, a more detailed regulation in relation to the matter of zoonoses is under development in the EU.

The executive document to the Act on protection the health of animals and treatment of infectious diseases of animals is the Decree of Ministry of Agriculture and Development Rural Areas on 18th May 2004 on the matter of zoonosis and zoonotic factors dependent of duty of registration (Dz. U. No 130, item. l394). It mentions the following diseases:

1) Tuberculosis caused by Mycobacterium bovis
2) Brucellosis and its zoonotoc factors
3) Salmonellosis, and its zoonotic factors
4) Trichinosis
5) Campylobakteriosis and its zoonotic factors;
6) Echinococcosis;
7) Listeriosis;
8) Rabies;
9) Toxoplasmosis;
10) Yersiniosis;
11) Anthrax;
12) Tularaemia;
13) Glanders;
14) Q fever;
15) Chlamydiosis;
16) Highly pathogenic avian influenza, HPAI d. Fowl plague;
17) Rift valley fever;
18) Foot and mouth disease;
19) Bovine spongiform encephalopathy - BSE);
20) colibacteriosis caused by Escherichia coli.

Also other diseases, mentioned in annexes 2 and 3 to the decree belong to zoonosis and they are among others: vaccinia of sheep and goat, pseudo avian plague (ND), American encephalitis and pith of horses. Controversial zoonozis are: Aujeszky’s desease, infectious anaemia, Marek’s desease and myksomatosis.

It is apparent that over 40% of zoonoses and potential zooonoses are either notifiable and/or subject to statutory measures.

Zoonosis i.e. diseases of animal origin, are not only epidemiological and epizootic problems, but also socio-economic. The presence of these diseases leads to serious economic losses connected with costs of human treatment, absence in work, livestock liquidation and goods of animal origin. It is unusual that most countries have initiated and realised many programs, which are aimed at the eradication of defined zoonosis. In Poland, eradication of most well-known zoonosis such as tuberculosis and brucellosis was completed in 1975 and 1980, respectively. Currently, control studies aiming in permanently monitoring the epizootic and epidemiological situation are carried out. In chance of rabies and, e.g .BSE, the action is continued.

The epizootic situation in Poland on example of chosen zoonosis

Rabies

Rabies, as an incurable infectious disease with high mortality rates, has been known for nearly 4,000 years. The causative agent is a rabdovirus. The period of rabies incubation is from several days to 6 years. About 84% of all cases of rabies of humans were between 10 and 90 day after infection.

In Poland, last cases of human rabies were noted in 2002. From period of the second war the main reservoir of virus of rabies in Europe is fox (Vulpes vulpes). In Poland in 2003, there were 391 cases of rabies. The rabies of foxes in 235 cases was confirmed (61% of cases). In 54 cases, the rabies of racoon dogs (*Nyctereutes procyonoides*) was confirmed (14% of all cases). The most cases of domestic animals were confirmed in cats – 29 (7%), and among farm animals in cattle: 26 cases (6.6%).

In 1993 in Poland, the oral vaccinations of foxes against rabies with vaccine with attenuated tribe of virus SADBERN19 was started. Basic foundation is to carry out vaccinations in all counties in spring and autumn. The average quantity of doses of vaccine is 20 pices/km^2. Action is carried out in spring and autumn in intervals of 6 months by “plane" method and embraced at first terminal areas with Germany on the length of 400km reaching 100km inside of country. This area was systematically enlarged and from 2002 the oral vaccinations of foxes are carried out in all parts of Poland. Confirmation of effectivity of vaccinations is monitoring with a marker - tetracycline in bones (OTC- coefficient of acceptance) and presence of antibodies in liquids from body cavities (RFFIT- level of immunisation).

Tuberculosis

Tuberculosis is a multiorganic disease with characteristics of a pandemic. The infectious factor of is *Mycobacterium bovis* in cattle and both *Myocbacterium bovis* and *Mycobacterium tuberculosis* in humans. It is suggested that, in the light of the present epidemiological state, tuberculosis is more of an antroponosis than a zoonosis.

Already in inter-war period, in years 1927-1939, cattle tuberculosis was subject to control. The general action of control of cattle tuberculosis began in Poland in 1959. The contagion of animals was on average 31%. The action was completed in 1975, and Poland has been free of cattle tuberculosis (*Mycobacterium bovis*) since then. However, in the beginning of 1990, the level of diagnosed cases of tuberculosis in humans in Poland was one of the highest in Europe at 42.8 per 100 thousands of inhabitants. In 2003, 1,724,936 heads of cattle were examined (with intradermal tuberculine test). A total of 309 positive reactions were recorded. When the reacting animals were slaughtered, laboratory investigation isolated *Mycobacterium tuberculosis* in 94 of the animals.

Brucellosis

Brucellosis is an infectious disease found mostly in cattle and caused by Brucella abortus bovis. This microbe is most often responsible for human brucellosis. In other species, brucellosis is caused by Brucella melitensis (sheep, goats), Brucella ovis (sheep), Brucella suis (pigs) and Brucella canis (dogs).

In Poland, the infections in humans were caused by direct contact with the animals, rather than by alimentary route. Brucellosis control in Poland began already in 1937, and continued after the war from 1948 when the prevalence in cattle was some 23%. However, statutory measures for notification and slaughter were not introduced until 1975. Poland is officially free of brucellosis since 1980. In 2003, the examination of 1,211,775 heads of cattle was made. In 7 cases, seropositive reaction was found. Reacting animals were slaughtered.

Bovine spongiform encephalopathy (BSE)

BSE is currently controlled in Poland according to the existing EU legislation. Initially, tests in BSE were started in 1996, but had a character of an epidemiological investigation, and a histopatological method was used. In 2001, the routine „quick" tests was introduced. In Poland, currently three tests are used: Bio-Rad Platelia, Enfer and Prionics check.

In 2003, 455,413 samples taken from slaughtered animals were examined. The investigations are carried out in five veterinary regional laboratories (Institutions of veterinary hygiene - ZHW) in Kraków, Gdańsk, Leszno, Wrocław and in Warsaw. The confirming investigations are carried out in reference laboratory – State Institute of Veterinary in Puławy. By July 2004, 13 cases of BSE have been confirmed in Poland. No cases of CJD or its new variant in humans have been detected.

References:

Wiesner E., Ribbeck R Worterbuch der Veterinarmedizin, Gustaw Fischer, 1991
Becker In. Menk W. Zoonosen - Fibel, H. Hoffmann Verlag, Berlin, 1996
Thraenhart O. Der Praktische Tierarzt. 5, 96
Anusz Z. Zapobieganie i zwalczanie zawodowych chorób odzwierzęcych. Wyd. ART. Olsztyn, 1995

Toxoplasma gondii infection in organic pig production systems

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Introduction

Toxoplasma gondii is a ubiquitous protozoan parasite capable of infecting all warm-blooded animals (Tenter, 2000). It is one of the most prevalent chronic zoonoses affecting approximately 50% of the world's human population. Among the foodborne infections, toxoplasmosis has been shown to be the third major cause of food related deaths, only outnumbered by salmonellosis and listeriosis (Mead *et al*, 1999). Although the disease is usually asymptomatic, it can cause serious disease when the infection is transferred to the unborn child during pregnancy or when it occurs in immunocompromised individuals.

Infection with the parasite is followed by an immune response by the host, which results in the transition of the parasite (tachyzoite) into an encysted stage. These cysts contain a large number of parasites (bradyzoites) that reside in muscles, the brain and sometimes in the retina, thereby escaping from the host immune response. These cysts reactivate every now and then, leading to a local inflammatory reaction. Reactivation in muscle tissue may go unnoticed, but in the retina it can lead to serious visual disturbance and irreversible damage to the delicate intraocular structures (Figure 1). Antiparasitic treatment for ocular toxoplasmosis does not seem effective, which may be due to the fact that the available anti-parasitic drugs do not easily penetrate the retina (Stanford *et al*; 2003). A long term follow up of ocular toxoplasmosis patients has shown that eventually 24 % of the affected eyes become blind (Bosch-Driessen *et al*; 2002). Toxoplasma reactivation in the brain in immunocompetent individuals may lead to behavioural changes, and controversy exists whether toxoplasma infection is involved in the pathogenesis of schizophrenia (Webster *et al*; 2001). These findings are in agreement with earlier studies in rodents that showed a profound influence of toxoplasma infection on behaviour (Webster *et al*; 2001). A striking observation was the finding that rats infected with *Toxoplasma gondii* lose their aversion for cats. In immune compromised individuals, a reactivation of toxoplasma in the brain often causes a fatal encephalitis (Montoya *et al*; 2004).

Figure 1: Example of a fundus of a patient with ocular toxoplasmosis.

The lifecycle of *Toxoplasma gondii* and its role in human infection

The life cycle of the parasite was largely deduced by Professor Hutchison from Glasgow University (Wastling *et al*; 2000). Felidae are the definitive hosts in which sexual reproduction of toxoplasma leads to the excretion of millions of parasite eggs (oocysts) during a period of several weeks. After sporulation, the oocysts become infectious for other (intermediate) hosts, including farm animals, rodents and humans. Oocyst uptake can take place via the oral uptake of infected water, soil, food (plants, fruits) or bedding material. When an intermediate host becomes infected, the parasite transfers the intestinal wall and an intracellular asexual reproduction of the parasite takes place elsewhere in the body, followed by an encysted phase. The site where encystment takes place can vary amongst species and may also depend upon the toxoplasma strain. In cattle, no evidence of encystment is available, whereas all edible parts of an infected pig have been shown to be capable of transferring the infection (Dubey *et al* 1995). In mice a heavy infestation of the brain can be observed. Uptake of tissue containing toxoplasma cysts by a herbivorous animal will lead to the infection, whereby the uptake of one cyst is sufficient for transfer. Uptake of an infected rodent by a cat thereby closes the life cycle of the parasite. Of interest is the fact that cats, after having caught a mouse, instinctively will commence by eating the brains of their victim. Humans can be seen as an end host, because in view of the position of humans in the food chain hierarchy, transfer of parasites from humans to other hosts is unlikely and infection of humans would not pose an advantage for the parasite from an evolutionary point of view. In a way, the ability of the parasite to infect all warm blooded animals makes humans an unintended victim.

Several studies indicate that the prevalence of human *Toxoplasma gondii* infections in western countries is slowly decreasing (Tenter *et al*; 2000). In The Netherlands, approximately 50% of the individuals in the age group between 30-35 years were toxoplasma positive in 1987, whereas the 50% prevalence had shifted to the 40-45 years group in 1996 (Kortbeek, personal communication). It is not clear which factors were involved in this shift.

At present its is assumed that the annual seroconversion rate of humans in the Netherlands is 0.5%. With a population of 16 million individuals, this would amount to 80,000 new cases per year. The number of congenitally infected babies is calculated to range between one in a thousand to one in ten thousand live born babies. With 200,000 liveborn babies each year, it is expected that the annual number of congenitally infected babies will range between 20 and 200. Some of these babies will have neurological impairment and a substantial amount will develop ocular disease. Apart from ocular disease following congenital infection a number of epidemics have provided evidence that ocular disease can also follow acquired disease. The incidence of ocular disease following toxoplasma infection ranges between 0.3 to 0.05% of cases. Of the 80,000 annual toxoplasma infections between 80 and 240 individuals are estimated to develop eye lesions. The above figures are summarized in Table 1.

Table 1: Human toxoplasmosis in The Netherlands in 2004.

	Estimated annual cases
new annual infections (0.5% seroconversion rate)	80,000
congenitally infected babies (annual liveborn babies: 200,000)	20-200
acquired ocular toxoplasmosis	40-240

The risk for humans to become infected with the toxoplasma parasite are listed below:

- Eating unwashed contaminated vegetables, fruit;
- Drinking contaminated water;
- Gardening in contaminated soil;
- Contact with contaminated cat litter;
- Eating undercooked, or not previously frozen meat; cured meat products;
- poor kitchen hygiene; and
- being a fetus in a seronegative mother.

Which routes of infection are most important was investigated in a large multi center European epidemiological study involving the cities of Napels, Lausanne, Copenhagen, Oslo, Brussels and Milan (Cook *et al*; 2000). It was concluded that 30-63% of infections could be ascribed to eating undercooked meat or meat products, whereas 6-17% were due to soil contact. The risk of contracting toxoplasma via meat can be prevented by thoroughly cooking the meat (a few minutes above 67 degrees celsius) or by freezing the meat (Dubey; 2000). The sources of meat which are considered to play an important role in toxoplasma infections in humans are listed in Table 2 (taken from Tenter *et al*; 2000). Although the consumer can prevent the risk by adequately heating fresh meat, the consumer is often not aware of the procedures used to prepare meat products such as sausages. Some of the procedures used have not been critically tested for their ability to kill encysted toxoplasma parasites. Dubey has for instance reported that salting does not kill the parasite (Dubey; 2000).

Table 2: The importance of different kinds of meat as a source of toxoplasma infection in humans

Sheep, pigs, goats + + +
poultry, deer, rabbit ++
horse +
cattle -

Pigs and *Toxoplasma gondii*
Pork meat has always been considered to play an important role in toxoplasma infections in humans (Dubey; 2000). Over the last decades, the toxoplasma infection rate in pigs has dramatically dropped in several countries (Tenter *et al*, 2000). In the Netherlands, approximately 50% of pigs tested positive for toxoplasma antibodies in the late sixties. Coinciding with complete indoors management and further implementation of hygiene measures following swine fever epidemics, the seroprevalence rate for toxoplasma has dropped below the 1% level. A growing demand from the public for animal friendly meat has led to production systems reintroducing outdoor access. Organic pig production systems in the Netherlands imply outdoor access of pigs on a concrete floor and access to pasture for the sows. When comparing toxoplasma serology in slaughter pigs from different management systems, it was shown that conventional pigs were all negative, whereas a few percent of the organic pigs or free range pigs were positive (Table 3: taken from Kijlstra *et al* 2004). Although only a few percent of the animals were positive one should keep in mind that one pig is consumed by 200-400 consumers (Fehlhaber; 2001). No data are available in the

Netherlands concerning consumer habits for meat preparation making a direct risk evaluation difficult. A large risk probably involves preparation of pork meat during barbecues. As mentioned above, further risks are associated with inadequate kitchen hygiene (using same utensils for meat and vegetables without in between cleaning; washing hands following meat handling). A risk not controlled by the consumer is the preparation of meat products.

Table 3: Effect of management system on toxoplasma infection of slaughter pigs.

Type of pig farm	Total number of pigs	Number of seropositive pigs	% positive pigs	Total number of farms	Number of farms with seropositive pigs	% positive farms
Organic	660	8	1.2	16	3	18
Free range	635	30	4.7	17	10	59
Conventional	621	0	0	30	0	0

Toxoplasma infection in sows was markedly higher than that seen in slaughter pigs (Table 4). Sows live longer than slaughter pigs and also have access to pasture. In the Netherlands, organic sows are slaughtered together with conventional sows and processed together as meat products. Details of the methods involved in the preparation of sow-derived meat products have not been studied in detail and it is not clear whether these methods lead to an adequate killing of encysted parasites. A recent study from the UK has shown that more than 30% of pork meat products still contain detectable toxoplasma DNA (Aspinall *et al*; 2002). Whether these meat products contained infectious parasite was not investigated. In the UK, a large proportion of the conventional sows have access to pasture, which may explain why conventional meat products in the UK are contaminated with the parasite.

Table 4: Effect of management system on toxoplasma infection of sows.

Type of pig farm	Total number of pigs	Number of seropositive pigs	% positive pigs	Total number of farms	Number of farms with seropositive pigs	% positive farms
Organic	109	16	15	10	7	70
Free range	89	20	22	8	6	75
Conventional	95	0	0	8	0	0

Risk factors for a pig to become infected with *Toxoplasma gondii* are diverse and are listed in Table 5. The presence of cats on the farm is an important risk factor. In our study, the mean number of cats on a conventional farm was 2.2, whereas organic and free range farms had 4.9 and 6.3 cats per farm, respectively. As mentioned above, an infected cat can excrete a few hundred million oocysts during a period of several weeks. These cysts can infect the outdoor access, the straw bedding, the feed, roughage and the drinking water. Although cats only shed the oocysts during a short period of time, these eggs can remain infectious for a number of years. The mild climate in western European countries favor the long term infectious nature of the parasite in the environment. Uptake of the oocysts by annelids and insects has also been suggested. Uptake of one oocyst can already lead to an infection in a pig (Dubey *et al*.;1996). Infection of pigs via the uptake of tissue cysts is also possible. An example includes eating an infected rodent. Earlier studies have already indicated that inappropriate rodent control is asssociated with toxoplasma infection of pig farms (Weigel *et al*; 1995). We observed that 100% of the conventional farms used chemical rodenticides, whereas 14 percent of free range farms and 31 percent of organic farms did not use these chemicals. Various studies have shown that a few percent of wild rodents are infected with the parasite (Dubey *et al*; 1995). Of interest is the fact that, unlike in humans, vertical transmission in mice can go on for several generations (Owen *et al*; 1998). This implies that rodents can form a reservoir of toxoplasma that can be very difficult to control.

Table 5: Risk factors for a pig to become infected with *Toxoplasma gondii*

- cats
- contaminated outdoor access
- contaminated water
- contaminated food
- contaminated whey (goat)
- carcasses of infected rodents
- contaminated bedding/compost
- congenital transfer

In view of the current EU ban of meat products in pig feed, it is unlikely that tissue cysts of the parasite are present in pig feed. Tail biting is a transfer route between pigs which is hypothetically possible. Congenital transfer of toxoplasmosis from an infected sow to her offspring has been described and could also explain some infections in slaughter pigs. Whether milk from an infected sow can be infectious is not known. Infected goat milk has been mentioned as a possible source of toxoplasma parasites although detailed information is not available (Tenter *et al*; 2000). At present, it is not yet clear which routes of infection are the most important for a pig to become infected.

Prevention of toxoplasmosis on pig farms

Prevention of toxoplasma infection on pig farms can be directed at a number of different issues (Kijlstra *et al*: 2004). Since outdoor access is a prerequisite for organic farming, it is not possible to keep animals inside. Because cats are an important source of oocysts, most attention should be paid to the number of cats on the farm. Controlling the number of cats on the farm in combination with toxoplasma vaccination may be an important way to reduce the oocyst contamination in the environment (Mateus-Pinilla *et al*; 2002). Cats that are on the farm should be neutered to prevent young cats to be born. Furthermore, cats should not be allowed to have access to the outdoor area, feed, roughage supply, bedding materials and stables. A further point that deserves attention is a proper rodent control. Use of chemical rodenticides is currently allowed according to the EU regulations for organic farming, but is of course not in line with principles of organic farming. Some organic farmers tend to rely on cats for rodent control, although effectiveness of this method is poor and, as mentioned above, may introduce environmental contamination with toxoplasma oocysts. Nevertheless, rodent control should be such that the pigs do not have a chance to eat a dead or a live rodent. Water is known to function as a source of toxoplasma infection, and pigs should only have access to a water supply that is free from toxoplasma oocysts. Furthermore, farmers should be discouraged to provide their animals goat whey (byproduct of cheese making). The use of compost should also be discouraged since compost may contain cat litter.

Indoor farming and improved hygiene have decreased the number of toxoplasma cases in pigs over the last decades. Organic and free range pig farming are associated with a higher risk for acquiring toxoplasma infections than indoor farming. Development of a hazard analysis critical control point (HACCP) system in combination with serologic monitoring at slaughter should lead to the implementation of strategies to prevent toxoplasma infection of pigs raised in conditions that improve their welfare.

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References:

Aspinall TV, Marlee D, Hyde JE, Sims PF. Prevalence of Toxoplasma gondii in commercial meat products as monitored by polymerase chain reaction--food for thought?
Int J Parasitol. 2002;32:1193-9.

Bosch-Driessen LE, Berendschot TT, Ongkosuwito JV, Rothova A. Ocular toxoplasmosis: clinical features and prognosis of 154 patients. Ophthalmology. 2002;109: 869-78.

Cook AJ, Gilbert RE, Buffolano W, Zufferey J, Petersen E, Jenum PA, Foulon W, Semprini AE, Dunn DT. Sources of toxoplasma infection in pregnant women: European multicentre case-control study. European Research Network on Congenital Toxoplasmosis. BMJ. 2000;321:142-7.

Dubey JP, Lunney JK, Shen SK, Kwok OCH, Ashford DA and Thulliez P, Infectivity of low numbers of *Toxoplasma gondii* oocysts to pigs, J. Parasitol. 1996; 82: 438–443

Dubey JP. A review of toxoplasmosis in pigs. Vet Parasitol. 1986;19:181-223.

Dubey JP, Thulliez P, Powell EC. Toxoplasma gondii in Iowa sows: comparison of antibody titers to isolation of T. gondii by bioassays in mice and cats. J. Parasitol. 1995; 81: 48-53.

Dubey JP, Weigel RM, Siegel AM, Thulliez P, Kitron UD, Mitchell MA, Mannelli A, Mateus-Pinilla NE, Shen SK, Kwok OC, et al. Sources and reservoirs of Toxoplasma gondii infection on 47 swine farms in Illinois. J Parasitol. 1995;81:723-9.

Dubey, J.P., Beattie, C.P., 1988. Toxoplasmosis of Animals and Man. CRC Press, Boca Raton, FL, 220 pp.

Dubey JP. The scientific basis for prevention of Toxoplasma gondii infection: studies on tissue cyst survival, risk factors and hygiene measures. In: Congenital Toxoplasmosis. Scientific Background, Clinical Management and Control. 2000; pp 271-275. Eds P. Ambroise-Thomas and E. Petersen. Springer Verlag France

Fehlhaber K. Schwierigkeiten und defizite in der bekämpfung lebensmittelbedingter Salmonellosen. Fleischwirtschaft 2001; 81: 108-110.

Kijlstra A, Eissen OA, Cornelissen J, Munniksma K, Eijck I, Kortbeek T. Toxoplasma gondii infection in animal-friendly pig production systems. Invest Ophthalmol Vis Sci. 2004; 45: 3165-9.

Kijlstra A, Meerburg BG and Mul MF. Analysis of Toxoplasmosis risks in animal-friendly livestock production systems. NJAS, Wageningen Journal of Life Sciences. in press 2004

Mateus-Pinilla NE, Hannon B, Weigel RM. A computer simulation of the prevention of the transmission of Toxoplasma gondii on swine farms using a feline T. gondii vaccine. Prev Vet Med. 2002; 55:17-36

Mead PS, Slutsker L, Dietz V, McCaig LF, Bresee JS, Shapiro C, Griffin PM, Tauxe RV. Food-related illness and death in the United States. Emerg Infect Dis. 1999; 5: 607-25

Montoya JG, Liesenfeld O. Toxoplasmosis. Lancet. 2004; 363:1965-76.

Owen MR, Trees AJ. Vertical transmission of Toxoplasma gondii from chronically infected house (Mus musculus) and field (Apodemus sylvaticus) mice determined by polymerase chain reaction. Parasitology. 1998;116:299-304.

Stanford MR, See SE, Jones LV, Gilbert RE. Antibiotics for toxoplasmic retinochoroiditis: an evidence-based systematic review. Ophthalmology. 2003;110: 926-31.

Tenter AM, Heckeroth AR, Weiss LM. Toxoplasma gondii: from animals to humans. Int J Parasitol. 2000;30:1217-58.

Wastling J, Heap S, Ferguson D. Toxoplasma gondii--keeping our guests under control. Biologist (London). 2000; 47: 234-8.

Webster JP. Rats, cats, people and parasites: the impact of latent toxoplasmosis on behaviour. Microbes Infect. 2001;3:1037-45.

Weigel RM, Dubey JP, Siegel A, Kitron UD, Mannelli A, Mitchell MA, Mateus-Pinilla NE, Thulliez P, Shen K, Kwok O and Todd KS , Risk factors for transmission of *Toxoplasma gondii* on swine farms in Illinois. J. Parasitol. **81** (1995), pp. 736–741

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Salmonella and campylobacter in organic egg production – with special reference to the Finnish situation

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Introduction

Microbial food safety is a major public health issues in most developed countries. Food-borne microbial infections have had an increasing trend in many western European countries in spite of preventive efforts and economic inputs in the field. A new zoonosis directive has been adopted in 2003. This directive updates and expands the Regulation 92/117/EEC. All EU countries have established national food safety programmes that include, in the first phase, a comprehensive monitoring of relevant food chains for important zoonotic, food-borne pathogens at points where the contamination most probably takes place, as well as monitoring systems for human infectious diseases associated with food-borne transmission.

The most important food-borne, bacterial illnesses in Europe are campylobacteriosis, caused mostly by *Campylobacter jejuni*, and salmonellosis, caused by several salmonella serovars (*Salmonella enterica* serovar. Enteritidis, Typhimurium and some other less common serovars). One of the examples of successful management programmes of food-borne zoonoses has been the decreasing trend of *S. enterica* serovar Enteritidis infections in humans in the UK (Cogan and Humphrey 2003). The main reasons for the decreasing trend have been the implementation of a vaccination programme for laying hens against S. Enteritidis. This was initiated in the mid-990s, together with improved biosecurity programmes at farm level (Anonymous 2001).

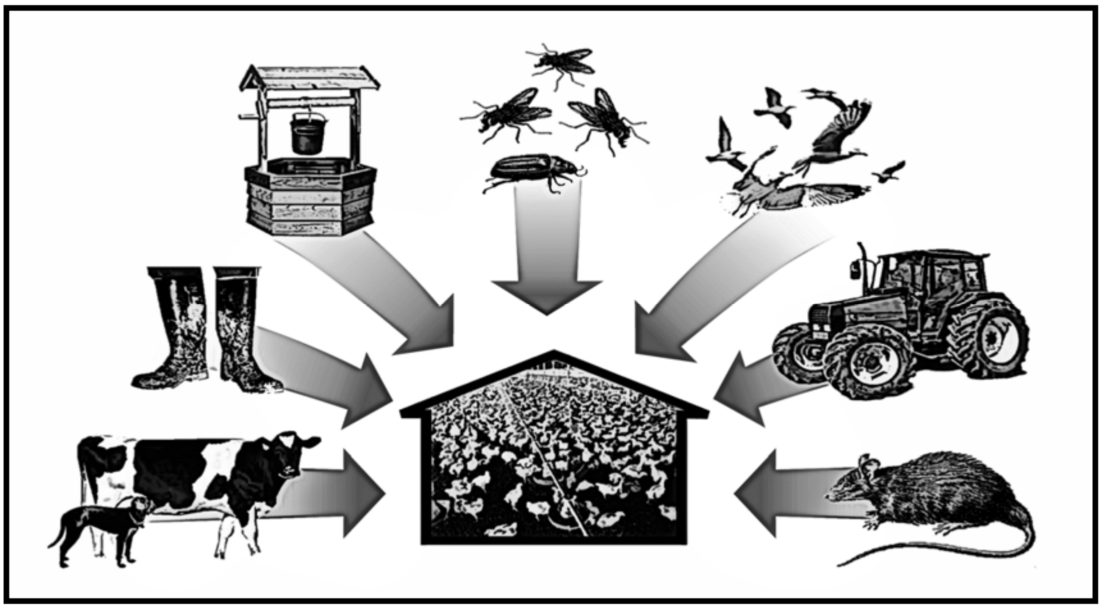
Campylobacter jejuni in animals, especially in poultry

Campylobacter jejuni is a microaerophilic gram-negative organism, which has a large spectrum of hosts in warm blooded animals, including domestic animals, poultry and wild birds. Reported human campylobacter infections have been increasing in most western European countries during the second half of 1990s. Several epidemiological studies performed in Europe and USA indicate that handling or exposure to improperly heat-treated chicken meat is a significant risk factor for acquisition of the illness in humans. The reasons for the increase are unknown, but one of the hypotheses has been that the increase is associated with the extensification of poultry systems.

The bacterium colonizes mostly as a commensal in high numbers (10^6 – 10^8 per gram) in the lower gastrointestinal tract of host animal. It is excreted into the outside environment, such as litter. The survival of the bacterium is restricted and depends e.g. on moisture, temperature, pH and UV light. The organism will survive in natural water if temperature is < 10°C for a few days. The infectious dose in experimental inoculations has been shown to be low, tens of organisms for a few days old chickens. A difference in infectivity between strains is also evident. *C. jejuni* seems to be extremely well adapted for colonization in birds. A supporting factor can be the relatively high body temperature of birds, 43-45°C which is close to the optimum growth temperature of the bacterium *in vitro*. When a commercial chicken flock reared in isolated buildings with 10,000 to 30,000 birds became contaminated by campylobacters, the contamination rapidly spreads into the whole flock during a few days. The flock is usually resistant to colonization during the first two weeks of life.

The *C. jejuni* contamination comes, in most cases, from outside of the house (Figure 1). Common sources of contamination are shown to be the boots of a farmer, if appropriate biosecurity measures are not taken. If the chicken house is located close to other farm animals, an increased risk for contamination is evident. Wild birds, e.g. sparrows living at the farm environment, can be important contamination source of the soil around the chicken house by fecal material. Flies seem to be a very important vehicle in transmission of campylobacters from an animal source to chicken houses. Rodent control is also a well recognized biosecurity measure to limit campylobacter contamination.

Figure 1: Potential contamination sources of a chicken flock by *Campylobacter jejuni*



Campylobacter contamination within a flock can, in the first stage, be limited into a few birds that come first into contact with the bacterium. The contamination, however, easily spreads within the flock by faecal-oral route.

As chicken flocks are easily contaminated by campylobacters from several potential sources during the rearing period, a high level of biosecurity is required for prevention of contamination. The high susceptibility of chicken farming for campylobacter contamination is reflected by high number of campylobacter positive flocks reported in several European countries: 50 to 100% of the flocks are positive. The prevalence of campylobacter positive poultry flocks follows a clear seasonal pattern, especially in the northern Europe. The highest level of positive flocks are found in July, August and September. In late autumn, winter, spring and early summer, fewer positive flocks are detected.

Salmonella in poultry

Several salmonella serovars may colonize poultry. S. Gallinarum and S. Pullorum were common in poultry before 1970s. These serovars cause an invasive disease in hens. The most common serovars associated also with human illnesses in poultry are Typhimurium, and Enteritidisis. Infantis and some other serovars can also cause human infections but these infections are less common. Especially S. Enteritidis PT4 has been important in Europe. S. Enteritidis infection in laying hens is asymptomatic and spreads also into oviducts and ovaries, causing contamination of the contents of shell eggs. S. Enteritidis has a range of host animals that spread the infection rapidly. S. Enteritidis and S. Gallinarum have closely related LPS, fimbriae and they belong to same clonal lineage that favors poultry as animal host. Eggs have been shown to be vehicles in human infections. PT4 has been especially successful in spreading through Europe and the USA, but no unique factors explaining its spread have been far identified so far.

Salmonella is controlled in poultry in most of European countries either by an approved control programme (Austria, Finland, France Denmark, Sweden, Ireland and Norway) or by a monitoring scheme based on the sampling procedures in the Zoonosis Directive. Some countries may have their own monitoring scheme (the Netherlands, Belgium). In 2000, virtually no salmonella positive flocks of layer flocks were reported in Finland, Norway and Sweden. In Ireland, 4.5% and, in Denmark, 3.7% of layer flocks were positive, mostly for S. Enteritidis. In Great Britain, a decreasing trend in salmonella positive flocks was seen (European Commission 2001).

Organic laying hens

Hens used for organic egg production have free access to outside environment during the summer months in Finland. Their life span is much longer than that of broiler chickens. As a result, the management system is susceptible for contamination by zoonotic enteric bacteria, such as campylobacters or salmonellas. The most significant risk in food safety is the contamination of eggs by zoonotic enteropathogens. In case of S. Enteritidis, the contamination is due to infection in the oviducts and ovaria of hens. Prevention is targeted on the spread of infection to farm by high level of biosecurity and vaccination of birds, to increase their immune response. Other salmonellas, e.g. S. Typhimurium, contaminate the shells of the eggs by faecal material after laying. Prevention is targeted to biosecurity and handling eggs at farm. Similarly, the food safety aspect associated with campylobacter colonization in hens is faecal contamination of egg shells by campylobacters. The survival characteristics of salmonellas and campylobacters are, however, not similar. Salmonellas resist e.g. dryness and ambient temperature much better than campylobacters and, for this reason, have more opportunities to survive the egg food chain from stable to table.

In Finland, an ongoing (2003–2005) research project on organic egg production, animal welfare and food safety, funded by the Ministry of Agriculture and Forestry, is examining campylobacter and salmonella contamination of approximately 20 organic layer farms (out of the total of 57 certified layer farms in Finland in 2003). The study includes visits to farms (autumn 2003and spring 2004), a questionnaire dealing with welfare and farm management issues, with potential risks associated with campylobacter colonization.

The size of farms varied from a few hundred to approximately 2,500 hens. In autumn 2003 and spring 2004, a total of 19 and 16 farms were studied, respectively. In autumn 16/19 and in spring 12/16 of the farms were positive for *C. jejuni*. Pulsed-field gel electrophoresis pattern analysis of *Kpn*I digests showed that, on some of the farms, several genotypes existed simultaneously and that some of the genotypes persisted during the whole study period. On some of the farms, entirely new genotypes were detected during spring sampling. None of the samples were positive for salmonella. None of the egg samples from all farms were salmonella positive, and only one egg shell sample was positive for *C.jejuni.* These results reflect data from conventional egg production in Finland where, in all monitoring studies, the number of salmonella positive laying hen flocks or chicken flocks has been very low (virtually non-existent). The flocks that were not campylobacter positive probably reflected low infection pressure in the environment.

In conclusion, adequate biosecurity levels, lowering the number of potential zoonotic infection sources in the vicinity of hen houses and vaccination of hens against S. Enteritidis are available tools to decrease contamination of organic laying hens by campylobacters or salmonella.

References

European Commission: Trends and sources of zoonootic agents in animals, feeding stuffs food and man in the European Union

Cogan, T.A. and Humphrey. The rise and fall of *Salmonella* Enteritidis in the UK. J Appl Microbiol 2003, 94: 114S-119S

No difference in paratuberculosis seroprevalence between organic and conventional dairy herds in the Netherlands

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Introduction

Mycobacterium avium subsp. *paratuberculosis* (MAP) is the cause of a severe incurable gastroenteritis in ruminants, also known as Johne`s disease (see for extensive review: Chacon *et al*; 2004). It is an important cause of economical losses in dairy farming since the milk yield in animals with paratuberculosis decreases approximately 10-20%, the farmer is confronted with high veterinary costs and animals die or have to be killed due to the disease.

In 1998, more than half of the Dutch dairy farms had animals infected with paratuberculosis on their farms (Muskens *et al*, 2000). In the positive herds, approximately one out of twenty animals had circulating MAP antibodies.

Especially young animals are susceptible for infection with the bacterium, which is transferred via the faecal-oral route. The bacterium infects the gastrointestinal tract, ultimately, leading to a malnutrition syndrome and, finally, to the death of the animal. The disease is often overlooked in its early stages because the symptoms are not very specific. Once infected, an animal can begin shedding the bacterium via the faeces at an age of approximately two years.

The methods to diagnose paratuberculosis in cattle can be divided in those that detect the bacterium via culture or by bacterial DNA and those, whereby the immune response against the bacterium is measured. The immune response can be detected via a skin test, detection of gamma interferon to test cellular immunity or by performing an ELISA to detect circulating antibodies against the bacterium. Culturing the bacterium from faecal samples is considered as the golden standard, but is extremely time consuming (weeks to months). The ELISA test is gaining popularity, as results can be available within hours/days. Although most tests have a high specificity, the sensitivity is quite low, meaning that none of the diagnostic tests are capable of identifying all sub-clinically infected animals. Most research and prevention programmes therefore aim at an analysis of paratuberculosis at the herd level.

Food safety aspects

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 (Chiodini *et al*., 1984). This suspicion has been based on the detection of the bacterium in inflamed intestinal tissue from patients with inflammatory bowel disease (Bull *et al.*, 2003).

Many researchers have addressed this issue, but to date the MAP issue in the aetiology of human inflammatory bowel disease is still controversial, due to conflicting results and differences in laboratory techniques applied (Chacon *et al*., 2004).

Prevention of paratuberculosis in cattle

Since young animals are extremely susceptible to becoming infected, prevention starts at the time of calving. Farmers are advised to use separate clean rooms for calving and to separate the calves from their mothers immediately after birth. Calves are allowed to drink colostrum (collected by the farmer) from their own mother but should not drink raw milk. Raw milk from infected cows can harbour the bacterium but can also be contaminated with small amounts of faeces.

Another advice to farmers includes using clean pastures for the calves. These pastures should not have been in use by older cows during the same season, nor should manure have been applied to the pastures. When new animals are introduced to the farm, the farmer should be aware of the paratuberculosis status of the farm where the animals came from. In the Netherlands, a farm can obtain a paratuberculosis status ranging from 0-10, depending on whether the herd contains animals with positive serology or faecal cultures for MAP. The farmer should also know the paratuberculosis scores of other farms supplying manure. Infected animals should be removed from the herd.

Organic farming and paratuberculosis

Organic dairy farming differs from conventional dairy farming in a large number of ways, of which some might influence, both in a positive and a negative way, the prevalence of paratuberculosis. On one hand, the strains of cows used or the management of the herd might offer a higher resistance against an actual infection with paratuberculosis. On the other hand, organic dairy farmers may be reluctant to separate calves from the mother cows immediately after birth. Furthermore, feeding calves with artificial milk is expensive and against the organic principles. To date, no studies have been published, whereby paratuberculosis prevalence between conventional and organic dairy herds was studied. This paper will describe results of a study carried out in the Netherlands in 2003.

Comparison of paratuberculosis risk factors

In 2003, we performed a study on 76 organic dairy farms, whereby farmers were interviewed concerning their management practice in relation to paratuberculosis prevention. A questionnaire was used that was developed by the Animal Health Service and allowed a comparison with data obtained earlier in conventional herds (two studies performed in 2001 and 2002).

As shown in Table 1, organic farmers differ from conventional farmers in that a lower percentage of organic farmers use a separate space for calving. Only 20% of organic farmers remove their calves from the mother after birth, as compared to 42-45% of conventional farmers. When comparing management of calves until weaning, it is evident that 50% of conventional farmers feed their calves with artificial milk, whereas only 4% of organic farmers do this (Table 2).

Table 1: Response of organic and conventional (group 1 and group 2) farmers to a questionnaire concerning paratuberculosis prevention management: Calving

1	**Calving**	**Organic %**	**Group 1 2001 %**	**Group 2 2002 %**
1.1	Calving in separate space	58	75	74
1.2	Before calving thorough cleanup floors and walls	11	15	16
1.3	Calves born on clean surface	45	49	57
1.4	Calving area only used for this purpose	25	24	33
1.7	Calves removed from mother immedialey	20	42	45

Table 2: Response of organic and conventional (group 1 and group 2) farmers to questionnaire concerning paratuberculosis prevention management: period until weaning.

2	**Calves: period until weaning**	**Organic %**	**Group 1 2001 %**	**Group 2 2002 %**
2.1	Calves receive colostrum from their own mother	83	80	86
2.2	Calves receive artificial milk after colostrum period	4	50	51
2.3	Drinking gear is cleaned with hot water after feeding	74	61	64
2.4	Calves sometimes drink penicillin milk, whey, cleaning water or milk with high cell count	80	53	52
2.5	Drinking bins in contact with bins of older cattle	11	3	3
2.6	Calves are fed grass sometimes contaminated with cow manure	31	39	38
2.7	Feed is fed so it cannot become contaminated	91	72	71
2.8	Animal contact or contact with manure from older animals (>2 jaar) is not possible	80	86	83
2.9	Before entering the calves area separate shoes or clothing is used	13	2	1

The results of calf management after weaning (Table 3) shows that more organic farmers keep their animals on grassland used earlier that season by cattle or goats than on conventional farms. Organic farmers are also less strict as to allowing their calves on pastures that have been fertilised the same season with cattle or goat manure. On the organic farms interviewed, the calves come into contact with cattle older than two years more often than on conventional farms.

Table 3: Response of organic and conventional (group 1 and group 2) farmers to questionnaire concerning paratuberculosis prevention management: Calves period after weaning.

3	Calves management after weaning	Organic %	Group 1 2001 %	Group 2 2002 %
3.6	Calves remain inside during the first year	30	46	42
3.7	Calves younger than 12 months can drink surface water	60	35	73
3.8	Calves younger than 12 months are kept on grass land used earlier that season by cattle or goats	46	22	23
3.9	Calves younger than 12 months are kept on grass land onto which goat or cattle manure was applied in the same season	39	6	7
3.10	Calves younger than 12 months sometimes come into contact with goats	5	3	2
3.11	Calves younger than 12 months sometimes come into contact with cattle older than 2 years	20	50	54

When comparing general hygiene on the farm (Table 4), it is apparent that less organic farmers have a separate room and clean clothes/shoes for visitors than on conventional farms. Organic farmers more often buy animals from a farm with an unknown paratuberculosis status. Furthermore the organic farmers more often use manure from other farms.

Table 4: Response of organic and conventional (group 1 and group 2) farmers to questionnaire concerning paratuberculosis prevention management: General hygiene.

4	General hygiene	Organic %	Group 1 2001 %	Group 2 2002 %
4.1	Farm has a separate area where visitors can obtain farm clothes and where hands and shoes can be cleaned	34	79	85
4.2	Animals are sometimes bought from a farm with an unknown or lower paratuberculosis status	41	22	22
43	Cattle or goat manure obtained from other farms is sometimes used on the grassland	32	3	3
4.4	Machines and animal transport vehicles of third parties that come on the farm area are clean, empty and free from manure	26	36	43

Comparison of paratuberculosis prevalence

The data presented above indicate that organic herds appear to have a higher risk for paratuberculosis than conventional farms. Whether this is reflected in the actual infection of the animals was the next question of our project. To investigate paratuberculosis infection, blood samples were taken from all animals older than 36 months and tested for the presence of MAP antibodies using a commercially available ELISA (Institute Pourquier, Montpellier, France). Tests were performed by the Animal Health Service and results were compared with data obtained earlier from conventional herds.

In total, 3,688 organic cows were tested, of which 43 (1.2%) were positive and 7 (0.2%) were borderline positive (Table 5). When combining positive and borderline positive animals, 1.4% of the investigated organic cows older than three years tested positive. Data collected by the Animal Health Service showed that 1.7% of conventional cows tested positive.

Table 5: Number of organic cows with positive paratuberculosis serology

Paratuberculosis antibodies	Number of animals	Percentage of animals
Positive	43	1.2%
Bordeline	7	0.2%
Negative	3,638	98.6%
Total tested	3,688	100%

Analysis of the data at farm level showed that 36% of the organic farms versus 39% of conventional farms had one or more infected animals on their farms (Table 6). These differences were not statistically significant.

Table 6: Farms with positive plus borderline positive animals: organic versus conventional dairy herds.

Number of positive animals per farm	Number of organic farms	Percentage of organic farms	Percentage conventional farms
0	48	63%	61%
1	20	26%	20%
>1	8	10%	19%
Total	76		

Discussion

Despite a higher risk to contract paratuberculosis due to farm management, the actual number of infected farms or animals is not different in organic farms in the Netherlands when compared to conventional farms. This could be due to the fact that, despite the presence of the MAP bacterium, animals resist infection due to a higher degree of natural defence mechanisms as compared to conventionally reared animals. As yet, no proof is available showing that organically reared animals have a better immunity than conventionally reared animals. Genetic background of the animals probably does not appear to have an important role, as most Dutch organic farmers use the same type of cows as the conventional farms. On the other hand, it could be argued that some of the risk factors such a the immediate removal of calves from the mother or giving raw milk to calves may not be as important risk factors as initially claimed.

Studies from Scotland point to a role of rabbits in the transmission of paratuberculosis (Greig et al; 1999; Beard et al; 2001a). MAP strains isolated from rabbits on these farms were related to the cattle strains and were used to produce disease in experimentally infected cattle (Beard et al; 2001b). The role of wildlife in transmission of paratuberculosis in the Netherlands has not yet been reported.

The prevention program to decrease the prevalence of paratuberculosis in the Netherlands is based on a large number of risk factors, of which some have been mentioned in this paper (Groenedaal *et al*. 2003). It appears that the program has been successful, as the number of seropositive herds has decreased from 55% in 1998 to 39% in 2001. The contribution of calf management to this decrease is not known.

Although the paratuberculosis situation in Dutch organic herds does not seem to differ from that found in conventional herds, it is mandatory to keep monitoring the prevalence so that measures can be taken if seroprevalence starts to rise again.

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References:

Beard PM, Rhind SM, Buxton D, Daniels MJ, Henderson D, et al. 2001. Natural *paratuberculosis* infection in rabbits in Scotland. J. Comp.Pathol. 2001a; 124: 290–99

Beard PM, Stevenson K, Pirie A, Rudge K, Buxton D, et al.. Experimental *paratuberculosis* in calves following inoculation with a rabbit isolate of *Mycobacterium avium* subsp. *paratuberculosis*. J. Clin. Microbiol.2001b; 39: 3080–84

Bull TJ, McMinn EJ, Sidi-Boumedine K, Skull A, Durkin D, et al. Detection and verification of *Mycobacterium avium* subsp. *paratuberculosis* in fresh ileocolonic mucosal biopsy specimens from individuals with and without Crohn’s disease. J. Clin. Microbiol. 2003; 41: 2915–23.

Chacon O, Bermudez LE, Barletta RG. Johne's Disease, Inflammatory Bowel Disease, and Mycobacterium paratuberculosis. Annu Rev Microbiol. 2004; 58:329–63.

Chiodini RJ, Van Kruiningen HJ, Merkal RS, Thayer WR Jr, Coutu JA. Characteristics of an unclassified *Mycobacterium* species isolated from patients with Crohn’s disease. J. Clin. Microbiol. 1984; 20: 966–71

Greig A, Stevenson K, Henderson D, Perez V, Hughes V, et al. 1999. Epidemiological study of *paratuberculosis* in wild rabbits in Scotland. J. Clin. Microbiol. 1999; 37: 1746–51.

Groenendaal H, Nielen M, Hesselink JW. Development of the Dutch Johne's disease control program supported by a simulation model. Prev Vet Med. 2003; 60: 69-90.

Muskens J, Barkema HW, Russchen E, van Maanen K, Schukken YH, Bakker D. Prevalence and regional distribution of paratuberculosis in dairy herds in The Netherlands. Vet Microbiol. 2000; 77: 253-61

Working Group Report: Solutions to minimise risks from zoonotic diseases in organic livestock production

Cattle

Compiled by K. Dredge

The problems

General issues concerning the zoonootic risks in organic livestock production were discussed. It was suggested that the risk might be increased in cases where consumers might think, falsely, that organic products are safer than other products and, consequently, might handle them with less care.

It was also agreed that housing and other management factors (e.g. hygiene, calf rearing) on individual farms influence the risk markedly. So far, little effort has been put into developing production systems that take both food safety and animal welfare into account. For instance, the different available options for optimal outdoor areas for pig or poultry production have not been studied adequately. On the other hand, there is still a scarcity of some baseline on the prevalence of zoonotic infections in organic vs. conventional systems.

While it was accepted that, in some cases, it may be impossible to find optimal solutions for balancing the needs of animal welfare and behavioural needs on one side and food safety on the other. However, it was agreed that in most cases, there is enough existing knowledge and proven good management practises to limit risk from zoonotic diseases in cattle systems. The implementation of these practices on organic farms is important.

The following zoonoses that were considered as possible risks in organic dairy and beef production were listed:

- Leptospirosis;
- Enterohaemorrhagic E. coli (EHEC);
- Tuberculosis;
- Brucellosis;
- Paratuberculosis;
- Listeriosis;
- Salmonellosis;
- Bovine spongyform encephalopathy (BSE);
- Staphylococcosis; and
- Necrobacillosis.

It was considered complicated and unhelpful to put the diseases into any kind of order of importance because 1) of the differing animal disease situation in different countries and 2) of the incidence risk and consequences of disease differing between different zoonoses. Paratuberculosis and EHEC were, however, considered to require specific attention as the solution to risk minimisation may be different on organic than on conventional farms. In contrast, for instance BSE was considered to require the same approaches on both farm types.

Potential solutions

The following, potential solutions to zoonoses risks in organic cattle systems were put forward:

- proper manure handling (composting, keeping manure and feeding lines apart, not using on pasture);
- feeding hygiene (birds out from stalls, rodent control, cover the concentrates);
- reduce the movement of animals (breeding own replacement, buying animals from safe sources);
- keeping animals clean (housing, stall hygiene, bedding); and
- consumer education.

The following recommendation, as an outcome of the SAFO network, was made:
All certification bodies should make sure that good management practises are implemented at certification and at farm level. This should be achieved through using herd health plans that include regular checks of the critical control points. Farmers should be helped in the zoonooses control by providing them with action plans to aid decision making in different situations.

Level of current knowledge – need for further research

Finally, the group briefly discussed the level of current knowledge on zoonotic diseases and their control in organic systems. Some studies have found organic product to contain less harmful environmental toxic substances like cadmium; while others have shown greater contamination levels of campylobacter in organic broilers. The data is inconclusive, at best, and the number of studies is low. The group concluded that more information on the *status quo* and the long term impact of organic management on zoonosis risk in cattle systems is needed.

Poultry

Compiled by M. L. Hanninen and C. Atkinson

Egg production

The working group considered the issues under following headings:

Definition of risk:

- in poultry the primary issues are contamination of meat or eggs with zoonotic bacteria,- principally with campylobacter (*C. jejuni and C. coli*) and with *Salmonella enterica* (S. Enteritidis, which is a poultry-adapted serovar, and S. Typhimurium + some other serovars, namely Infantis and Livingstone).

Food chain analysis:

In layers, the vehicle of exposure is egg. Meat of spent hens is less extensively used as food but, in cases when it used, the whole food chain needs to be analysed: farm – slaughtering process – products – retail/catering – consumer.

Common characteristics of salmonella and campylobacter:

- usually, do not cause harm or illness in the bird;
- the epidemiology of S. Enetritidis in laying hens in conventional farming is well-known, and this knowledge can be applied in organic farming;

- contamination at farm can be decreased by good hygiene measures, biosecurity and, in some cases, vaccination (S. Enteritidis);
- control of risk required throughout the food supply chain;
- risk to human health can be eliminated by good hygiene measures by the catering industry/consumer at home, in food storage and preparation: prevention of cross contamination, proper heating etc.

Questionmarks?
Antimicrobial susceptibility of zoonotic bacteria: does organic production have an effect on antimicrobial susceptibility of salmonella or campylobacter?
Why have some countries made good progress (e.g. Finland, with very low prevalence of salmonella), while some have difficulties?

Broiler production
Risk of contamination of meat may be similar in organic and non-organic production, however:
- Poor information level on infections may be a problem in organic systems where inexperienced producers start broiler production (farmers not aware of risks?);
- Some risk factors are known, but not well understood (role of wildlife in free-range systems); and
- Hygiene practices by farmer can have a major impact on infection levels (contact with other flocks and livestock).

Rfesearch requirements
- Risks in the whole food chain need to weighed and best intervention points identified.
- Reservoirs and sources of contamination of flocks must be identified and understood.
- Acceptable biosecurity measures must be identified.
- Methods to promote "good gut bacteria" in free range rearing systems need to be studied.

Sheep and goats
Compiled by E. Stoger

The problems
Major zoonotic diseases in milk production:
- Listeriosis
- Staphylococcus aureus
- Brucellosis

Major zoonoses in meat production:
- Toxoplasmosis
- Chlamydia
- Cryptosporidia
- Echinococcus

It was also recognised that ticks and tick born diseases may affect humans, who work with sheep and goats.

Risk minimisation

Listeria

- Consumer education
- Risk communication
- Milking and processing hygiene
- Composting and compost management
- Pasteurisation (however, in some countries the pasteurisation is not accepted by the farmers or the consumers, e.g. in France)

Brucellosis

- State-controlled measures
- Vaccination
- Lambing hygiene
- Isolation

S. aureus

- Pasteurisation
- Isolation of sick animals
- Improved milking techniques
- Stable hygiene
- Culling

Toxoplasmosis und chlamydia

- Risk education for people handling sheep and goats

Cryptosoridia

- Environmental management (water catchment areas)

Echinococcus

- Concerted action to treat all sheep-dogs
- Meat inspection

Part C:
Toxic residues and food safety in organic livestock production

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Mycotoxin levels in organic pig husbandry

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Introduction

Mycotoxins are secondary metabolites (not essential for the life of the cell) of fungi which have negative effects on human and animal health. There are more than 300 known mycotoxins, produced by more than 200 fungi (Betina, 1989). Fungi may produce one or more mycotoxins and one mycotoxin may be produced by different fungi. Not all metabolites of fungi are mycotoxins. In the field, mycotoxins are produced by so called field fungi. These fungi grow in the soil and contaminate from there the crops on the field. When growing on the crop, fungi may produce mycotoxins. Storage fungi develop during harvesting or storage of the product. Storage fungi may produce mycotoxins. There is no strict distinction between the different fungi; field fungi can develop during harvesting or storage (Veldman, 2003a).

Mycotoxins can be carcinogenic, mutagenic, teratogenic, neurotoxic and may have adverse effects on the immune system. The consequences of mycotoxin contamination depend on the dose and type of mycotoxin. Combinations of mycotoxins have different effects compared to each mycotoxin separate. Mycotoxins may have an additive effect as well as an antagonistic effect (Fink-Gremmels, 1999).

Mycotoxins can be found in cereals, grass, silage as well as in sugar beets and straw (Veldman, 2003b). The consequences of the mycotoxins Deoxynivalenol (DON), Zearalenone (ZEN) seem to be important in the pig husbandry as pigs are more sensitive to the mycotoxins DON and ZEN than other animals. DON, ZEN, T-2 toxin and Nivalenol are most frequently seen in North-West of Europe (De Nijs *et al*., 1996; Müller *et al*., 1998). We only compared the burden of mycotoxins DON, ZEN and T-2 toxin with the regulations, standards or recommendations. The amount of Nivalenol is most of the time very low.

In organic pig husbandry, feeding organically grown pig feed and providing straw bedding and roughage is compulsory. All these products potentially contain mycotoxins. Therefore, the hypothesis that the mycotoxin burden of DON, ZEN and T-2 on organic pigs may exceed the national regulations, standards or recommendations was tested.

The effect of DON, ZEN and the T-2 toxin on animal health

Mycotoxins in feed may result in acute intoxication or in subacute intoxications. The effects of mycotoxins are referred to as mycotoxicosis. Mycotoxicosis may arise due to a single uptake of mycotoxins or due to long-term uptake of mycotoxins. Combinations of mycotoxins, uncertainties about the results of analyses and lack of typical symptoms of intoxications due to the combinations of pathogens and mycotoxins result in difficulties in diagnosing mycotoxicosis. Beside that, the effect of intoxications due to natural infected commodities with a certain natural produced mycotoxin is different than the effect of the same synthesized pure mycotoxin (Dillenburger, 2001). Table 1 summarises the main effects induced by the mycotoxins DON, ZEN and T-2 toxins on pigs.

Table 1: Main effects induced by the mycotoxins DON, ZEN and T-2 toxin on pigs.

DON	**T-2**	**ZEN**
Feed refusal	Feed refusal	Reduced fertility
Vomiting	Reduced feed intake	Reduction of embryonic survival
Reduced feed intake	Reduced growth	Delayed return into estrus post weaning
Reduced growth	Reduced fertility	Swelling of the vulva in piglets
Decreased feed efficiency	Dermatitis of snout, nose and buccal commisures	Enlargement of vulva, uterus and mammary glands of sows
Defects in immunocompetence	Defects in immunocompetence	Depressed weights of testes and spermatogenesis, suppressed libido

(After D'Mello *et al*., 1999)

Method for calculation the mycotoxin burden in organic pigs

The mycotoxin burden in organic pigs was determined by means of a model. The outcome of this model was compared with the national regulations, standards, recommendations or No Effect levels (Table 2) (Veldman, 2003b; PDV, 2004).

Table 2: National regulations, standards or recommendations for the mycotoxins DON, ZEN and T-2 (in mg/kg) in pig feed.

	DON	ZEN	T-2
FDA regulations	5,0		
German norms for breeding gilts (in 88% DM)	1,0	0,05	
German norms for fattening pigs and sows (in 88% DM)	1,0	0,25	
Dutch limit of rejection, sows and fattening pigs	1,0	0,25	
Dutch limit for action, sows and fattening pigs	0,8	0,2	
Dutch limit of rejection, piglets and breeding gilts	1,0	0,1	
Dutch limit for action, piglets and breeding gilts	0,8	0,08	
No Effect level piglets	1,0	50*	1,0
No Effect level fattening pigs	1,7	0,250	1,6
No Effect level breeding gilts		1,0*	
No Effect level sows	3,3	0,18	

* Lowest concentration in literature with demonstrable effect

Different feed rations were modelled: pelleted feed, pelleted feed and straw, pelleted feed straw and silage and pelleted feed and silage (Table 3). For each type of feed for pigs at different age and/or stage of pregnancy all compounds and the ration for pelleted feed was known (Table 4). Veldman (2003b) determined by means of literature for each feed commodity the mean content of mycotoxins DON, ZEN and T-2 toxin. With these numbers the mean content of pelleted feed was calculated. Driehuis and Te Giffel (2003) estimated the mycotoxin content of hay, grass silage and maize silage. The mycotoxin content of straw is estimated as 2.5 times the amount of cereal mycotoxins. During the Mycotoxin Workshop in Herrsching (may 2004, Germany) experts agreed that the mycotoxin content of straw is 2 – 3 times higher than the mycotoxins of the cereals. We estimated that the mean DON content of wheat straw was 0.81 mg/kg product. The mean ZEN content of wheat straw was 0.168 mg/kg product. In Table 5 the estimated mean DON and ZEN content of roughage is shown.

Table 3: The 8 different feed rations for model calculation.

	-	Hay	Grass silage	Maize silage
Pelleted feed	x	x	x	x
Pelleted feed and straw	x	x	x	x

Table 4: Model assumptions of feed ration at different ages and gestation.

Gram Dry Matter/day	Fattening pigs		Piglets	Pregnant sows	Lactating sows	Breeding gilts	Weaned pigs
	starting						
Pelleted feed	1600	2100	800	2850	6140	1800	300
Straw	420	420	-	840	168	420	84
Hay	166	166	-	415	168	415	83
Grass silage	135	135	-	630	450	225	45
Maize silage	81	81	-	405	270	135	27

Table 5: Mean concentration of DON and ZEN in hay, straw, grass silage and maize silage.

	DON (mean) g/kg DM	ZEN (mean) mg/kg DM
Hay	0.25	0.005
Straw *	0.68	0.14
Grass silage	0.25	0.005
Maize silage	1.4	0.05

(After: Driehuis and Te Giffel, 2003)

* calculated average mycotoxins concentration in wheat multiplied by 2.5.

Results

After comparison with the national regulations, standards and recommendations:

- National regulations, standards and recommendations of DON, ZEN and T-2 in feed ration for fattening pigs, pregnant sows, lactating sows, weaned piglets and breeding gilts were not exceeded.
- National regulations, standards and recommendations for ZEN in pelleted feed for young piglets (Dutch level of action) were exceeded.

- The calculated mycotoxin burden is estimated to be the highest when the pelleted feed together with straw and maize silage is fed. E.G. DON and ZEN content in a ration with pellet feed, straw and maize silage for fattening pigs is calculated as 629 respectively 100 microgram. The DON and ZEN content in a ration with pelleted feed, straw and grass silage is calculated as 549 respectively 97 microgram. For pregnant sows is the DON and ZEN content in a ration with pellet feed, straw and maize silage for fattening pigs is calculated as 1,382 respectively 162 microgram. The DON and ZEN content in a ration with pelleted feed, straw and grass silage is calculated as 972 respectively 163 microgram.

Discussion

No mycotoxin values were exceeded. However, the mycotoxin burden on pigs was determined by means of a model. The input of the model was derived from the literature. This literature showed the mycotoxin content of feed commodities from mainly outside The Netherlands. The mycotoxin burden might be underestimated due to the fact that not all mycotoxin concentrations were known for the feed commodities and the known concentrations were mainly conventionally grown. Very little information has been published about the mycotoxin content in (organic) roughage and straw. However, more research results are on their way, from research groups in Germany and The Netherlands.
Overestimation of the mycotoxins content in the feed ration of organically grown pigs might be possible due to the organically grown feed commodities, roughage and straw. The FAO concluded in 2000 that the organic farming does not lead to an increased risk of mycotoxins contamination. The methods for growing (better crop rotation and field cultivation) may even lead to a lower risk for mycotoxins and lower concentrations (Smiley *et al*., 1996; Oldenburg *et al*., 2000; Fink-Gremmels, 1999).

These results help to understand the influence of feeding roughage, providing straw and the risk of mycotoxins when feeding roughage and straw it to pigs.

Conclusions

Based on model calculations, feeding sows more roughage and/or providing straw bedding does not appear to result in unacceptably high levels of the mycotoxins DON, ZEN and T-2 toxin in pork.

Providing silage to young piglets should, however, be limited. The results of the model calculations showed that the ration with pelleted feed could lead to exceeding the Dutch level of action. The highest estimated burden of mycotoxins is reached when pelleted feed is fed together with straw and maize silage. Maize silage contains high levels of ZEN, which induced the most important effects in pigs in The Netherlands (personal communications: Veldman and Bouwkamp). When providing maize silage, it is advisable to analyse the silage on mycotoxins before feeding to pigs.

References:

Betina, V. (1989). Mycotoxin. Chemical, biological and environmental aspects. Elsevier, Amsterdam, ISBN 0444988858.

Dillenburger, T., Lauber, U., Schollenberger, M., Muller, H.M. and Drochner, W. (2001). Wirkung von Deoxynivalenol beim wachsenden Schwein in Abhängigkeit von der Darreichungsform. *Mycotoxin Research* **17A**, 170-173.

Driehuis, F. en Te Giffel, M.C. (2003). Mycotoxinen en melkvee: een integrale ketenstudie naar mycotoxinen in voeders voor melkvee en de effecten op diergezondheid en melkkwaliteit. Deel 1: Mycotoxinen in voeders geproduceerd en opgeslagen op het melkveebedrijf. *NIZO-rapport* E 2003/50. NIZO food research Ede.

FAO (2000). Food safety and quality as affected by organic farming. Twenty second FAO regional conference for Europe. Porto, Portugal, 24-28 July, 2000. (www.fao.org)

Fink-Gremmels, J. (1999). Mycotoxins: Their implications for human and animal health. *The Veterinary Quarterly*: **21**, 115-120

Müller, H-M., Reimann, J., Schumacher, U. and Schwadorf, K. (1998). Natural occurrence of Fusarium toxins in oats harvested during five years in an area of southwest Germany. *Food Additives and Contaminants*, **15**, 7, 801-806

De Nijs, M., Soentoro, P. Delfgou-van Asch, E. Kamphuis, H. Rombouts, F.M. and Notermans, S.H.W. (1996). Fungal infection and presence of deoxynivalenol and zearalenon in cereals grown in The Netherlands. *Journal of Food Protection*: **59**, 772-777.

Oldenburg, E., Valenta, H., Sator, Ch. (2000). Risikoabschätzung und Vermeidungsstrategien bei der Futtermittelerzeugung. *Landbauforschung Völkenrode* **216**, 5-34.

PDV (2004). *Richtlijnen en acceptatiecriteria voor analysemethoden Mycotoxinen (DON, ZEN en OTA) in diervoeder(s)grondstoffen.* Productschap Diervoeder, Den Haag, juni 2004; *Kwaliteitsreeks* nr. **96**.

Smiley, R.W., Collins, H.P. and Rasmussen, P.E. (1996). Diseases of wheat in long-term agronomic experiments at Pendleton, Oregon. *Plant Disease*: **80**, 813-820.

Veldman, B.(2003a). Deskstudie naar de aanwezigheid en detectie van mycotoxinen in diervoedergrondstoffen. *Rapport van De Schothorst*. Stichting Instituut voor de Veevoeding. V&K-03-04.

Veldman, B. (2003b). Mycotoxinen: de belasting van éénmagige landbouwhuisdieren en de overdracht naar het dierlijk product. Een deskstudie. *Rapport van De Schothorst*. Stichting Instituut voor de Veevoeding. V&K-03-06.

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Mycotoxins in the milk from organic farms in the Florence province, Italy

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Introduction

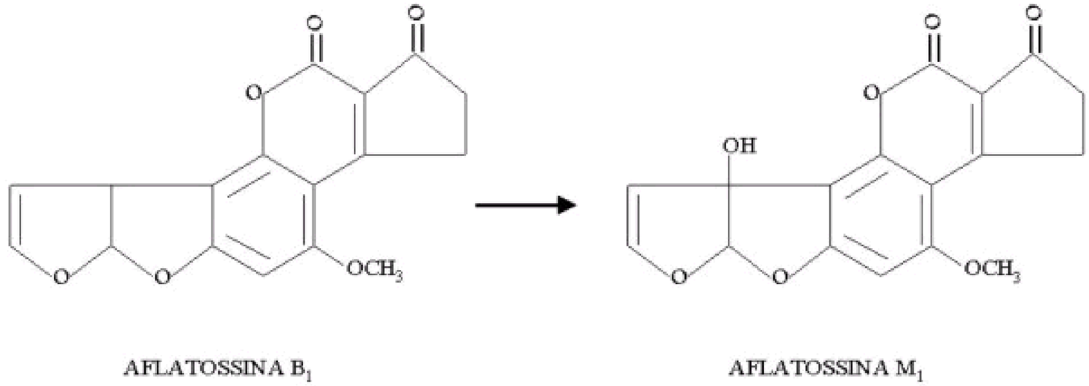
It is estimated that up to 25% of the world's foods are contaminated with mycotoxins (Capei and Neri, 2002). The most frequently occurring mycotoxins are aflatoxins (AF), p roduced mainly by two species of filamentous fungi, *Aspergillus flavus* and *Aspergillus parasiticus*, which contaminate a wide variety of foods. These filamentous fungi produce AF B (B_1 and B_2) and G (G_1 and G_2) as metabolites. The nomenclature B e G (blue and green) is derived from the fluorescence colours of the fungus under UV light. The degree of contamination is dependent on climate, crop growth, harvesting and storage practices. Environmental conditions also play an important role in determining the extent of contamination. The growth of these filamentous fungi is associated with warm and humid climates, and for this reason, it is possible to define the optimum growth conditions in this range: humidity (88-95%), temperature (25-30 °C) and water activity (Aw ≥0,78) (Baioli, 2000).

Major foodstuffs contaminated with AFB and AFG include maize grains and derivatives, maize silage, ground ear corn, cotton, peanuts, linseed cake, barley, corn gluten and hay.

The AFM_1 and AFM_2, known as "milk toxins", are hydroxylated metabolites of AFB_1 and AFB_2, which are produced by liver cells of animals that ingest contaminated food (Figure 1). AFM causes immunodeficiency and cancer. Symptoms of chronic aflatoxicosis include decrease in milk production, reduction in growth, rough and opaque hair growth, diarrhoea and lameness. Symptoms of acute aflatoxicosis include mutagenesis, teratogenesis, necrosis of hepatocitis, alteration in coagulation capacity, apathy, anorexia, mastitis, immunodeficiency, fever, liver cancer (Naceur Haouet *el al*., 2003). The carcinogenic potential of different AF in contaminated foodstuffs, varies according to the following ratio: $AFB_1 > AFG_1 > AFB_2 > AFG_2$. AFB_1 is a Class 1 carcinogen (definitely carcinogenic for humans), whereas AFM_1 is a group 2B cancerogen (probably carcinogenic for humans).

The toxin AFM_1 is thermostable, therefore any contamination in the milk leads to contamination of other diary products such as cheese and yogurt. The toxin AFM_1 appears in the milk 12 hours after the ingestion of feed contaminated with AFB_1.
The carry over ratio of AFM_1 in milk from AFB_1 is about 0.1-0.6 % and is associated with the protein fraction. During lactation (in cattle), the carry over ratio appears to be 3.3–3.5 time higher in the first period than in those following. It is estimated that 1 ppb of AFB_1 contained in foodstuff corresponds to 1 ppt of AFM_1 in milk of cows that produce about 25-28 kg of milk per day (Bertocchi *et al,* 2004).

Figure 1: Molecular structure of AFB_1 and AFB_2



Amongst the methodologies most used for the analysis of AFB_1, AFM_1 and other mycotoxins present in foodstuffs and milk, we found that liquid chromatography was the most efficient. This methodology has a high sensitivity and specificity and it is possible to resolve 0.1 ppb (µg/kg) of AFB_1 in foodstuffs and 1-2 ppt (ng/kg) of AFM_1 in milk. Using this method, it is also possible to make a distinction between the different types of AF. The high cost of the analysis, the time requirement in conducting the experiment and the requirement for qualified staff are factors that must be taken into consideration when undertaking this analysis. In comparison to the HPLC method, the ELISA (Enzyme-Linked Immunosorbent Assay) methodology shows the following advantages: high specificity, relatively simple and short assay time (4 hours), however the analysis does not distinguish between the different types of AF.

Another method employed is the ALITEST Srl rapid Kit, which has a very short assay time (15 minutes) and low costs. This test is commercialized under the name of Aflatoxin M_1 and is very useful in monitoring AF both in foodstuff and in milk. It represents a useful tool for the operators of dairy farms and companies, both in terms of the degree of confidence (the only problem is a low percentage of false positive) and for the opportunity in being able to check the milk before discharge to the tankers. This measure serves to obtain a reliable indication of AF contamination before the official HPLC test.

In Table 1, the legal limits of AFB_1 contamination in animal feed for cattle are reported. These are the limits as set by the Community Directive 2002/32/CE, the proposed changes after 20 November 2004 (2003/100/CE) are also included.

Table 1: AFB_1: The current legal limits and projected limits (as from November 2004) of AFB_1 contamination in foodstuff for cattle.

Products	Actual limits ppb (µg/kg)	As from November 2004 ppb (µg/kg)
Complete feeding stuffs for cattle, sheep and goats with the exception of:	50	20
complete feeding stuffs for dairy animals	5	5
complete feeding stuffs for calves and lambs	10	10
Complementary feeding stuffs for cattle, sheep and goats (except complementary feeding stuffs for dairy animals, calves and lambs)	50	20

In Table 2, the actual limits of AFM_1 contamination in milk and dairy products are reported (EC Regulation 1525/98, EC Regulation 466/2001, EC Regulation n°472/2002 and EC Regulation 2174/2003).

Table 2: The actual limits of AFM_1 contamination permitted in milk and dairy products

Products	ppt (ng/kg)
Milk	50
Dairy products	50

In Tuscany, a crisis regarding AFM_1 contamination of milk occurred in both conventional and organic farms during the autumn of 2003. The problem was discovered from an analysis of the sanitary control data performed by the Dairy Centre of Florence, Pistoia and Livorno (Mukki Latte). Thereafter, the farmers and sanitary services took immediate action and, as a consequence, the processing companies increased the regulatory controls.

It is believed that risks linked to AF contamination are higher in organic production than in conventional milk production, and that production in the Mediterranean areas is more problematic, since the warm climate increases the risk of AF contamination in maize. The objective of this work was to establish that the risks linked to AF contamination of milk are equal in organic and conventional milk production, and that it is possible to produce milk that is safe for human consumption in Mediterranean areas, by adopting the necessary preventive measures.

Methodology

The study was initiated with a literature review, in order to evaluate the problem in dairy products and foodstuffs in Italy, with specific emphasis on the Florence area before 2003.

A statistical analysis was carried out on conventional and organic milk from data (HPLC) supplied by Mukki Latte. The data obtained from the statistical analysis were reported on charts to underline the legal limit. Means and standard deviations are also shown.

Interviews were held with farmers and operators of processing companies (technicians of Mukki Latte laboratory), to discover the critical points considered useful in understanding the AFM_1 problem and to implement corrective measures.

Finally, an economic analysis was carried out, as a case study, to both report the events and consider the measures taken in an organic farm in the Mugello area.

Results

Literature review

It is difficult to find data regarding the problem of aflotoxin contamination in the literature, but few studies report heavy contamination rates in maize in samples collected between 1995 and 1999 (Table 3).

Table 3: Levels of AFB_1 contamination in maize harvested in Northern Italy (Pietri *et al.*, 2004).

Samples 1995 – 1999	**ppb (µg/Kg)**
Sample 1	109
Sample 2	158
Other five samples	>20

Firstly, from the literature, the data show the presence of AF contamination in milk and dairy products imported from Northern Europe (Table 4). This study reports, that in 1984, a large percentage of samples tested were found positive to AFM_1 (12,5%-53,5%), but in 1985 only a low percentage of samples (2,2%-2,5%) had a content of AFM_1 within the legal limits. The data show the presence of AF contamination in Germany, France and the Netherlands, as having existed at least for the past 20 years.

Table 4: The occurrence and percentage contamination levels of AFM_1 in dairy products marketed in Italy (Piva *el al.,* 1988)

1984	**Samples found positive to AFM_1 (%)**
225 samples (German liquid milk)	13.8
88 samples (French liquid milk)	12.5
82 samples (French cheese)	19.5, only 2,44% > 250 ppt[1]
34 samples (German cheese)	26.5
43 samples (Dutch cheese)	53.5
1985	
276 samples (Imported liquid milk)	25.3%, only 2.5% > 50 ppt
416 samples (Imported cheese)	31.3%, only 2.2% > 250 ppt[1]

[1] Swiss limit for cheese at this time

Two studies, published ten years later, show results of the analysis of samples taken from dairy products marketed in Italy (Table 5). Those studies report that, in both 1995 and 1996, a large percentage of samples taken from milk and yogurt tested positive to AFM_1 (53-86%), but only a small percentage of the samples were within the legal limits (1,75%-6,28%).

Table 5: The occurrence and levels (percentage and ppt) of AFM_1 in dairy products marketed in Italy (Galvano *et al*., 1988; Galvano *et al*. , 2001)

1995	**Samples found positive to AFM_1**
59 samples (liquid milk)	86% (mean 10,19 ppt, only 3,39% > 50 ppt)
97 samples (dry milk)	84% (mean 21,77 ppt, only 1,03% > 50 ppt)
114 samples (yogurt)	80% (mean 18,62 ppt, only 1,75% > 50 ppt)
1996	
161 samples (liquid milk)	78% (mean 6,28 ppt)
92 samples (dry milk)	53% (mean 32,2 ppt, only 4,35% > 50 ppt)
120 samples (yogurt)	61% (mean 9,33 ppt)

In a study undertaken in 2003, relating to Italian milk production from 1984 to 1995 (Table 6), samples positive for contamination as well as those in which the levels of contamination were within the legal limits show an oscillating pattern varying according to climate.

Table 6: Occurrence and percentage of AFM_1 contamination levels in liquid milk (national production) (Naceur Haouet *et al*. 2003)

Year	**Positive %**	**1 – 10 ppt %**	**11 – 50 ppt %**	**> 50 ppt %**
1984	41,5	22	8,5	11
1985	25,3	14,1	8,7	2,5
1990 -92	68,2	46	22,2	0
1993 -94	100	8,6	48,1	43,3
1994	100	23,6	60	16,4
1994 -95	89,8	52,5	29,7	7,6

The extraordinary climate is proposed to have caused the contamination crisis of 2003 (data from the Lazio Region) (Table 7). The number of contaminated samples within the legal limits, decreased in the first months of 2004, but was still high.

Table 7: Occurrence and levels percentage and ppt of AFM_1 in liquid milk in Lazio Region (Amatiste *et al*., 2004)

Last months 2003	**Samples found positive to AFM_1**
3228 samples (liquid milk)	42% > 50 ppt
First months 2004	
1700 samples (liquid milk)	25% > 50 ppt

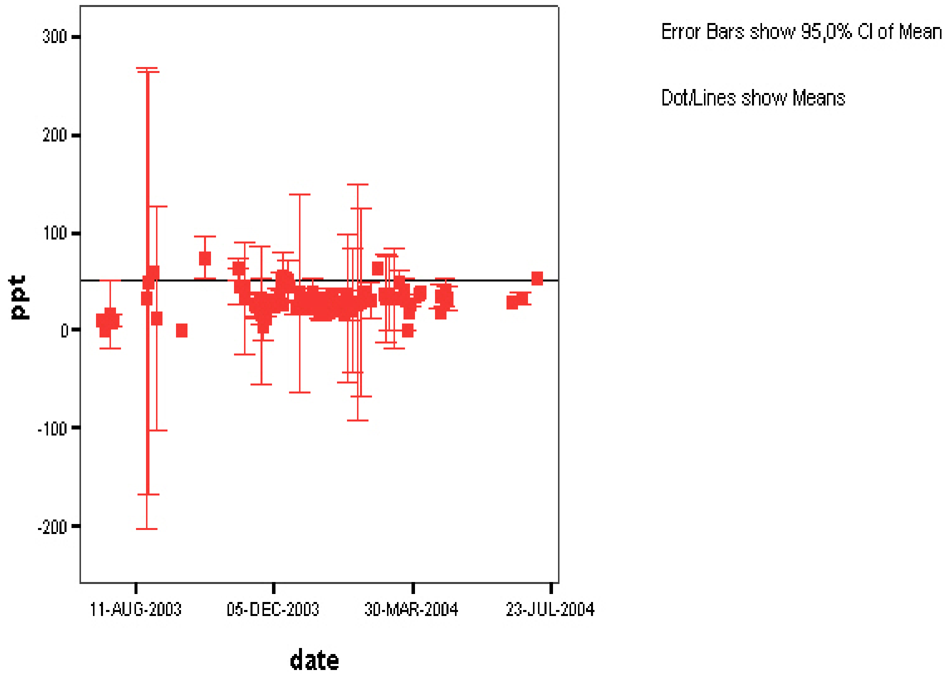
Collection of the data supplied from Mukki Latte (2003-2004)

Mukki Latte commercializes milk from three different sources: firstly, conventional national milk, secondly, conventional high quality milk of the Mugello area in the province of Florence, and thirdly organic milk under the label “Podere Centrale” from two dairy farms in Mugello and one from Lazio.

Mukki Latte carries out analyses using both official methodology HPLC and ALITEST Srl rapid kit, not only to reject contaminated milk, but also in order to administer a monitoring service to any farms requesting it. The first results showing a contamination of AFM1 > 50 ppt were found in conventional national milk in August 2003. An alarm was immediately sounded and the appropriate measures were taken by both Mukki Latte and by the Veterinary Sanitary Service (Azienda Saniaria Locale 10 di Firenze). The contaminated milk was rejected, with serious losses for dairy farmers.

Sanitary services then increased controls on diary farms, by sampling the milk and also by providing additional technical support. Measures taken by dairy farmers were based on replacing the contaminated maize (principle contamination source) with AFB_1 free feed. However, not all the farms could immediately rapidly reduce the AFM_1 level within the legal limits. In fact, today, it is possible to find samples with AFM_1 level over legal limit (Figure 2).

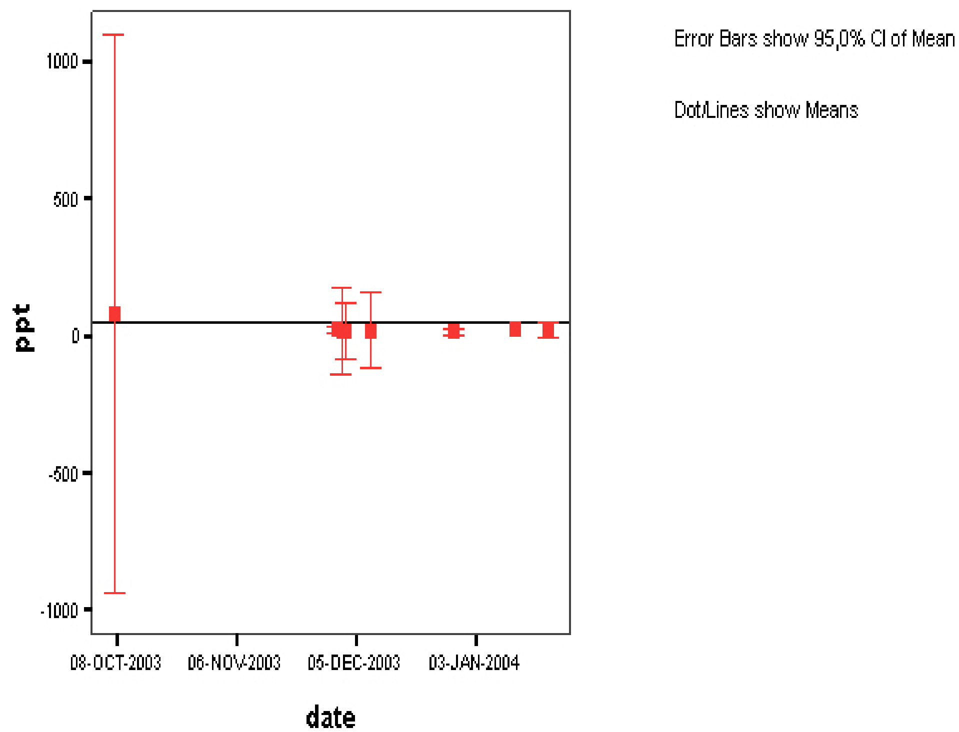
Figure 2: AFM_1 in conventional national milk (HPLC method)



From the analyses carried out on two organic farms in the Mugello area, it is shown that AFM_1 levels were lower than the levels recorded in conventional farms. In fact, after the contamination peak between October – November 2003, the AFM_1 levels decreased < 50 ppt, due to the appropriate measures taken.

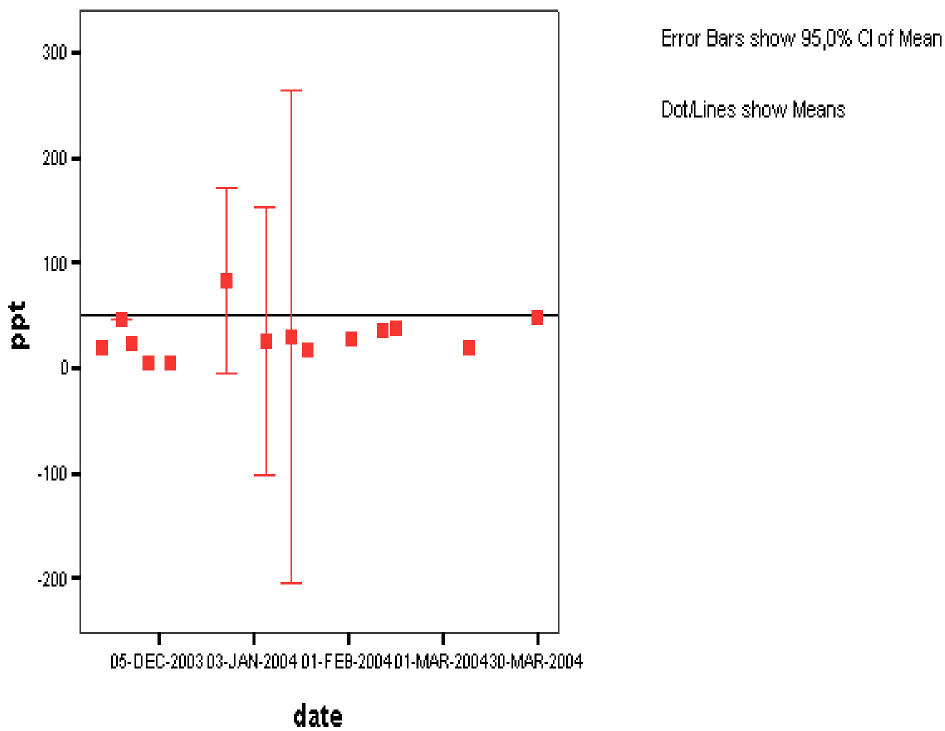
Those organic farms, which had the same problems as the conventional farms, reacted immediately by increasing sanitary control to a higher level than that adopted by conventional farms.

Figure 3: Organic milk from Florence (HPLC method)



In organic milk produced in Lazio, a similar pattern was obtained to that of the two Mugello farms. The time required to resolve the problem and reduce the levels of contamination within the legal limits AFM_1 contamination permitted was longer (Figure 4).

Figure 4 AFM$_1$ in organic milk of Lazio (HPLC method)



Interviews

Organic farmers and Mukki Latte's lab staff were interviewed, to discover critical pointers useful in better understanding the AFM$_1$ problem and also to implement corrective measures.

Agronomic problems

It is believed that by not using preservatives, the risks linked to AF contamination are higher in organic production than in conventional milk production. It appears that there are both advantages and disadvantages, regarding the AF problem in organic agriculture. Included amongst the advantages is the use of less N in organic agriculture, and also the use of organic N. The disadvantages are that, since no herbicides are used in organic farming, there are more weeds, as well as the presence of *Pyralidae*, since no pesticides are used. However, in organic agriculture it is possible to reduce the presence of weeds and *Pyralidae*, by using crop rotations and other agronomic practices.

Cultivars of maize, harvesting systems and the keeping of seeds

In organic agriculture, it is possible obtain free AFB$_1$ maize using early cultivars to avoid the September-October harvest (because of the high level of humidity), even though the harvest is earlier than in conventional farming. During the harvest, it is important to adopt a system to prevent seed breakage. It is also always useful to dry the seeds before keeping. However, this practice was not implemented in the past year because the climate was warm and dry. Cleanliness of silos and of other storage areas is also fundamental.

Animal health

It is important to evaluate the risk to animal health and to exercise caution, since animals may also show related pathologies after many months of exposure to the toxins (mastitis, lameness, immunodeficiency, toxicosis, etc.).

System to evaluate the AFM_1 quantity in milk

Many technicians use formulas in order to evaluate the AFM_1 level in milk. Those formulas are used on maize with known level of AFB_1.

$$AFM_1(\text{ ng/Kg in milk}) = \frac{\text{(ng di } AFB_1 \text{ ingested/herd/day) / 55}}{\text{litres of milk/ day}}$$

The legal limits are reached (AFM_1 = 50 ppt) with 82,5 ppb (= 82500 ppt) of AFB_1 ingested per day.

- $$\text{50 ppt } AFM_1 = \frac{\text{(82500 ppt } AFB_1 \text{ ingested/herd/day) / 55}}{\text{litres of milk produced/ day}}$$

(Bertocchi *et al.* 2004)

On the other hand, many authors report that those formulas reported are not very reliable.

Problems with AFM_1 contamination after changes in ration

Usually, when the ration is changed, the AFM_1 level decreases within 24 h. However, in certain cases AFM_1 levels produced in the milk remain high, even if the feed ingested appears to have low AFB_1 levels. Many possible reasons may exist to explain this phenomenon. Firstly, it would be important to establish the link between AFB_1 ingested and the carry over of the toxin in the milk. However, there also exists the possibility of toxin accumulation in the animal body. Moreover, additional contaminant food sources are possible, such as hay. Some farmers report that even if the maize is completely removed from the ration, the level of AFM_1 in milk remains about 25 ppt.

Fate of contaminated maize produced by the farmers

It was shown that the contaminated maize produced by the farmers was sometimes not destroyed. This contaminated maize may be used to feed other more resistant animals, such as pheasant or pigs (for those animals the law limits are about 10 fold higher then diary cows) (Table 1). Sometimes the contaminated material was sold by farmers to animal feed companies, where it was then mixed with "foodstuffs considered safe" from contamination in order to limit the level of AFB_1. There are also practices in existence to purify the contamination including that of extrusion.

From the literature, malpractices have been documented, such as the use of ammonia, of acids, bases, chloration agents, oxidants (H_2O_2) and formaldehyde to conceal the presence of AF contamination (Naceur Haouet *et al*. 2003). The most efficient system to treat AF contamination seems to be the use of NH_3 (<7% for 14 – 42 days of treatment or for only few hours using high temperature, about 70 – 120 °C and 35 – 50 psi).

Adsorbing products

To decrease the level of AFM_1 in milk, adsorbing products (e.g. bentonite and other complexing substances) are administered to the animals to neutralize AFB_1 ingested in the feed. However, these precautionary treatments are expensive and without clear benefit on animal health.

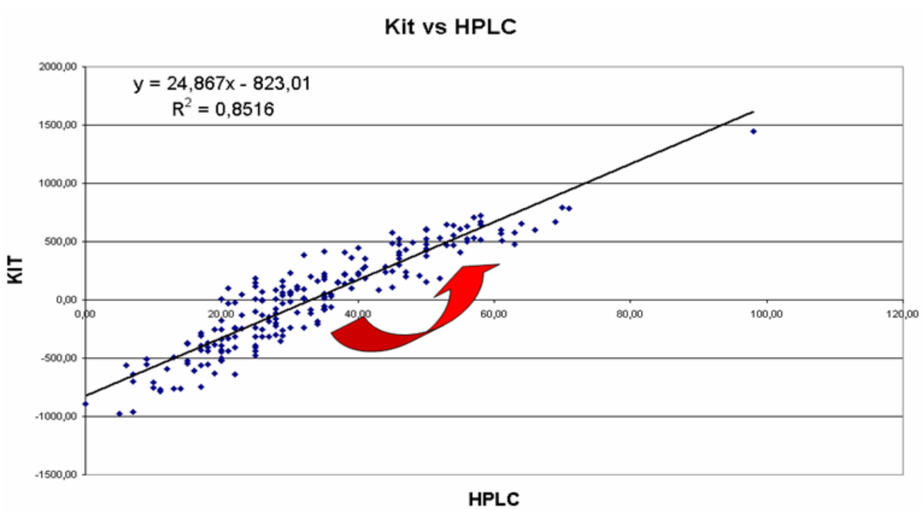
Fate of contaminated milk

Contaminated milk should be destroyed in an incinerator. However, sanitary services are in the position to authorize that it be added to manure, as is shown to occur in the Mugello area. Sometimes, when the contamination is not high, the milk may be used to feed pigs (sold at 0,03-0,05 €/litre).

Rapid Kit

Rapid tests like the test of ALITEST srl are very useful in monitoring AF both in foodstuffs and in milk. Mukki Latte performed a study to correlate HPLC methodology and the rapid kit ALITEST srl. Results showed a positive correlation. This test is also used as a preliminary measure in anticipation of the HPLC test, since the response is more rapid and cheaper than the HPLC analysis. (Figure 5)

Figure 5: Correlation between HPLC methodology and the rapid kit of ALITEST srl (data supplied from Mukki Latte)



Malpractice regarding milk and dairy products

In the literature, there are reports of malpractice regarding the treatment of contaminated milk and dairy products. For example, AFM_1 in milk could be masked by the addition of H_2O_2. Mukki Latte is in the position to provide evidence of this malpractice. The mixing of contaminated milk with other milk, from other farms or from the same farm (old milk with high acidity), is an example of another malpractice, which is relatively easy to detect.

Action taken and economic results

The impact of the AF problem on farm economy was assessed with regards to one of the two organic farms in Mugello. At the end of October, the controls carried out by Mukki Latte revealed critical levels of AF contamination in the milk produced by this cooperative. The cooperative was informed of the problem at the beginning of November and immediately responded by arranging for the analysis of the feed in order to verify, which feed sources were responsible for high levels of AFM_1 in the milk. The results of the analysis showed a critical concentration of AFB_1 in the maize produced by the farm itself, which represented the main source of concentrates in the ration.

Based on the results of the analysis, the farm decided to change the ration composition: at the outset the farm was shown to have continued using the maize produced, but thereafter a reduction of maize in the ration was implemented. Although this attempt was effective in reducing AFM_1 contamination below the tolerance level, there was no guarantee that a small increase of AFB_1 in food (which is difficult to control) would not affect the AF levels in the milk to a level exceeding the limit permitted. Simultaneous to the changes in the rations, milk analyses were carried out in order to verify the effectiveness of the respective ration changes. The difficulty in maintaining the level of AF under control in the maize rations produced by the farm was responsible for the one day self-interruption of the milk supply to Mukki Latte, since the level of AFM_1 in the milk had exceeded the tolerance level. The disposal of the milk took place within the farm and did not incur any cost to the farm. Thereafter, the maize produced by the farm was sold and then completely replaced with AFB_1 free concentrates bough by the farm.

A decrease in the production of milk was registered from November, and this was attributed to low content of concentrates in the ration. It is expected that the production will rise to the farm average in October 2003, when the regular feeding of the animal will be resumed.

The additional costs attributed to the measures carried out by the farm to cope with the emergency, and the lower income of the farm in this period were analysed during an interview carried out with a member of the cooperative. During the interview both the accounting and non accounting books were examined.

It was not possible to quantify the economic damages due to the effects of AF contamination on the health of the animals because the known symptoms directly linked to AFB_1 poisoning were not observed.

The additional costs and the lower income were brought forward to the 30th of November, using a 4% rate. Indeed, it was decided that the emergency could be considered terminated on that date, as the farm is paid for the milk supplied to the Mukki Latte after 60 days. Hence the income of the farm should be no longer influenced by the fall in production.

The results showed that the lower income due to the problem of AF was 31,027 €. This amount represents 4,7% of the value of milk produced in the farm from November 2003 to

November 2004, and is representative of the same period during which the additional costs and lower income occurred.

The different items taken into consideration for the assessment of the farm's lower income had a different importance. The fall in the production was responsible for 68% of the lower income. This was followed by the expenditure for food (18%), the expenditure for the analysis of the milk and food (8,4%) and by the expenditure incurred from one-day self-interruption of milk sale (5,6%).

Table 8: Additional costs, lower income and value of the milk produced by the farm from November 2003 to November 2004. All the values are expressed in Euro and brought forward to the 30th of November 2004.

Analysis	Food	Interruption of milk sale	Fall of the production	TOTAL additional costs and the lower income	Value of the milk produced
2.608,95	5.592,12	1.736,75	21.089,26	31.027,07	661.164,89

Together with the costs covered by the farm when the emergency arose, there are permanent c0sts that the farm has to carry out in order to prevent the occurrence of high levels of AFM_1 in milk production. In addition to this permanent cost, there are also additional costs for fuel and the analysis of the milk. The former precautionary step is required to allow for a better drying of maize, while the latter should be done twice a month in order to monitor the level of AFM_1 in the milk.

This permanent cost was assessed together with a member of the cooperative. Its amount was 2,236 € per year, that is 0,4% of the average value of the milk produced by the farm.

Conclusions

In conclusion, AF is not only a problem for organic agriculture, but also for conventional agriculture. Therefore, adopting preventive measures, it is possible to produce safe milk for human consumption in Mediterranean areas where the warmer climate increases the risk of AF contamination in the maize.

The control activity of the Dairy Centre and the sanitary services is not sufficient to prevent new crisis. It is essential for dairy farms to adopt preventive measures. Possible solutions to prevent a new crisis are the following:

1. Preventive analysis on milk and feed produced and bought, using a rapid kit to avoid an outbreak of a new crisis;
2. Using early cultivars of maize to foreword the harvest date.
3. Adopting crop rotation and agronomic practices to limit attack of *Pyralidae*;
4. Adopting a harvesting system that would prevent seed breakage.
5. Drying of the maize seeds before keeping.

References

Ametiste, S., Rosati, R., Ubaldi, A., Proietti, A., Pietrini, P., Giangolini, G., Bricioli, N.R. (2004) *Gestione dell'emergenza aflatossine nella regione Lazio: metodi di analisi impiegati per latte e alimenti zootecnici.*

Bertocchi, L., Biancardi, A., Boni, P., Bonacina, C. (2004) *Emergenza aflatossine nella provincia di Brescia: esperienza di campo* Osservatorio Epidemiologico Veterinario Regionale Della Lombardia **(**Anno 7 - n. 1 Febbraio 2004).

Capei, R., Neri, P., (2002) *Occurrence of aflatoxin M1 in milk and yoghurt offered for sale in Florence (Italy)*, Ann. Ig. 2002 Jul-Aug; 14 (4): 313-9.

Galvano, F., Galofaro, V., De Angelis, A., Galvano, M., Bognanno, M., Galvano, G. (1988) *Survey of the occurrence of aflatoxin M1 in dairy products marketed in Italy*. Food Prot. 1988 Jun; 61(6): 738 – 41.

Galvano, F., Galofaro, V., Riteni, A., De Angelis, A., Bognanno, M., Galvano, G. (2001) *Survey of the occurrence of aflatoxin M1 in dairy products marketed in Italy: second year of observation.* Food Addit Contam. 2001 Jul; 18 (7): 644 – 6.

Naceur Haouet, M., Serena Altissimi, M. (2003) *Micotossine negli alimenti e micotossicosi animale e umana.* Istituto Zooprofilattico Sperimentale dell'Umbria e delle Marche http://www.pg.izs.it/arretrati/numero_18/hau2_4.html#4 Webzine Sanità Pubblica Veterinaria® (Numero 18 - febbraio 2003).

Pietri, A., Bertuzzi, T., Pallaroni, L., Piva, G., (2004) *Occurrence of mycotoxins and ergosterol in maize harvested over 5 years in Northern Italy*, Food Addit Contam 2004; 21(5): 479 – 487.

Piva, G., Pietri, A., Galazzi, L., Curto, O., (1988) *Afaltoxin M1 occurrence in dairy products marketed in Italy*, Food Addit Contam; 1988 Apr- Jun 5(2): 133 – 9.

The role of organic and free range poultry production systems on the dioxin levels in eggs

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Introduction

Dioxins encompass a large family of polychlorinated dibenzo-p-dioxin and dibenzofuran congeners (Huwe; 2002). They are formed during incomplete natural or industrial combustion processes and a variety of other industrial processes and are considered as the most toxic substances known. Dioxins may cause dermal toxicity, immunotoxicity and reproductive and developmental toxicity. The toxicity of dioxins may differ considerably. The congeners, which are substituted in the 2,3,7,8-position, are most toxic. Therefore, of the many theoretically possible congeners, 17 are considered to be especially important from a toxicological point of view. Analytical results of these 17 congeners are combined into so called toxic equivalents (TEQ). The conversion to TEQ is based on different binding activities of the individual dioxins to the dioxin receptor(s), whereby each dioxin is given a toxic equivalency factor (TEF), calculated from the toxicity of a congener relative to the most toxic compound 2,3,7,8-TCDD, which has been given an arbitrary TEF of 1. The amount of each congener is multiplied by its TEF, giving the TEQ for that congener. All TEQ's of the 17 congeners are added and give the total TEQ for the sample investigated.

Human exposure to dioxins

Approximately 90% of the dioxin uptake by humans is due to food consumption, whereby 90% is caused by animal products. This is due to the lipophilic nature of dioxins and their accumulation in the food chain. Since the 1980's, many countries have implemented measures to reduce dioxin emissions from industrial and waste burning sources. Although this has led to a drastic decrease in dioxin emissions, there is still a heavy environmental historical burden, as many of the congeners are persistent. This is due to the fact that they are not easily degraded and thus have very long half lives.

Based on the daily intake of certain foods and the dioxin levels in this food package, the relative contribution of different foods to the daily dioxin intake can be calculated. Figure 1 shows that almost half of our daily dioxin intake is due to consumption of meat and dairy products. Eggs only contribute 4 % of our total dioxin intake, which is based on dioxin levels present in battery eggs.

According to current health views, the EU has set a goal for a daily tolerable dioxin intake of dioxins that should not exceed 2 pg TEQ per kilogram bodyweight per day. To achieve these aims, regulations have been set up, whereby maximum levels have been assigned to a large number of food products (EU regulation 2375/2001). Table 1 shows the maximal levels of dioxin per gram fat in various food products. The level for eggs has been set to 3 pg TEQ per gram egg fat (one egg contains approximately 6 grams of fat). Eggs from free range or organic chickens, which have an outdoor access, have to comply with the 3 pg level after January 1, 2005. It should be noted that the calculation of these levels has been based on levels that are reasonably achievable in the various food production systems, and not necessarily from a health risk perspective.

Figure 1: Contribution of various foods to the daily dioxin intake in humans. Data are presented as a percentage and are derived from report 639102022 from the National Institute of Public Health and the Environment in The Netherlands.

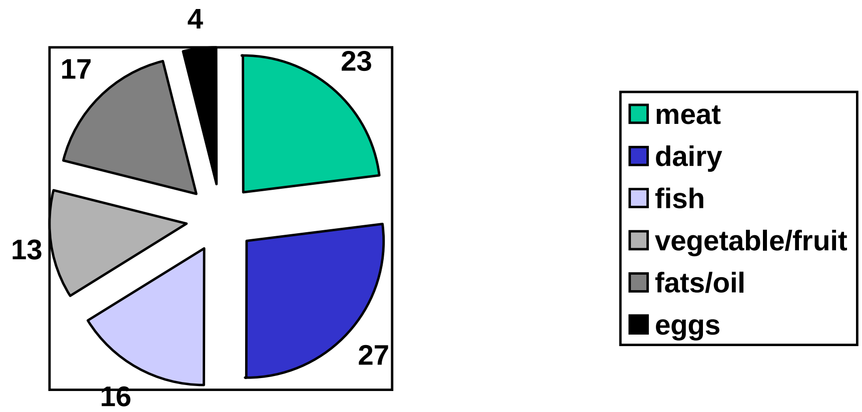

Table 1: Maximal levels of dioxins in food products as dictated by EU regulation 2375/2001.

Product	**Max level (pg TEQ/gr fat)**
Meat (beef, sheep)	3
Meat (poultry)	2
Meat (pig)	1
Livers	6
Fish	4
Dairy products	3
Eggs	3
Oil and fats	0,75 –3 (plant-beef)

Dioxins in eggs
Due to the fact that eggs contain about 10% fat, it is not surprising that dioxins also tend to accumulate into eggs. Stephens *et al* (1995) have shown that chickens exposed to a dioxin source reach a steady state of dioxin transfer after 30-60 days, and that up to 80% of certain dioxin congeners taken up, are distributed over adipose and egg fat. Egg fat may contain up to 30% of the dioxins taken up via food or soil (Stephens *et al* 1995). Modelling studies from the Netherlands have shown that chickens that are continuously exposed to a dioxin source have a

gradual increase in the dioxin content of their eggs. Dioxin levels in the eggs build up gradually reaching a plateau after more than 200 days (van Eijkeren *et al*, submitted for publication 2004). The difference with the data obtained by Stephens *et al* (1995) may be due to the different types of contaminated soils used in the two studies. Some soils may release bound dioxins easier than others.

Many studies have already shown that free ranging (not organic) chickens have higher levels of dioxins in their eggs, than chickens kept inside (Table 2). In many countries. the eggs from free foraging animals exceed the proposed dioxin limit of 3 pg. Hardly any studies have, however, been published concerning dioxin levels in the eggs from organic poultry farms. A recent study from Belgium indicated that organic eggs had a similar dioxin content (approximately 1 pg TEQ per gram egg fat) as conventional eggs (Pussemier *et al* 2004). Of interest was the finding from these authors that eggs produced by hobby farmers had very high dioxin levels (10 pg/gram egg fat).

Table 2: Dioxin levels (pg TEQ/gram fat) in battery and free range/organic eggs; data from various European countries

Country	Battery system	Free range/organic	Reference
Netherlands	1-2	0.4-8.1	EC 2000b Kijlstra unpubl.
Belgium	1	1-10	Pussemier 2004
Germany	0.5-2.3	0.4-11.4	Fürst 1993 EC 2000b
Ireland	0.1-0.6	0.5-2.7	FSAI 2004
Sweden	0.6	0.6-3.1	Unpubl. data
Switzerland	1.3	2.3-19	Schüler et al 1997

A small study performed on a few farms in Ireland showed that dioxin levels in organic eggs were approximately 3 fold higher than those seen in conventional eggs, but levels did not exceed the 3 pg level (FSAI, 2004). Similar unpublished results were found in Swedish organic eggs.

Researchers from Wageningen University recently investigated dioxin levels on organic poultry farms (Kijlstra et al; manuscript in preparation). This study, that was performed in the fall of 2003, showed that 25% of the 34 investigated organic poultry farms in The Netherlands produced eggs with a dioxin level that exceeded the upper level proposed by the EU (3 pg TEQ/gram egg fat). Dioxin egg levels on the organic farms ranged between 0.4 and 8.1. When taking the daily egg production figures into account, it was calculated that 14 % of the eggs produced, had dioxin levels exceeding the 3 pg level. These figures were even higher than in data collected earlier in 2001, whereby 6 out of 68 farms tested positive (10 %) (de Vries, 2002).

Due to large media coverage during 2001, Dutch organic poultry farmers have been aware of the fact that outdoor access of chickens can be associated with increased egg levels of dioxins as compared to so called "battery eggs". Most attention was paid to soil contamination due to local burning practices, and a number of farmers have removed the soil from such areas on their premises. Despite these actions, the dioxin levels in approximately 10% of the eggs remain above the 3 pg level. Possible explanations for these findings are discussed in the following paragraphs.

Feed for laying hens as a source of dioxins

The composition of organic poultry diets resembles that of conventional feed and contains cereals and legumes, which are mainly of organic origin. In organic poultry farming, 80% of the feed has to come from organic origin. It is not allowed to feed animals with ingredients of animal origin (meat or bone meal), extracted oil meals or synthetic amino acids. Analysis of conventional laying hen feed has shown that dioxin values ranged between 12-232 pg TEQ/kilogram feed (European Commission report 2000). Comparison of dioxin contents, using the CALUX assay, showed that organic feed contains a lower amount of dioxins than conventional feed (Platform Biologica unpublished data, 2002). Although organic laying hens are given approximately 15 grams of feed more per day than regular hens, one may assume that feed is not the main cause of the raised dioxin levels seen in organic eggs. Some organic poultry farmers feed their animals with plant material from their vegetable garden or with unsold organic food (for instance bread). Some vegetable leaves may contain higher dioxin levels due to their wax like surface. It is not yet clear at present how this contributes to the egg dioxin content.

If an organic hen takes up 140 gram of commercial organic feed, containing between 10-200 pg of dioxin per kilogram and 25% of these dioxins are transferred to 6 grams of egg fat, one can calculate that this will lead to an egg dioxin content of 0.05 or 1.25 pg TEQ dioxins per gram of egg fat, respectively (Table 3).

Substances can also be added to feed to decrease bioavailability of dioxins (binders) or stimulate the excretion. Chlorophyll has been shown to stimulate excretion of dioxins in rats (Morita *et al*; 2001). No data are available concerning the role of chlorophyll on dioxin excretion in chickens.

Table 3: Sources of contamination leading to final dioxin levels in organic eggs assuming a 25% transfer of the dioxin intake.

Source	Low estimate	High estimate
Regular feed	0.05	1.25
Worms and insects	0.25	1.5
Herbs and grass	0.25	0.5
Soil	0.25	2.5
Total	0.8 pg/gr	5.75 pg/gr

Data represent the contribution of the various sources mentioned to the egg dioxin level per gram fat.

Soil uptake as a source of dioxins

Chickens are known to take up soil, a behaviour known as geophagy. Many reasons for geophagy have been mentioned, including mechanical digestion of feed, mineral supplementation and self-medication against endoparasites. Quantitative data are not available concerning soil uptake by foraging laying hens, but estimates range between 2 and 10 grams per hen per day (Stephens *et al*.; 1995). Soil intake will depend on the amount of time the chickens spend in the outdoor area, the number of animals per free ranging area and the coverage of soil. Hypothetically, the general health status (endoparasites, mineral/vitamin shortage etc) of the animals may also influence the amount of soil taken up. Recent studies from our group, whereby soil dioxin content from organic poultry farms was measured by the GC/MS method, showed that levels varied between 1 and 6 pg TEQ per gram of soil (Kijlstra *et al*. manuscript in preparation). Values in Europe range between 0.5 and 87 pg per gram soil (dry matter). When assuming a 25% transfer, an uptake of 10 grams of soil samples, containing between 1 and 6 pg TEQ/gr, could lead to an egg dioxin content of 0.25-2.5 pg TEQ per gram of egg fat, respectively (Table 3). As mentioned earlier, it is not exactly known how much soil can be taken up daily by a chicken. If a chicken would take up 20 grams per day this would lead to egg dioxin levels between 0.5 and 5 pg TEQ per gram egg fat.

Apart from historical contamination, the farmer on the area where the laying hens forage could pollute soils with dioxins due to waste burnings. In our study, we did not find evidence for highly polluted areas due to these burnings. Dioxin contamination of soil via faeces of chickens has been mentioned but seems unlikely, since most dioxins are extremely lipophilic and will not leave the body via the faeces.

Forage as a source of dioxins

It has been estimated that the daily forage intake of layers may amount to 35 g (grass, legumes, herbs, European Commission report 2000). These 35 grams represent about 7 gram of dry weight material. Grass has been shown to contain between 0.8-1.6 pg TEQ of dioxins per gram dry weight. Assuming a 25 % transfer, an uptake of 35 grams of forage could lead to an egg dioxin content of 0.25-0.5 pg TEQ per gram of egg fat (Table 3).

Insects and worms as a source of dioxins

Approximately 20 grams of worms and insects have been assumed to be daily consumed by foraging laying hens (European Commission report 2000). Quantitative studies have, however, not been published and the true intake of worms and insects by chickens will depend upon many factors, including the actual use of the outdoor area by the chickens and the density of worms/insects. The density of worms /insects may also depend on the density of chickens in the outdoor run (Schuler 1997).

In a recent study, we measured dioxin content by GC/MS in worms obtained from organic poultry farms in The Netherlands (Kijlstra *et al*. manuscript in preparation). In this study, the dioxin content ranged between 0.3-1.9 pg TEQ per gram worm. Assuming a 25 % transfer, an uptake of 20 grams of worms could lead to an egg dioxin content of 0.25-1.5 pg TEQ per gram of egg fat (Table 3).

Time spent outside as a factor determining egg dioxin level

Most of the dioxin sources mentioned above are found in the outdoor area, and uptake of these sources will directly depend upon the time spent outside. This may vary, to a large degree, because, although birds are given access to a large outside area, many of them will not go outside at all or will stay within the immediate environment of the houses (Dawkins *et al*; 2003). This depends, amongst others, on the habitat of the outside area (tree coverage), presence of predator birds and the scale of the flock size (large flocks tend to remain close to the houses). The way the animals have been reared will also influence the use of the outdoor area. Animals that have been given the opportunity to use the outdoor area as young as possible will show a different "outdoor" behaviour compared to animals given an outdoor access at the time they start laying eggs.

The time spent outdoors may also differ between free range and organic production systems, whereby free range animals are only allowed to be outdoors for a few hours per day, whereas EU regulations dictate that an organic chicken should spend at least 30% of it's lifetime outside.

How to lower dioxin levels in organic eggs?

A number of different factors may lead to the accumulation of dioxins in eggs, of which only a few can be manipulated. From the currently available knowledge, the following list of possible interventions can be tried. It is clear that some of the proposed actions counteract conditions, which have been implemented in organic farming to ensure animal welfare.

- Decrease the soil uptake by assuring complete coverage either via grass, shredded wood, etc. or shielding bare areas from the chickens.
- Decrease uptake of soil/earthworms/insects by diverting the behaviour of the laying hens.
- Stimulate excretion of dioxins via administration of chlorophyll (for instance via Chlorella, which is a unicellular green algae) or by adding dioxin binders to food.
- Do not feed laying hens with feeding stuffs with unknown dioxin content. The commercial feed suppliers should provide data concerning dioxin content. Do not feed hens with scraps or leftovers.
- Eliminate possible point sources (old burning sites) in the barn or outdoor area.
- Replace soil of the outdoor area with soil containing a lower dioxin content.
- Limit the time the chickens spend outside.
- Limit the outdoor area per chicken.

Proving the assumptions and future questions

Behaviour of the laying hens

The effect of the use of the outdoor area in time and space on egg dioxin levels is a parameter that needs to be investigated further. This behaviour may be influenced by 1) the actual time the barns are opened and closed by the farmer 2) the size of the flock (large flocks tend to spend less time outside 3) the way chicks were raised in the past 4) the presence of roosters in the flock 5) the shielding of the outdoor area against predators (presence of trees and bushes) 6) race of the laying hens.

Worms and insects

It is not exactly known how many worms and insects are actually eaten by free-range chickens. Nor is it known what the biomass of earthworms and insects is in the outdoor area used by the laying hens. If earthworms and insects play an important role as a source of dioxins then a gradual drop in dioxin levels would be expected in wintertime. Earthworms tend to reside deeper as soon as temperature drops, and levels of insects also decrease dramatically in the fall.

Herbs and grass

The amount of herbs and grass consumed by chickens on organic poultry farms is not exactly known nor is it known how this affects the dioxin content in eggs.

Soil uptake

It is not exactly known how much soil free-range chickens take up and how this uptake can be influenced. Methods to exactly quantify soil uptake by laying hens should be devised. How is soil uptake influenced by the health status of the chickens, grass coverage of the outdoor area etc.?

Conclusions

Only limited data has been published in the literature concerning dioxin levels in organic eggs. Analysis of dioxin levels in organic eggs among various European countries shows marked differences. An explanation for these differences may be found in the historical dioxin emissions, which may be lower in countries such as Sweden and Ireland, when compared to a densely populated country, such as The Netherlands. On the other hand, differences between the behaviour of the chickens amongst farms in different countries may also explain the observed difference. In some countries, the actual number of chickens going outside may be quite low as well as the total time spent outside. In some countries, the weather conditions in winter may be such that chickens stay inside most of the time, and even if they go outside they will not have access to soil under a heavy snow.

The most likely source of dioxins leading to higher levels in the eggs is directly (soil uptake) or indirectly (uptake worms/insects) related to the soil dioxin levels. Deficiencies in the amount of minerals or vitamins in the organic feed preparations may influence the soil uptake behaviour (geophagy) of the chickens. The outdoor area per chicken may influence the amount of worms and insects that are available. Higher stocking densities may lead to a low insect/worm population but on the other hand may lead to disruption of the grass coverage and a possible higher uptake of soil from a bare outdoor area. Many of the explanations described above are theoretical and should be investigated under well-defined conditions.

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References

Dawkins, M. S., Cook, P. A., Whittingham, M. J., Mansell, K. A. & Harper, A. E. What makes free-range broiler chickens range? In situ measurement of habitat preference. Animal Behaviour 2003; 66: 151 - 160.

De Vries J. Monitoring dioxine gehalte in eieren afkomstig van biologische legbedrijven. Report Keuringsdienst van Waren, March 2002

European Commission: Assessment of dietary intake of dioxins and related PCBs by the population of EU Member States. 7 June 2000b

European Commission: Scientific committee on animal nutrition; Dioxin contamination of feedingstuffs and their contribution to the contamination of food of animal origin 2000a

Food Safety Authority of Ireland (FSAI): Investigation into Levels of Dioxins, Furans, PCBs and some elements in Battery, Free-Range, Barn and Organic Eggs http://www.fsai.ie/surveillance/food/dioxin_report04/Dioxin_04.pdf March 2004

Fürst, P., Fürst, C., and Wilmers, K. (1993) PCDD/PCDF in commercial chicken eggs-dependence on the type of housing. Organohalogen Compounds. 1993; 13: 31-34

Huwe JK. Dioxins in food: a modern agricultural perspective J Agric Food Chem. 2002; 50:1739-50.

Morita K, Ogata M, Hasegawa T. Chlorophyll derived from Chlorella inhibits dioxin absorption from the gastrointestinal tract and accelerates dioxin excretion in rats. Environ Health Perspect. 2001; 109: 289-94.

Pussemier L., Mohimont L., Huyghebaert A., Goeyens L. Enhanced levels of dioxins in eggs from free range hens; a fast evaluation approach. Talanta in press (2004)

Schuler, F., Schmid, P. and Schlatter, C. The transfer of polychlorinated dibenzo-p-dioxins and dibenzofurans from soil into eggs of foraging chicken. Chemosphere 1997; 34, 711-718

Stephens, R.D., M.X. Petreas and D.G. Hayward. Biotransfer and accumulation of dioxins and furans from soil: chickens as model for foraging animals. The Science of the Total Environment1995; 175: 253-273.

Reduction of heavy metal input – a task also for organic animal husbandry

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Introduction

In Germany and at the European level, there are efforts to limit heavy metal inputs in soils and to avoid their enrichments in the food chain. These efforts lead to legal rules, which have an impact on farming.

In the case of cadmium (Cd) and lead (Pb), the main input is caused from deposition and is not influenced directly by farming. On the other hand, the main source for copper (Cu) and zinc (Zn) input in the soils is manure. In Germany, there is a yearly surplus of Cu of 237 g per ha and of ZN of 896 g per ha (Döhler and Wilcke 1995).

In Germany, the aim of a working group of Kuratorium für Technik und Bauen in der Landwirtschaft (KTBL) and Umweltbundesamt (UBA) is to reduce the heavy metal load in soils and to protect soil life and minimise risks for residues in harvest products for the consumer and the farm animals.

Different viewpoints need to be taken into consideration, when heavy metal reduction is planned in agriculture. In livestock production, it is considered a priority to fulfil the trace element requirements of the animals in every situation. This is usually done by the standard advice systems, who are worried about a potential introduction of ‘unpractical’ bans on trace element substitution in animal feeds and the bring out of manure. On the other hand, the soil scientists and soil conservationists want to introduce strict limits an monitoring values on manure loading (e.g. a ban on manure application where the soil heavy metal load has exceeded certain maximum levels).

Sources of heavy metal input in the agricultural cycle

The main sources of heavy metal inputs in the nutrient cycle of a farm are supplements in animal nutrition, foot baths with Cu-based agents, medicines, mineral bedding materials and other chemicals in stable equipment (Zn) and in plant production (potato and wine production in particular).

The main input in the pig manure originates from the high supplementation in fodder with Cu and Zn, because of their ergotrophic effect. The limiting values for piglets are 170 mg per kg DM, for pigs 25 mg per kg DM (EC regulation 1334/2003). The proposal of the EC-scientific group on animal nutrition (SCAN-group) in 2000 was to reduce the limiting values to 30 respectively20 mg per kg DM. The requirement norms are at a level of 4 and 10 mg per kg DM, respectively.

The main input in cattle manure is caused by (partly illegal) prophylactic foot baths to prevent certain types of lameness. The bathing liquids are often added into the slurry after use.

The above suggests that there are several areas where reductions in heavy metals are possible.

Potential measures to reduce heavy metals in agricultural soils

A valuation of reduction measures is necessary. The results of a German working group (delegates from UBA, KTBL, Science, Bioland) show that the main potential with a high practicability of reduction is in the supplements in pigs and poultry feeds and bedding materials. Another measure with good potential is to introduce improved practices in the use and disposal of cattle foot baths.

Other measures, such as a ban on Cu- and Zn-medicines, the use of enzymes to improve the availability of trace elements, a better choice of Cu- and Zn-compounds or the protection of Zn-corrosion in stable equipment have low reduction potentials and/or low practicability.

The role of organic animal husbandry

Organic farming offers some important advantages in terms of protecting an agricultural system against the overload of heavy metals. The main advantage is the high degree of integration between animal husbandry and land use and the low external inputs in general. Investigation showed that foot baths are used only rarely. For feedstuffs, the contents are restricted by a requirement to demonstrate genuine need for supplementation. Basically, organic farming follows a preventive, evidence-based strategy, rather than a blanket strategy.

On the other hand, the organic systems have some weaknesses, in terms of preventing soil contamination with heavy metals: On occasions, the Cu- and Zn-contents in feedstuff (mineral feed) for pigs are too high. This is mostly caused by unknown contents in the home-grown feedstuffs and, sometimes, by the necessity to compensate bad hygiene management with measures that lead to Cu and Zn surplus in some farm cycles.

The following improvements could be made in organic systems to prevent such surpluses:

- Different mineral feeding stuffs, with a better adaptation to the content of the home-grown feedstuffs, have to be developed;
- Hygiene management advice has to be improved;.
- Quality management for the feedstuff manufacturers has to be applied also for trace elements (e.g. certification EC regulation 223/2003); and
- Any foot baths must be replaced with an holistic foot health system that includes cow comfort, ruminant-adapted feeding, foot care etc.

Conclusions

There are practical measures that have a high potential for reducing the risk of overloading a farming system with heavy metals. Improved hygiene advice to substitute ergotrophic and health stipulated inputs and evidence-based feed supplementation are likely to lead to reduced inputs. Organic farming should aim at setting a good practice precedent in this area.

Literature:

DÖHLER, H. and W. WILCKE (1995): Schwermetalle in der Landwirtschaft. KTBL Arbeitspapier 217, Landwirtschaftsverlag Münster

Part D:
Organic livestock production in new and emerging EU countries

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Legal regulations of animal production in organic agriculture - chances and perspectives for Polish farmers

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Introduction
Organic agriculture is the only system of agricultural production which is legally regulated in a comprehensive manner both in EU and worldwide. There are private or state standards existing for years, as to what can and what cannot be used for food production (including fodder production) within organic agriculture.

First European regulation pertaining to organic agriculture was issued on June 24th 1991 as the Decree of the European Commission on Organic Production and Marking Agricultural and Food Products No 2092/91. The act dealt in detail with the principles of plant food production and processing. Animal production was treated with fewer particulars. In 1999, European Commission elaborated detailed rules and requirements for organic animal production and processing of animal products organically and issued the Decree No. 1804/1999 of July 19th 1999, which supplemented the earlier document No. 2092/91.

First Polish legal regulation pertaining to organic agriculture was the Act on Organic Agriculture published on March 16th 2001. The act became valid six months after the publication, i. e. on November 3rd 2001. Together with associated decrees, it regulated the conditions of agricultural production and food-processing industry with organic methods, the system of control and certification, trading and principles of marking organic products.

Detailed regulations can be found in decrees of the Minister of Agriculture and Rural Development issued on:
- May 14th 2002 - on the detailed conditions of organic farming. The decree contained a list of allowable fertilisers, plant protection means and animal fodder, means for cleaning and disinfecting animals and their houses.
- May 15th 2002 - in cooperation with the Ministry of Health on additional substances and components of agricultural origin produced with methods other than organic which are allowed to be used in the processing of organic products.

Legal definition of "production carried out with organic methods" was as follows: "it is a way of obtaining agricultural products which applies to the greatest possible extent natural methods of production and which does not violate natural equilibria". The principle referred to all types and stages of both plant and animal production and to processing and trading organic products. These regulations were aimed at adopting the country law to European regulations i.e. the two already mentioned EC decrees.

The establishment of country legislation on organic farming three years ago incorporated Poland to the EU countries that have uniform regulations concerning the production and trading of agro-organic products.

Organic farming principles

Agricultural production on an organic farm is carried out according to the principle of sustainable development; it activates natural mechanisms of production through the use of natural productive means and provides permanent soil fertility and the health of plants and animals.

In particular this type of production consists in using:

- crop rotation and other natural methods of maintaining or increasing biological activity and soil fertility,
- organic fertilisers, plant protection means and animal fodder obtained in a way other then the industrial chemical synthesis,
- seed material obtained from plants which for at least one generation (and in the case of perennial plants - for at least two vegetative seasons) were grown according to the rules listed in paragraphs 1) and 2),
- Selection of plant species and varieties and animal species and races which would consider their natural resistance to diseases, using in particular local populations and races.

Organic farms in Poland, since their very beginning, used to keep livestock. This allowed to produce composts, mainly of animal origin, which in turn soon resulted in a high content of organic matter in soils. Animals are mostly fed on pastures using green fodder as their main food source. Old native breeds are more often introduced to breeding. Organic farms are a good place for maintaining these old breeds.

Organic certification

A basic element of a functioning organic agriculture is the control system. Every farmer, food processing manager or anyone trading in food products (importer, wholesaler) should first apply to the control unit (legally called the certification unit) stating his/her readiness to enter organic farming and his/her agreement on the control. Entering organic farming, the farmer, together with the inspector of certification unit, prepares a plan of converting the farm to organic production. The plan should list the measures to be carried out on the farm during the 2-year conversion period as well as allowable fertilisers, fodder and plant protection means. The farmer should also keep registers of production means used on the farm.

It is important to note that it is not the product but the method of production that is controlled and certified in organic farming. The system of control and certification in Poland is of a mixed, state-private character and consists of:

- Ministry of Agriculture and Rural Development as an office that empowers private certifying units to perform control and to issue certificates,
- Chief Inspectorate of Trade Quality of Agricultural Products - an office that supervises authorised certifying units,
- Certifying units accredited according to the PN-EN/45011 norm in Polish Accreditation Centre and authorised by the Minister of Agriculture and Rural Development to perform controls and to issue or withdraw certificates.

The system of control and certification in organic agriculture should be a basic guarantee for consumer that food products on the market, marked as the products of organic farming, conform to the rules of organic production. These regulations order the market of organic food and increase our confidence in it. This is especially important in view of some affairs that were associated with agriculture and animal production in several EU countries.

Organic livestock production

Animal production enables to broaden the range of produced goods on an organic farm, positively affects farm development and may thus largely enhance the income. Animal production is also essential for the organisation of plant production in terms of delivering organic matter and nutrients, improving soils and contributing to the development of sustainable agriculture.

According to the definition of the decree No. 2092/91 “animal production” means the production of domestic or domesticated animals both terrestrial (including insects) and aquatic species bred in fresh, brackish or salt waters. Organic production does not mean any product from wildlife hunting or fishery.

Organic animal production should, as a rule, encompass a close relationship between production, soil improvement in an appropriate long-term crop rotation and feeding animals with organic fodder produced within the farm. Biodiversity in farming should be encouraged and an ability of adaptation to the local conditions should be considered when selecting animal breeds.

> Animal production may pose a threat to the environment. To avoid water contamination by nitrogen compounds, farms carrying organic animal production should have an appropriate storage capacity and should plan the management of solid and liquid animal manure.

As much as possible fodder should be produced on the farm. Self-sufficiency of organic farms is the preferred option. This postulate stems from the very essence of organic agriculture, which should be self-balanced. It means that nutritional requirements should be met within the farm, and animal production should bring as much as possible natural fertilisers. Such a status might be defined as follows: an organic farm should import the least possible energy from outside. Energy should be understood *sensu lato* as that introduced to the farm in the form of production means. For example 20 GJ energy is needed to produce 1 t of ammonium saltpetre and 30 GJ to produce equivalent amount of urea. As to animals, it is assumed that the amount of nitrogen delivered in 1 t of ammonium saltpetre may be obtained from 10 cows in a year. Analysing utilisation of energy and production means for organic production, one may conclude that self-sufficient plant production is beneficial for economic and organic reasons.

Animal health care should be based mainly on prevention through selection of proper breeds and varieties, high quality fodder and environmental conditions - in particular in stocking animals, managing farm buildings and in animal welfare. Synthetic, allopathic drugs are not allowed routinely in organic agriculture. Farm animals should have an access to corrals or pastures if weather permits, grounds for these corrals should be rotated. Farm buildings should meet animal needs as to ventilation, light, space and comfort. Animals should have sufficient space for free movement and for the development of their natural social behaviour. Systematic actions causing stress, harm, diseases and suffering in animals should be kept at minimum during production, storage, transport and slaughter. Particular interventions necessary in some types of production might be allowed only as an exception.

Anybody introducing products from animals bred with organic methods to the market should undergo regular and uniform control. A register should be kept in a farm to record detailed data on animals brought in and leaving the farm and on any veterinary treatment.

Thanks to the use of renewable natural resources (manure, legumes and green fodder), growing and grazing systems allow to maintain and increase soil fertility in a long-term scale and sustain permanent agricultural development. In organic systems, all farm animals in the same productive unit should be treated according to the principles adopted in this decree. However, it is possible that animals not bred according to this decree are kept together in the farm providing the grounds and building are distinctly separated from those used in organic breeding and the animals belong to different species.

During conversion of a production unit, whole area used for feeding animals should conform to the rules of organic farming with the consideration of conversion periods established in part A of this annex that refers to plants and plant products.

If animal products are to be sold as organic products, farm animals should be reared according to the principles established in this decree for at least:

- 12 months in the case of slaughter horses and cattle (including *Bubalus* and *Bison* spp.) and in every case for at least three quarters of their life period,
- 6 months in the case of small ruminants and pigs. In the three-years conversion that ended on August 24th 2003 the period for pigs lasted 4 months,
- 6 months in the case of dairy animals, during the conversion mentioned above the period lasted 3 months,
- 10 weeks for meat poultry introduced before the third day of life,
- 6 weeks for egg-laying hens.

Prospects for organic livestock production in Poland

We want to solve the existing or prospective problems in animal production through scientific studies on methods of organic rearing and farming of particular animal species, on health and welfare protection. Financial support for these aims is secured in the state budget.

Legal regulations on animal production and processing are elaborated for the member countries of the EU - thus scientific support and efficient advisory will be the most important elements to help farmers in managing farms with organic methods.

Certified organic livestock production in Poland: an overview

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Introduction

Since the beginning of organic farming development in Poland, Polish organic farms have always been very traditionally organised in terms of balanced plant and animal production. The majority of Polish farms keep dairy cows, some cattle in various ages, sometimes bulls and a few chickens and pigs. The regionally and historically diversified but extensive animal rearing systems, connected with traditional buildings and pasture use, are causing many problems to the farmers after the direct implementation of the EU Regulation 2092/91.

Problems with compliance with the EU regulation

One of the bigger problems is the lack of money for changing the rearing systems from tethered to loose housing. Often, old buildings have poor ventilation and light access. In many cases in small farms, there is not enough room for open-air runs due to the small farmyards. Even in cases where the farmer practices good stockmanship, looks after the animals individually and even knows the cows by name, the stock are not always kept according to the legislative requirements.

Organic farmers also have problems with the renewal of the herd and, in other situations, when they are planning to buy new animals. As the number of organic farms in Poland is small, the organically raised animals are mostly not available, and farmers are often forced to buy conventional animals.

The feed used by Polish organic farmers is mostly produced on the farm. Only one company produced organic feed; but has recently stopped doing this as the market was too small. It is likely that the production will be re-establish, however, as there is a growing number of organic farms. Some of the “new” organic farmers prefer industrial feed for piglets or poultry, as it is felt that it is difficult to manage with home mixed rations. More experienced farmers have, however, no problems with home mixing, but have to accept that, with home mixed rations, the fattening periods tend to be longer, particularly in the case of pigs. Currently, these longer production periods are not compensated by price premia for organic pork.

The traditional Polish animal husbandry system ensures relatively good conditions for good animal welfare. However, when there is a need for veterinary treatment, most of the veterinarians are not sufficiently informed about the role of the organic regulations. They neither propose to the farmers any alternative medicinal products, nor remind them that the withdrawal period for organically raised animals should be twice as long as the legal withdrawal period. Even if a well-informed veterinarian suggested phytotherapeutic or homeopathic products, the farmer would have difficulties to buy them, particularly in the remote areas where it is not possible to get such a product in any pharmacy within a reasonable distance.

Marketing needs to be improved

The main problem of Polish organic livestock production is the small scale of organic farming in comparison with the conventional one. The market for organic animal products is very limited, because the word “organic” is still associated with „vegetarianism”. Only for a few years, the consumers have had the possibility to buy organic meat and different meat products, cheese, butter and sometimes eggs in some shops in the bigger cities. Only few processing units process organic animal products. If somebody is interested in getting their addresses, one has to look for them on the labels of the products in the shops. There is no publicly accessible register of addresses of organic farmers and processing plants, which is a real barrier for rapid development of the market for organic products. The Inspection Service for the Commercial Quality of Agricultural and Food Products (Główny Inspektorat Jakości Handlowej Artykułów Rolno-Spożywczych) is preparing a database of organic products in Poland, so maybe the statistics of organically raised animals and organic food products will be available next year.

Natural and economic conditions for the development of organic farms in Poland

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Introduction: general characteristics of Polish agriculture

Polish agriculture is still in the phase of political transformation. Agricultural production and its profitability are decreasing. There is an increasing area of abandoned and fallow arable lands and grasslands. Incomes of the population (and so the expenditure for food) and the demand for farm products are decreasing. Symptomatic is the fall of agricultural incomes parity in the last decade - from 92% in 1990 to 57% in 1994 and to 38% in 1999 (Okularczyk, 2004).

This situation has resulted in an area of 3.5 million ha (20%) of unproductive land. On the other hand, there are nearly one million registered, and almost the same number (0.9 million) of unregistered, unemployed in the country (at over 3 million in Poland). The countryside has become a “store” for over 45% of all unemployed in Poland (Fedyszak-Radziejowska, 2002).

Agriculture contributes 6-7% to the Gross National Product (GNP), and its share in labour market is 14% of the total number of registered posts in the country (this does not include the additional unregistered two million people in pre- or post productive age and of disabled persons working in agriculture) (Michna, 1999).

A challenge for Polish agriculture today is to withstand the competition in the European Union agricultural market. Problems in farming are further complicated by the small area of an average farm (8.4 ha of croplands in 2002) and their unfavourable dispersal (6-7 plots on average and several dozen in southern Poland) (Plan......, 2004).

A total of 56.6% of farms in the country cover an area of 1-5 ha, and as many as 91.5% cover an area of 1-15 ha. Farms of 15-20 ha constitute only 4.5 %(Rocznik, 2000). According to some specialists, the minimum farm area that would bring profit to a family is several dozen hectares. Achieving such a status means liquidation of a great number of farms and will take time. Notably, the enlargement of mean farm area from 8 ha in 1945 to 18 ha took 20 years in the Federal Republic of Germany (Fedyszak-Radziejowska, 2002).

Agriculturally productive area in Poland is currently shrinking. Total cropland area in 2002 (according to the agricultural census) was 16.9 million ha and the area of fallow and barren lands 3.5 million ha (20%), including over 1 million ha of permanent grasslands. The latter figures increased by nearly 20-fold since 1990. These areas are usually weed-infested and become overgrown by shrubs and trees. Expensive restoration will be needed to resume production (Jankowska-Huflejt, Moraczewski, Zastawny, 2003).

Restraining cropland utilisation or their abandoning by farmers is the phenomenon which appeared in the period of transformation. It particularly concerns grasslands due to the decreased cattle and sheep stock and lower demand for fodder. But meadows and pastures are commonly known as the cheapest (1.5-2 times cheaper than arable lands) source of valuable fodder for ruminants which, especially in the summer time, may be exclusively fed there. For this reason bulk fodder is produced mainly on grasslands in the EU.

The share of grasslands in the cropland structure in Poland is rather small and still decreasing. According to the agricultural census of 1996, grasslands covered 4.1 million ha i.e. 22.4% of agricultural lands. According to the census of 2002 grasslands occupied 3.6 million ha, i.e. 21.7% of total croplands. Except for Hungary, this is the lowest index in Europe. In the former Czechoslovakia, the index was 23.5% and in the Netherlands and England - 55-62%.

Permanent meadows covered 2.5 million ha in 2002 and constituted 70% of total permanent grasslands, while permanent pastures occupied some 1 million ha, i.e. 30% of grasslands. In comparison with the countries of intensive farming, where grazed areas constitute 50-70% of grasslands, it means proceeding extensification in agriculture and particularly in grassland farming, until restraining production on their part or total abandonment (Table 1).

Table 1: Area of unused meadows and pastures in Poland in 2002 (Użytkowanie.., 2003).

Grassland	Area (thousand ha)	Unused	
		Thousand ha	%
Meadow	2 531.3	809.6	32
Pasture	1 030.6	287.6	28
Total	3 561.9	1 097.2	30

The reason for a rapid regress in bulk fodder (i.e. green fodder, silage, hay silage, hay) farming on permanent and alternate meadows was a result of the drastic fall of farm animals stock (Table 2 and 3). Another reason was the unfavourable conditions in agriculture for example extremely high costs of the productive means, compared with the purchase power of farmers, and low prises obtained for animal products.

Since 1946, the cattle stock and milk production systematically increased to the highest level of 13,3 million cattle and 665 litres of milk per capita in 1975 (Table 2). Now, when the total population has increased to over 38 million people (by over 60%) and cattle stock decreased to only 6.1 million head., the indices decreased below the level of 1938 in both the stock per 100 ha and per capita milk production. The number of cattle per 100 inhabitants decreased even below the level of 1946. This drastic decline in animal stock was the effect of a large import of cheap, subsided milk and meat products from Western Europe (Nazaruk, 1999).

Table 2: Cattle stock index and milk production in Poland (within its present borders) in the years 1938-2000, according to Nazaruk (1999) and supplemented by authors.

Year	Stock thous. ind.	Stock per 100 ha croplands	Country population thous.	Cattle stock per 100 inhabitants	**Per capita milk production, l**
1938	9 924	**47.5**	32 100	30.9	**346**
1946	3 911	**18.7**	23 930	16.6	**299**[1)]
1950	7 200	**34.6**	25 008	28.8	**310**
1975	**13 254**	**69.0**	**34 175**	**38.8**	**665**
1985	11 055	**59.0**	37 203	29.7	**429**
1989	10 733	**57.0**	37 693	28.3	**403**
2000	**6 083**	**33.0**	**38 644**	**15.7**	**299**

[1)] Data for 1949.

Table 3: Farm animals in Poland and in the EU countries

No.	Country	Total ind/100 ha 1989-1991	Total ind/100 ha 2000	Including cattle 1989/-1991	Including cattle 2000	Including swine 1989-1991	Including swine 2000	Including sheep 1989-1991	Including sheep 2000
1	EU	78.9	66.0	61.2	57.6	81.1	86.8		
2	Austria	75.1	52.9	72.7	49.8	107	87.8		
3	Denmark	116	122	79.9	70.0	337	437		
4	France	65.2	65.3	69.9	68.7	39.2	48.9		
5	Spain	28.8	35.5	16.8	20.7	54.1	79.0		
6	Holland	303	273	243	208	672	668		
7	Germany	118	93.8	111	86.2	185	159		
8	Sweden	51.2	52.3	50.4	52.9	66.3	59.3		
9	Great Britain	73.2	80.0	67.2	64.7	42.2	37.6		
10	Italy	54.3	49.1	50.4	44.2	54.0	51.7		
11	**Poland**	**60.0**	**40.5**	**52.8**	**33.0**	**107**	**93**	**22**	**2**
Western Europe[1)]					**84.8**		**209.9**		**62.6**

[1)] Average for 7 West European countries, Denmark, France, Spain, The Netherlands, Germany, Great Britain and Italy

At the present level of profitability, the cattle stock, which would bring to three- person farming family the income comparable to that out of agriculture, varies between 14 highly productive milk cows to 18 cows of average efficiency, providing the milk would be of the I class. Such (or higher) concentration of the herd guarantees an efficient connections with food processing industry and modern animal production on a farm (Okularczyk, 2004).

Still bigger (by over 90%) was the decline in sheep stock (Table 4). From 5 million sheep in the 1980s, only a fraction (340,000) remained in 2002. This was a result of a collapse of wool market after dissolving the Board of Economic Cooperation, re-privatisation of farms and selling out large sheep herds which formerly were in the possession of big state farms and cooperatives. The flocks became dispersed into small productive units (Bonnet, 2004) and therefore, the intensity of breeding became restricted. Mean size of a flock is 80-85 sheep and, according to some experts, the minimum profitable size is 100 sheep in a flock.

Table 4: Sheep stock per 100 ha croplands and per capita (data of 1998/99).

Stock	***EU -15***	*Poland*	***Romania***	***Bulgaria***
per capita	0.25	**0.01**	0.43	0.46
per 100 ha croplands	70	**2.5**	70	6.7

Source - European Council

Polish agriculture has an excess of manpower (Table 5), is spatially dispersed and economically weak. It is also regionally differentiated. The greatest number of employed per unit area can be found in southern Poland. On farms with the excess of manpower, labour consuming production is more profitable than the market one. Particularly high dispersion of farms is typical for southern and south-eastern parts of Poland. On most farms, the production is extensified by the restriction of outputs for productive means and by simplification of the crop structure (a large contribution of cereals). In western and northern Poland the grounds are relatively abundant, which enables their concentration, better utilisation of special machines and large-scale production and extensive technologies. Mechanisation and modern technologies usually decrease the demand for manpower. In regions of marked agrarian dispersion, ground saving but labour consuming technologies are more justified.

Table 5: Selected indices of the production potential of agriculture in Poland and in Europe

Indices per 100 ha croplands	Poland	Regions Europe Central and Eastern	Western
Professionally active (persons)	21.5	14.3	5.3
Tractors in agriculture - pieces	7.1	2.7	4.5
- power – in kW	221	107	206
Cereal harvesters – pieces	1.1	0.7	1.5
- power – in kW	40	18	32
Consumption of mineral fertilisers - kg NPK/ha	91	70	119
Consumption of plant protective chemicals - kg/ha	0.6	0.5	4.9

Source: Pawlak, 2002

Natural conditions and intensity of agriculture in Poland

Soils and climatic conditions in Poland are poor in comparison with Western Europe. The evaluation index of agricultural productive space adopted after IUNG (soils, agroclimate, land relief, water conditions) assumes the values between 60 and 70 points in Poland, while up to 100 in Western Europe (maximum possible index is 130 points).

Land use and designation of croplands is also different, mainly because of climate. In Poland, 59% of land area is used in agriculture. 76% of this is occupied by arable land, out of which 60% is located on light soils. Extensive technologies, in which the costs are smaller by 20-50% than in intensive technologies, prevail on light soils. Consequently, the profitability of production and the cost effectiveness are lower there.

Southern and south-eastern Poland is characterised by good soils, dispersed agrarian structure and 50-60% contribution of cereals in the crop structure. In northern and western Poland, soils are of poorer quality, farms are larger by 50-100%, compared with the country mean, and cereal contribution ranges between 70 and 80% of croplands (Harasim, 2003). Poland, with its 18.6% of the EU cropland area, obtained in 1999 slightly over 10% of its total crops, including 12.5% of cereal crops, 11.6% of sugar beet yields and 10.6% of rape. Only the potato crop in Poland was 43.5% of the EU crops. These figures show the effect of lower yields of wheat, potatoes, sugar beets and rape.

Animal production in Poland (Jasiorowski and Przysucha, 2004) calculated per 1 ha of croplands is worth 300 euro in Poland, 800 euro in France and as much as 2000 euro in Denmark. The importance of a particular productive branch is determined by its contribution to the total value of agricultural production. At similar contribution of milk production in Poland and in EU, we differ to our disfavour in beef and mutton production and to our favour in pork and dairy production. Such situation is unfavourable due to a large share of grasslands and barren lands, which could be used exclusively by ruminants.

After years of underinvestment, the Polish agriculture is at a low level of technological advancement. That pertains to both qualitative advancement (precision, terms, forms, technique, methods, equilibration etc.) and quantitative (inputs) advancement like e.g. the type and amount of measures, sowing standards, seed treatment, harrowing, fertilisation, application of microelements, manure, liming, pesticide treatment (doses and the number of treatments), application of growth regulators, harvest and transport, cleaning and storage, lower level of education (Klepacki, 2003). Important factors are also the knowledge and skills of producers, which often are not satisfactory. The adherence to quantitative and qualitative elements constitute the so-called technological regime. It is assumed that, on best farms, the deviations from recommendations reach 20-30%, in average and, on poor farms, they are even more frequent.

Efficiency of production does not always bring economic effects, since harvested crops may achieve varying prises. The important factor here is a variable relation between the prises of productive means and the prises of food crops. These relations are, however, unfavourable and the production is unprofitable. At low prises of basic crop products, farmers need to sell more crops for the purchase of productive means (Table 6). Worsening economic situation in agriculture in Poland particularly pertains to animal production since it requires larger investments and running costs than plant production.

Table 6: Relation of the retail prises of selected agricultural productive means to prises of basic agricultural products (according to the Polish Main Statistical Office).

Item	***Year***	**Prises of productive means**				
		wheat (dt)	rye (dt)	slaughter pork (dt)	slaughter beef (dt)	milk (hl)
Tractor Ursus 2812 – piece	2000	684	961	94	120	443
	2001	775	1072	90	136	498
	2002	946	1243	115	152	574
	2003	**971**	**1272**	**137**	**171**	**617**
Concentrated fodder PT-2* for swine – 1 dt	2000	1.5	2.1	0.20	0.26	0.96
	2001	1.6	2.2	0.19	0.29	1.1
	2002	1.8	2.4	0.22	0.29	1.14
	2003	**1.8**	**2.3**	**0.25**	**0.31**	**1.1**
Summer diesel oil – 1 hl	2000	5.0	7.0	0.69	0.88	3.2
	2001	5.1	7.0	0.59	0.89	3.3
	2002	6.0	7.8	0.73	0.96	3.6
	2003	**6.2**	**8.2**	**0.88**	**1.1**	**4.0**

*Up to 2001 it was T-2 fodder

The consumption of yield forming productive means (mineral fertilisers, plant protective chemicals, qualified seed material) is also lower in Poland. Fertiliser consumption systematically increased since the II World War till 1990, up to the level of 164 kg NPK ha^{-1}. Now Polish agriculture uses rather extensive methods, which is evidenced by 2-3 times lower fertiliser consumption (Table 7) and 7 times lower consumption of pesticides (0.4 kg/ha) than in the OECD countries. Now, (data from the year 2000) the consumption of mineral fertilisers amounts 85.8 kg NPK ha^{-1} (nitrogen fertilisation of grasslands does not exceed 30-40 kg ha^{-1}). Consequently, Polish agriculture does not pose any risk of over-fertilisation.

Table 7: Consumption of mineral fertilizers in kg·ha^{-1} of croplands (Rocznik. 2001).

Lata	Consumption of mineral fertilizers				
Years	NPK total	N	P_2O_5	K_2O	CaO
1990	163.9	68.9	40.7	54.3	182.4
1997	88.3	49.0	17.3	21.1	139.0
2000	85.8	48.4	16.7	20.7	95.1
2000 : 1990 (= 100%), %	52.4	70.2	41.0	38.1	52.1

Organic agriculture - an alternative activity

Organic agriculture is justified in Poland. Due to a long lasting low investment and a lack of subsidies, Polish agriculture was never as intensive as that in the EU countries. Legal aid to organic agriculture increases the interest in that form of farming, and the integration of Poland with EU opens new markets for food (Hamm & gronefeld, 2003). Austria and Sweden may serve as an example. After joining the European Union, they utilised the measures for supporting organic farming. Now, such production occupies 8-18% of croplands in these countries, while in Poland organic farming uses less that 1% of the agricultural area.

In the crop structure of the existing Polish organic farms, vegetables and berry plantations dominate. It is easier to sell these products intended for direct consumption (main ecological product exported to the EU countries) and easier to obtain prise bonuses, especially because the market for organic products is still weak in Poland and farmers may sell only part of their crops for higher prices. The accomplishment of organic production on small farms may be enhanced by group utilisation of specialised machines, common harvesting and creation of conditions for agro-tourism.

Existing organic farms in Poland are distinguished by markedly higher share of permanent grasslands than the traditional ones. This is a favourable trend, as animal production is integral part of organic farming. Organic production of slaughter cattle, slaughter sheep and goats, particularly in the mountains and horse meat production and export to the countries of the tradition of horse meat consumption, could form an uncomplicated production system on these farm. This production will be directed by the domestic and foreign demand for organic products. Food produced in Poland may be competitive in quality and prices.

The greatest potential is (Okularczyk, 2004) in ecological production of beef, mutton and goat meat. According to the author, ecological breeding of these animals is justified in regions of a high contribution of grasslands and in large farms. This may be true for some parts of Bieszczady, Warmia and Mazury and Podhale and also for some formerly state-owned farms with spare buildings.

An important aspect for activating organic livestock production is unemployment in rural areas. Organic animal production is usually more labour consuming, potentially decreasing the unemployment. It is notable that in Poland, rural areas are inhabited by 4 times as many people as in the EU countries.

According to Kuś and Stalenga (2003), two options of the advancement of organic farming in Poland will develop:

- free market option: the dynamics of this option will depend on the demand for attested products, thus mainly in the vicinity of larger towns; and
- supported (steered) option: within agro-environmental programmes on naturally valuable and/or protected areas and in regions of dispersed agriculture.

Combination of ecological production with agro-tourism brings positive effects. It stimulates production of healthy food for direct consumption by agro-tourists and has many other aspects. It is an alternative source of income from agricultural production, stimulates ecological production of plant crops, integrates rural areas and towns, promotes cultural penetration, intellectually enriches the inhabitants of rural areas, leads to the conversion of unemployment, stimulates the development of rural infrastructure and may be of small business in the future.

Possibilities and perspectives of organic livestock production

Beef and milk market

Poland is the eighth country in the EU in beef production. In June 2002, cattle stock was 5.5 million head. Low prises of beef and high standards for milk quality were the reasons for further decline in the cattle stock in 2003. After the accession of Poland to the EU, due to marked increase in prises, one may expect an increased production of cattle meat and its export. Significant role in the increase of incomes to Polish beef producers, apart from higher prises, will play direct subsidies and negotiated special bonuses: bonus for breeders (926,000 head), slaughter bonus (calves: 839,518 head and adult cattle: 1.8 million head) and milky cow bonus (325,581 head).

Milk quota prescribed to Poland (9.38 million tons, including 0.464 million tons of restructuring reserve until 2006) should provide the development of the sector in the near future according to specialists. Poland occupies fourth position in the EU in milk production (c. 12 million tons) behind Great Britain, France and Germany. As the milk quality in Poland has improved, the contribution of milk of the extra class reached 80% while three years ago it was 50%. Facing direct competition in the EU market will, however, be difficult. Technological gap between an average farm in Poland and in the EU countries is large. The differences may be demonstrated by a comparison of an average efficiency of cows and of the herd sizes (Table 8).

Table 8: A comparison of cow efficiency and the herd's size in Poland and in the EU countries - the year 2001

Index	Poland	European Union
Efficiency of a cow, l	3828	> 5000
Size of a herd, ind. - average	3	25*
1-2	70%	
3-5	25%	
> 10	0,5%	

* up to 40-60 in the leading EU countries

The system of direct subsidies used in the EU countries promotes extensification of production. Due to extensive character of beef production in Poland, the changes should be favourable for us. They will impede the development of cattle breeding in EU and thus will decrease the distance between Poland and countries of the former "EU 15". On the other hand, through direct subsidies, the changes will support broader utilisation of low-efficient grasslands for the extensive cattle breeding.

Cattle stock decreases mainly in the smallest farms that have a difficulty of meeting the quality criteria. Due to small production, they are unable to invest in machines for cow milking and milk cooling.

Poland - the largest horse exporter

The production of horse meat is quite prospective in Poland. Poland, being one of the largest world horse exporters, is important as horse meat producer on the EU market. Horse meat is imported by Italy, France and The Netherlands. Production of slaughter horses in the EU countries covers the demand for horse meat in only 50%. Therefore, the export of horses from Poland could be two times higher, especially as the offered prices are attractive. The demand for horse meat (and colt meat in particular) is still high as it supplements beef.

The export of horses for butchering to the EU countries is free of taxes and tariff quota. Poland does not exploit its possibilities for development of breeding and exporting horses. Our advantage is e.g. the great number of small farms that could develop organic production, including horse meat production. There are fodder reserves, for example unused grasslands, and appropriate breeding material of domestic races well adapted to local conditions.

Breeding of Hucuł horses is possible in Bieszczady, these of Małopolska races - in southern regions and horses of cold-blood races - in other regions (Kałuża, 2003). Moreover, horse breeding can be combined with the development of agro-tourism.

Poultry production

Poultry products constitute 29% of the total meat consumption in Poland, but this is only 9% of the production in the EU. The market for poultry and eggs has good prospects in Poland, though many farmers face problems with selling their products and with fluctuating prices. The development of poultry production will be mainly determined by consumption in domestic market. Currently Poland is self-sufficient in poultry meat production and occupies the 7th position in production in the EU.

Polish poultry producers, having at their disposal the poultry houses of an area of 1000 m^2 with corrals, may transform into ecological production of meat and eggs - the so-called enriched eggs or eggs with lowered cholesterol content. Poland imports total breeding material of meat hens and turkeys, while pedigree breeding of ducks and geese takes place in Poland.

Uncontrolled imports may be a risk for Polish poultry production. One should attempt to introduce - like in the EU countries - the so-called “internal protection”, i.e. the introduction of import licences, to the agreements on contingents, to establishing appropriate taxes and subsidies to export.

The market for slaughter pigs and pork

In Poland, the development of pig stock is of greatest importance due to high consumption of pork. Production among the EU countries is largest in Germany (3.8 million tons), Spain (2.9 million tons), Poland (2.5 million tons) and France (2.3 million tons).

Almost all Polish production is consumed locally, since pork is the meat still most commonly eaten by an average Pole. The production remains constant, in spite of the decrease in pigs stock (18.7 million head in 2002). This is the evidence of better utilisation of the sow herd and increased reproductive efficiency.

Concentration of pig rearing in the EU is very high: some 49% of herds are of more than 1,000 head (average: 92 head per farm). In Poland, the average herd size is 16 individuals. Dispersal of production makes standardisation of quality of carcase difficult. The improvement of meat properties in pork production is necessary. The accession to the EU, smaller support and resignation of intervening into swine market in favour of subsiding private storage may result in larger fluctuations of prices and in decreasing incomes to pig producers. An enforced concentration of pig rearing in Poland will be a likely consequence of the EU integration.

Sheep production

Polish sheep rearing is traditionally based on wool production, but it is difficult to obtain thin, good wool in Polish climate. For this reason, it is necessary to keep sheep under natural conditions, at low precipitation and in relatively dry habitat without shelters. Free market and the introduction of foreign capital to textile industry in Poland almost totally restricted the demand for raw materials, imported now from Australia and New Zealand. The export of mutton to Arab countries has also ceased almost totally (Moraczewski, Jankowska, 2004).

Out of 5 million sheep in Poland in the middle of the 1980s, only 340,000 head remained only in 2002. Protection of sheep breeding is thus necessary in Poland, more so that the species for ecological reasons is highly valued and protected in the EU countries through various forms of subsidies. The importance of that type of production is much smaller in Poland that in the EU, where some 98 million sheep are bred - most of them in Great Britain and Spain, and less in France, Italy and Greece.

Now the main source of incomes in sheep rearing are slaughter lambs. Production is focused on external market, as there is no tradition of consuming lamb in Poland. The EU is the main market partner. For example, light lambs and the so-called “Easter” lambs are exported to Italy. The best meat is obtained under Polish conditions from Polish meat races (Niżnikowski, 2004). Lower production costs enable competition on foreign markets (Bonnet, 2004).

The development of domestic sheep breeding largely depends on export possibilities. Production of slaughter lambs may also be supplemented by moderately extensive (ecological) production and processing of sheep milk. In the Carpathians, the highlanders milk mountain sheep produce famous oscypki, bundz, bryndza and żętyca.

Poland negotiated the productive quota for mother-sheep of 335,880 head per annum. Additionally, Poland obtained 355,000 euro for increasing bonuses for sheep. The bonuses may help developing this branch of organic animal production.

Summary

Presented data demonstrate a possibility of using over a million hectares of permanent grasslands, abandoned due to political transformation, for organic or extensive farming in Poland. It is suggested that the use of all abandoned and fallow lands, and especially permanent grasslands, should be directed to the extensive farming, using their ecological potential to produce beef or mutton based on natural bulk fodder produced with respect to the principles of good agricultural practices. It is advisable to direct more farms to production based on organic methods. Development of such production is justified for many reasons like e.g. the excess of conventional agricultural products in the EU, low consumption of chemical substances in Polish agriculture (the consumption of plant protective chemicals equals 0.4 kg/ha in Poland and 5-6 kg/ha in the EU countries), thanks to which food produced in Poland potentially contains less pollutants and is of better quality and has not lost its taste values.

The development of organic food production would expand the possibilities of export of Polish agricultural products (Moraczewski & Jankowska-Huflejt, 2003). The success on agricultural market in Europe and in Poland will be determined by the quality of offered products. It is argued that the niche for organic food will appear on the European markets, and the Polish products will be sold easier if they posses certificates of organic production.

Milk production in Poland is relatively stable. Increasing interest by farmers in the development of herds, in the increase of milk production and quality indicates that, in the nearest future, one may expect increased milk production, in spite of limited cattle stock.

Poland has relatively large areas of grasslands and favourable climatic conditions for horse breeding and a large stock of breeding horses. It is thus possible to develop breeding of slaughter, sport and recreational horses.

Possibilities of selling pork in the member countries of EU after extension will probably be no greater than at the moment. This may cause a decline in pork production in Poland. After the accession to the EU, Poland will compete with Hungary. Other accession countries like Czech Republic, Estonia and Cyprus are not an important market for pork. Already now the increasing self-sufficiency in pork production is a fact in the EU.

Beef market of the EU is currently burdened by overproduction and, in view of no possibilities of expanding the exports, requires self-restriction. In the internal export among the member countries, the important role will be played by factors other than prices: cattle identification, meat quality certificates and obligatory marking will sharpen this process.

The argument for activating animal production, processing and marketing of organic food in Poland is based on the high unemployment in rural areas. It is suggested that farmer incomes could be increased through e.g. agro-tourism, selling regional goods and food products or by organic production The reform of Common Agricultural Policy established in June 2003, will also affect Polish agriculture. The main aim of the reform is to separate subsidies from production in order not to stimulate the production. In the system adopted by Poland, the subsidy will pertain to arable land and pastures irrespective of whether there are animals on the farm or not. Consequently, there will be no stimulation of agricultural production which could be accepted in countries of high production. In Poland, where production has recently decreased, yields are low and food import overweighs export, this principle bears a risk of stagnation in already low agricultural production.

References

Bonnet J.N., 2004. Sytuacja i perspektywy produkcji owczarskiej w krajach kandydujących do UE. Zagrożenie czy szansa dla hodowli francuskiej? Przegląd Hodowlany nr 5 s. 19-23.

Fedyszak-Radziejowska B., 2004. Opinie. Polityka nr 23 5 czerwca s. 100 (przedruk za „Tygodnikiem Powszechnym" z 30 V).

Hamm U., Gronefeld F., 2003. Market situation for organic livestock products in Europe. In: Pro. Of 1st SAFO Workshop "Socio-economics aspects of animal health and food safety n organic farming systems", 5-7 September 2003. Florence Italy, ed. M. Hovi, A. Martini, S. Padel, s. 27-34.

Harasim A., 2003. Technologia jako czynnik kształtujący wykorzystanie potencjału produkcyjnego rolnictwa. Pamiętnik Puławski z. 132 s. 87-104.

Jankowska-Huflejt H., Moraczewski R., Zastawny J., 2003. Potencjał produkcyjny trwałych użytków zielonych w Polsce i możliwość poprawy jego wykorzystania. Pamiętnik Puławski z. 132 s. 121-126.

Jasiorowski H., Przysucha T., 2004. Perspektywy dla polskich hodowców zwierząt w świetle reformy Wspólnej Polityki Rolnej UE. Przegląd Hodowlany nr 5 s. 4-6.

Kałuża H., 2003. Konkurencyjność produkcji zwierzęcej na rynku Unii Europejskiej w aspekcie procesu integracji. Pamiętnik Puławski z. 132 sp. s. 159-171.

Klepacki B., 2003. Organizacyjno-ekonomiczne uwarunkowania wykorzystania potencjału polskiego rolnictwa. 184. Pamiętnik Puławski z. 132 sp.

Kuś J., Stalenga, 2003. Rolnictwo ekologiczne – alternatywny sposób wykorzystania potencjału produkcyjnego rolnictwa w Polsce. Pamiętnik Puławski nr z. 132 sp. s. 261-270.

Michna W., 1999. Znaczenie rolnictwa dla gospodarki narodowej. W: Gospodarowanie na użytkach zielonych w warunkach rolnictwa integrowanego. Mater. Semin. 44. Falenty: Wydaw. IMUZ s. 23-29.

Moraczewski R., Jankowska–Huflejt H., 2003. Perspektywy wykorzystania trwałych użytków zielonych po wejściu Polski do Unii Europejskiej. Wiad. Melior. nr 4, s. 213-215.

Moraczewski R., Jankowska-Huflejt H., 2004. Problemy kwalifikowania trwałych użytków zielonych do obszarów o niekorzystnych warunkach gospodarowania w Planie rozwoju obszarów wiejskich. Woda-Środowisko-Obszary Wiejskie t. 4. z. 1 (10) s. 311-322.

Nazaruk M., 1999. Żywienie pastwiskowe – podstawy produkcji taniej i dobrej jakości mleka i mięsa. Wiad. Melior. 2 s. 67-71.

Niżnikowski R., 2004. Systemy produkcji owczarskiej a jakość pozyskiwanych produktów. Przegląd Hodowlany nr 4 s. 15-17.

Okularczyk S., 2004. Dylematy ekologicznej produkcji zwierzęcej w polskich uwarunkowaniach ekonomicznych i rynkowych. Przegląd Hodowlany nr 3 s. 1-3.

Plan Rozwoju Obszarów Wiejskich na lata 2004-2006. 2004. Warszawa: Ministerstwo Rolnictwa i Rozwoju Wsi.

Rocznik statystyczny rolnictwa 1993, 1994. Warszawa: GUS.

Rocznik statystyczny rolnictwa 2001, 2002. Warszawa: GUS.

Użytkowanie gruntów, powierzchnia zasiewów i pogłowie zwierząt gospodarskich 2002, 2003. W-wa GUS.

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Application of hygiene regimen in obtaining and treatment of milk on organic and conventional farms in the Slovak Republic

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Introdcution

The quality of milk and milk products is determined by the quality of the basic material, i.e. the quality of the raw milk. Harmlessness and quality of milk and milk products can be achieved only by observation of rules of correct production practice during the treatment of milk in the dairy. The inevitable preconditions of achieving the required conditions during obtaining milk on farms is manipulation with milk during the distribution, treatment and final adjustment to the respective milk products.

One of the effective ways of the control of cleaning of dairy equipment and working surfaces is the Hazard Analysis and Critical Control Points system. In order to create such a system, samples were taken from milk parlours focusing on different parts of the milking equipment. The overall level of hygiene on three evaluated farms was compared.

Methodology

Evaluations were carried out on three farms with different orientation: a farm with organic dairy cows, a dairy farm in conversion and a conventional dairy farm.

Organic farm

The organic farm was situated in a protected mountainous area. The farm specialised in Slovak pinzgau breed, suitable for the mountains conditions. The number of dairy cows on the farm was 162. System of housing was based on cubicles with dimensions of 2.4 x 1.2 m and with bedding and permanent access to pasture. Milking was carried out in an Alfa Laval milking parlour two times per day. Milk production per lactation was 4,000 litres. Composition of milk was as follows: fat content of 3.8 % and protein content of 3.4 %. All milk produced was processed in own processing plant on the farm.

Farm in conversion

The farm in conversion was situated in a north-east protected area. The number of dairy cows was 100. The farm worked 690 ha of agricultural soil, 152 ha of arable soil, and 520 ha of pasture. The reared breed was the Slovak spotted breed. System of housing was based on deep litter, with access to range. Milking was carried out in an Alfa Laval 2 x 8 milking parlour. Quality of milk was class Q. Milk production was 3,500 litres per lactation and feeding was based on organic rations.

Conventional farm

The conventional farm was situated in a lowland area. The number of dairy cows of Holstein breed was 400. System of housing was based on resting cubicles of dimensions 2.1 x 1.2 m. All animals had permanent access to range. Dairy cows were divided into groups according to the reproductive cycle. Milking was carried out in a fully computerised BOUMATIC milking parlour. Production of milk per lactation was 7,300 litres, with a fat content of 3.9%.

Results

Swabs for bacteriological examination were taken from the following critical points of the milking system: distributor, filter and collecting tank. These parts appeared very important, as they indicated the effectiveness of cleaning and disinfection measures.

The results of the microbiological examination of swabs of the mentioned parts of examined milking equipment (CFU/10 cm^{-2}) in BOUMATIC and ALFA LAVAL milk parlours are summarised in Table 1. The microbial plate counts determined on the respective surfaces reflect the effect of application of disinfectants in relation to total number of micro-organisms Microbial contamination of the mammary gland is affected by its treatment with disinfectants after milking, the errors in sanitation of the milking equipment and, particularly, by selection of suitable concentration of the respective solutions, solution temperature and time of exposure.

Table 1: The hygiene level in primary milk production: microbiological evaluation of the swabs taken from different parts of the milking equipment (cfu/10cm^2).

SAMPLES	BACTERIA	Number of micro-organisms (CFU/10cm^2) DISTRIBUTOR morning	DISTRIBUTOR evening	FILTER morning	FILTER evening	COLLECT. TANK morning	COLLECT. TANK evening
CONVENTIONAL FARM	BOU-MATIC (Alkaline and acidic solutions – guardian system)						
I.	TBC	3	-	2	-	1	4
	E.Coli	-	-	-	-	-	-
II.	TBC	-	-	-	-	-	-
	E.Coli	-	-	-	-	-	-
III.	TBC	11	2	-	-	-	-
	E.Coli	-	-	-	-	-	-
FARM IN CONVERSION	ALFA LAVAL (CL_2 DISINFECTANTS)						
I.	TBC	12	2	23	14	7	14
	E.Coli	2	-	3	7	2	1
II.	TBC	-	-	3	5	4	-
	E.Coli	-	-	-	-	-	-
III.	TBC	-	-	1	-	3	5
	E.Coli	-	-	-	-	-	-
ORGANIC FARM							
According to information obtained from farmers the quality of the sanitation complied with the level required by regulations.							

Serious problems may arise when acidic disinfectant solutions are not alternated with alkaline ones. It is necessary to consider that the sanitation measures are not effective against all micro-organisms present on surfaces.

The differences between morning and evening milking were minimal in our study. Cleaning and disinfection in the primary milk production in the BOUMATIC milk parlour was automatic by application of acidic and alkaline disinfectants. Cleaning of the milking systems was ensured by preparations with detergent properties.

The farm in conversion used the Alfa Laval system. Cleaning and disinfection of the milking equipment was ensured with disinfectants based on active chlorine.

Different sanitation regime was applied on the organic farm. According to the regulations, only potable water heated to 85°C, 0.5 % solution of nitric acid and 0.5 % solution of sodium hydroxide may be used.

The microbiological control of disinfection in the primary milk production is one of the most important parts of the control of application of correct disinfectants and a suitable way of sanitation. Table 2 shows that, despite very good results obtained by taking microbiological swabs after sanitation, parallel application of a ATP bioluminiscence method (Merck HY-LITE SYSTEM) pointed to the presence of residual organic matter. The ATP method is considered a more sensitive measure of the cleaning effect than the conventional microbiological method, as it indicates the hidden potential of soiling for microbial growth overlooked by microbial swabs.

Table 2: Comparison of the results from primary milk production.

SAMPLES	BEFORE SANITATION		AFTER SANITATION	
	RLU	TBC	RLU	TBC
TEAT HOLDERS	38 000	800	85	0
DISTRIBUTOR	49 000	2010	120	0
TANK	95 000	23 000	180	0

Welfare of animals is affected also by the hygiene level of their environment. Table 3 indicates high level of care about the animals from all aspects, that are important not only for animal welfare but also for animal health and quality of animal products.

Table 3: comparison of environmental hygiene levels in the evaluated farms.

CRITERIA	FARM		
	ORGANIC	*IN CONVERSION*	*CONVENTION*
ANIMAL HOUSES	HIGHLY SATISFACTORY	SATISFACTORY	SATISFACTORY
YARDS AND ACCESS PATHS	HIGHLY SATISFACTORY	SATISFACTORY	HIGHLY SATISFACTORY
MILKING FACILITIES	HIGHLY SATISFACTORY	SATISFACTORY	HIGHLY SATISFACTORY
WORKERS AND MACHINES	SATISFACTORY	SATISFACTORY	SATISFACTORY

Conclusions

Complex sanitation in animal production is a basic prerequisite of good quality and safety of products. Evaluation of sanitation procedures should consider the method used and its impact on reliability of results. Hazard Analysis and Critical Control Point System is designed to increase safety of milk production and processing by monitoring and controlling processing steps that affect biological, chemical or physical hazards associated with production.

Development of organic livestock farming in the Czech Republic

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Scope of organic farming in the Czech Republic

The development of organic farming in the Czech Republic began in 1990. Compared with this first year, when there were just three farms in the Czech Republic operating according to the principles of organic farming, by the end of 2003 the number of organic farms had grown to 810, of which 346 are livestock farmers, operating over a total area of 254,995 ha, i.e. 5.97% of all farmland in the Czech Republic (this proportion is higher than the average of approximately 4% in EU Member States). However, organic production, particularly finished products, vegetables and fruit, is not sufficient. The share of organic food products in the total food market in the Czech Republic amounts to mere 0.06% (Table 1).

Table 1: Structure of land used for organic farming and the developments in the area of farmland used for organic farming in the Czech Republic

Year	*Number of enterprises inspected*	**Area of farmland used for organic farming (ha)**	**Percentage of agricultural land stock**
1990	3	480	-
1991	132	17 507	0.41
1992	135	15 371	0.36
1993	141	15 667	0.37
1994	187	15 818	0.37
1995	181	14 982	0.35
1996	182	17 022	0.40
1997	211	20 239	0.47
1998	348	71 621	1.67
1999	473	110 756	2.58
2000	563	165 699	3.86
2001	654	217 869	5.09
2002	717	235 136	5.50
2003	**810**	**254 995**	**5.97**

Land use and enterprise types

Land use and structure of organic primary production in the Czech Republic are presented in Tables 2-5.

Table 2: Structure of the land used for organic farming in the Czech Republic

Land	**Share (%) 2001**	**Share (%) 2002**	**Share (%) 2003**
Arable land	8.78	8.31	7.70
Permanent grassland	89.69	90.13	90.86
Perennial cultures (orchards, vineyards)	0.45	0.38	0.36
Other land	1.08	1.18	1.08
Total	100	100	100

Table 3: Development of the structure of the land stock used for organic farming in the Czech Republic

Land	**2001 area (ha)**	**2002 area (ha)**	**2003 area (ha)**	**Year on year rise 2002/2003 (%)**
Arable land	19 164	19 536	19637	0.52
Permanent grassland	195 633	211 924	231683	9.32
Perennial cultures (orchards, vineyards)	963	898	928	3.34
Other land	2 354	2 778	2747	- 1.12
Total	**218 114**	**235 136**	**254 995**	**8.45**

Table 4: Overview of registered land and land classified in the transitional period by culture in 2003

Land	arable land	**permanen t grassland**	**perennial cultures**	**other land**	**total**
registered	14988	177787	322	2119	195216
transitional period	4648	53897	606	628	59779
Total	19 636	231684	928	2747	**254995**

Table 5: Number of enterprises classified as organic farmers as at 31 December 2003

Business entities by subject of activity	*2001*	*2002*	*2003*
Organic entrepreneurs, applicants for registration	654	717	810
Manufacturers of bio-foodstuffs (including those with their own distribution activities)	75	92	96
Persons placing bio-products and bio-foodstuffs into circulation	49	164	189
Total	**779**	**973**	**1095**

Structure of subsidies and factors driving the development

The greatest rise in organically farmed land was registered between 1997 and 2003, mainly because of the resumption of state aid for organic farming in 1998, which picked up on the state subsidies which had previously been available between 1990 and 1993. This support takes the form of direct grants and is established in a government ordinance on the support of the non-production functions of agriculture. A comparison of the amount of resources provided between 1998 and 2003 reveals that, in 1998, approximately CZK 48 million (i.e. approximately EUR 1.6 million) was paid out, rising to more than CZK 210 million (approximately EUR 7 million) in 2002. In 2003, state aid for organic farmers stood at approximately CZK 230 million (approximately EUR 7.7 million).

Organic farmers in the Czech Republic receive financial support throughout the time they are involved in organic agriculture. For example, aid is not restricted just to the time it takes to adapt a farm to organic operations (the conversion period). Government support is differentiated by type of culture; the different rates per hectare range from CZK 1,000 per ha (approximately EUR 33) to CZK 3,500 (approximately EUR 117), where grassland receives CZK 1,000, arable land CZK 2,000, and orchards, vineyards or hop fields, and vegetables on arable land CZK 3,500.

A significant factor in the stabilization of the system of organic farming was the adoption of Act No 242/2000, on organic farming, which formed a much-needed legislative framework for the whole system and which was prepared by the Ministry of Agriculture in cooperation with the Ministry of the Environment. This law entered into effect on 1 January 2001 and lays down the rules for organic farming, the production of bio-foodstuffs, processing, the import requirements connected with products from other countries, and the labelling of the produce of organic farming, as well as general requirements related to inspection procedures for this type of production. The law’s implementing regulations are Regulation No 53/2001, which with effect as of 15 September 2003 was amended by Regulation No 263/2003. This amendment mainly dealt with the implementation of Commission Regulation 1788/2001, an update of the list of fertilizers and plant production products, the list of raw and ancillary materials which can be used in the production of bio-foodstuffs, and the list of countries and their inspecting bodies whose certificates are acknowledged as equal to the certificates issued under the law.

Accreditation and certification

KEZ o.p.s. is the Czech national certification body and ČIA o.p.s. is the accreditation authority. In October and November 2003, supervisory inspections were carried out by the national accreditation body ČIA o.p.s. KEZ o.p.s. successfully defended its certificates for these activities: Certificate for the implementation of certification activities in accordance with Act No 242/2000 Coll. and Council Regulation (EEC) No 2092/91 - number 3096. Certificate for the implementation of inspection activities in accordance with Act No 242/2000 Coll. and Council Regulation (EEC) No 2092/91- number 4019

As a result, the requirements of the Ministry of Agriculture and the EU regarding the commissioned entity were fulfilled, and KEZ o.p.s. expanded its accreditation. Now it is eligible to carry out inspections and certification in accordance with the requirements of Council Regulation (EEC) No 2092/91.

The Czech Republic is registered in the list of third countries under Commission Decision No 548/2000 of 14 March 2000 for non-processed and processed products of a plant origin cultivated in the Czech Republic. The Czech Republic is also registered under Commission Decision No 2589/2001 of 27 December 2001 for livestock, non-processed and processed products of an animal origin. Registration in the List of Third Countries in accordance with Article 11(1) of Council Regulation No 2092/91 was extended until 30 June 2008 by Commission Decision No 2382/2002 of 30 December 2002.

At the beginning of 2003, KEZ o.p.s. received a certificate of accreditation from The International Organic Accreditation Service, Inc., with the right to use the logo of the International Federation of Organic Agriculture Movements (IFOAM) in its certification programme called KEZ Standards. The accreditation agreement was officially signed on the occasion of the international exhibition BIOFACHJ 2003 in Nuremberg on 14 February 2003.

'KEZ Standards' are designed for those farmers and processors who are interested in operating and fulfilling higher criteria of organic farming in accordance with the IFOAM Basic Standards, i.e. above the framework of the law and Council Regulation (EEC) No 2092/91. During the year, another supervisory accreditation visit was made, this time by the auditor IOAS. Minor inconsistencies discovered during the audit were explained and resolved. The system of inspection and certification in accordance with IFOAM rules was successfully launched.

Challenges of the organic milk production in Hungary

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Introduction

Until very recently, the primary aim of the agriculture has been to produce feed for the population. In developed countries today, there is also a demand for the agricultural production to provide a wide variety of safe food. Partially, the aim is to produce food with wholesome nutritional value and, indirectly, to maintain or increase the soil productivity by environment friendly technologies. The aims of organic farming fit these demands well, and organic farming has been developing from the mid-1990s in Hungary. The area of organic land was 11,390 hectares in 1996, which increased by almost ten times, and in 2003 it was around 130,000 hectares.

This paper presents the results of a recent study, based on deep interviews with Hungarian organic milk producers, and it is intended to answer the questions on the reasons of the difficulties and the opportunities of organic milk production in Hungary. The questionnaire included issues ranging from keeping, feeding and natural parameters of the livestock to the farmers' opinion on processing and marketing of organic products. Apart from the objective data on the enterprises, the project allowed the collection of information on issues, such as motivation of the farmers and the influence of external factors on organic dairying in Hungary.

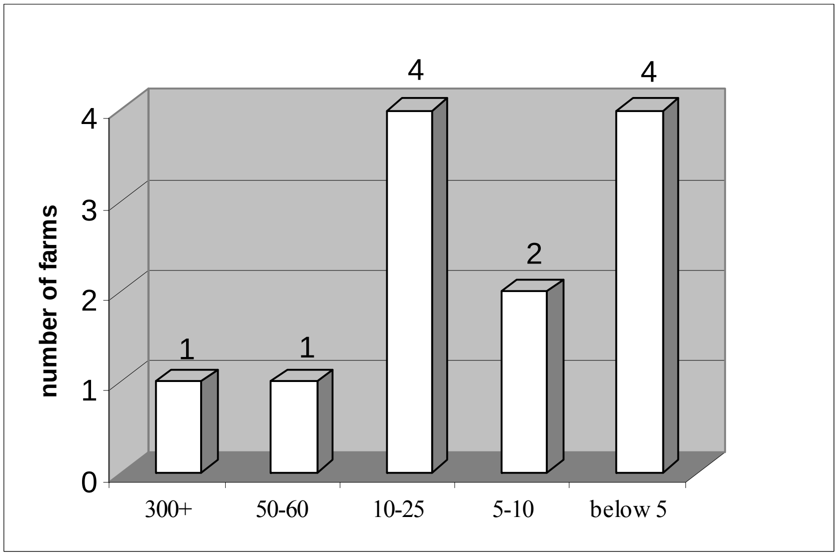
Organic dairy farming in Hungary

Milk production is a specific field of organic farming all over the world as well as in Hungary. All age groups think that milk consumption is healthy due to its role in whole value nutrition independently of regions and income (Hemme et al., 2002).

Unlike in some European countries, such as Switzerland, Austria and Germany, the development of organic dairy farming has been slow in Hungary. The reasons for this can partly be attributed to the structure of conventional dairy farming in the country. In Hungary, the feeding of dairy cows has traditionally been based on crop production. On the market of organic products, due to the high crop prices, the break even point of milk production would be higher than, or at least as high as, that of crop production only at an extremely high milk price. This high milk price is unrealistic both in Hungary due to low demand and in western Europe due to the existing lower prices. Further difficulty is that the crop produced is paid for in cash, whereas a dairy farmer would have to store the crop for feed at an added cost. Thus, only a few larger farms produce organic milk; with most of them keeping only a few cows in back yard.

Our survey showed that, in 2003, there were 555 milk type cows on 12 organic farms in Hungary (Figure 1).

Figure 1 Distribution of organic dairy farms by their size in Hungary, 2003



The annual milk yield per cow ranged from 3.5 to 7.5 thousand litres, with a mean yield of 5 thousand litres (weighted average at 6.7 thousand litres). The fat content of milk was 4% and protein content 3.5 % of the milk (with high standard deviation of 0.38 and 0.31, respectively).

The strengths of small farms are local specialities, however, their low volume of production is not suitable for commercial production and, therefore, the necessary investments are not available for them. For these small producers, only the traditional marketing channels provide income, such as selling from home and on markets, only providing part of the farmer's income. These farms can only provide appropriate income through government support or with other functions, such as organic tourism, catering, outwork or seasonal work.

Main motivating factor for starting organic farming amongst the farmers was a desire to practice environment friendly farming. One third of the farmers interviewed, however, admitted that economic reasons, such as a better profitability of organic farming, are also motivating factors. There are basically two ways how farmers plan to exploit the advantages of organic farming: by increasing the size of their enterprise or by adding services to their enterprise (agro tourism, training). Almost 60 percent of the farms participated in organic agro-tourism, one third of them had own shop, and two farmers process food and conducted training.

On all dairy farms involved in the study, the whole food chain was present from feed production through to its conservation, heifer rearing, milk handling or even processing up to the marketing of final products (raw milk, cheese, curd, butter). This kind of "separation" is economically reasonable, because crop purchase is expensive and difficult, and if the feedstuffs come from conventional farms, their share in feed ration is limited by regulations.

The organic dairy farmers also kept other traditional Hungarian animal species and breeds, such as mangalicza for pork production and Hungarian Yellow hens for egg and poultry production. Certain farms produced organic vegetables and fruits as well. It can be stated that the organic farms had both horizontal and vertical complexity.

The organic dairy farmers tended to adhere to thinking ‘close to nature’ and were conscientious with their husbandry and product quality, suggesting that good product quality could be one of the future strengths of organic dairy production in Hungary.

The producers were also careful in their choice of suitable breeds of cows. Two major breeds were Holstein and Hungarian Red, with the main emphasis on the Hungarian Red. Cross-breeding with Holstein, Jersey, Hungarofrezian or Finnish Ayrshire was also seen.

Further strengths of the small farms in the study were the local specialities (flavoured yoghurts, semi hard, hard cheeses), which well represent the flavours and tastes of given region.

Future prospects

Direct farm payments

As opportunities of organic farming, direct payments should be mentioned. In Hungary, organic farmers were supported by the government first from 1997 onwards. At that time, conversion and a part of paid costs were supported. The direct payments were distributed through applications for the grant. From 2002, the National Agricultural Environment Program (NAKP) supports the organic farms after their transition period as well. The difficult system of tenders was changed to normative payments; the payment is given on the basis of fulfilling the requirements instead of proving the costs. In 2003, the direct payments are given on normative basis, the payments for the transition period are the same, but are increased with only the inflation for organic lands. The number of farmers eligible to get support is greater than the previous year. In Hungary, there are not any payments for organic milk; however. Indirect payments are available for all organic farmers. Independently from the payments, organic milk production is a good source of income, which is either enough for or contributes the income of the family.

Healthy eating habits by consumers tend to favour organic products, and although no major growth in this areas has been seen in Hungary yet, the emergence of consumer interest is likely to be only a question of time. Organic milk is consumed by 10 to 11 percent in Austria and Denmark, 5 percent in Switzerland; this share is only 0.2 percent in Hungary, according to an internet portal (WWW.TEJPORTAL.HU). This is not surprising, since consumption of milk and milk products is lower in Hungary than in the EU. While in 1987, it was 200 litres per capita per year, recently it is only 150 litres. Suitable marketing strategy, advertisements and emphasising the especially good features of milk would be necessary to enhance milk consumption, which indirectly would increase the organic milk consumption as.

Imported organic milk products have appeared on the Hungarian market, threatening the home production. In certain regions of Europe, oversupply of organic milk can be seen, which means that after the EU accession, the leading organic milk producers, such as Austria and Germany will intend to sell their products in Hungarian stores. In order to avoid that, the Hungarian organic milk producers should gain on inland and abroad as well. Today, the organic milk products produced in Hungary are sold inland; there is not any or only a very low share of export.

Despite of many advantages, the sector faces several difficulties. One of these is feeding. Organic feeds have to be produced on the same farm if possible, but it is allowed to buy in from other organic farms. It is however cost demanding to buy in forage due to the high distances and the difficult transport.

Another source of threat is animal hygiene in organic dairy farming. In the field of elimination and treatments of diseases, the most important are the prevention and resistance. The use of medication is highly regulated. Traditional medicines are not allowed, instead herbs and homeopathic drugs may be used. The natural resistance of animals is maintained with good quality feed and free range keeping and raising by considering animal welfare rules. The most critical disease is mastitis; and recently in one of the farms the number of the animals dropped due to leucosis immunisation. Unfortunately animal hygiene is such a threat for organic farming that is not possible to avoid in many cases even if all the requirements are met.

On top of the previous, further challenge is the marketing of products of smaller producers. A significant amount of the milk produced is sold as liquid milk, while in smaller farms; the milk is processed to cheese and curd, because these are longer lasting and more variable. As these farms represent low amount of products on the market, partly they can not provide enough raw material for processors, and from the other side, neither they can launch into larger food chains, therefore their products should be sold locally on markets or from home. Despite of this, some of these farms have good ideas, and process their milk at their own processing facilities and sell. It is necessary to mention here the following challenge of organic milk production that is processing. For many farmers, it is highly challenging to meet the more strict requirements of food and animal hygiene rules. There are a low number of processors who are given allowance, thus the products can not be merchandised, which influences the market situation of organic milk products and allows only a few consumers to be introduced to the products and their advantages. Three fourth of the producers thinks that the requirements of processing are unreal.

On the common market of the EU, the Hungarian farmers can count on a favourable reception due to the high quality of agricultural products, especially of organic products. However, the food prices that are as high as or higher than those of the EU are not competitive, and because of the strengthening supply it will be more challenging to sell these.

Reviewing the history of organic milk production in Europe, it is obvious that this sector lives its childhood in Hungary. With the exception of a farmer who already produced organic milk in the 1980s, organic milk production started to develop in the end of the 1990s in Hungary. One reason for it was the long privatisation process: organic farming started slowly, while in the neighbouring countries it was given significant support by the government. In Hungary, the role of organic farming was acknowledged only later.

References:

Biokontroll Hungária Kht. (2002): Éves jelentés. Budapest, 2002. Január.;
Hemme T., Kirsch B., Borbély Cs., Kovács B., Geszti Sz. (2002): A tejtermékek fogyasztói árának és a tej felvásárlási árának nemzetközi összehasonlítása. Élelmiszermarketing, II. évfolyam 1-4. szám;
Kotler P. (1999): Marketing menedzsment. Műszaki Könyvkiadó, Budapest, 1999. 615-621. p.p.;
Madsen G. – Wendt H. (2004): Die Auszahlungspreise sinken, die Erfassungskosten bleiben hoch. Stiftung Ökologie und Landbau, 2004. 1. 129. sz. 47-49. p.p.;
Márai G. (2003): Miért jobb a biotej? Biokultúra, XIV. 6. sz. 4-5. p.p.;
Roszik P. – Kiss A. (2003): Állattenyésztés az ökológiai gazdaságban. Magyar Állattenyésztők Lapja, XXXI. 3. sz. 13. p.p.;
Solti G. (2003): Az ökológiai gazdálkodás 2003. évi támogatása. Kistermelők Lapja, 2003. 3. sz. 24. p. p.;
Szakály S. (1990): Tejgazdaságtan. Egyetemi jegyzet, Kaposvár-Pécs, 1991. 1-128.o.;
Szakály S. (2000): Tisztázó gondolatok a tejtermékek táplálkozásbiológiai szerepének valós megítéléséhez. Tejgazdaság, LI. 1. sz. 9-14. p. p.;
Yussefi M. – Willer H. (2002): Ökologische Agrarkultur Weltweit 2002-Statistiken und Perspektiven. SÖL, Nürnberg, 2002. Sonderausgabe 74.;
www.tejportal.hu/cikkek, Ismét biotej a hazai piacon.

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Organic horse-breeding in Estonia 2003

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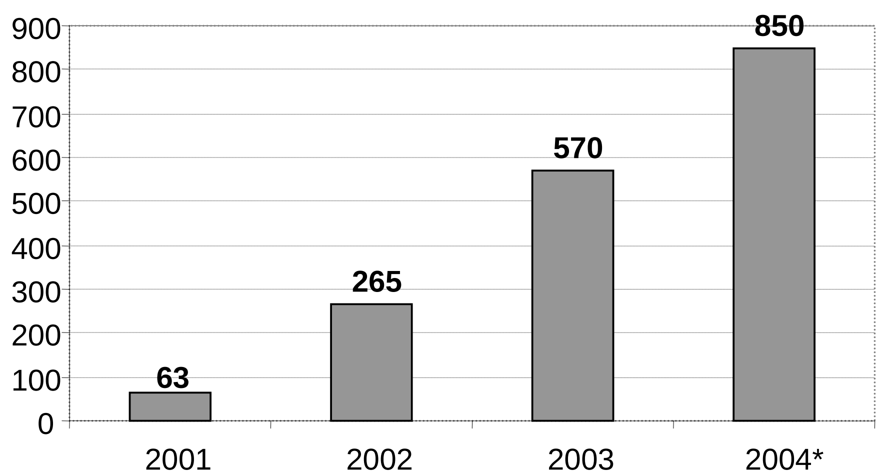
Introduction

This topic has been chosen due to the relatively wide-spread rearing of organic horses in Estonia. Approximately 10 per cent of horses are kept organically. Secondly, it was considered opportune to raise the several problematic areas in rearing sport or riding horses according to the organic regulations.

Organic horses in Estonia

There are about 5,800 horses in Estonia. Out of these, 570 horses were under organic control in year 2003 (Figure 1). Notably during the same period, there were some 7,900 cattle were under organic control (only 3.1% of all cattle in Estonia (Figure 2).

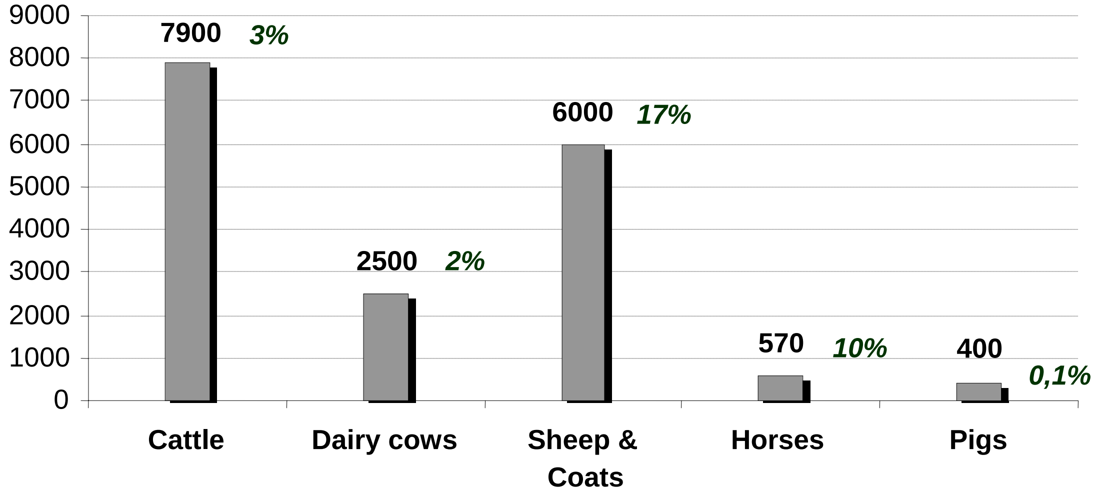
Figure 1: The number of organically raised horses in Estonia (2001-2003).



* expected value

In the organic farming register, there were 56 farms that were approved to raise horses organically. The farm sizes and numbers ranged from 1-5 horses in 40 enterprises, 6-10 horses in 5 enterprises and more than 11 horses in 11 enterprises. The biggest horse-breeding farm had some 130 horses. Furthermore, there are 35 farms, with total of 350 horses, where the arable production is organic but the horses are reared conventionally. Therefore, about 1/5 of all horses in Estonia are reared on organic or partially organic farms.

Figure 2: The number and share (%) of organically raised animals in 2003.



Why organic horses?

The main reason for the farmers' desire to start organic animal husbandry, including horse-breeding, is to get the subsidies for organic farming. If an enterprise keeps horses or other animals organically, the farmers will get higher support for perennial grasslands per hectare than he/she would without the livestock.

EU regulation 2092/91, Annex I part B 2.2.1, lays down the guidelines for conversion into organic production. If livestock products are to be sold as organic, the conversion of horses is 12 month for meat production. But, if horses are not reared for the meat, it means, they have no conversion period at all.

Problems?

Organic livestock must be registered and marked. All horses are intended to be marked with microchips since 2001 in Estonia. At the end of 2003, only 228 horses were marked. However, each horse has an individual data on a card, and all horses are entered in a national register. All veterinary treatments and vaccinations are to be entered on the individual card by farmers or the veterinarian.

Castration of stallions is a problem on organic farms. Castration of organically reared animals is permitted only in order to improve the quality of organic animal products, i.e. meat. The organically reared horses in Estonia are, however, not intended for meat production, making this justification difficult to pursue.

The Infectious Animal Disease Control Act enacts the list of especially dangerous infections. There are two diseases of horses on this A-list. These are: 1) African horse sickness; 2) Equine viral encephalomyelitis. According to the Estonian regime, vaccination of horses against tetanus should be done once every three years and against rabies once every year.

Horses are in contact with a large number of other horses, for example at different training centres, racetracks and shows. Therefore, horses must be vaccinated routinely twice a year in order to prevent equine influenza. Foals are routinely vaccinated to preventing influenza at least three times during there firs year of life. As routine vaccination is not readily accepted under the organic regulation, two organic enterprises were infected by influenza brought in from Germany in May 2003 and they had to re-vaccinate all horses.

In addition to routine vaccinations, preventive treatments for endoparasites are normally carried out two or three times a year. Ivermectins are routinely used for endoparasitic treatments on the organic farms. Another example of routine medication in the organic horse enterprises is the use of intravenous injections of phenylbutazone to control arthritis.

"Eternal conversion"

Horses are valuable animals, and their owners will spend considerable amounts of money for veterinary treatments. It is against organic principles for a farmer to conclude a conversion period for horses that have received too many routine veterinary treatments. As a consequence, many farmers ask permissions for a new conversion for the same horses. This practice leads to "eternal conversion periods", as farmers have no interest in selling the horse of their products as organic but are maintaining the herd organic only to be entitled to the subsidies for their permanent grassland.

A case study highlights this phenomenon: a large enterprise was inspected for organic certification. This was the first inspection for approval of organic animal husbandry on the enterprise. The farmer had approximately 60 horses. The farms veterinary prevention plan consisted of individual record cards of horses, where 5 to 8 different routine veterinary treatments were recorded for each horse annually. On this instance, farm was not approved for organic certification.

Conclusions

The main problems associated with the organic standards and organic horse rearing are:

- Castration of stallions;
- Intensive use of veterinary medical treatments;
- Manure is likely to contain high levels of residual substances from medicines; and
- Frequent transport of saddled horses.

The current system raises questions about keeping horses organically if they are not intended for food production. Should alternative standards be developed for horses that are kept organically but only for recreational purposes, or should the subsidy anomaly for horse enterprises be changed?

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The development of organic livestock production in Romania

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Introduction

In the present context of sustainable rural development, particularly in terms of integration with the EU, the interest in organic agriculture has increased in Romania in recent years.

This paper presents a synthesis of general data concerning Romanian agriculture, development of organic agriculture, with an emphasize on organic livestock farming.

Present situation of the agriculture in Romania

Romania has high agricultural potential. The agricultural area is of 14.8 million hectares and represents 62% of the surface of the country, with an average of 0.65 ha of agricultural area per inhabitant (Hera, 2004). The breakdown of the agricultural land area is presented in Table 1.

Table 1: Romanian agricultural land in 2003 (source: the Ministry of Agriculture, Forestry, and Rural Development – MAPDR –):

Type of land use	Area in million ha (%)
Arable surface	9.4 (63%)
Natural pastures	4.9 (33%)
Vineyards and orchards	0.5 (4%)

After 1989, when the laws No. 18/1991 and No. 1/2001 were put into practice, over 88% of the agricultural area of the country belonged to private owners. The cultivated arable surface is 9.1 millions ha, from which. The breakdown of land use of this area is presented in Table 2.

Table 2: Breakdown of land by crop type use of arable agricultural land in Romania.

Crop type	Area (million ha)
Cereals	5.1
Oleaginous	1.3
Technical plants	0.045
Vegetables	0.3
Seed and other cultures	1.4
Forages	0.6

Pastures are the main animal feeding resource (70–75% of feeding structure in herbivore vertebrates), forages cultivated on arable areas, and part of cereal production (concentrates, and products resulted from processing). Recently, there has been a tendency to resort to improved pastures and increase in livestock numbers. Table 3 present the total numbers of livestock in Romania.

Table 3: Livestock numbers in Romania in 2003 (according to MAPDR).

Type of livestock	Number of animals
Cattle	3,055,000
Sheep	8,504,000
Pigs	7,006,000
Laying hens	44,847,000

The active population, which currently works in agriculture, is about 41%, a 13% increase when compared to the year 1989. This development is considered to be a consequence of decline and unemployment in the industrial areas of Romanian economy. It is significant that the number of young people, who come back in rural areas in order to practice organic agriculture or to develop non-agricultural complementary activities, is increasing.

Present stage of the organic agriculture in Romania

After 1997, when the first associations practicing ecological agriculture appeared (”Bioterra”, ”Agroecologia”). Acceleration was recorded in the development of this sector. The increasing interest in organic farming amongst Romanian farmers has been seen as a result of improved information, and stimulating legislation by MAPDR. This has resulted in a rapid development in crop production and animal breeding in organic system.

Objectives

The objectives of the Romanian government for organic farming are:

- To put into practice plant and animal production systems that permit the rehabilitation and maintenance of the ecological equilibrium, by optimization of the relation soil – plant – animal, avoiding pollution.
- To integrate animal production with plant production.
- To consolidate living systems in the context of bio-geo-chemical cycles.
- To maintain biodiversity and genetic diversity in agro-ecosystems.
- To ensure animal welfare, health, and feed security using appropriate technologies;
- To maintain homeostasis in ecosystems, leading to improved quality and quantity of the primary (vegetal) and secondary (animal) production.
- To economically use conventional and especially non conventional (solar, energies, bio gas, etc.) energetic resources.
- To optimize the inputs (energy, materials) in the process of production.
- To supply a solid, healthy and attractive work environment which meets the needs of the farmers; and
- To obtain high quality vegetal and animal products, this will provide human health and feed security.

The agricultural surface area cultivated and certified in organic system

The development of the total surface area (Table 4) recorded a notable increase from 17,438 ha in 2000 to 57,200 ha in 2003 (328%). For 2004, an increase of the surface area under organic management to 755,000 ha (433% as compared to the year 2000) is estimated. The highest proportion is represented by forage crops (including pastures), followed by cereals, oil producing plants and protein crops.

For the year 2004, an increase of crop surface is estimated, by 8 times for vegetables, by 4 times for orchards, by 18 times for other crops (including medicinal plants) and 10 times for hay and forests as compared to 2000. A high interest for crops export was also recorded.

Table 4: The development of surfaces area certified as organic (ha) in Romania during 2000 – 2004.

Certified agricultural surface/crops	**Realized**				**Estimated**
	2000	**2001**	**2002**	**2003**	**2004**
Total surface	17438	28800	43850	57200	75500
Pasture and other forage crops, arable	9300	14000	20000	24000	27000
Cereals	4000	8000	12000	16000	24500
Oil producing and proteic crops	4000	6300	10000	15600	22000
Vegetables	38	100	700	200	300
Other cultures (including medicinal plants)	50	300	800	900	900
Fruits (morello, cherry)	-	-	50	100	200
Forest fruits	50	100	300	400	500

(Source: MAPDR)

Organic production

As a consequence of the increase of the ecological certified surfaces for the year 2004, as compared to 2000, the following estimations were performed: the total forage production will increase by 415%, cereal production by 424%, oil and proteic crops by 360%, vegetables by 500%, other crops (including medicinal plants) by 450%, and forest fruits by 250% (Table 5).

Low production levels were noticed per unit of surface area, due to the minimal inputs (material expenses, work, mechanical works, etc.).

Table 5: The development of organic production (thousands t) of crops in Romania during 2000–2004.

Certified agricultural surface/crops	Realized 2000	2001	2002	2003	Estimated 2004
Pasture and other forage crops, arable	32550	56000	78000	48000	135000
Cereals	7200	12.500	15	14.400	30.500
Oil producing and proteic crops	5500	7200	9000	12480	19890
Vegetables	0.600	4	7	2	3
Other cultures (including medicinal plants)	0.002	0.300	0.8000	0.900	0.900
Fruits (morello, cherry)	-	-	0.200	0.300	0.800
Forest fruits (hazelnuts, raspberries, bilberries)	0.200	0.400	0.300	0.320	0.500

(Source: MAPDR)

The main operators in organic farming and processing in Romania are described in Table 6.

Table 6: The main operators (produces and processors) in organic production in Romania.

Name of operator	Description
ASI Nature SRL	Romanian – German mix farm with headquarters in Sibiu; 5 ecological farms (vegetal farm with 1,500 ha, livestock farm with 5,000 dairy sheep). Perspectives: conversion of a 800 ha farms from the county of Timis, a farm for young rams rearing; a factory for sunflower oil production
Group BIO LA DORNA	Large milk processor; supported the inspection and ”BIO” certification for over 3,000 small milk producers from Dornelor Depression (mountain area with exceptional ecological conditions for obtaining high quality milk and milk products); produces the highest quantity of ”BIO” milk, butter, cheese of Dorna, and Schweitzer type. Perspectives: with SAPARD help, the group BIO LA DORNA credits 120 ecological farms (with at least 20 cows by farm; productions of about 15 millions L ”BIO” milk/year are estimated)
SC Camylact SRL Vatra Dornei	Milk processor; collects ecological milk from 340 producers which obtained certification, produces its own brand cheese and Schweitzer, all ”BIO” type
SC Prod-HOSAL Sibiu	Vegetal ecological farm with 875 ha surface, in the county of Arad; wheat, maize, sunflower, alfalfa are cultivated
SC BETRIEBS SRL	Vegetal ecological farm with 1,002 ha surface; wheat, sunflower, soy, clover are cultivated
SC CORTINA SRL	Livestock ecological farm; first farm in Romania with 2,500 laying hens
Association of Beekeepers from Romania – Mures branch	Mures branch has 1,256 members with 32,500 bee families. All formalities were performed in order to realize the ecological conversion. A number of 120 producers obtained certification.
BIOTERRA - the association of bio-agricultors from Romania	This association with headquarter at Luna de Sus county of Cluj, is considered the most powerful association of producers and processors from Romania. It has over 3,000 members, which obtained ”BIO” certification for vegetal (cereals, oil producing plants, vegetables, fruits, medicinal plants, forage crops, and other crops) and animal (milk and milk products, poultry, porc, calve, and lamb meat, honeybee, etc.) production. The members of the association are interested of ”BIO” production of the following: medicinal plants, snails, fish, frogs, pheasants, rabbits, geese, ducks, guinea hens, turkeys.

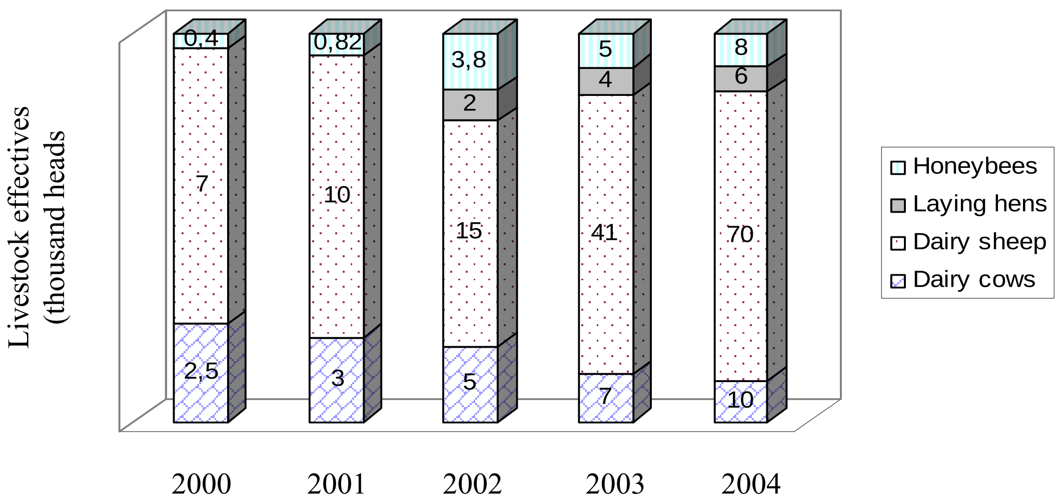
Organic livestock farming

There was a rapid development of organic livestock farming as well (Figure 1). In particular, after 2000, an increased interest for ”BIO” milk production was noted. From the year 2000, the number of certified dairy cows was 250,000 head. An increase of 280% was recorded in 2003, as compared to 2000, and a 400% increase, as compared to the same year, was estimated for 2004. This increase is spectacular in dairy sheep. In the year 2000, the number of organic sheep was approximately 7,000, and increased by 586% in 2003. In the year 2004, an increase to 70,000 head is estimated.

The number of hens reared using an ecological system was 2,000 in 2000, having, in 2003, increased by 100%, as compared to 2000, and for 2004 the estimated increase is 300%.

A notable increase was also recorded in beekeeping sector. During 2000, about 400 families were certified for organic beekeeping. Their total number increased 12.5 times in 2003. For 2004, an increase to 8,000 families was estimated.

Figure 1: The development of organic livestock numbers in Romania in 2000–2004.



In the year 2000, five tonnes of feta cheese was certified as organic, and in 2002–2003 a 10–12 time increase was recorded (Table 7). For the year 2004, the certification of 80 ton of feta cheese is estimated, representing a 16 time increase, as compared to the year 2000. Certified cheese totaled 200 ton.

During 2002 (reference year) 478,000 organic eggs were obtained, and in 2003 a 200% increase was obtained. For the year 2004 a 300% increase was estimated.

A substantial increase was recorded for the production of certified honey. In 2000, a quantity of 10 tonnes of honey was certified, and an 8–11 times increase was recorded in 2002–2003.

Table 7: The development of certified organic animal production in Romania (2000 – 2004).

Product	**MU**	**Realized**				**Estimated**
		2000	**2001**	**2002**	**2003**	**2004**
Feta cheese	t	5	10	50	60	80
Schweitzer cheese	t	-	-	100	150	260
Cheese	t	-	-	100	200	380
Eggs	thousands pieces	-	-	478	965	1438
Honeybee	t	10	20	80	110	200

(according to MAPDR)

The organization of organic farming in Romania
Presently, professional associations or societies, with major role in promotion of the ecological agriculture, exist in Romania. These are presented in Table 8.

Table 8: Associations and organizations involved in ecological agriculture in Romania.

Association/Society	**Headquarters**		**Short presentation**
”AGROECOLOGIA” association	Cluj – Napoca	Operators	- 18 ”BIO” farms - 154 producers
		Area	- 185 ha
”BIOTERRA”association of the Romanian bio-agricultors	Luna de Sus, county of Cluj	Operators	- 2,700 individual producers - 1 regional milk producer, Dorna – Lactate - 1,700 controlled farms
		Area	- 12,000 ha
”ROMANIAN ASSOCIATION FOR SUSTAINABLE AGRICULTURE”	Fundulea, county of Calarasi	Operators	- 75 individual producers - 2 commercial societies
		Area	- 250 ha
”SOCIETY FOR AN ECOLOGICAL AGRICULTURE”	Cluj – Napoca	Members	- professors, researchers - students, operators (producers and processors)
”ECORURAL” association	Bucuresti	Members	- professors, researchers - students, operators (producers and processors)
”ROMANIAN ASSOCIATION OF APPLIED BIO-ECOLOGICAL AGRICULTURE”	Arad	Members	- professors, researchers - students, operators (producers and processors)

Within the Ministry of the Agriculture, Forests, and Rural Development, the National Authority of the Ecological Products (ANPE) was recently founded. This organism has the following duties:

- Elaborates the National Program concerning the ecological agriculture.
- Monitories of legal rules observance in the field of ecological agriculture.
- Controls the methods of ecological production of agro-alimentary products.
- Initiates projects of normative documents concerning the ecological agriculture.
- Elaborates and reviews duty booklets for ecological products.
- Elaborates control certification and commercialization rules and norms for ecological agro-alimentary products.
- Records and updates the evidence of operators (physical and juridical persons), which produce (process, import/export) ecological agricultural products.
- Accredits physical and juridical persons from both public and private sector which will perform inspection and quality tests for the ecological products.
- Monitories the activity of the inspection and certification organisms.
- Approves the Program for Inspection and Certification.
- Takes back, if necessary, the accreditation of the inspection and certification organisms.
- Assures the connection with the international specialized organisms in the field of ecological agriculture.

National legislation concerning the ecological agriculture

With the immediate perspective to adhering to European Union, Romanian officials considered as opportune to elaborate and implement national legislation harmonized with the European legislation. The following regulations were taking into account: CEE No. 2092/91. EC No. 1804/99, EEC No. 94/92, EEC 3457/92, EEC No. 207/93. Furthermore, when recent negotiations of Chapter 7 (Agriculture) were developed, Romania accepted the communitarian acquis for the point 6 concerning organic agriculture, and did not solicit transition time.

The sustainable development of farming and agro-alimentary sectors, in close association with environment protection and preservation of natural resources, is a strategic objective for the National Program for Agriculture and Rural Development in Romania. The legislative development aims to create and stimulate the development of organic agriculture system in concordance with the European systems.

Support for organic farming

Organic operators (producers and/or processors) in Romania benefit from financial support by bank credits with advantageous interest (e.g. FIDA), subventions of agricultural production (e.g. during 2004 the sum of 24 billions lei was used for a partial subvention of both organic vegetable and animal production).

The Special Program of Pre-adhering for Agriculture and Rural Development (SAPARD) offers to operators special opportunities, with its series of support measures. These are listed in Table 9.

Table 9: SAPARD measures in Romania for financial support of organic farming and processing activities.

Measure 1.1.	Improvement of processing and marketing of agricultural and fishery products (meat, milk, milk product, fish, cereals, oil producing plants, viticulture, fruits, vegetables, potatoes, sugar)
Measure 1.2.	Improving of the structures in order to realize the veterinary and phyto-sanitary quality control for the quality of the alimentary products, and food safety
Measure 3.1.	Investments in agricultural exploitations, horticulture, livestock farming (dairy cows, cattle, swine, poultry, fattening farms)
Measure 3.2.	Constitution of producers group
Measure 3.3.	Agricultural production methods, designed to protect the environment and to maintain the rural landscape
Measure 4.1.	Improvement of professional training
Measure 4.2.	Technical assistance

Inspection and certification

The inspection and certification activities were initially performed by foreign operators, primarily from Hungary, Germany, France, Austria and Italy. In July 2004, RENAR and MAPDR accredited SC Ecoinspect SRL, the first domestic body to inspect and certify organic products in Romania. SC Ecoinspect SRL is a private body, with 23 Romanian and foreign (from Republic of Moldavia, Switzerland, Germany, and Hungary) shareholders. The main aim of this body is to guarantee that the arable and animal products correspond to national and European Union regulations on organic production. SC Ecoinspect SRL collaborates with Bioterra Association and receives support for a limited time period from Swiss government.

Research in support of organic livestock farming: a case study of milk production in the East Carpathian region

Recent research, concerning the hygienic conditions and milk quality, were performed on 1,658 organic dairy farms in Dornelor Depression, situated in East Carpathian (Man *et al.*, 2003). This area is of great interest and with high potential to produce organic animal products.

From agricultural point of view, Dornelor area is characterized by the following features:

- The farms are private (100%), of low dimensions (2 – 10 ha of pasture, 1 – 8 ha of hay fields, 0.04 – 1.50 ha of arable fields for annual cultures).
- Permanent natural pastures represent the main forage source for herbivore animals (75 – 95%) during the entire year.

- The productivity of the pastures is low (2 - 4 t DM/ha) but the forage is of high quality due to the biodiversity of vegetation rich in gramineous and leguminous of high nutritional value, and also in different species with direct action on production stimulation and improvement of quality indices of milk and milk products, but also on animal heath.
- An extensive agriculture is performed in this geographic area (700 – 1,600 m altitude). Mineral fertilizers and pesticides are not used.
- Silage and industrial products are not administered to animals.
- The animal products, milk and meat especially are of high quality, appreciated on internal market and also on external market.

SC Dorna Lactate SA is one of the most important units for milk processing in the area. This unit collects milk from over 8,000 small producers, and can process about 25,000 l milk/24 hours. This society aims to collaborate with specialized units capable to certify milk production and processing according to European Community rules. Organic certification was obtained for milk production in verified farms (six ecological areas, having 1,658 farms, with a total surface area of 9,162 ha, and 3,621 head of cattle, of which 2,111 were milking cows and 295 heifers).

In concordance with EU Rules 2019/92 and GO 34/2000 research was focused to the study of hygienic conditions of the organic milk from above mentioned area, and examination of nutritional, bacteriological, technological and sensorial quality of milk obtained from the farms.

The quality of the milk obtained from the farms was studied using samples collected from producers in collection points and centers. The following methodology was used: nutritional quality: fat, protein, lactose, dry matter without fat were spectrophotometrically determined using the device Bentley 150; technological quality: somatic cell counts/ml of milk with Somacount 150 device; bacteriological quality: TGN (total germ number)/ml with Bactocount 70 device; sensorial quality: aspect, color, smell, taste, temperature, acidity by ordinary direct examination (Rotaru, O. *et al*., 1999).

The physical examination of the farms showed that the animal shelters corresponded to EU Rules 2092/91 concerning material (wood), stocking density standards and presence of pens and alleys for moving. Only 1% of the 1,658 farm buildings was constructed with azbo-cement roofs. In winter, during the night, cattle were tied in stalls but were kept loose during the day. The microclimate in the shelters and mesoclimate in the grazing areas (from 700 m altitude to 1,500 m, including the forest areas) had high temperature and moisture variations. The lighting arrangements were adequate in 47% of the shelters, satisfactory in 45% and insufficient in 8%. Ventilation was natural, but only in 27% of the cases did it correspond with hygienic norms; in 60% of the cases, ventilation was not sufficient. Harmful gases, such as ammonium, were temporarily and locally identified in the winter, in shelters with inadequate ventilation.

Collection and storage of manure was carried out manually in most cases, and the systems had many hygiene deficiencies. Only 2% of the farms had manure platforms made of concrete and adequate collection facilities for slurry. The manure and slurry collected on the farms was used for pastures and hay fields fertilization, but not over the equivalent of 170 kgN/ha/year.

Table 10 presents the core results of the milk analysis.

Table 10: Milk quality in bulk milk from organic farms in the East Carpathian region in Romania.

Month	No. sample	Collected milk (L)	Milk quality (%)				
			Fat	Protein	Lactose	Extracts*	Density
November	26	12,490	3.97	3.42	4.74	8.59	1.0290
December	25	11,100	3.94	3.42	4.80	8.56	1.0289
January	26	11,425	3.82	3.33	4.78	8.60	1.0287
June	25	14,084	3.52	3.27	4.82	8.53	1.0285
July	27	14,618	3.52	3.19	4.74	8.44	1.0283
August	27	14,618	3.55	3.22	4.65	8.50	1.0282

*Non-nitrogenous substances
(Man, C. *et al*., 2003)

Individual values of milk fat content were between 2.88 and 4.56%, the monthly averages in winter being satisfactory, over 7% useful substances, while during summer, they supported the effect of heat. The potential of Pinzgau of Dorna breed, which is dominant in studied area, is high, but feeding, based almost entirely on grass in summer and hay in winter, and does not permit the animals to reach their full potential. Technological quality estimated using the somatic cell counts/ml (SCC/ml) is presented in Table 11.

Table 11: Somatic cell counts levels in organic milk from the East Carpathian region in Romania.

Month	n	SCC/thousands/ml (month average)	Limits (x 10^3)
November	26	355	335-382
December	25	344	314-366
January	26	318	237-372
June	25	386	340-589
July	27	361	284-385
August	27	374	309-567

The month average number of somatic cell counts/ml collected milk from processing unit was high, even over 98% in farms where manual milking is used and clinical mastitis incidence is very low. Many farms with SCC under 100,000/ml or even 50 50,000/ml exist, suggesting that there is room for improvement on many farms.

Bacteriological quality of milk, in total bacterial count/ml (TBC) is presented in Table 12 (months' averages). TBCs were very high at all harvesting points: central tank, milk from collecting centers or by routs, confirming important hygienic deficiencies recorded especially at farm level.

Table 12: Total bacterial counts in milk form organic dairy farms in the East Carpathian region in Romania.

Month	n	TGN/ml/ x 10^3 (month average)	Limits (x 10^3)
November	26	466	381-582
December	25	444	409-490
January	26	445	406-488
June	25	486	416-555
July	27	489	416-555
August	27	497	456-532

References

Hera, C. (2004) – Agricultura României în contextul integrării în Uniunea Europeană. Rev. Agra Terra, nr. 2, 5-8, ISSN: 1583-6460.

Gădea, Ştefania, Puia, I., Paşca, M., Fiţiu, A., Vâtcă, S., (2003) – Combaterea bolilor şi dăunătorilor la produsele depozitate în agricultura ecologică. Ed. Risoprint, Cluj-Napoca, 219 p, ISBN: 973-656-571-8.

Găvrilă, M., Fiţiu, A., Cernea, S., Vâtcă, D., Oltean, I., Sârbu, Camelia (2003) – Tehnologii în agricultura ecologică. Ed. Risoprint, Cluj-Napoca, 207 p, ISBN: 973-656-551-3.

Ivan, I., (2002) – SAPARD Programme – Anoportunity to increase the performances of the Roumanian animal sreeding, Bul.USAMV Cluj-Napoca, Seria Zootehnie şi Biotehnologii, 57, 87-90.

Man, C., Podar, C., Ivan, I., (2002) – Ecologia exploatării taurinelor – Ecology of catle reading. Ed. Academicpress, Cluj-Napoca, ISBN: 973-8266-70-X.

Man, C., Mihaiu, M., Cristina, Hegheduş, Man, C.A., Trînc, V., (2002) – The study of some hygiene factors an milk chain in sheep farms. Bul.USAMV Cluj-Napoca, seria Zootehnie şi Biotehnologii, 57, 91-95.

Man, C., Sandu, M., Ivan, I., (2003) – Condition of hygiene and quality of milk obtained in bio farms from Dornelor Depression. Bul. USAMV Cluj-Napoca, Seria Zootehnie şi Biotehnologii, 59, 15-18, ISSN: 1454-2382.

Mihai, Gh., (2002) – Valorificarea pajiştilor prin păşunat. Ed. Academicpress, ISBN: 973-8266-47-5.

Mihai, Gh., (2004) - Grazing systems in Romania.- Influence on the production of pasture ecosystems. 39th Croatian Symposium on Agriculture, Opatija-Hrvatska 17-20 february, 659-660.

M.A.P.D.R. (2004) – Buletin informativ, iunie-iulie.

Oroian, I., Fiţiu, A., Florian, V., Puia, C., Dumitraş, A., (2003) – Controlul patogenilor în agricultura ecologică. Ed. Risoprint, Cluj-Napoca, 204 p, ISBN: 973-656-559-9.

Puia, I., Soran, V., Rotar, I., (1998) – Agroecologie, ecologism, ecologizare. Ed. Genesis, Cluj-Napoca, ISBN: 973-9387-02-0.

Puia, I., Soran, V., Carlier, L., Rotar, I., Vlahova, M., (2002) – Agroecologie şi ecodezvoltare. Ed. Academicpress, Cluj-Napoca, ISBN: 973-85075-3-7.

Toncea,I., Stoianu,R., (2002) – Metode ecologice de protecţie a plantelor. Ed. Ştiinţelor Agricole Bucureşti, 191 p, ISBN: 973-85284-4-5.

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Organic farming in Bulgaria: development and problems

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Introduction

Bulgaria is situated in the Sought-East part of Europe, in Balkan Peninsula and covers a total area of 110,910 square kilometres. Its greatest distance from north to sought is 330 km and from east to west 520 km. To the North is Romania, to the west, Serbia and Macedonia, to the sought, Greece and Turkey and to the east, the Black Sea (Stefanova, 2002).

According to various official national statistic reports, the total agricultural land area in Bulgaria was 6.2 –6.4 million ha, 56 -58% of Bulgarian national territory. Of this, approximately 4.8 million ha were arable (43% - Table 1), and around 1.4 million were pastures and grasslands. Around 95% of the cultivated lands are private, while the state still owns around 72% of the pastures.

Table 1: Land use in Bulgaria.

Arable land:	43 %
Permanent crops:	2 %
Permanent pastures:	14 %
Forests and woodland:	38 %
Other:	3 %
Irrigated land:	12,370 sq.km

Bulgarian agriculture has seen fundamental changes since 1989, with the abandonment of the centralised planning of farming and the liberalisation of agricultural markets. Huge agricultural production organisations have been liquidated and agricultural land and other assets redistributed or privatised (Bachev and Terziev, 1999). Despite the privatisation of land a fairly large share of the agricultural area is farmed by co-operatives, over 40 percent of arable land belongs to them. As far as the individual farms are concerned, their size distribution is presented in Table 2. It is evident that the individually operated farms in Bulgaria are characterised by a large number of very small farms. Only a small number (0.2 %) of farms are above 10 ha. The average size of the private farms above 10 ha is, however, 509 ha. In addition to these private farms, 3,126 cooperatives (with an average of 700 ha) and 364 state farm (with an average of 3,573 ha) exist (Sarris, 1999). The rural population is 32.3 percent of the whole population, or 2.7 million people (Bentcheva and Georgiev, 1999).

Table 2: Size distribution on individual farms in Bulgaria

Groups by farmed area, ha	*Number of farms*	*Share of group in total, %*	*Farmed land, 1000 ha*	*Average size, ha*	*Share of land in total, %*
< 0.2	915 217	51.5	83.1	0.09	3.1
0.21-0.5	363 564	20.5	118.4	0.33	4.4
0.51-1.0	256 442	14.4	180.5	0.7	6.7
1.1-2.0	156 473	8.8	214.6	1.37	8.0
2.1-5.0	68 474	3.9	205.1	3.0	7.7
5.1-10.0	13 446	0.8	90.3	6.72	3.4
> 10.0	3 506	0.2	1 783.2	508.6	66.7
Total	1 777 122	100.0	2 675.3	1.51	100.0

(Sarris, 1999) referring to the European Commission

According to Bentcheva and Georgiev, the changes during the transition period have resulted in a lack of equipment and machinery on farms (Bentcheva and Georgiev, 1999). Many inputs that had been critical before (e.g. fertilizers, lime and pesticides)
are simply too expensive to buy. Since many farmers lack experience, management and financial capabilities, as well as a difficulty in tacking credit, they have been careful not to take any market or export risks. Survival of the farm and a minimum income in the short-term are the first priorities. Natural resources and environmental management, therefore, appear to be secondary factors when farmers decide upon agricultural production. Significant areas of land are abandoned, left uncultivated and severely infested with weeds. They are creating an increasingly unattractive post-collective landscape.

Good possibilities for organic farming in Bulgaria

Bulgarian agriculture is at a crossroads, seeking the right approach to develop its future. A challenge for rural policy in Bulgaria is to find agricultural systems that produce enough food, preserve the environment and increase employment. Sustainability of agriculture could be obtained by developing of organic farming, low-input sustainable agriculture systems and integrated production.

Bulgaria has several good pre-conditions for such systems:

- Favourable geographical and climatic conditions: natural conditions are very suitable for development of organic agriculture, especially in mountain and semi-mountain regions, in combination with eco tourism;
- Labour costs remain low;
- Restrained use of pesticides and fertilisers: there are a lot of lands in the country where agrochemicals were not used during last 5-10 years. It is possible to start organic farming on such lands under reduced conversion period;
- Experts even regard organic farming as the chance of Bulgaria after its EU accession because the extensive farming is common in Bulgaria;
- The necessary know-how is already available in the research institutions and NGOs; and
- Legislation is harmonised with that of the EU.

Starting level of organic farming

There are serious efforts made to establish organic agricultural production, but these activities have mainly been carried out by NGOs. For a long period of time, Bulgarian government and especially Ministry of Agriculture were not engage with organic agriculture. It is still without any government support and, consequently, has not developed successfully, like in other new members of the Union and pre-accession countries.

Several structures for development of organic agriculture in Bulgaria are in existence, however:

- Agroecological centre at Agricultural University – Plovdiv, founded in 1987, is the first Bulgarian member of FOAM, from 1993;
- Association for Ecological Agriculture "Ecofarm" – Plovdiv was founded in 1996;
- Foundation for organic agriculture "Bioselena" – Karlovo was founded by support of Swiss organisations. Established in 1998, with the aim of dissemination and development of organic and sustainable agriculture and preservation of the agrobio-diversity, Bioselena is a member of the International Federation of Organic Agriculture Movements (IFOAM);
- Cooperative Bio-Bulgaria, founded in 1999 by 35 farmers wishing to work according to the principles of organic farming. In April 2001, it was registered as a legal entity, which is supported by the Swiss Agency for Development and Cooperation. The agency has been involved in Bulgaria for eight years and has already spent three million Swiss francs (1.3 million euros) on helping farmers find their feet;
- Association "Agrolink" – Sofia;
- National commission of organic agriculture at Ministry of agriculture and forestry is founded in 2002;
- The first Bulgarian Organic Inspection and Certification Agency - Balkan Biocert was set up in September 2002. Balkan Biocert is a product of international partnership aimed at answering the need of the Bulgarian organic operators. The project partners are FiBL (Research Institute of Organic Agriculture, Switzerlans), IMO (Institute for Market Ecology, Switzerland) and Bioselena (Foundation for Organic Agriculture, Bulgaria).

Two National regulations for organic agriculture are approved: Regulation No 22 for organic plant production, from August 2001 of Ministry of agricultural and forestry and Regulation No 35 for organic animal production, from August 2001 of Ministry of Agriculture and Forestry and Ministry of Environment and Waters.

On 21 and 22 November 2003 in Plovdiv, was held a conference "The opportunities of the organic agriculture in the enlarged European Union". This conference offered a platform for more detailed discussion of organic production perspectives and potential in order to achieve a sustainable agriculture and efficient management of natural resources. The main goal of the conference was to find an answer for the opportunities of organic agriculture in the enlarged European Union. In the conference, participated Mr. Franz Fisher, EU Commissioner on agriculture, fishery and development of rural areas, Deputy Ministers from eight countries, representatives of State institutions, NGOs and producers.

Number and type of organic livestock farms

More than 100 farmers are registered in conversion period for organic farming at "Ecofarm" and "Bioslena", with about 500 ha and 1,000 beehives. They are mainly small farms and grow strawberries, raspberries, medical crops, fruits and vegetables, milk, meat, honey etc. Organic production is mainly for export, very little is consumed within Bulgaria.

In the Table 2, the organic livestock farms are presented, according to their region and number and type of animals. All of them are situated in Balkan mountain, where a lot of grassland and pastures are available. Abundance of grassland is the main reason for keeping organic dairy cows and sheep. The number of farms is still very small, compared to other countries with the same type of development.

Table 3: Organic livestock farms in Bulgaria (source: "Bioselena").

Farm	Region	Dairy cows	Heifers	Yang males and females	Cows	Calves	Sheeps	Arable land, dka	Grassland and pastures, dka
1	Trojan	24	11	21					853
2	Trojan	18		11				187.54	1100
3	Trojan			20	60				908.6
4	Trojan	8		3					250
5	Sevlievo	14	2	8					350
6	Sevlieo			4	11	40			500
7	Sevlieo				18		110		400
8	Sevlievo	13	2	6				40	350
9	Karlovo						700	1500	150
10	Karlovo	30**					60	35	30

* Farmers in shaded are in a transition period, others will join till the end of the year
** Grey Iskar Cattle - combine use - milking only in 4 months per year
** Grey Iskar Cattle - combine use - milking only in 4 months per year

International projects in organic farming

In Bulgaria, organic agriculture has been promoted via several international projects:

- TEMPUS project - for establishment of an University Agroecological centre and open a new speciality – Agroecology at Agricultural University–Plovdiv;
- Two PHARE projects – to set up two demonstration centres for sustainable agriculture with demonstration farms and research and education centres for dissemination of knowledge and experience in organic agriculture;
- A Bulgarian – Swiss project for development of sustainable agriculture in the region of Central Balkans;
- A Bulgarian – Austrian project – for support of small farmers from two Bulgarian regions in production of safe organic food;

- Project - "Rare Indigenous Breeds", financed by Swiss Agency for Development and Cooperation. Objective of this project is the protection and preservation of the four threatened breeds of domestic animals: Bulgarian Grey Cattle, Rhodope Shorthorn Cattle, Karakachan Sheep and Copperred Shumen Sheep. The project aims to provoke public interest in the preservation of the Bulgarian breeds and the creation of economic preconditions for the breeding of animals of these breeds. As a result of the project's activities, big part of the presenting animals have been investigated, described and marked; breeds' descriptions are both developed and established; the four breeds are enlisted in the 1.3 Measure of SAPARD program.

SAPARD program

The decision of the European Commission from 27.05.2003 approved agri-environmental measure "Development of environmentally friendly practices and activities" of the national agricultural and rural development plan under SAPARD program. This includes support to private investments and schemes to develop the diversification of economic activities in order to retain population in the rural areas, based on improved working and economic conditions. The implementation of the measure will also contribute to the preservation of Bulgarian environment, as well as the protection of wild flora and fauna, when it operates in an integrated way with the rest of the measures under SAPARD, and especially with these included in the "Integrated rural development" priority area.

In the same time a lot of difficulties to be sponsored by this program exist, namely:
- A lot of documents and papers have to be supplied; preliminary investments have to be available;
- Reimbursement of funds is up to 50% (EC: 75% and national: 25%) of the total eligible cost of the investment;
- A business must demonstrate that it can serve its debt obligations in a regular manner;
- Businesses must demonstrate market outlets by presenting letter of intents/preliminary contracts from trade partners; and
- The minimum total eligible cost have to be 1,000 EUR0.

All these and other requirements make it difficult for farmers to take such credit when agricultural production is in a very small scale and when the main aim is survival.

Difficulties facing organic livestock farmers in Bulgaria

In the countries of EU, transition from conventional to organic farming is much easier than in Bulgaria, especially for herbivorous animals. In practice, all member states have their agri-environmental programmes for support of producers – in some of these countries this support is provided only during the conversion, but in the most of the member states it is granted during the whole period. The effect of the support is the same in all cases: it contributes for the development of the sector.

In Bulgaria there are problems for successful development of organic livestock farming, due to the lack of state support. For the conversion, a lot of investments are needed for: reconstruction of buildings and barns (shelters); building of places for storage the manure; own forage production. There are strict veterinarian hygiene requirements for processing of livestock products. On farm processing and direct marketing to the consumers is limited and livestock products are not traditionally part of Bulgaria's export trade in food.

Some measures and possible solutions for better development of organic farming in Bulgaria

For the consumer

Most of Bulgarian consumers do not recognise organic products and their specific method of production, and are interested mainly on health effects. More information about the best quality and health impact is needed. Information on organic foods is not sufficient and rules for production and certification need additional promotion.

Consumers do not recognise organic logo, so they need clarification in this field.

For the farmer

To change farmers motivation, as half of interviewed farmers put market demand ahead of the desire to convert to organic production. The environmental concerns are not much appreciated in Bulgaria, in contrast to the producers in other parts of Europe. The farmers need to be convinced of the need for nature conservation. There is also a need to create more confidence in the future of agriculture among farmers.

For NGOs and the official advisory services

These institutes need to

- improve the farmer's view about organic farming;
- make producers acquainted with the legislation in the field of organic production;
- supply farmers with all necessary information – literature, brochures on organic production; and
- improve extension services by advertisements.

For the Bulgarian government

The government needs to provide special financial support for organic farming, because Bulgarian producers need mechanisms similar to that in the EU countries. Financial losses have to be compensated. Direct subsidies are the most desirable way of support. The government could also facilitate credit systems in agriculture and make credit available even for the smaller producers. There is also a need to make requirements for production of organic foods much lighter, to encourage and stimulate the market of organic products and to provide subsidies for research in organic farming.

References

Bachev H. & Terziev D. (1999) Review of needs and potentials for farm and farming systems data in Bulgaria, In Proceedings from Central and Eastern European Workshop on Need and Potentials for Farm and Farming Systems Data, p. 20-26, FAO, Rome.

Bentcheva N. & Georgiev S. (1999) Country report on the present environmental situation in agriculture – Bulgaria, In Proceedings from the First Workshop of the Central and Eastern European Sustainable Network at Gödöllő, Hungary, March 2 to 7, 1999, p. 47-68, FAO, Rome.

Sarris, A. H. (1999) Agricultural restructuring in central and eastern Europe: implications for competitiveness and rural development. Eur. Rev. Agric. Econ., 26(3): p. 305-329.

Stefpnova, V. (2002) Background study on the link between agriculture and environment in asseccion countries, National report for Bulgaria, May, 2002 –
http://www.ieep.org.uk/PDFfiles/PUBLICATIONS/AC-13/Bulgaria.pdf

http://www.balkanbiocert.com/index.htm

http://www.biobulgaria.com/index.html

http:/www.bioselena.com/bioENG/index.htm

http://www.eubusiness.com/afp/030928045018.mdh9ubw3 - Bulgaria hopes to become Europe's organic food basket
http://www.factbook.net/bulgaria/agriculture.php
http://www.fao.org/regional/seur/Review/Bulgaria.htm
http: /www.ieep.org.uk/PDFfiles/PUBLICATIONS/RuralAreasNewslink/Newslink3_GB.pdf – Sustainable farming in Bulgaria
http://www.mzgar.government.bg/MZ_eng/Sapard/Sapard.htm – SAPARD Program
http://www.mzgar.government.bg/ECOconf/eng/default.htm – Conference on organic agriculture

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Development of organic animal production in Turkey

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Introduction

Turkey is located at a point where the three continents are making up the old world. Europe, Asia and Africa are close to each other thus, making it is a pre-eminent centre of commerce for centuries. Turkey's surface area is 814,578 sq km of which 790,200 sq km are in Asia (Anatolia) and 24.378 sq km are in Europe. Turkey is divided into seven regions (Ege, Marmara, Blacksea, Mediterranean, Central Anatolia, East Anatolia and South East Anatolia Regions). The prevailing climate in Turkey is hot dry summers with mild, wet winters; harsher in interior. Terrain is composed of mostly mountains, narrow coastal plains and high central plateau. Because of its geographical conditions, the mainland of Anatolia has been found as favourable location for settlement throughout history.

Turkey has a suitable position for organic agriculture because of its different ecosystems and rich biodiversity. In addition to this, about 40 % population are engaged in agriculture. Total cultivated agricultural area is estimated to be 22,156,234 hectares. Currently, only 103,190 hectares of total agricultural area is in use for organic farming (~0.5% of agricultural land). The aim of this paper is to show the development of organic farming and to determine the possibilities for the future development of organic animal production in Turkey.

Development of organic farming in Turkey

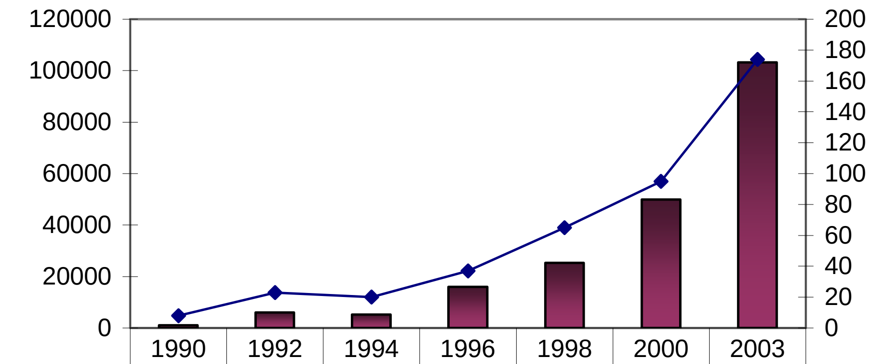
Organic agriculture in Turkey was structured according to the demands that came from the exporters, traders or farmers from Europe. Organic agriculture started with dried fruits and nuts (fig, grape, apricot, and hazelnut) and was limited to eight products in 1984-1990. Due to increasing demand, after 1990, the number of farmers and products increased steadily in organic plant production (Aksoy *et al*, 2002). Organic animal production started to develop in the last 2-3 years, except beekeeping that has a longer history. The reasons for the slow start in animal production lies in the traditional structure of Turkish agriculture: an exporter and a large scale producer of dried products in the world, plant production is not integrated with animal production like in many other Mediterranean countries and there are general problems even in conventional animal production.

Statistics

According to the statistics given by the Turkish Republic, Ministry of Agriculture and Rural Affairs (MARA), total organic agricultural area was 1,037 hectares (ha), and the number of products was 8 in 1990. In 2003, total organic agricultural area was 103,190 ha, and the number of products was 174. Total organic agricultural area had increased 100 %, and the number of products had increased by 42 % between these years (Figure 1).

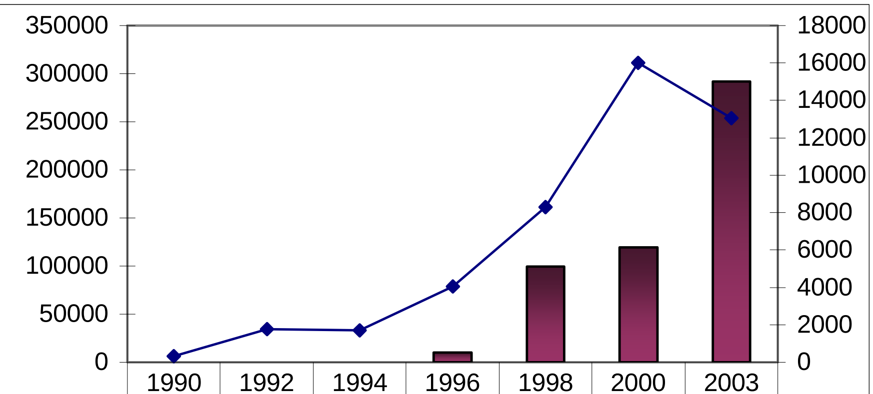
The number of farmers also increased from 133 in 1990 to 16,000 in 2000. It then decreased to 13,044 in 2003 (Figure 2). While the organic agricultural area increased, the number of farmers decreased in 2003, because exporters preferred big land owners in organic production instead of too many small farmers (Anonymous, 2004a). Total organic production is calculated as 291,876 tons in 2003, of which 15,275 ton is consumed in Turkey, mostly as conventional products.

Figure 1: The organic agricultural area and the number of products in Turkey in 1990-2003.



	1990	1992	1994	1996	1998	2000	2003
Organic Agricultural Area (ha)	1037	6077	5196	16000	25303	50000	103190
Numbers of products	8	23	20	37	65	95	174

Figure 2: Organic production and the number of farmers in Turkey in 1990-2003.

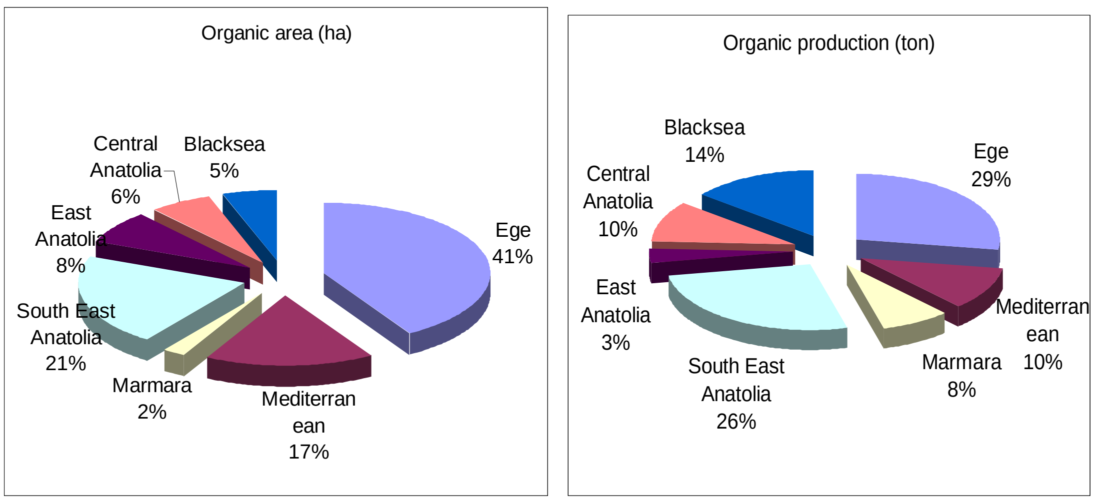


	1990	1992	1994	1996	1998	2000	2003
Organic production (ton)				10304	99300	119270	291876
Numbers of farmers	313	1780	1690	4034	8302	16000	13044

The distribution of organic farmers, within the Turkish regions, shows that Ege is leading, with 4,894 farmers, followed by Blacksea with 2,907, East Anatolia 2,021, Central Anatolia with 1,374, Marmara with 746, Mediterranean with 729 and lastly South East Anatolia with 373. The distribution of organic agricultural area according to the regions show that the majority is in Ege with 42,609 ha and a 41% share (Figure 3). Regarding the distribution of organic products with respect to the regions, most of the production is in Ege (29 %) with 80,639 tons (Figure 3).

Dried fruits and vegetables are the most common certified organic plant production system. According to the production data of organic animal production, certified organic production is rare and includes 48 tons of milk production, 8 tons of beef production and 4 tons of sheep meat production (Anonymous, 2004a). The number of organic beekeepers was 6 in 1998 and increased to 191 in 2003. Organic honey production was 679 tons in 1998 but, in 2003, increased to 1170 tons (Öztürk, 2004).

Figure 3: Distribution of organic area and organic production according to the regions in Turkey in 2003.



Standards, certification and labelling

Turkey is one of the few countries that has its own national organic regulation among developing countries, because it is an important exporter to the EU. Organic agriculture regulation in Turkey is based on EU regulation (Council Regulation EEC No 2092/91), was prepared by MARA and come into force on 18 December 1994 (No 22145). This regulation was revised and put into force on 11 July 2002 as "Principles and Application of Organic Farming" and animal production was included in this revision and modified according to Council Regulation EC No 1804/1999 (Anonymous, 2002). Alignment of the regulation is important for Turkey to be able to enter to the EU third country list. Equivalency with the EU will bring many advantages for the exportation of these products (Anonymous, 2004c).

Organic inspection and certification is carried out by private agencies authorized by Organic Agriculture Committee (OAC)" in MARA. There are seven independent inspection and certification bodies in Turkey. Five are representatives of European Agencies (IMO from Switzerland, Ecosert-sa from France, SKAL from Holland, BCS from Germany and ICEA from Italy) and two are Turkish Agencies (ETKO and EKO-TAR). Inspection and certification bodies must comply with the criteria of Turkish Accreditation Agency and issue certificates for exportation to the EU, EU quality standards (EU 45011). The farmers are visited and controlled at least once a year by an inspector. (Altındişli, 2002). The national organic label of Turkey is presented in Figure 4. The label is printed by MARA and the authority of this label belongs to OAC.

Figure 4: The national organic label of Turkey

Marketing

Almost all organic farmers in Turkey produce under contracted farming systems. Most of the organic products are exported to the EU countries. Germany is in the first row (about 55-60 % of total sales). The domestic market is much below the expected level but has started to develop since the last 2-3 years, due to the interest of people who are living in big cities. The sales of organic products in domestic market are made in natural product shops or in special sections of hypermarkets. Unfortunately, all products come from plant production, and there are few sales of organic animal products in Turkey.

Education and research

With the aim of providing healthy development of organic farming and to support education and researches in Turkey, Association of Ecological Agricultural Organisation (ETO) was established in 1992. ETO and MARA organize special courses and training, mostly for unemployed agriculture engineers, the extension workers at MARA and, rarely, for farmers. Currently, post-graduate organic farming lessons are given to students in some universities. There is an organic farming department in Kelkit Aydın Doğan Vocational School of Atatürk University in Erzurum. The school was opened in 2003.

Two national conferences were organised recently; next congress is planned for 2005. The first international organic animal production conference was organised in 2004 in İzmir, and 32 presentations were made, of which 17 were from EU countries. The congress was very successful and demonstrated the status of organic animal production in other countries.

The first research in organic farming in Turkey was carried out on organic viticulture. Following this, many research projects were supported by TÜBİTAK (Technical Research Council of Turkey), MARA and GTZ from Germany. In 2004, the research institutes of MARA prepared five projects on organic animal production. These projects were presented to the Agriculture Research and Development Directorate of MARA for support. Two of the projects are about "The Possibilities to Develop of Organic Aquaculture Production in Turkey" in Western Blacksea Region and South East Anatolia Region. The other three are about "The Development of Organic Sheep Production and Lamb Fattening" in Southern Marmara Region, "National Cattle Production" (South Anatolian Red / Kilis and East Anatolian Red)" and "Organic Beekeeping".

The possibilities of developing organic animal production in Turkey

The national animal stock of Turkey has an important potential for production. Large animal stock is 11 million heads, small animal stock is 35 million heads and poultry stock is 260 million. Total meat production is 1,348,134 Mt (of which beef and veal meat production is 381,000 Mt, mutton and lamb meat production is 286,000 Mt, goat meat production is 46,500 Mt and poultry meat production is 626.000 Mt), total milk production is about 8.160.000 Mt (of which cow milk, whole, fresh production is 7,100,000 Mt, sheep milk production is 780,000 Mt, goat milk production is 207,000 Mt) and egg production is about 543,000 Mt (Anonymous, 2004b).

The surface area that allows quality forage production in Turkey is 22.4 million hectares, of which the pasture and meadow land (grassland) is 21.7 million hectares and fodder crops land is 70,000 hectares. Of the main fodder crops in Turkey, the following are grown successfully: alfalfa (Medicago sativa), common vetch (Vicia ssp), maize for silage (Zea mays), and sorghum (Sorghum ssp) in all regions, white clover (Trifolium repens) in Marmara, Blacksea and transit regions, common clover (Trifolium protense) in Marmara, Blacksea, East Anatolia and transit regions, trefoil (Onocryshis viciaefolia) in regions where dry climate conditions dominate like central Anatolia. As a secondary fodder crop grown in winter seasons, common are vetch, common vetch+grain mix, clovers and clover+grass mix. For summer season; maize, sorghum, sudangrass (Sorghum sudanense) and sorghum+sudangrass mix in Mediterranean Region, maize on coastal regions, especially sorghum species durable to dry weather conditions inner regions, common vetch, trefoil and common vetch+grain mix can be grown in Eastern and Central Anatolia (Avcıoğlu et al, 2000). Grassland of Turkey has been damaged because of over-grazing, and its production capacity is very poor. (Kılıç, 2000)

Grassland should be improved and fodder crops should be increased in Turkey, Production of fodder crops are the basic branch to provide the integration of plant and animal production and this integration is the basic principle of organic agriculture (Şayan and Polat, 2002). Turkey is surrounded with seas from three sides, with different ecological characters, has altitude differences exceeding 5,000 meters from the sea level and various climatic zones arising from those features. Therefore, Turkey has become one of the most important countries is in its geography from the point of wetlands (Anonymous, 2004c). The integration of plant and animal production is very important in this wetlands, as by introducing fodder crops into rotations programs and by providing manure, soil structure and soil nutrition content will be improved, and the cost of organic plant and animal production will be decreased (Şayan and Polat, 2002). It may be easy to convert to organic management in animal production, if this integration takes place.

This is true especially in areas, where organic plant production is widespread, such as Düzce and Göksu Delta. Düzce is 200 kilometres from Istanbul, and has a great significance in respect to the drinking water of Istanbul (the Melen River passes through Düzce). Organic plant production in Düzce started after the big earthquake in 1999. The important organic products are beans, chickpea, peanut and maize. Although the city has fodder crops potential and quality grassland, organic animal production did not start, as organic fodder crops were not considered/integrated in organic plant production. There is rural a development cooperative, which has 200 members (from six villages) and an association working on organic production in the region. If the organic animal production starts in Düzce, it will be a good production model for other regions. In addition, drinking water provided from the Melen River will be protected from chemical pollutants. Goksu and Çukurova are other big wetlands of Turkey. Goksu Delta is the second biggest delta on the Mediterranean Sea coast, after Çukurova Delta. Converting to organic animal production will be easier in Göksu Delta than Çukurova delta, as the area is already well-protected.

North and eastern parts of Turkey are especially suitable for organic animal production, with their capacity of pastures and meadow and stock of large and small animals. Also the agricultural structure, customs and the natural and economical conditions are considered to lend themselves for the development of organic farming (Kaymakçı et al, 2004). It will be easy to convert to sheep meat and milk production in the east and the southeast regions, as sheep nutrition is based on pasture and meadow. Organic milk and beef production has a good potential, as plenty of fodder crops and wintering land is available in northern regions.

Imroz sheep that are bred in semi-wild conditions, on Gokceada on Northwest of Ege Sea, have a certain potential for organic meat production. The sheep provide shelter in areas where they themselves determine in different places on the island and feed only on pasture (Konyalı *et al*, 2004). The island can be the centre of organic sheep meat production, if organic animal and plant production are integrated.

Few examples of existing organic animal production in Turkey can be given, such as the organic dairy farm in Kelkit. A feasibility study was conducted and the region was defined an organic agricultural pilot are by MARA, and following this a master plan was prepared. The milk will be organically obtained from the management, which started with a capacity of 1,000 head/year. Contracted fodder crop production by local small scale producers will supply the production of organic feed. Another organic animal production farms is the Klan farm in Çanakkale. The production in the farm does not have any commercial features and animal production is kept at fixed number as 60 goats, 100 sheep, 5 cows and 350 chickens.

Conclusion

Organic animal production, in which ecological balance, animal welfare and health aspect in product quality are taken into consideration and emphasized, has a certain potential in Turkey. However, currently this potential is not put into use. The reasons can be stated as follows: organic plant production has developed due to the request of foreign countries, plant production is not integrated with animal production, organic feeds are rare and, especially many farmers are small land owners and are not organized to meet the prices of inspection and certification.

According to the Turkish view, during the transition to the EU membership, main targets are to improve the income distribution, to overcome poverty and to activate the dynamics in agriculture. Therefore, investments in organic plant and animal production could be one of the opportunities for this transition period.

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References:

Aksoy, U., Altındişli, A. ve İlter, E., 2002. Ekolojik Tarımın Tarihçesi ve Gelişimi. Organik Tarım Eğitimi Ders Notları. İzmir, 1-8.

Altındişli, A. 2002. Türkiye'de Ekolojik (Organik Biyolojik) Tarım. Organik Tarım Eğitimi Ders Notları. İzmir, 9-17.

Anonymous 2002. Organik Tarımın Esasları ve Uygulamasına İlişkin Yönetmelik. T.C. Tarim ve Köy İşleri Bakanlığı. Resmi Gazate, 11 Temmuz 2002. Sayı 24812.

Anonymous 2004a. T.C. Tarım ve Köy İşleri Bakanlığı İstatistikleri.

Anonymous 2004b. FAO, Statistical Databases/ Agriculture (www.fao.org)

Anonymous 2004c. Workshop Report on Development of Organic Agriculture in Turkey and Aligment of Related Turkish Legislation. 21-24 January Ankara, 19th February Erzurum, 8 March Adana.

Avcıoğlu, R., Açıkgöz, E., Soya, H., Tan, A.. 2000. Yem Bitkileri Üretimi. V. Türkiye Ziraat Mühendisliği Teknik Kongresi, 17-21 Ocak, Ankara. 567-586

Kaymakçı, M., Taşkın, T., Koşum, N., Önenç, S. ve Önenç, A. 2004. Organik Süt Üretimini Türkiye'de Geliştirme Olanakları. I. Uluslararası Organik Hayvansal üretim ve Gıda Güvenliği Kongresi, 28 Nisan-1 Mayıs. Kuşadası Türkiye. 358-370.

Kılıç, A., 2000. Kaba Yem Üretimi ve Sorunları. V. Türkiye Ziraat Mühendisliği Teknik Kongresi, 17-21 Ocak, Ankara. 845-858.

Konyalı, A., Das, G., Savaş, T., Yurtman, Y., 2004. Gökçeada'da İmroz Koyunu Yetiştiriciliği: Organik Hayvancılık için Potansiyel? I. Uluslararası Organik Hayvansal üretim ve Gıda Güvenliği Kongresi, 28 Nisan-1 Mayıs. Kuşadası Türkiye. 358-370.

Öztürk, A. 2004. Türkiye'de Organik Bal Üretimi. I. Uluslararası Organik Hayvansal üretim ve Gıda Güvenliği Kongresi, 28 Nisan-1 Mayıs. Kuşadası Türkiye. 358-370.

Şayan, Y. Ve Polat, M. 2002. Ekolojik (Organik Biyolojik) Hayvansal Üretimin Genel İlkeleri. Organik Tarım Eğitimi Ders Notları. İzmir, 239-251.

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Part E:
Poster presentations

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Hyperketonaemia risk lower in organic cows housed in free stalls

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Introduction

Hyperketonaemia is a common condition of dairy cows in early lactation, defined as an increase of ketone bodies beyond normal levels in blood, milk and urine. It is caused by negative energy balance, leading to mobilisation of the fat reserves of the body and increased production of ketone bodies. Hyperketonaemia causes financial loss by decreasing milk production, and by predisposing to other diseases. The purpose of this study was to explore the incidence of hyperketonaemia and its association with some predisposing factors in organic and conventional dairy herds.

Material and methods

In the Finnish province of South-Savo, all organic and a randomly selected sample of conventional dairy farms, were asked to participate. Altogether 10 organic (5 tie stall and 5 loose housing systems) and 13 conventional farms (all tie stalls) volunteered. Information was collected by interviewing the farmers, by making observations during two farm visits and from the national herd health recording database. Farmers collected three milk samples, at weekly intervals, 3-5 weeks after calving, from all of the cows that calved between October 2001 and April 2002. All three samples were collected from 123 organic and 103 conventional cows. Milk acetone was detected by flow-injection-analysis-technique. Cows were divided into normal and hyperketonaemic, based on their highest acetone value, with the cut off value of 2.5 mg/100ml. Hyperketonaemia risk and its association with predisposing factors was modelled with GEE population-averaged mixed model, and the association between hyperketonaemia and lactation curve with Greenhouse-Geisser variance analysis.

Results

The median incidence of hyperketonaemia was 18% at herd level, but there was a great variability between individual herds (0-50% in organic, and 0-86% in conventional). The risk for hyperketonaemia was significantly lower in cows in loose housing systems, being lowest (0.05) for 1st parity cows in organic loose housing, and highest (0.42) for 3rd parity and older cows in organic tie stalls. The level and form of the lactation curve differed significantly between normal and hyperketonaemic organic cows. The difference in the mean energy-corrected milk production between the ketonaemia groups in organic cows was non-significant, but a marked trend was noted, suggesting that hyperketonaemia can be more common among high producers

Conclusions

The variation in the incidence of hyperketonaemia is marked between individual herds, and even though organic farms have some feeding related factors predisposing to hyperketonaemia, there are also some management practices (especially in loose housing systems) which might act as preventive factors. However, it may be advisable for organic farmers to favour moderate milk production when selecting cows for a herd.

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Parasite control in Danish organic dairy herds and farmers' attitudes to agricultural production

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Introduction

A substantial number of Danish dairy herds is certified organic. The organic production system aims at having all cattle on pasture during the summer and restricts use of external inputs, e.g. the prophylactic use of anthelmintics. The objectives of the study were to establish to what extent preventive grazing management is used in Danish organic dairy farming, how it influences the number of diagnosed parasite infections and to what extent farmer attitudes towards agricultural production influence the use of preventive grazing management.

Results

In December 2002, a questionnaire was distributed to all Danish certified organic dairy farmers (n=717). 293 (41%) questionnaires were returned and used. The average farm size was 120±60 ha of approximately 47% clover-grass within the rotation and 9% permanent pasture. Average number of cows was 90±40 with a mean yield of 7,505±950 kg ECM. The data was analysed in three different groupings, according to: diagnosed nematode infections in 2002, diagnosed lungworm infections from 1998 to 2002 and, thirdly, farmer attitudes towards agricultural production. The latter was measured with the Alternative-Conventional Agriculture Paradigm Scale (ACAP-scale).

In total, 42% of the farms had diagnosed gastrointestinal (GI) nematode and/or lungworm infections in the herds in 2002. Moreover, 10% of the farms had lungworm infections in the herds each year from 1998-2002. Organic farmers with conventional attitudes towards agricultural production had a higher rate of parasite infections in the herd than herds where the farmers had more alternative attitudes. The majority of diagnosed cases of GI nematodes and lungworm were treated with parasiticides, whereas few treatments were characterized as prophylactic. Farms where (1) parasite infections were diagnosed in 2002, (2) lungworm infections were diagnosed each year in five year or (3) where the farmers had conventional attitudes, were significantly larger. Moreover, the first season grazing (FSG) heifers at these farms were turned out on unclean pastures, moved to clean pastures and housed before October 1st at a higher rate.

The latter two factors are considered attempted treatments and not risk factors *per se*. The approach to grazing management used for the FGS heifers, was thus more a treatment strategy than a preventive strategy. This could be due to a lower priority of preventive grazing management compared with forage production and grass growth or lack of grazing areas close to the farms in larger herds. The organic farmers with alternative attitudes turned out the FGS heifers on clean pastures, grazed by other animal species during the previous season more often than farmers with more conventional attitudes. It was concluded that the organic farmers in the future have to increase the use of preventive grazing management in order to effectively control parasite infections and reduce to use of medicines.

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Organic pig husbandry in Germany: structure, economics and market

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Introduction

This study was carried out between June 2002 and February 2004 by Die Ökoberatern in cooperation with the ZMP, Bonn, and the Institute for Organic Agriculture of the FAL in Trendhorst and many consultant specialists in organic pig-husbandry.

The study describes the structural and economical situation of the pig farmers in Germany. A pig husbandry working groups of 27 fattening units and 17 piglet producers came together to examine the production on these farms. The producers' production systems were examined intensively over 12 months by 9 consultants (full-cost-calculations, work-economy, and hygiene management). Data collection took place between September 2002 and September 2003. Discussions with the consultants and the producers were held in January of 2004. Additional intensive interviews with 73 pig farmers describe the status quo on farms.

Results

Piglet production

The results of the interviews of piglet producers about the structure of their businesses are summarised as follows:

- Annual finished pig production of 2001: about 130,000 finishing pigs (= 0.32% of the overall production); expectation 2004: 100,000 finishing pigs;
- 550-600 piglet producers, on average 18 sows per producer:
- about 220 farms with >9 sows; 7000 - 8000 sows in Germany 2004, about 450 producers with >2 sows;
- 2001: 16.3 reared piglet per sow and year, the corresponding figure in 2002/ 2003: 13.1.
- Annual weaned piglet production of 2001: 100,000 piglets (80% of the finishing pig numbers); 2002: 115,000 piglets; 2003: 100,000 piglets, 2004= 90,000 piglets expected (90 % of the demand);
- Piglet quality: poor to medium;
- Very few piglet producers are interested in the conversion to organic piglet production;
- Very few piglet producers with herds over 100 sows within Germany, consequently, integrated groups of 100-150 piglets per delivery is hard to achieve;
- Until 2005, additional planned increase of sows about 60%. Especially bigger producers of more than 45 sows think of increasing. Smaller producers, under 20 sows, plan to give up their production;
- Dominant breeds are DL-sows and Pi-boars;
- Important disease mention by interviewees: diarrhea (44%), red run (17%), milk fever (17%) and internal and external parasites (11%);
- Only 1 producer used a slatted floor system;
- Only 1 producer fed only straw as forage. Fresh grass and silage dominated as forage;

- Trough feeding was used on 95% of the farms. A quarter of the producers used dry feeders;
- Over 77% the producers already had built (part-) outdoor accesses, but no showers or wallows;
- Approximately a quarter of the producers had invested approximately 230€ per sow for the outdoor access. 36% of the piglet producers had invested about 360€ per sow in the housing area.

Performance indicators for the 17 case study farms in piglet production are presented in Table 1.

Table 1: Performance indicators, based on full cost analysis for 17 organic piglet producers in Germany, based on production figures from 2002-2003.

N	Key figures	Unit	Min-value	Max-value	4 producers Less successful	17 producers average	4 producers successful
1	Calculative profit per produced piglet	€	-160,84	45,70	-86,99	-26,88	17,66
3	Sow herd	number	9,00	155,00	41,13	46,35	64,13
9	Piglet price	€/25 kg	55,67	88,00	75,63	74,83	81,74
10	Lost of suckling piglets	%	6,01	52,22	26,59	20,84	16,57
11	Lost of weaned piglets	%	0,00	14,35	7,95	5,55	3,29
12	Total lost	%	6,01	53,92	34,55	26,59	19,87
14	Litters per sow per year	Number	0,00	2,22	1,07	1,65	2,03
22	Weaned piglets	Piglets/ sow/year	8,68	20,08	10,73	14,28	17,29
23	Reared piglets per sow and year	piglets/ sow/year	8,21	20,08	9,63	13,14	16,59

The full costs (including work and interest) per sow and year in 2002/2003 were with 16 piglets per sow and year and under 30 hours per sow and year: in new housing 95–98€ per piglet (27.5 kg) and in labour optimised old housing 80–90€ per piglet. With a performance of 18 piglets per sow and year the costs were, in new housing, 88–91€ per piglet and, in labour optimised old housing, 75-84€ per piglet.

Fattening

The results of the interviews of pig fatteners about the structure of their businesses are summarised as follows:

- Annual production 2001: about 130,000 finishing pigs (0.32% of the overall production), 2002: 145,000 pigs, 2003: 115,000 pigs, expectation 2004: 100,000 finishing pigs
- 1,000– 1,100 fattener producers with more than 5 finishing places, around 500 producers with more than 49 finishing places, on average about 125 finishing places per producer, 1.6 turns per year
- Growing days 150 days per pig, the daily growth rate is 625 g/d/pig
- The feed conversion rate is 1:3.25 (based on data from 31 units);

- Only few of the bigger pig producers are considering an increase of the production under present conditions;
- Main disease problems mentioned: pneumonia (34%), red run (19%), internal and external parasites (13 %);
- Only 5 % of the producers use a partly slatted system!
- Only 16 % of the producers feed only straw as forage, mostly the large producers; otherwise, grass and silage dominate as forages;
- Trough-feeding is used on 80 % of the farms. Bigger producers, with more than 199 finishing places, use dry or wet feeder.
- Over 50 % of the producers already have built (part-) outdoor accesses, showers are found only in 5 % of the farms;
- Approximately a quarter of the producers has invested approximately 80€ per pig place for the outdoor access. 40 % of the pig producers invested about 90€ per pig place in the housing area.

Performance indicators for the 27 case study farms in piglet production are presented in Table 2.

Table 2: Performance indicators, based on full cost analysis for 27 organic piglet producers in Germany, based on production figures from 2002-2003.

					5 producers	**27 producers**	**5 producers**
N	**Key figures**	**Unit**	**Min-value**	**Max-value**	**Less successful**	**average**	**successful**
1	Calculative profit per kg SW	Euro/kg SG	-3,83	0,49	-1,82	-0,45	0,33
2	Growing places	Number	50	870	390	302	338
5	Turns	Number	0,65	2,45	1,32	1,73	1,97
8	Animal lost	in % of the theoretical produced pigs	0,56	13,49	6,47	4,04	3,78
12	Piglet price	€/piglet	40,98	110,83	65,34	79,60	76,86
14	Slaughter weight	kg/pig	84,05	165,86	94,06	101,79	103,20
16	Slaughter price	€/kg SW	1,25	2,84	1,62	2,29	2,53
17	Lean meat share	in % of the theoretical	N/K	57,50	53,18	53,78	53,26

The full costs (including work and interest) per finished pig FP were in 2002/2003
with 2.2 turns per year, 650 gr. daily growth per day, feed utilisation of 1:3.3 und 1.2-1.5 h per FP, in new housing between 2.18–2.38€ pro kg slaughter weight SW, in old housing with outdoor access 2.36–2.86€ per kg SW, in old housing without outdoor access, 1.80–1.85€ per kg SW.

Main problems

The main reasons for poor performance in both piglet and fattening production were identified as:

- Inexperienced and inadequate stockman/stockmanship, leading to missing birth control, latent disease pressure with endemic diseases and weak piglets, non-use of vaccines when indicated and inadequate hygiene;
- Inadequate stockmanship is often a result of overwork and too many tasks and planning is not used effectively to solve problems with work efficiency.
- The building technology is poor and redesigns for organic requirements is often carried out unsuccessfully with mistakes leading to poor ventilation, too cold farrowing nests and increased manual workload.
- Ration formulation is poor, with inadequate understanding of individual components.
- Growing phases are too long in fattening, often due to sales being delayed and daily growth and feed conversion rates are low;
- External feed components (potato protein, organic soybeans) are used but are too expensive;
- Prices for finished pigs do not cover the full costs of production (partly due to the fact that not all pigs are sold at organic prices);
- Piglet quality from organic sources is often poor, leading to poor performance in fattening;
- Marketing to supermarket and retail chains is not secure, leaving the producers with direct marketing as the only reliable outlet;
- High standards of the animal care (outdoor access, straw, forage) requires relatively high investment;
- Premiums not easy to achieve as quality (taste, tenderness) between organic and conventional pork not different

Conclusions

The full cost calculation showed that most of the farmers did not produce enough profit in piglet rearing or in fattening. The main reasons for the poor performance have been identified and a new project, the Consultants-Practice-Network, started to work in May 2004, to identify and implement solutions to the problems.

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The effect of the system of housing on the health status and welfare of organic and conventionally managed dairy cows

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Introduction

Organic farming is based on such forms of animal husbandry that satisfy the physiological and ethological needs of an animal and respect ethical criteria. Animal husbandry on organic farms is governed by rules of organic agriculture and by welfare requirements. The principles of organic animal husbandry have developed in such a way that the animals are kept under conditions as close as possible to the natural ones. This is expected to eliminate their exposure to undue stress resulting from unsuitable technologies and unnecessary and inappropriate manipulations (Kolesár, 2003).

The essential conditions of organic animal husbandry include the following:

- housing of animals with sufficient access of fresh air and natural light;
- providing runs for all categories of animals;
- arranging for natural movement of animals in the fresh air; and
- ensuring sufficient resting area and good quality bedding for all categories of animals (Juršík, 2002).

This paper describes evaluations that were carried out on an organic and a conventionally managed dairy farms in the Slovak Republic. It is evident that present conventional rearing in Slovakia cannot meet all the organic requirements.

The organic farm

The organic farm farms the area of about 1,000 ha and is situated in protected mountainous area, about 600 m above the sea level. The animals reared on this farm are kept in two locations, dairy cows of pure Slovak Pinzgau breed in one and sheep of improved Valachian breed in another. Of the total number of 400 cattle, 162 are dairy cows. The mean milk yield per lactation is 4,000 litres, with fat content of 3.8% and protein content of 3.4 %. The milking equipment is cleaned and disinfected according to legislative requirements. The farm also keeps 500 sheep, out of which 400 are milking ewes. The milk is used for production of cheese, with a mean cheese yield of 200 kg per head per year.

The total annual production of about 260,000 litres of cow milk and 8,000 kg of sheep cheese is processed further in farm's own facilities to various products, such as fresh, semi-soft, non-ripening cow and sheep lump cheese. The cheese is also used to make additional non-ripening, special traditional cheese products in various forms, such as "parenice" and "korbáčiky". Another product prepared here is special sheep cheese "kysucká bryndza".

The annual output of organic products is put on the market in the region and sold in farm's own retail shop. To ensure production of organic, healthy and safe food it is necessary to observe respective technological and hygiene procedures. Hygiene of the production process on the farm is ensured by the HACCP system (Polaček, K., 2003).The farm was awarded EKO-biocertificate for products produced according to organic starndards.

Evaluation of the health status of the organic dairy herd and flock showed no serious health problems. The health is also affected by the climatic conditions, as the period of keeping the cows on pasture varies between 160 and 200 days. No mastitis cases were recorded in the herd because considerable attention is paid to the milk production and associated aspects. Treatment of cows before milking and of the milking equipment corresponded to the respective legislative requirements.

The conventional farm
The observed conventional farm, with some elements of organic husbandry, is located in the lowland area. The farm keeps 400 dairy cows of Holstein breed. The mean milk yield per lactation is 7,300 litres.

Suitable housing conditions are the basic precondition of health and productivity of individual categories of farm animals. One of the most important aspects of technological system in animal rearing is the area per animal. The size of cubicles for the above cows is 1.2 x 2.1 m and runs are available to all of them. All dairy cows, as well as other categories of cattle (calves in milk and plant nutrition, heifers in high stage of gravidity), have access to runs throughout the year. In order to respect the welfare requirements. To ensure optimum conditions for the rest in a dry and warm place, straw is used in the runs. It should be noted that housing conditions affect not only productive ability of animals but also their health status. The space reserved for animals is very important not only with regard to welfare but also the social herd structure (Novák et al.,2002). Housing is related to predisposition to specific diseases, such as lameness, mastitis, reproductive diseases, etc. Clarkson et al. (1996) reported 35 – 55 % annual incidence of lameness, associated with housing in cubicles in United Kingdom, but only 7 % incidence with the same type of housing in Michigan.

Despite good hygiene standard and the efforts of the farmer, lameness is the most frequent cause of morbidity. The basic measures that can be taken to prevent this problem include adjustment of nutrition, particularly elimination of acidosis, decreased use of concentrates and increased feeding with bulk feed. Great attention was paid to nutrition on the observed farm, for example some herb components, based on homeopathics, were added to the feed. In addition to regular treatment of hoofs, disinfection of cow’s feet in zinc-containing preparation was used to prevent laminitis and lameness. The disinfectant bath was located in the waiting room before milking, which ensured that every cow was subjected to this treatment.

Strict, anti-mastitis measures are applied on the observed farm. Cows are milked in a BOUMATIC milking parlour with computerised registration of all cows. If there are cows affected by mastitis, they are milked after milking of all healthy cows and the milk is collected separately and disposed of in the proper way.

Conclusions
There is a lack of information about organic products. Their sale is affected by this. It is necessary to inform better the wider public about these safe and healthy products, free of harmful additives.

We would like to stress two important points: firstly, that organic farming is environmentally friendly and, secondly, that the costs of organic production are higher; therefore governmental subsidies are necessary.

Organic production not only reflects our life style, our relation to nature and preservation of diversity of life but it is also represents very demanding and hard work on behalf of the producer. We would all like to see healthy food on our table. In order to reach this goal, we have to ensure, on one hand, sufficient quantity of reasonably priced organic foods and, on the other hand, to educate consumers to ensure a market for them (Sabolová, 2002).

References

Juršík,J.,Trávniček,P., Drgáč,M.: Chov kráv bez tržní produkce mléka v podmínkách ekologického zemědělství., Pro-Bio, Šumperk, 2001, 109.

Kolesár,R.: Welfare zvierat v ekologickom a konvenčnom chove. In: Zb. referátov" Ekologický chov zvierat a produkcia biopotravín". Nitra, 2003.

Novák,P., Novák,L., Šlegerová,J.: Úloha výživy, zoohygieny a chovného prostředí na organizmus zvířat pri optimální tvorbě živočíšných produktu. Workshop" Animal Environment Interaction", Brno, 2002, 8 – 11.

Poláček,K.: Chov dojných kráv a oviec v systéme ekologického poľnohospodárstva In: Zb.referátov " Ekologický chov zvierat a produkcia biopotravín." Nitra, 2003.

Sabolová, G.: Názory spotrebiteľov na biopotraviny a zdravú výživu. Slovak Veterinary Journal, XXVII, 2002,3. 17-19.

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Organic livestock, bamboo and medicinal plants in India: learning from the rural poor

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Introduction

Organic agriculture and livestock used to be a way of life in India, a tradition which for centuries has shaped the thought, the outlook, the culture and economic life of its people. Prior to independence and till two decades later, a majority of the Indian farmers were unaware of the use of chemicals in plants and animals to control growth, pests and diseases. In fact, it was all holistic agriculture, and the majority of farmers were cultivating in this way.

However, to feed the ever-growing population of the country, it was felt necessary to rapidly increase the production of food. Thus, to achieve self sufficiency in food, chemicals were developed and made available. This process has propelled dramatic changes in farming practices over the last two decades, resulting in a loss of natural habitat and species, danger to food security, quality and safety of food and high input costs, leading the farmers into a debt trap.

In recent years, organic farming has grown in India and has been considered to be a viable option as an alternative to intensive agriculture. Indian States, like Karnataka, have been declared *organic*[1]. Countries rich in animal and plant biodiversity, like India, have high potential to develop solutions for the organic livestock sector, also in the European countries.

Organic livestock production in India: an overview

Livestock play an important role in the socio-economic life of India. The organic livestock management is based on minimal use of off-farm inputs like veterinary drugs for animal health care and non-use of fertilizers and pesticides for fodder production. Livestock comprising cows, buffalos, pigs, poultry, etc., has the role of recycling of farm by-products and waste products, adding value to them. This system alone can keep the farmers active and provide employment throughout the years. Above all, this is a self-sustaining system of production of organic manure on farm, needed for organic cultivation. Livestock provides supplementary income and employment, not only to producers in the rural areas, but also to a large number of people engaged in secondary and tertiary businesses, related to livestock business. Livestock rearing is an important occupation and a source of family income also for women in the villages. It is also an important source of several value-added by products of animal origin, which presently are not properly processed and utilized as a commercial activity but have business potential.

There is potential for domestic and international markets of organic livestock products for India but, unfortunately, at present, the absence of a powerful core organization leads to failure to organize specialists, processors, government officials and practitioners who are

[1] IFAD. (2004). Karnataka State Policy on Organic Farming Report.

engaged or interested in developing organic livestock systems. Efforts have been made to establish credible “organic livestock” food certifying bodies[2]. In addition to this, the EU regulations (Article 11, EEC 2092/91) for organic livestock constitute a considerable barrier to the entry to EU markets and the costs of certification limit exports. Large-scale, commercial farms undertake most organic livestock production for exports[3]. For smallholders, the most likely possibility for organic production may be with ruminants, because of the high cost of cereals for monogastric species. Feed is obtained from many different sources, and it would be difficult to secure organic sources. Support should be given via government departments and non-governmental agencies that target resource-poor pastoral and mixed farming groups. Policy initiatives and investments should concentrate to put in place inspection, certification, labelling, packaging, transportation services and different infrastructures, such as slaughterhouses, and traceability systems, in order for organic livestock to succeed.

Bamboo and medicinal plants for livelihood development

The local knowledge in natural resource exploitation has shown that, in the Indian rural villages, bamboo and medicinal plants are widely utilized for organic livestock management. The traditional Indian medicine is based on herbal remedies and therapeutic plants, most of which do not cause residues in the animal products. Research for development projects on the medicinal plants utilization have emerged in the recent years with the aim of exporting valuable therapeutic principles in the growing international market of natural remedies. Indian private companies produce and export to Europe annually tonnes of these medicinal plants (e.g. *Neem*, *Tee Tree Oil*, etc.). When access to land is possible for the farmers, the medicinal plants can be cultivated in the farm; otherwise, these are harvested in the local forests.

Bamboo is commonly utilized as medicinal plant in human medicine. Some species of bamboo contain active immune stimulatory compounds that the farmers utilize also for their animals. Bio-active forages, like bamboo, offer low-cost and environmental friendly solutions for feeding all species of domestic animals. Bamboo is a multi purpose crop for organic livestock. The culms are utilized for building ecological animal housing, such as shelters, stalls, hen houses, fences etc., while the leaves and seeds are given to the animals as fresh food grown on the farm.

Studies on the nutritional and economic value of the different species of bamboo (e.g. toxicity and comparative advantages versus other materials) are in progress at the INBAR[4]. INBAR promotes action research projects aiming at integrating the people, the animals, and the environment for ecological security and livelihood development. With particular regard to

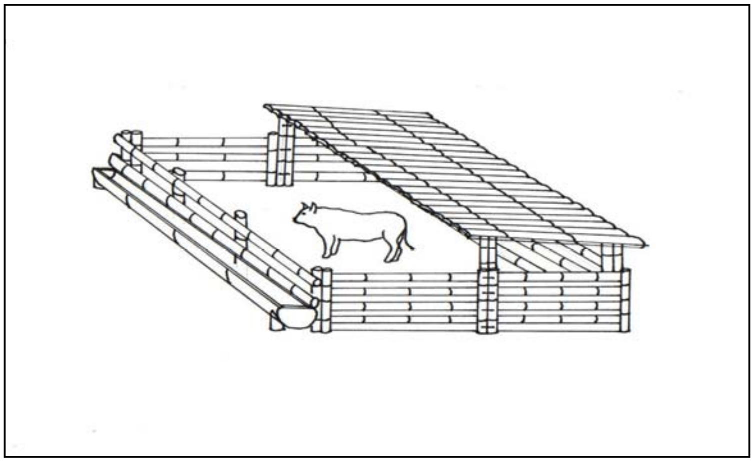
[2] Choudhary, B. (2004). Organic farming: Indian farmers set to go green - Internet search.

[3] PASS and DFID Report. (2003). The Organic Livestock Trade from Developing Countries: Poverty, Policy and Market Issues.

[4] INBAR, the International Network for Bamboo and Rattan, funded by IFAD, is an international organization established by treaty in November 1997 with 28 Member Countries (i.e. Bangladesh, Benin, Bolivia, Cameroon, Canada, Chile, China, Colombia, Cuba, Ecuador, Ethiopia, Ghana, India, Indonesia, Kenya, Malaysia, Myanmar, Nepal, Nigeria, Peru, the Philippines, Sierra Leone, Sri Lanka, Tanzania, Togo, Uganda, Venezuela and Vietnam). The mission of INBAR is to improve the well-being (social, economic and environmental) of producers and users of bamboo and rattan within the context of a sustainable bamboo and rattan base by consolidating, coordinating and supporting strategic and adaptive research and development.

sustainable models of eco-housing solutions for the animals built in bamboo, INBAR's studies emphasize the animal welfare aspects for their improved health and productivity, such as reduced heat stress and higher milk yield for cows in pens with bamboo roofing sheets (Figure 1).

Figure 1: Model of bamboo shelter for cows. Designer: Francesca Ambrosini for INBAR.



Future challenges

The promotion of knowledge exchange in the organic livestock sector between European and poor countries, like India, builds a win-win learning process and a bridge between research and development stakeholders of the public and private sectors. The European countries can import from the poor countries experiences of sustainable, low-cost and ecological practices of the traditional organic farming. The poor countries can adopt standards and certification models, develop legal and policy frameworks for the organic livestock sector, acquire technical and entrepreneurial capabilities, obtain market information and market access and develop biodiversity, conservation, and animal welfare schemes.

Collaborative partnerships between Indian and European research institutions, also involving private companies, should be encouraged to test the chemical effects of the Indian herbal remedies available on the local market. Identified and validated medicinal plants could offer an efficacious alternative to the use of the chemicals in Europe and in India. In addition to this, cultivating and marketing medicinal plants is a trade option for the enhancement of the rural economy.

In the European countries, where the environmental and climate conditions are favourable to the growth of bamboo, ecological feeding and housing "best practices", developed in the poor countries, can be repeated in the organic farms as innovative models of sustainable agriculture.

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Sustainability in animal farming and production

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Introduction

Modern animal farming is an industry. Up to 10,000 pigs or 200,000 broilers are often kept crowded in an animal house. Inputs, such as feed, energy and water are high. Outputs, such as animal products, manure, carcasses, pollutants (gases, smell, dust, infections) all can cause danger to the health and to the environment. The question is whether we do really need so much animal products at all. Almost 50% of global grains are fed to livestock. This grain was formerly eaten directly by humans. Population growth, and scarcity of agricultural areas need maximum efficiency without conversion loss (Goodland, 1997*)*.

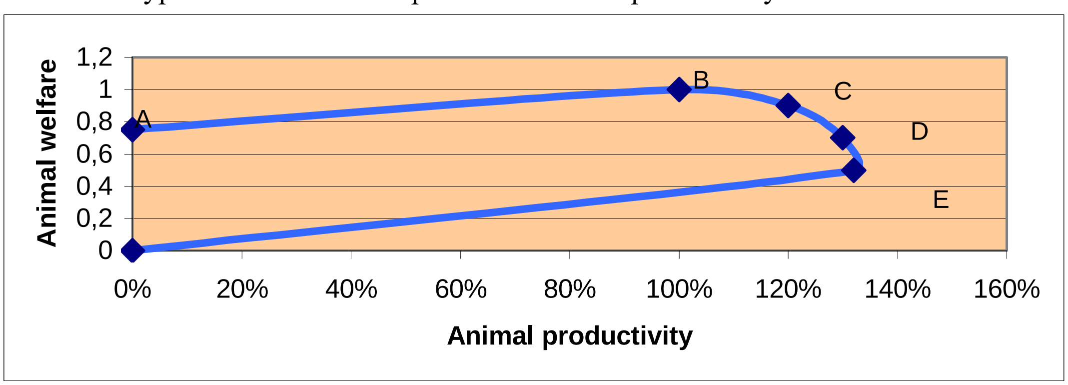
This short review aims at demonstrating the potential adverse effects of modern livestock production to the environment and looking at some indicators of these adverse effects. The aim is also to mitigate the listed adverse effects, to find inexpensive, measurable, efficient indicators for them and to maintain natural and social system capacity for regeneration (functional integrity) (Thompson and Nardone, 1999).

Discussion

To meet the human requirement for food, farm animals have undergone drastic changes in the systems of production. In general, the objective of many animal production systems is to decrease the cost of production by maintaining high standards in productivity. Many farming systems are a compromise, and there is much we do not know or understand, but farmers say that healthy, well-managed animals perform better.

Concerns over declining farm animal welfare were mentioned by McInerney (1991) in relation to modern systems of production:

Figure 1: The hypothetical relationship between animal productivity and welfare.



A= Natural state without human intervention at 0% productivity
B= Maximum welfare supported by human care (feeding, temperature, etc.) at 100% productivity
C= Economic efficiency and animal welfare are balanced in an optimum way at about 120%,
D= By the law enforced minimum animal welfare at about 130%,
E= The critical level beyond the system collapses at about the 135% productivity level

From environmental management point of view sustainability is so arbitrary that this review can only point to environmental impacts and to their indicators:

Table 1: Input, output, and measurable indicators (5, 8,11)

Resource use (inputs):	**Indicators:**
Land for feed production:	about 5 tons grain/ha
Feed Conversion Ratio: (but: human utilization of their proteins is more efficient)	pig: 4 kg grain/bwkg cattle: 7 kg grain/bwkg poultry: 2 kg grain/bwkg
Land for manure deposition:	max. 170 kg N/ha
Livestock Unit (LSU):	max. 2,3 cattle/ha max. 51 fattening pigs/ha max. 255 hens/ha
Water:	10000 L/kg beef
Energy:	See Figure 4
Resource use (outputs):	
Manure quantity:	10 million m^3/year in Hun.
content:	N, P, K, infectiousness
factors: - soil	texture, water capacity
- ground water	distance
- surface water	distance
- plant type	absorption capacity
Carcasses	40,000 tons/year in Hun.
Food-processing by-products	210,000 tons/year in Hun.
GHGs: methan by ruminants	2,5% contribution of GHG
Smell: NH_3, H_2S, etc.	distance
Food-products	residuals, infectiousness

Four diagrams are shown (Figure 2,3,4,5), depicting square meters of arable land per kg produced meat, nitrate leaching per ha fodder area, production costs per kg meat, and simulated energy use, respectively, compared cattle and pigs, organic and conventional farming. These results arise from certain type of local conditions and research, and they can change in other circumstances (the rate of external and internal costs, land abundance or scarcity, soil structure and the vegetation on it, etc.):

Figure 2: Square-meters of arable land per kilo produced meat under Swedish conditions (after K.-I. Kumm)

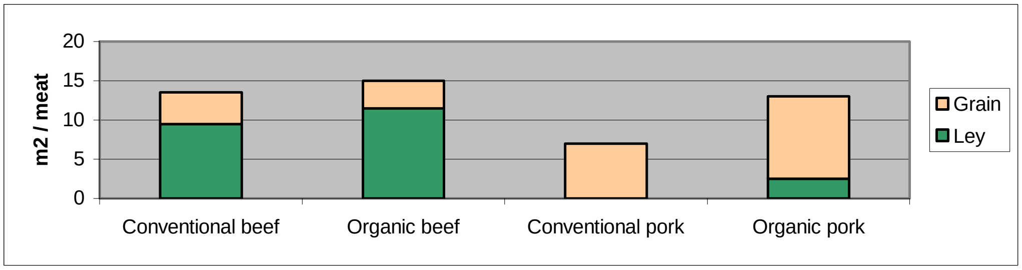


Figure 3: Nitrate leaching per ha fodder area. It was calculated on clay soil under Swedish conditions (after K.-I. Kumm)

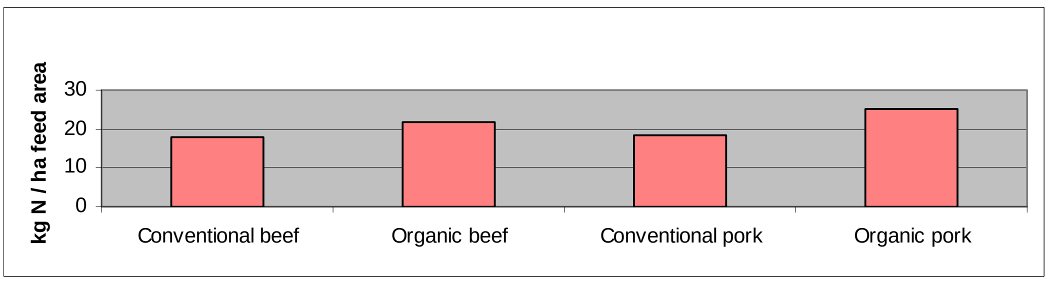


Figure 4: Simulated energy use (EU) for ruminants and non-ruminants in the 1996 situation (conventional farming) compared to organic farming (after T. Dalgaard)

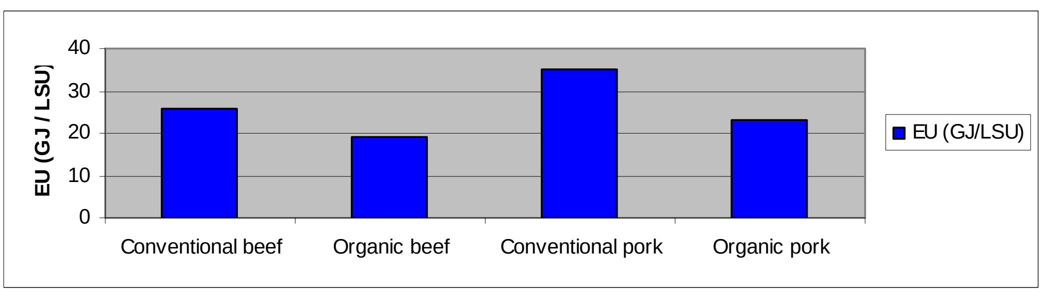
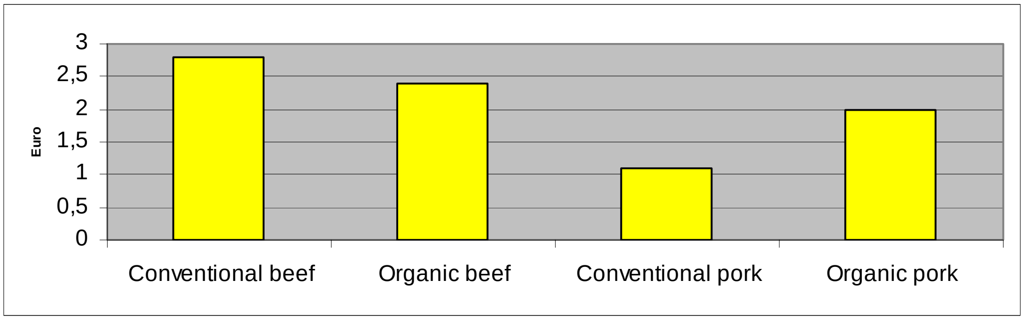


Figure 5: Production costs per kilo meat. It was calculated under Swedish condition (after K.-I. Kumm)



Sustainability can not be analyzed only inside animal houses, environmental impacts mainly depend on their outside effects. Resource use and resource availability (energy, water, land usage for feed, for manure, machines, chemicals) must be balanced with each other and with the values of the animal products (Cobb *et al.,* 1999*)*.

Output pollutants like manure, carcasses, food-processing by-products can be all dangerous infectious materials which could be also used as e.g. resources for fertilization of soils, but because of their great amount, of their concentrated and possible infectious nature, this recycling seldom works.
The great resource use and the consequent environmental pollutions are mainly external costs and are not involved into the distorted cheap price of animal products.

Conclusion
Criteria for sustainable livestock production will be derived from explicit but complex issues of un-sustainability, such as land scarcity, soil degradation (e.g. over-grazing), inefficient use of resources (water, energy, nutrients), environmental pollution (air, water, soil), declining biodiversity (clearing of forests), food born diseases.

Although, we can get a lot of information about the present state of a system, time and space considerations remain uncertain.

Real sustainability of a system contains the capacity for reproduction, as an important function of it, too. Cycles of animal productions are more rapid than the cycles with which the natural resources needed for productions are renewed (soil, water, oil).

There is not one overall truth, place-conditioned and time-influenced considerations must also be used for decisions.

Recommendations

Monitor environmental parameters and processes of animal production
Soil, water and fossil fuel are non-renewable resources in a short period of time. Using inexpensive, small, efficient sensors, environmental impacts will be captured in prices (fertilizer, fuel, pesticides, etc.), and market distortions will tend to diminish
More useable food per unit of land would results in possibility for land abandonment (for conversion to more valuable forests, wetlands, etc.)
Maintaining natural and social system capacity for regeneration (functional integrity)
Match the type of farming to local conditions, climate, and soil, rather than modifying the environment to the animal farming

Reference list is available from the author on request.

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Bioterra, the association of oraganic producers, promoter of ecological agriculture from Romania

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Introduction

The Association of Biofarmers, Bioterra, performs a major role in promotion and implementation of organic farming in Romania. The program, strategies, level of involvement and activities performed by Bioterra have a notable contribution to the increase in the number of members, and specialized farms in the field of crop and animal production. The main results and achievements of Bioterra (established in 1997) are presented in this paper.

History

Bioterra was founded in 1997 by 27 members, of which four were Swiss citizens. A notable suport was received from Christhche Ostmission of Switzerland, and subsequently from various domestic and foreign asssociations and foundations, among others from Switzreland, Germany and the USA.

Martin Schütz, the responsible of a project on orgnaic agriculture, and Ernst Frhiscnecht, BIO-SUISSE president and orgnaic farmer, made a significant contribution to the theoretical traiining of over 3,000 farmers in orgnaic agricutlure. Some 30–54 young farmers and students, members of Bioterra, worked annually on orgnaic farms in Switzerland, Germany and Austria.

Other notable moments in the history of Bioterra Association are:

- 1999: The first issue of Review of Biofarmers in Romania was published with the support of M.A.P.D.R.. (Ministry of Agriculture, Forestry, and Rural Development), A.N.C.A.(National Agency of Agricultural Consultance) and other collaborations from our country and abroad.
- 1999: The first National Conference of organic farmers was organized in Cluj-Napoca.
- 1999: Bioterra Association became IFOAM member.
- 2000: Th first demonstrative and experimental fields in the area of plant cultures and orgnaic grazing management were created by implementation of projects financed by World Bank, Ministry of Education and Research and also by resources belonging to the members of the association.
- 2001: The first crop and dairy products of "Dorna lactate" are exported by membrers of Bioterra to Germany.
- 2002: Bioterra Associaton becomes a member of FNAE (National Federation for Ecological Agriculture).
- 2004: The first handbook for organic technologies in crop and animal production is published.

Objectives of Bioterra Association

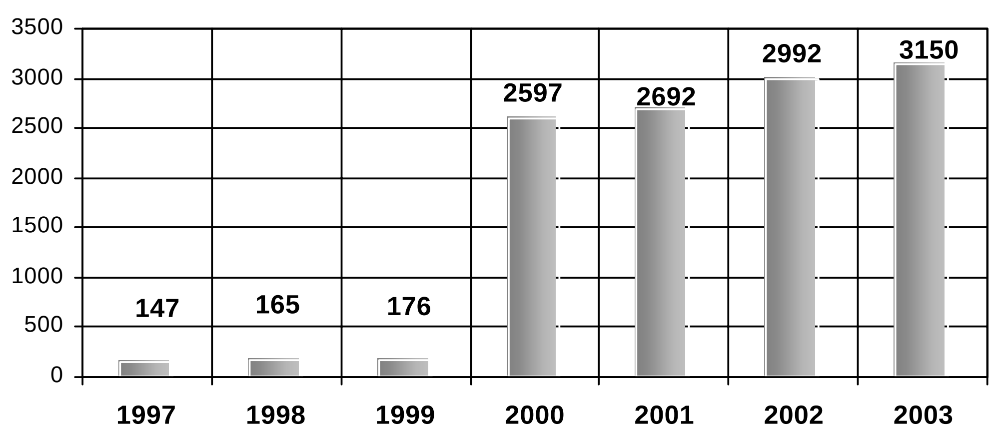
The main objectives of the association are:

- The promotion of ecological agriculture in Romania (main objective);
- The harmonization of the relation between man and environment, promoting protection measures for natural and/or man-made ecosystems and conservation of biodivesity;
- The increase of the level of professional training of organic farmers in the fields of plant crops, animal breeding, processing, marketing of vegetal and animal products, and both national and European legislation;
- The change of the mentality of agricultural producers concerning agriculture and relationships with environment;
- The signifcant increase of the quality of both human and animal life by promoting the systems of organic agriculture/supplying health and food safety;
- The establisment of the relationships of collaboration with other national and international associations and organizations in the field of orgnaic agriculture.

Members of the association

In 1997, the year of the foundation of Bioterra Association, the number of members was of 147. During 1997-1999 the number of members increased by 11-12 %. After 2000, a spectacular increase of over 21 times as compared to 1999, was recorded, reaching 3,150 members in 2003 (Figure 1). This growth demonstrates the interes of farmes, students and consumers in organic agriculture.

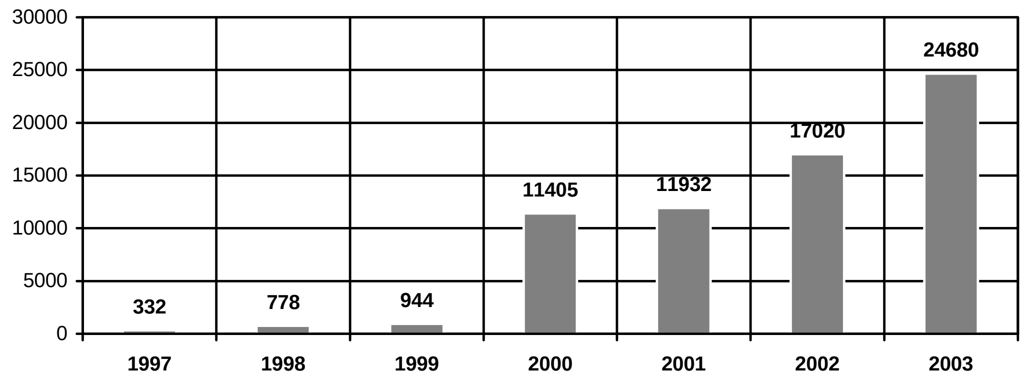
Figure 1: Growth in the Bioterra Associations membership from 1997 to 2003.



Agricultural surface area in orgnaic production

The figure 2 shows that during 1997-1999 the agricultural surface in conversion and/or certified as organic increased by 230-280%, as compared to 1997. A significant increase was recorded begining with 2000.

Figure 2: Growth in of agricultural surface (ha) area cultivated in organic systems (1997-2003) in Romania.

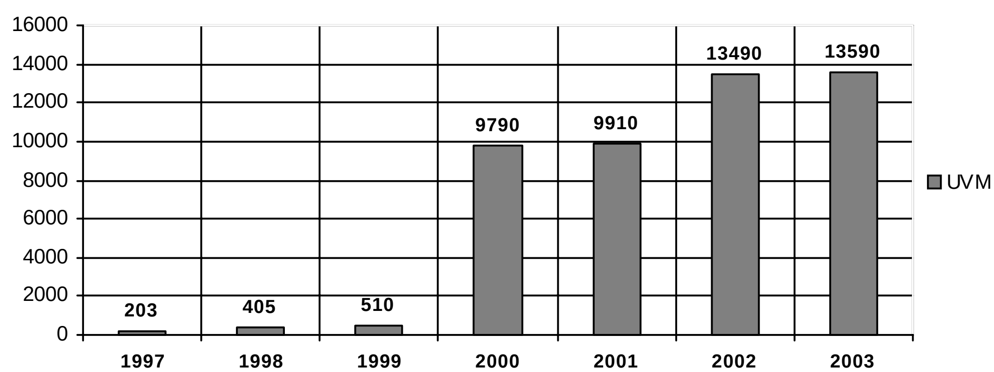


Permanent pastures form the majoritary of land area on orgnaic livestock farms (about 60-70 %). A recent study performed by Bioterra showed that arable surface is cultivated in proportion of 60 % with cereals, 17.8 % sunflower, 13.1 % annual crops, 2 % potato and about 7% trees, vineyards and other crops.

Animals reared in organic systems

Figure 3 shows that the number of animals in large cattle units (1 UVM=one unity of milked cow) reared in organic systems had a slow growth up to (under 6 thousands UVM), but after 2000 reached over 13500 UVM by 2003. This means a 67% increase as compared to 1997.

Figure 3: Greowth in organic livestock numbers in Romania (1997-2003)

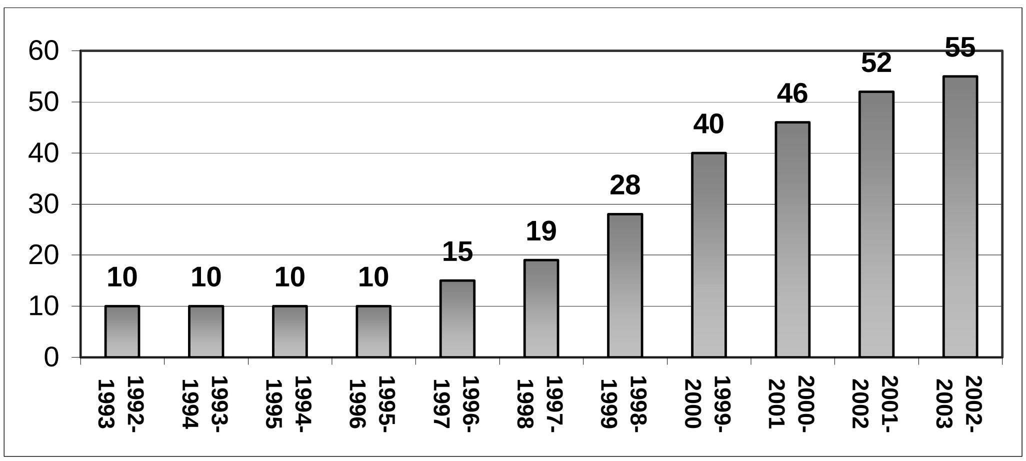


Activities of Bioterra Association in the field of promoting of orgnaic agriculture
The members of the association develop their activities in more than 17 counties of Romania from a total of 41. Their main activities are:

Consulting
Elaboration of SAPARD programs, grants, consultancy in the fields: law, economical, technological assistance in order to put into practice the ecological technologies.

Extension
Organic training. During 1987-2003, 240 speciality courses were organized (Figure 4), attended by over 11,200 interested people.

Figure 4: The growth in the number of workshops and courses organised by Bioterra in 1992-2003.



Inspection and certification
The experts of the Association meet the exigencies of Ecoimpact and assure technical assistance for inspection of the farms in organic conversion, and also for the action of certifiaction of crop and animal products.

Workshops and national conferences
A number of workshops and one national conference with 200–350 participants are annually organized.

National and international symposia
The members of the association organize or participate at national/international symposia in the field of organic agriculture.

Media
The practical experience and results obtained on organic farms are presented by Bioterra in written or audio–visual media.

Publications
Bioterra-magazine is published trimestrially and distributed in all counties of Romania in 11,000 copies.

Handbooks
In 2004, organic technologies for crop and animal production and the Guide for Organic Agriculture were published.

Demonstration and experimental fields
The Bioterra Association, in collaboration with ANCA (National Association for Agricultural Consultancy), research stations, universities and organic farmers, organized, demonstration and experimental fields concerning ecological agriculture performed for cereal, and sun-flower crops; forage, vegetables, and medicinal plants producing; testing of ecological graizing systems.

Agricultural shows
Bioterra organizes expositions in the frame of National Conference of Organic Farmers, or other national expositions, and participates with ”BIO” products.

Conclusions

Bioterra is one of the most important organic associations in Romania. It has had a dynamic development in the recent years, wiht a rapid growth in the number of members, cultivated area and number of certified animals.

By both consultancy and extension, Bioterra makes a significant contibution to the promotion of organic agriculture in context of sustainable development.

References

Luca, E., Varban, I., Mihai, Gh., Bodiş, A., Albert, I. (2004) – Tehnologii ecologice pentru cultura plantelor. Ed. Risoprint, Cluj-Napoca, 43 p, ISBN: 973-656-603-X.
Man, C., Bodiş, A., Albert, I. (2004) – Tehnologii ecologice pentru creşterea şi exploatarea bovinelor şi porcinelor. Ed. Risoprint, Cluj-Napoca, 39 p, ISBN: 973-656-602-1.
M.A.P.D.R. (2004) – Ghid legislativ pentru agricultura ecologică. Legislația Națională armonizată cu Legislația Comunitară. Ed. Risoprint, Cluj-Napoca.
Mihai, Gh. (2002) - Sisteme de pasunat recomandate pentru ferme ecologice private. Revista Biotera, Nr. 2, 21-24, ISSN: 1582-1803.

www.organic-europe.net/country-reports.
www.rec.org/REC/Programs/SEE-Networking.
www. greenagenda.org/bioterra/

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Advisory services for organic farming in Poland

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Introduction

In recent years, the Polish agriculture and food economy sector have been undergoing major changes. These changes have been unavoidable, in order to achieve such goals as improvement of food quality, raising profitability of agricultural production and meeting the European Union standard requirements. These achievements are of great importance for Polish farmers in competing with products on foreign and domestic markets. In this process, organic farming may turn out to be an interesting prospect for some Polish farmers.

It is suggested that a permanent development of agriculture can be ensured by ecological farming system. According to results of research into organic farming in Europe, is believed that, within 10-20 years, the number of agricultural holdings involved in organic farming will amount from 0,5% to 5% of all holdings. Organic farming plays and will have an important role in the future, as the aspirations of the whole agricultural sector will be increasingly determined by the expectations of the consumers and the taxpayers.

Moulding of organic awareness

Development of organic farming in Poland has aroused an interest among many institutions and organisations. There appears to be a wide participation in the organic farming development. All Polish agricultural universities and most Polish research institutes are interested in this issue. Moreover, there has been a rise in a great number of different associations, foundations, societies, and clubs, which not only support organic farming rules but undertake active efforts in order to develop it. However, most of these stakeholders do not have expertise knowledge in agricultural techniques that are suitable for organic farming. Their main activities are in advocating ideas of health, high quality food, environmental protection and eco-tourism.

There is a separate group of institutions and organisations that have an important role in the process of creating and supporting organic holdings. In the forefront of this activity are the Regional Advisory Centres for Agriculture and Rural Development and Provincial Agricultural Advisory Centres.

The farmers, who decide to undertake organic farming, have to have proper knowledge about farming methods as well as organic product marketing. Bringing organic farming systems into effect demands from farmers greater consciousness and knowledge in the field of natural environment protection as well as high quality food production. Organic farming has to be implemented in comprehensive way and must apply to the whole farm, both animal and plant production.

Organisation of agricultural advisory and staff advisory system in Poland

The history of Polish advisory services for agriculture dates back to the first half of last century. It's present form was shaped in the post–Second World War period. Now, it is subject of changes due to the developing market economy in agriculture. Apart from the government supported agricultural advisory system, there are new advisory organisations. A summary of the organic advisory systems in Poland is as follows:

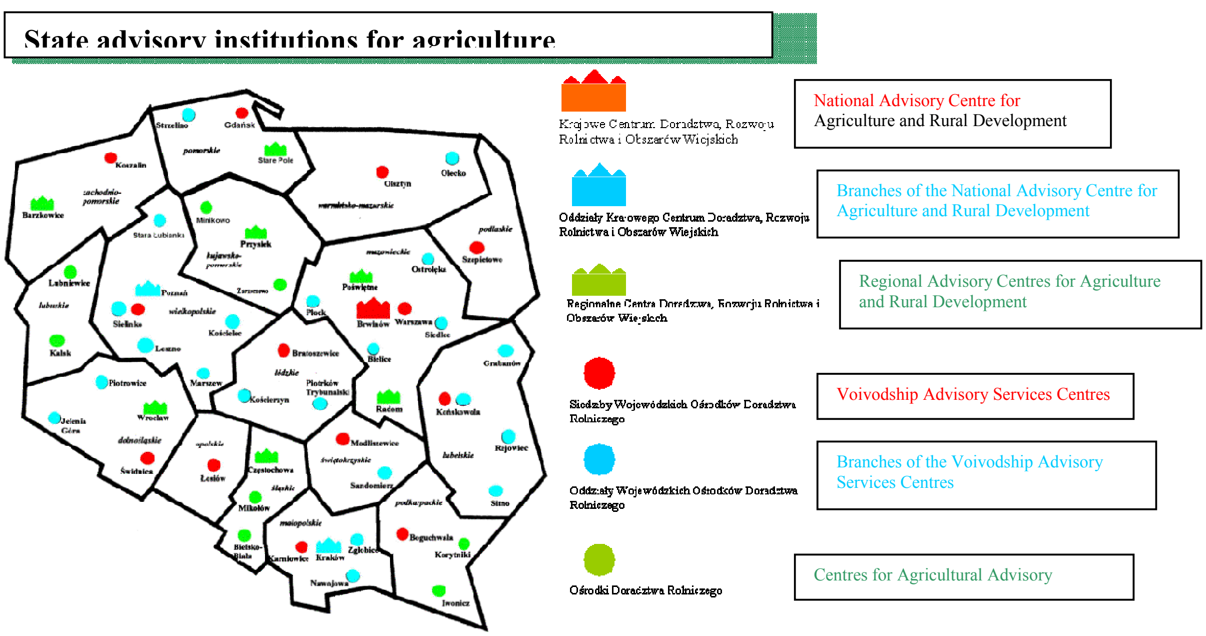
- o state advisory services;
- o self - government advisory services, governed by Agricultural Chamber;
- o Private advisory services:

1. Commercial companies advice/representatives (drug, fertiliser, food processing industry etc. services)
2. Farmers own co-operative advisory services; and
3. Private consultants.

In addition to the services above, there are numerous different bodies, including agricultural universities, research institutes, agricultural schools etc. However, the government advisory services have the most important role in rural development in Poland today. These are the Regional Advisory Centres for Agriculture and Rural Development and Agricultural Advisory Centres.

The current advisory system was created in completely different external conditions and was adequate in that period. In 1990, new approaches were initiated to involve farmers, scientists and others to define directions of agricultural programs as well as agricultural advisory tasks. In 1999, a new administrative system was implemented. Existing Agricultural Advisory Centres (N=49) were converted into seven Regional Advisory Centres for Agriculture and Rural Development. The seven centres were included in the National Advisory Centre for Agriculture and Rural Development. The rest underwent reorganisation and currently act as Provincial Agricultural Advisory Centres, or some of them run their activities independently. The total number of these units is 20 (Figure 1).

Figure 1: Agricultural Advisory Centres, Provincial Agricultural Advisory Centres, Regional Advisory Centres for Agriculture and Rural Development



Following the administrative changes, a new policy of staff employment has taken place. The numbers of employees in the advisory services is outlined in Table 1.

Table 1: Polish government agricultural advisory staff resources in September 2003.

No	Position	Provincial Centres	Regional Centres	Total number
1.	managers	211	111	322
2.	institution specialists	887	161	1048
	whereas some of them are specialists in organic farming	66	10	76
3.	specialists who work directly with farmers	2607	385	2992
	whereas some of them are specialists in organic farming (field advisors)	72	8	80
4.	Others	778	175	953
Total		4483	832	5315
whereas some of them are specialists in organic farming		138	18	156

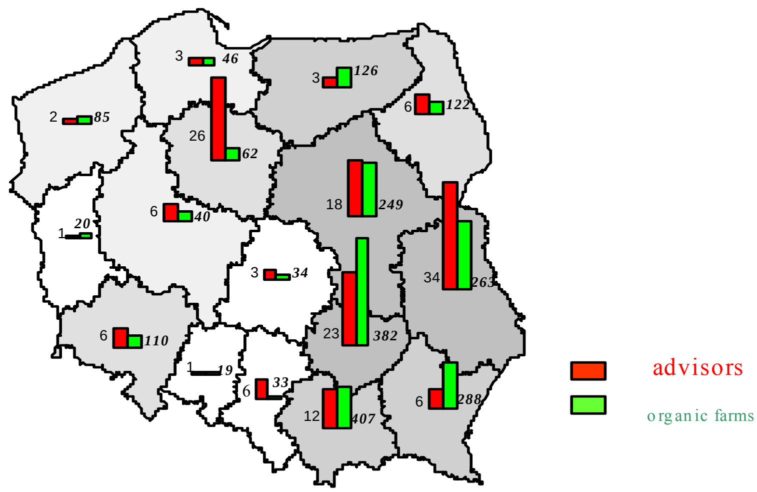
Advisory services for organic farming

Advisory service structures for organic farmers are different from the conventional services. Depending on the institutions, some departments or sections were created i.e.:

- The Organic Farming and Environment Protection Department: two Agricultural Advisory Centres (Modliszewice i Końskowola);
- The Environment Protection and Organic Farming Section: two Agricultural Advisory Centres (Boguchwała, Szepietowo);
- Independent organic specialist positions were created in 2 Agricultural Advisory Centres (Minikowo, Olsztyn);
- Twelve Centres (Świdnica, Zarzeczewo, Lubniewice, Bratoszewice, Kaarniowice, Warszawa, Łosiów, Gdańsk, Bielsko-Biała, Mikołów, Poznań, Koszalin) have appointed specialists in organic farming. However, they do not work in organic farming departments. Such positions were also appointed by seven Regional Advisory Centres for Agriculture and Rural Development.

Total number of specialists involved in organic farming is 156. (138 in Agricultural Advisory Services Centres; 18 in Regional Advisory Centres for Agriculture and Rural development). These institution have both office staff and field advisers. Currently, one adviser works with with 15 organic farms on average. However, the situation is markedly different in individual regions (Figure 2.

Figure 2: Total number organic advisors in Polish regions.



Advisory services for organic farms should concentrate on the tasks that concern directly the organisation and management of organic farms. These tasks have to take into consideration a compliance with the law, good technology and marketing. Within the next few years an advisory activity should be focusing on:

1. Assistance to farmers who are going to convert their farms into organic farms
   - preparing the farmers with regard their professional skills (organising of trainings and seminars);
   - preparing of conversion plans and servicing and doing direct assistance for farmers, during conversion time particularly;
   - preparing different application forms for farmers to enable them to access to financial support (environmental programme, direct payments, structural founds);
   - implementing of quality standards;
   - marketing and management of products;
   - establishing of producers groups.

2. Assistance for farmers on how to run organic farms
   - preparing of both registration applications and financial support applications;
   - marketing and management of product
   - technological advise
   - establishing of producers group
   - improving of professional skills (seminaries, training, study tours)
   - implementing of quality standards

3. Assistance for food processing industry

4. Disseminating and promoting of organic production system and organic food.

Training of advisory staff

The National Organic Farming Centre in Radom (NOFC), established in 2003, under frame of PHARE programme, created a chance to concentrate efforts on a range of coordination of both advisory activities and advisors professional skills improvement. NOFC has access to an “Experimental Organic Field” where organic technology production, new plant varieties and equipment have been tested.

During the realisation of the programme, actions have been taken to create a new model of advisory services for organic farms. Under the framework of this model, all organic advisory structures will be standardised in all Agricultural Advisory Centres. This structure will consist of Organic Farming Departments (regional level) and specialists for organic farming (county level). Furthermore, agricultural advisers have been trained. The total number of advisors who had been trained is 172. The program has also included 16 seminaries on organic farming and it was directed to local rural leaders, farmers, municipal employees and teachers. The total number of participants in these seminars has been 1,419.

Realisation of the PHARE programme allowed the implementation of organic farming rules for the first time in Poland. In this work, scientific research results have been used and different scientific institutions were involved. Until recently, all knowledge on organic farming was derived by Polish agriculture from foreign sources (sometimes, not reliable or applicable for Polish conditions). Manuals and teaching materials (presentation in MS Power Point) on organic farming were developed and distributed to agricultural advisors. Farmers have been given manuals and brochures which concerned all types of agriculture production e.g. cereals, potatoes, permanent grass areas, vegetables, fruit-growing, cattle, pigs, etc. Total edition of 14 subject matter manuals has been delivered. Furthermore, short instruction courses (28 subjects) on organic farming were prepared for farmers. By including research institutes in the programme, a possibility of a survey of Polish researches on organic farming has taken place. It was an opportune time to develop cooperation between agricultural advisory services and scientific institutions.

Since the work on these advisory materials was concluded, the European Commission has accepted the document “European Action Plan for Organic Food and Farming”. This document is composed of 21 chapters where there is a plan of project on how to support Polish organic farming, i.e. research development, food production methods based of science, strengthen agricultural advisory services, food analysis methods, implementing of organic food into natural sensitive areas etc. Under the framework of the activities of the Centre for Organic Farming, there are planned tasks that complement the PHARE programme, entitled “Organic Farming”. These tasks are as follows:

- improving the advisory staff by organising of seminars, workshops and practical trainings using demonstration object
- improving farmers by course trainings
- preparing and distributing educational materials for farmers and advisors
- organising training tours for farmers, food processing plant owners, and advisors
- taking part in the events which promote organic farming (Ekofestyn, Polagra).

The seminaries on national range like “Organic methods for cereals production”, “Organic animal production methods”, “Organic horticulture production methods” and several presentation of equipment in action have taken place. The demonstrations were undertaken on an organic farm. Additionally, two study tours are planned, in order to acquaint Polish advisors with organic farming in other countries. A distance learning system will be implemented.

In order to promote organic farming and organic food, a special conferences are planned during agricultural shows, like “POLAGRA” and “EKOFESTYN”. Thanks to PHARE programme, 115,000 advisory visits on organic farms and other activities were carried out. According to the Main Control Office for Trade Quality of Agro -Food Articles (2003) the total area where an organic cultivation had taken place in Poland was 61,276 ha (2,286 farms). The Plan of the Rural Development predicts that this area will be increased to 200,000 ha within three years. The expectations confirm a need of developing an organic advisory service and confirm a need of creating an efficient system to transfer knowledge. The well-prepared organic farming advisory staff will be a basis of organic production development in Poland.

Organic farming as a resort of the rural development

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Introduction

Rural development first appeared in the EU agricultural policy in the 1980s, and its device and establishment system has only shaped since the 1990s. In Hungary, rural development was mostly placed on the agenda due to the crisis of agriculture, resulting in the crisis of several country areas at the fall of socialism, and its major incentive was the intended EU accession.

Rural areas comprise irreplaceable natural, architectural and cultural values, the upkeep, enlargement and reasonable utilization of which is a common interest of the society (CS. SARUDI, 2002). Organic farming has gained ground in the agriculture of the developed countries. Its advance was ideologically based on the society's increased demand for sustainable development, protection of natural values and preserving health. Its growth was influenced considerably by the fact that organic farming principles are in harmony with the objectives of rural development and agricultural policy on several aspects.

In Hungary, a vast majority of the families residing in the countryside, particularly in villages, lived on agriculture or supplemented their income by agricultural production. In the 1970s and 1980s, small-scale farmers produced approximately 1/3 of the aggregated agricultural output, approximately 50% of the pork and poultry production, and even higher proportion at the labour-demanding horticultural branches (G. SZABÓ, 1998). This trend was characteristic not only in the preceding years, but a lot of people choose agriculture as a source of living even today. Derived from the production structure of these small farms, poultry and vegetable branches possess the best chance for organic production.

In Hungary, the National Agro environmental Program (NAKP) was established in the late 1990s, but the producers received the first subsidies first in 2002. Among the agro environmental tasks, this measure plays a significant role in environmental and landscape management subsidies, and within these, in the organic farming programme. A several years' delay in the implementation of the programme, however, has caused an incalculable damage to the advance of profitable agriculture and the development of rural areas from the aspect of our EU accession. Additionally, it has hindered the planned development of the Hungarian organic farming, which makes it doubtful to achieve the 300,000 ha, set for 2006.

As a consequence, several other problems arise, such as the absence of eco-social and educational effects and the decline of rural development linked to regions and coherent communities (J. ÁNGYÁN, 2001).

Definition and aims of rural development and organic farming

According to Buckwell's approach, rural environment covers every aspect of natural environment (biodiversity, living spot and resources protection but also landscape protection) as well as of artificial environment (conserving traditional architecture, archaeological sites and other elements of historical heritage). Rural development includes local population, its way of life, employment characteristics, income structure, dwelling conditions, service levels as well as cultural aspects, such as traditional handcrafts, dishes, language, clothing and habits. Since agriculture is a historically determining economic activity in rural areas, its effects primarily determine the rural ways of life (*Buckwell,* 1997).

The most important aims of rural development are the following:
- Consolidation of the rural economic base and diversification of the economic activity;
- Utilization of nature reserves using methods of natural or organic farming;
- Establishment of an enhanced support system in areas that are developing as ecological regions;
- Support to organic farming, facilitating production and purchase;
- Stimulation of economic programs, based on environmental and health culture with the harmonization of ecotourism, medicinal tourism, organic farming and -nutrition and the regional developmental efforts for tourism, agriculture and public health;
- Stimulation of rural- and ecotourism;
- Improvement of rural employment and income situation (CS. SARUDI, 2002).

Connections between organic farming and rural development

Organic farming has a special place within food economy and this specialty can be connected to any function of the rural area:
- Its economic role is represented by widening the range of employment, creating new workplaces, improving the population keeping ability of the area.
- Its ecological function is well connectable to environment- and landscape conservation and hence in an indirect way to maintaining biodiversity.
- Social and cultural functions mean in this context the revitalising and developing of traditional farming methods.

Organic (eco-) farming delivers a growing domestic and international market background for producers in rural areas, covering the whole production chain from raw material to selling end products. It is important that organic farming has to be concerned as a complex and integrated system. This means, on one hand, that the shift to organic farming should include not only the production of organic raw materials but also the processing, packaging and marketing of them. On the other hand, it is important to establish the organisational systems that cover the production itself, the equipment and genetic base supply, small and medium size processing facilities, and packaging, advisory and marketing management. Regarding growing domestic and foreign consumption trends, organic farming can turn itself into a new "alternative" employment segment in many areas. In this way, the previously ignored factor of rural development can potentially turn into an engine of regional development (Z. SZAKALY ET AL, 2003)

The potential of organic farming in Hungary's rural development

Hungary contributes minimally to the European turnover of organic foods, with a share of 40-42 million Euro. This amount aggregates less than 1% of the turnover on Hungarian food market including purchases in Hungary and abroad. The Hungarian consumption of organic foods is even lower; it is 0.005% of total food turnover (Á. OSZOLI, 2002). The low quantities can be attributed to the low number of domestic consumers preferring organic food. In the future, we expect an increase of consumption of organic food in Hungary but it is suggested that organic foods will be never manufactured at a wholesale level. They will cover requirements of special market segments (niche market).

References

ÁNGYÁN, J. (2001): Hozzászólás „A biokultúra jelentősége és helyzete az EU-csatlakozás folyamatában" témához. XIV. Biokultúra Napok, Gödöllő 2001. November 23-24.

BUCKWELL, A. (1997). Towards a Common Agricultural and Rural Policy for Europ. In: European Economy, Europen Commission Directorate – General for Economic and Financial Affairs, Reports and Studies, No.5. Luxenbourg

KASBOHM, A. (2002): Biomarkt 2001- Weltweit 26 Mrd. US $ Umsatz. Ökologie & Landbau, Bad Drückenheim, 121. 1. 28.

KORTBECH-OLESEN, R. (2002): Der Weltmarkt für Bioprodukte im Jahr 2000. Ökologie & Landbau, Bad Drückenheim, 121. 1. 2.

OSZOLI, Á. (2002): Az ökotermékekkel kapcsolatos fogyasztói szokások, értékesítési csatornák. FVM-AMC megbízásából készült tanulmány, Budapest, 50-61.

SARUDI, CS. (2000): Regionális politika és vidékfejlesztés. Kaposvár, Egyetemi jegyzet, 5-6. and 123-152.

SOLTI, G. (1999): Az ökogazdálkodás a nemzeti agrár-környezetvédelmi programban. Biogazdálkodás, Budapest, 10. 5. 22-24.

SZABÓ, G. (1998): Élelmiszer-gazdaságtan. Kaposvár, Egyetemi jegyzet, 22.

SZAKÁLY, Z. –SARUDI, CS. ET AL (2002): Interactions of organic agriculture, rural development and environment protection. Acta Agraria Kaposváriensis, Kaposvár, 6. 43-50.

WILLER, H. – YUSSEFI, M.(2004): The world of organic agriculture. Statistics and emerging trends 2004. SÖL, Nürnberg 2004. 76. 21-26.

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Part F:
Standard development work

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Report from the SAFO Standard Development Group: Implementation of the EU- Regulations on organic livestock farming in the EU countries – preliminary results of the partner survey

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Introduction

After a long period of negotiation, the EEC-Regulation on organic livestock production (EC Reg 1804/99), amending EU regulation 2092/91 on organic crop production, was passed in 1999. It sets out common rules for organic livestock production in the EU, while, at the same time, allowing member states to maintain or adopt higher national standards for livestock, as long as the basic requirements of the Reg 1804/99 were fulfilled.

By 2000, the EU15 members had to incorporate the livestock regulation into national organic standards. The ten new member states were required to implement the regulations as part of the process of joining the EU. The introduction of organic livestock standards comparable to 1804/99 varied from between 1997 in Estonia, 1998 in Latvia, 2000 in the Check Republic, 2001 in Slovenia and Poland, 2002 in Hungary and 2004 in Slovakia.

The interpretation of specific parts of the EEC regulation appears to differ between countries, influenced by different traditions in animal production and climatic conditions. This report presents the preliminary results of a questionnaire survey of the SAFO partners on the implementation and interpretation of specific paragraphs of the EU-Regulation in different EU member states and candidate countries.

Partner survey and preliminary results

In line with the objectives of the SAFO network, all its partners were asked to respond to a questionnaire that was based on the following two questions:

(i) Is there a problem with the implementation of this specific paragraph at the farm level in your country?

(ii) If there is a problem, what are the reasons and the background for problems with the implementation?

This report is based on the evaluation of fifteen responses, which were available at the time of the 3rd SAFO workshop in Falenty, Poland in September 2003. A further analysis of the responses from all partners is currently being carried out and is expected to be finished during the summer 2005.

The responses from the 15 partners are summarised here under general groupings of issues within the Regulation 1804/99.

Regulations regarding the selection of appropriate breeds or strains of animals as well as animal husbandry practices encouraging strong resistance to disease and the prevention of infections

- The difficulties of finding breeds suited for outdoor and free-range production. The scarcity of information about what constitutes a suitable breed or strain and the unclear definition of this in the standards leads to confusion. The problem was emphasised specifically for poultry production, where the same breeds as in conventional systems are used and the available birds are hybrids.
- The adoption of crossbreeding as a method to increase robustness.
- The absence of organic selection indices at European level. For example, in Norway, it was stated that the breeding populations of animals are too small to have separate breeding lines for organic production.
- Issues, such as adaptability and disease resistance, are not explicit breeding goals in most breeding programs.
- Unclear definition and lack of information about the potential of local and indigenous breeds. Small numbers of purebred animals due to their exploitation in crossbreeding programs in the past. Hence, the conservation of such breeds was seen as an important component of organic systems.
- Apart from the breeding issues, implementation of disease prevention and hygiene measures varies markedly between and within different countries. Lack of knowledge and ingrained farmer attitudes and poor definition of good biosecurity and other preventative management techniques within the regulations were seen as a problem here.

Regulations regarding organic feeds and animal feeding

- The different climatic conditions throughout Europe impose limitation in organic feed production as well as grazing availability to organic livestock. Feeding with 100% organic feed was seen as difficult in some countries. For example, pasture access is constrained during the winter months in Alpine areas and during summer in the southern European countries.
- Quality of organic feedstuffs is an issue in some countries and regions. The results suggest that data on the ingredients of organic feedstuffs and specific guidelines on quality of organic feeds are necessary.

Prevention of animal health problems

- The main specific problems highlighted by the responses were the prevention of mastitis (particularly in the absence of good milking equipment in sheep and goat systems and in some of the new member states) and control of parasites in sheep, pigs and poultry (lack of practical prevention schemes).
- Although, in most countries, traditional animal production has not been very dependent on medicinal inputs, there are problems implementing the EU organic legislation, as farmers, advisors and vets are not well informed of what is allowed and what is not. The responses suggested that there is a misunderstanding of what prevention means in organic livestock prodution. This combined with the lack of professional advice and the absence of reliable alternatives for conventional veterinary inputs was seen as a constraint to organic livestock production.

Treatment of sick or injured animals and the use of phyto-therapeutic and homeopathic products

- Some respondents raised the issue of low value of individual animals concerning their treatment. It was suggested that the long withdrawal periods imposed by the standards, may encourage non-treatment of certain type of stock due to the fear of not being able to slaughter the animals as organic (e.g. pig or calves).
- Lack of veterinary support (i.e. lack of knowledge about "alternative treatments" among veterinarians), together with farmer's reluctance to initiate treatments, due to concerns of loosing the organic status, were seen as issues that may lead to poor animal welfare in organic herds/flocks.
- Concerns were expressed over the fact that the regulation promotes the use of phyto-therapeutic and homeopathic products, while very few such products have been proven to have efficacy in disease management or are, either not available in the market, or have not been registered for animal use in many countries. This was seen as creating a conflict between vets and organic producers.

If the use of the above products should not prove, or is unlikely to be effective in combating illness or injury, and treatment is essential to avoid suffering or distress to the animal, chemically-synthesised allopathic veterinary medicinal products or antibiotics may be used under the responsibility of a veterinarian;

- The above regulation appears to have resulted in confusion amongst many of those that replied to the questionnaire, suggesting that it needs to be revised to clarify its meaning.
- It was pointed out that the absence of a reliable system to provide information about the effectiveness of the non-conventional therapies is the reason why veterinarians prefer to prescribe allophathic veterinary products.

Veterinary treatments to animals, or treatments to buildings, equipment and facilities which are compulsory under national or Community legislation shall be authorised (...) when a disease has been recognized

- Some of the respondents suggested that most farmers as well as member of certification bodies that act as advisors seem to ignore this part of the regulation

The use of substances to promote growth or production and the use of hormones or similar substances to control reproduction, or for other purposes, is prohibited. Hormones may be administered to an individual animal as a therapeutic veterinary treatment,

- The regulation appears to cause confusion, as the use of growth promoters is already prohibited in animal production in the EU. It was suggested that the regulation should be clarified and should focus on specific issues, such as the use of hormones for oestrus synchronisation, which is an issue in some countries.

The withdrawal period is to be twice the legal withdrawal period or, in case in which the period is not specified, 48 hours.

- Several respondents reported that this standard causes confusion, especially in the cases where 'natural remedies' are used. Also, problems were reported in relation to dry cow therapy and antiparasitic treatments for sheep and poultry. It was suggested that the doubling of withdrawal periods is unjustified, since this may make them unnecessarily long in practice or is in contradiction with effective therapy of mastitis in the dry period.

Only three courses of treatment with conventional vet inputs are allowed] with the exception of vaccinations, treatments for parasites and any compulsory eradication

- The responses suggest that, in most countries, the above has been misinterpreted. There appears to be problems with the definition of one 'treatment course' and how to control the number of treatments properly. Also in most countries there is no information available on whether such restrictions, in the number of treatments, are enforced, and how many animals actually loose their organic status as a result of the restriction.

Livestock must be fed on organically produced feedstuffs

- The most important problem with this requirement, in most countries, appears to be the availability of organic feedstuffs and their high cost.

Feed must come from the unit or (…), at least 50% of the feed shall come from the farm unit itself or be produced in cooperation with other organic farms,

- The implementation of the above regulation has created problems in approximately half of the 15 partner countries that responded.

The feeding of young mammals must be based on natural milk, preferably maternal milk. All mammals must be fed on natural milk ……

- The wording of the above appears confusing and allows different interpretations, according to the respondent. Certain problems appear to arise from the unclear definition of "natural milk" and the fact that in dairy sheep and goat systems weaning takes place sooner than the regulation allows.
- Absence of organic milk replacer in the market place was also reported as a problem.

Roughage, fresh or dried fodder, or silage must be added to the daily ration for pigs and poultry.

- In some countries, there has been confusion about suitability of roughages for pigs and poultry in relation to the age and production stage.
- Another problem reported here was the issue of 'high quality feed'. It was felt that the regulation should be more precise about the term high quality.

Housing and outdoor facilities, stocking density

- Many respondents felt that the regulation text about housing and outdoor facilities should be revised to provide concise and, where needed, more extensive information on the above subjects.
- Prohibition of tethering of livestock, which is a traditional husbandry practice in some countries, was highlighted as a problem by some respondents.
- Some respondents reported that stocking densities did not always correspond with the allowed densities on organic farms in their countries.
- It was also reported that organic poultry housing and outdoor management practices, in some countries, frequently did not comply with the regulation.
- There appears to be problems with pasture availability, throughout the year, in certain countries.
- Some respondents felt that the regulation needs to be more specific about of hygienic measures for buildings and housing equipment.

- The wide range of climatic conditions between the European Northern and Southern countries appears to make the implementation of the housing standards very difficult, due to economic constraints.
- Another problem, highlighted by partners from the Northern European countries, is associated with the availability of bedding materials and, hence, the difficulty of construction of floor areas fully compliant with the EU regulation.

Operations, such as attaching elastic bands to the tail of sheep, tail docking, cutting of teeth, trimming of beaks and dehorning must not be carried out systematically on organic farms.

- Many respondents raised concerns about the lack of explicit approach to the issue of animal integrity in the regulation.
- The issue of dehorning was highlighted, as it is associated with herd management and costly infrastructure problems on the farm. Some partner country representatives reported that dehorning of dairy cattle was a routine practice on organic farms and, as such, accepted by the certification authorities.

Physical castration is allowed in order to maintain the quality of products and traditional production practices (...) but only under conditions set out …

- Some respondents felt that this was in contradiction of the general prohibition of mutilations. It was also suggested that the conditions, under which castrations are allowed, should be made more explicit.

Transport of livestock must be carried out so as to limit the stress suffered by the animals (...). Loading and unloading must be carried out with caution and without the use of any type of electrical stimulation to coerce the animals. The use of allopathic tranquillisers (---) is prohibited.

- The main problem reported here was the shortage of appropriate vehicles for animal transport and the absence of information regarding transport of organic livestock. It was suggested that the regulation should be made more specific about the requirements for safety and welfare of organic animal transportation.

Preliminary discussion and conclusions

One of the reoccurring themes of the comments made in response to the questionnaire was the suggestion that there is a lack of clarity and detail in the regulation, leading to confusion and misinterpretation. It is obviously important that all such areas in the regulation are identified and problems arising purely from 'bad writing' are remedied. Some of the issues highlighted by the respondents, however, require more than grammatical/semantic changes, and can only be addressed at community level, providing clearer definition of concepts, such as 'a course of treatment, or 'outdoor access'.

There also appears to be a common desire, among the respondents, to have a regulation that takes into consideration the various geographical conditions, farming and husbandry traditions and eating cultures. For instance, dehorning of cattle seems to be common practice in many countries, and dehorning in organic herds is, therefore, also common or a norm. Tethering is also common in some countries and is practiced in organic farming in these countries as a norm. There appears to be different approaches to such problems. One would be to maintain the current standard and educating farmers and advisers on the ways to comply.

Another would be to allow regional ‘interpretations’ that take the cultural etc. factors into consideration. A third solution would be to change the standards so that the regional differences are incorporated. In the light of the EU Council current desire to ‘streamline’ organic legislation, the last alternative seems the most unlikely.

A third common category of responses reported difficulties that appear to be caused by attempts to comply with standards that arise from fundamental organic principles, such as the long product withdrawal periods, arising from the precautionary principle; and the long suckling periods, arising from the principle of allowing animals access to natural behaviour. In these areas, there appears to be a need to identify local/general technical solutions to the problems, rather than to change the standards.

A full analysis of the responses will be discussed at the 4th SAFO workshop in Switzerland in March 2005, and a more detailed report will be available summer 2005.

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