

Socio-economic aspects of animal health and food safety in organic farming systems

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

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Why do humans keep animals? Does the answer help to define the standards for organic animal husbandry?

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Introduction

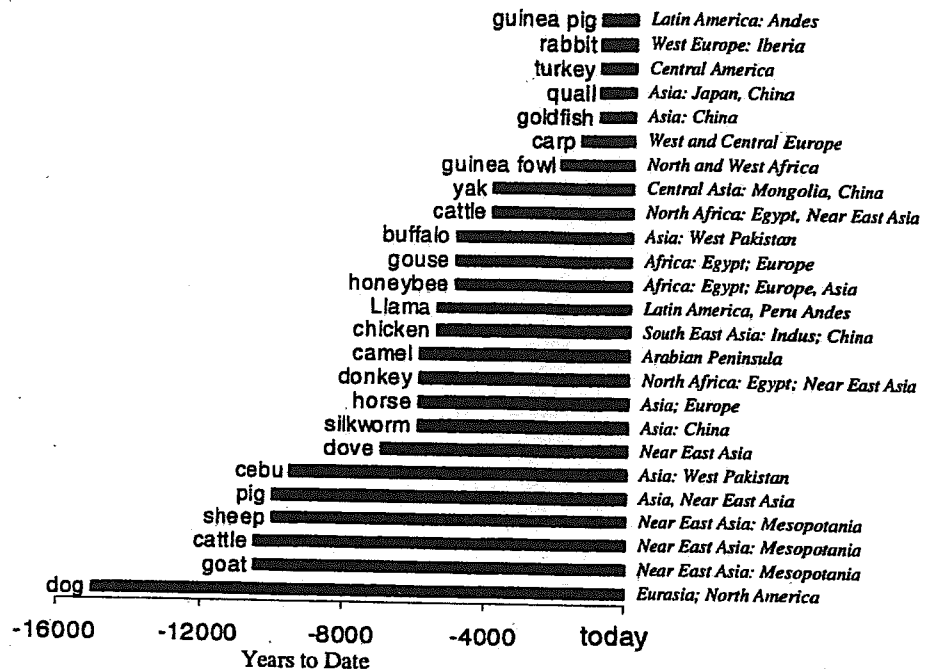
Domestic livestock, such as farm animals and pets, are part of the cultural heritage of mankind. Animals have been used for food, services, non-food or religious purposes or just as a hobby for thousands of years. Man-made breeding has created livestock that are adapted for different purposes and functions. Today, thousand of breeds exist: adapted to the various conditions in human households.

The discussion of animal welfare and the definition of standards for livestock keeping have to consider the different functions, ethical values and perceptions of people involved (Badura, 1999). The differences of culture, as well as private and common wealth between individuals, regions and countries, can be a reason for different standards for animal keeping. This discussion can become easier with an understanding of the functions of animals from a historical and ethical perspective. This can help to answer the question of how the animals should be kept.

History of livestock keeping

Worldwide, there are about 100 different animal species kept by humans for multi-purpose use (Groenefeld and Glodek, 2000). Most of the 40 different mammalian species (e.g. cattle, yaks, banteng, mithan, buffalos, sheep, goats, horses donkeys, pigs, reindeer, camels, cats, dogs, buffalos, rabbits, guinea pigs, llamas, elephants, rats, mice), 24 different bird species (e.g., chicken, geese, ducks, turkeys, doves, guinea fowl, ostriches), 18 different fish species (e.g., carp, trout, salmon) and several insect species (e.g., earthworms, bees, silkworms) are kept on farms and have been domesticated at different stages of history (Fig. 1).

Figure 1: Domestication periods and regions of important livestock species (Source: designed Rahmann)



Livestock utilisation and keeping has always been an important aspect of human activity. There are only a few cultures that do not use the services and products of animals. In the history of mankind, there were several stages in the building of human-livestock-relations (Tab. 1):

- **Hunting (pre-domestication: 15 000 years ago):** Humans hunted and collected wild animals for food and non-food purposes. This was their only influence on the wild animal population. A nomadic lifestyle was required to search for prey for self sufficiency.
- **Wild game keeping (domestication by chance: 15 000 – 10 000 years ago):** With increasing human density (1 to 2 people/km²), game became scarce and hunting more difficult. People started to settle and improved hunting and crop production. Domestication of wild animals began. Dogs were the first animals kept by humans. Puppies of wild dogs were probably reared. They could be trained for hunting and protection. Young, wild animals, caught alive were reared and slaughtered for meat (e.g., goats, sheep). Subsistence livestock keeping was dependent on local availability (man ↔ animal co-evolution, Luke 1989). Planned breeding, feeding and treatment was not practiced, and reproduction was still dependent on wild animals. The needs of self sufficiency determined the numbers of animals kept by humans.
- **Animal husbandry (10 000 years ago until the 18th century):** With planned breeding and feeding, animal keeping became independent from wild game resources. This period can be considered as the beginning of livestock keeping. The farmers could produce their own breeding stock. Suitable species were those that supplied the needs of the animal holder, were

easy to tame, were fertile under captivity and could be easily fed and controlled even during difficult seasons (e.g. winter period or harsh conditions). After many generations, domestic animals became adapted and, therefore, different from their relatives living in the wild. The increase in productivity and the selling of products – surpluses which could not be used for home consumption – began. Self sufficiency was still very important, but not necessary for everyone. Food could be sold and purchased (urbanisation). Fewer people needed to keep animals: livestock keeping was no longer just for subsistence, but became a market-oriented agricultural business.

- Animal production (the last two centuries): In the last two centuries, animal husbandry has shifted towards animal production. Improved feeding, health care, stable keeping conditions and breeding developed high yielding livestock. Distances and environmental conditions were no longer a limiting factor. Household equipment, artificial insemination, fodder production on crop land and veterinary drugs helped to increase productivity and reduce the impact of unfavourable environmental conditions for livestock. Cheap and fast transportation possibilities supported the trade and exchange of live animals and animal products all over the world. Today, every species can be kept in every country, every livestock product is available everywhere. The industrial form of animal keeping can only be practiced by a small number of farmers. Most people have lost any ties they may have had to livestock keeping. Pets, without any self sufficiency function, have become more and more important, especially in developed countries. Over-production, changed ethical values and animal cruelty, problems in animal health and negative environmental impacts are the results, and the social, economic and ecological sustainability can no longer be taken for granted.
- Animal husbandry of the future (from today until tomorrow): Developed societies are not clear in their approach to the development of livestock keeping. There are serious conflicts of different ethical values, perceptions and expectations between farmers, consumers and the society. Recently, three paths of development of livestock keeping in developed countries can be observed:
 - Type I: low to medium external input – low to medium output systems: back to nature (landscape management, organic farming, hobby farming).
 - Type II: medium external input – high output systems: development of the classical animal production systems (improved high yielding varieties/breeds, integrated production).
 - Type III: high external input – high output systems: technological advances (e.g., GM or cloned livestock, zero-emission stables, artificial food production).

Table 1: Three philosophical phases of man – animal relations in the Western world (Source: Badura, 1999)

Period	Human – Animal Relations	Philosopher
Antique	The differences between humans and animals are graduated (spirituality of animals and equality to humans on different levels)	Aristoteles, Plutarch, etc.
Middle Ages and Pre-Industrial	„Animals are like machines“, they have no soul and therefore no rights (e.g., vivisection was possible) (radically Anthropocentric, Christian theology)	Descartes, T.v. Aquin, Spinoza, etc.
1800s to Present	Animals and humans have the same history (evolutionary theory), animals have rights („The Five Freedoms of Animal Welfare“) (Socio-biology, „man and other animals“)	Darwin, Kant, Griffin, etc.

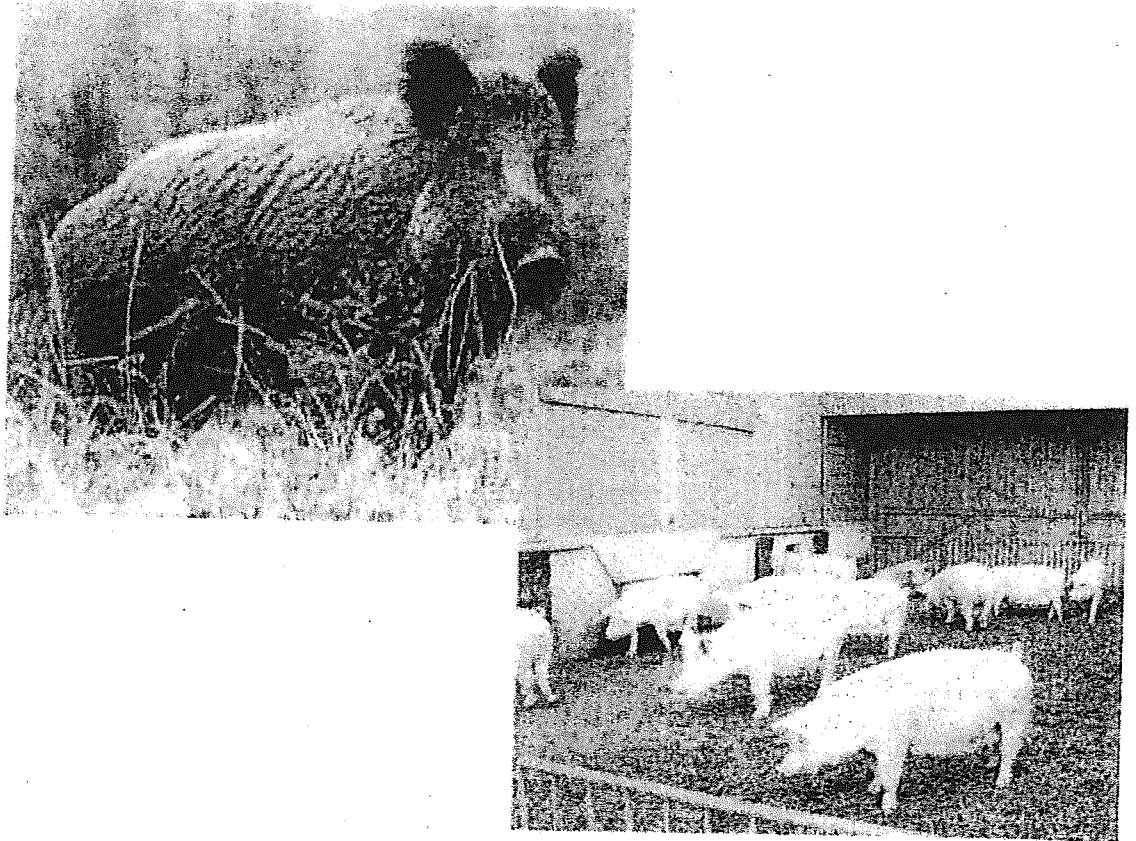
Results of man-made breeding

Today, most farm animals are domesticated breeds. Domestication means that the animals are adapted to the farm conditions due to a selection carried out by humans. These animals show differences in phenotype, physiology, productivity and behaviour when compared to relatives living in the wild (Fig. 2). Thousands of different breeds have been created for specific purposes and functions within the framework of environmental and socio-economic conditions (Rahmann, 1996). Only small populations are found of many breeds in specific regions (rare breeds), some are found worldwide (e.g., Holstein Friesian dairy cattle). The selection has created breeds adapted to the conditions and purposes of the farms. Worldwide, 863 sheep breeds, 783 cattle breeds, 313 goat breeds, 357 horse breeds, 263 pig breeds, 78 donkey breeds and 62 buffalo breeds are known. About 39% of these breeds are of European origin, but 26% of them are at risk of extinction (Loftus and Scherf, 1993) (Tab. 2). Endangered breeds are often no longer able to meet the demands of humans, and fewer and fewer people breed or keep them. Extinction means the loss of agricultural biodiversity. This is serious problem because it will never be known if these breeds could have been important in the future. For example, for organic farming purposes, breeds that are adapted to the local conditions are needed (Rahmann, 2002).

Table 2: Development of farm livestock in the world over the past 40 years (in millions of animals) (Source: FAO, 2003)

Species	Year	EU 15	Europe	North America	Latin America	Africa	Asia	World
Cattle	1962	87		144	147	124		957
	1982	97		178	246	177		1,241
	2002	81	141	161	311	237	475	1,267
Sheep	1962	89		39	117	133		997
	1982	82		21	103	185		1,129
	2002	105	141	16	74	240	407	1,034
Goats	1962	12		15	19	94		364
	1982	10		14	19	143		480
	2002	12	18	14	23	217	470	743
Pigs	1962	73		80	38	6		423
	1982	114		92	52	10		770
	2002	124	196	97	56	21	566	941
Chickens	1962	669		956	251	282		4,041
	1982	915		1,463	774	608		7,760
	2002	1,005	1,815	2,842	1,808	1,307	7,963	15,854
Turkeys	1962	8,7		40	2	1		113
	1982	54		66	5	2		207
	2002	98	112	100	16	8	13	251
Horses	1962	5		9	12	3		60
	1982	2		14	13	4		59
	2002	2	7	14	16	3	16	56

Figure 2: Thousand of years of breeding have changed the phenotype, behaviour and physiology of animals, for example of wild boars in comparison with domestic pigs (Fotos: Marek, Rahmann)



Many of the recent high yielding breeds (e.g., pig and fowl) are dependent on the farmers' care. They would not survive in the wild. Due to health problems, fodder needs and the loss of self-protective ability, most escaped farm livestock die after a while in the wild. Severe survival problems occur, particularly in winter. On the other hand, feral animals can be found in many countries around the world, sometimes for centuries. They can create problems like wild goats in Scotland; sheep, goats, dogs, camels and rabbits in Australia; cats in Germany; honey bees in Latin America and feral horses in the United States. They can transmit diseases to the indigenous livestock, damage the natural vegetation or crops on farmland, destroy infrastructure and even kill or injure animals and humans.

The functions of livestock on organic farms

In the course of history, the functions of different livestock species have changed. The answer to the question "Why do humans keep these animals?", seems easy, particularly in agriculture, but

following the initial reaction, many more reasons emerge (Clauss *et al.*, 1999; Capell, 1998; Tab. 3).

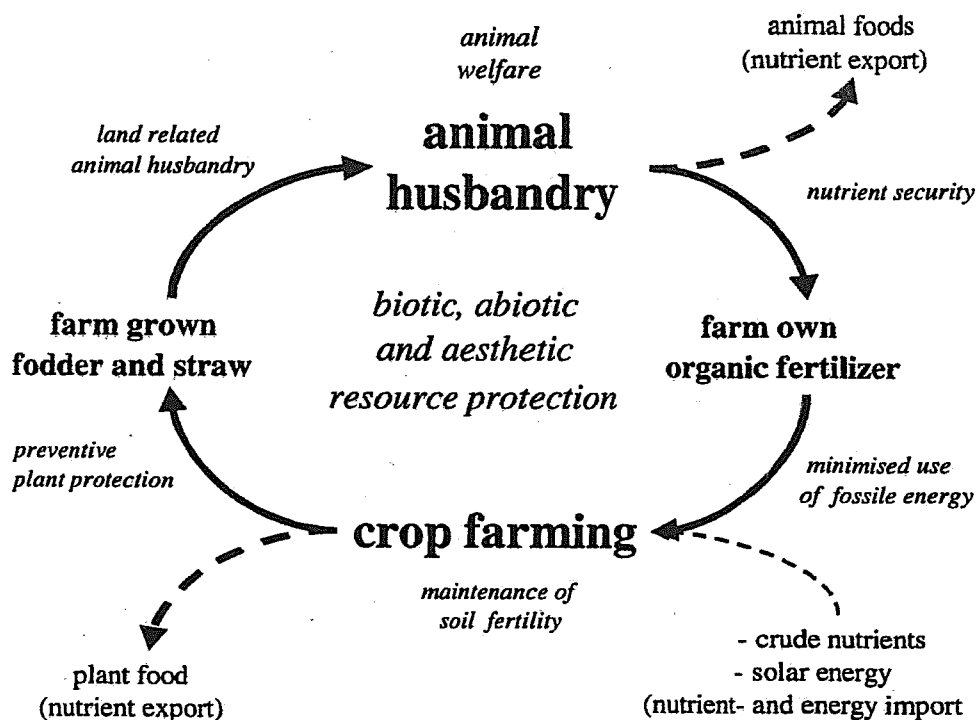
Table 3: Products and functions of farm livestock (Source: compiled by Clauss, 1999 and Capell, 1998)

Food products	meat, milk, eggs, honey, blood
Non-food products	feathers, wool, skin, hair, bones, silk, medicine, biogas, wax, propolis
Off-farm services	transport, therapy, recreation, landscape maintenance, hunting, protection, sport, status, research, religion
On-farm functions	manure production, utilisation of by-products from crop farming and processing, pollination, pest control (e.g., insects, rodents, snails), herding, marketing, attraction of guests, biodynamic preparation processing (e.g. horns)

In the last century, farm animals have changed from multi-purpose to single purpose animals. The majority of modern farm livestock is high yielding and specialized for only one product, even on organic farms in the Western world (Rahmann, 2003). This development has only been possible through a mutual development of the farm environment and the animal. Improved breeds were in need of better feedstuff, protection, health care and housing conditions and vice versa. The functions of livestock changed not only in a historical context, but even in terms of different socio-economic and environmental framework conditions.

The cost of the improved keeping conditions could only be paid for by higher animal productivity. This feedback system resulted in the modern animal production conditions of cost intensive and high yielding animal production. However, there seems to be a limit to this up-streaming. In the past decades, Western society – which is dominated by non-farmers and citizens – has substantially changed the framework conditions for farming. Animal welfare, environmental protection and landscape management play an important role in farm practices. The multi-functionality of stock has become more important; not in production sense but in soft functions, like on-farm impact, tourism, on-farm attractions, “edu-tainment”, landscape management, renewable energy production and/or hobby and recreation (Rahmann, 1998; Rahmann and Tawfik, 2000; Rahmann, 1997). This has also had an influence on the animal husbandry conditions. For example, organic farming has re-integrated livestock in the whole farm organism with respect to the on-farm functions. The traditional concept of farming system development focuses on the mutual relations of physical farming elements: soil, plant and animal (Fig. 3).

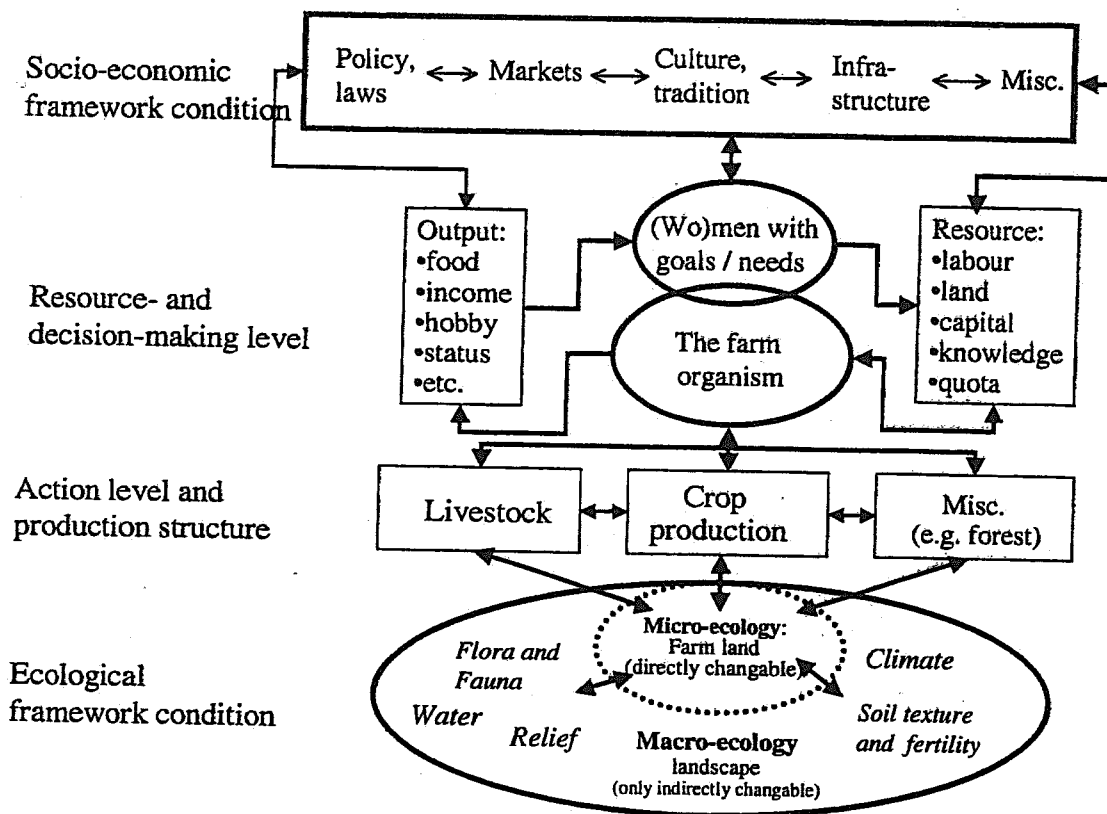
Figure 3: Animal husbandry at the production level of an organic farming system (Source: Rahmann, 2003)



A holistic approach needed for organic farming system development

The farm-focused development concept for animal husbandry, as described in Figure 3, does not include some important aspects that influence the farming system substantially: the farmer himself and his family with their resources, goals and needs, as well as the socio-economic and the ecological framework conditions (Fig. 4). For example, dairy cattle kept in wealthy, humid Germany is different from dairy cattle kept in a poor, tropical country like Bangladesh. The intercultural and supra-regional definition and development of standards and regulations has to respect local socio-economic and ecological conditions. Livestock keeping standards for different framework conditions can only be at a minimum level of consensus. Locally adapted interpretation of these standards has to be made (see 2092/91/EEC and 1804/99/EC). With an interdisciplinary approach, like the Farming System Research and Development concept (FSR+D), holistic problems of improvement and development of farming with different framework conditions can be better understood and, therefore, better solved (Rahmann, 1993; Rahmann, 1998; Fischer *et al.*, 1999).

Figure 4: The holistic approach of Farming System Research and Development (FSR+D)
(Source: Rahmann, 2000).



The ethical impact of standards definition in animal husbandry

Standards for animal husbandry and welfare mainly have an anthropocentric perspective (e.g., Kant, 1925; Krebs, 1993) and background. Product and process quality, compassion and morals are concepts of Western human society. It is difficult for some cultures to understand the animal welfare movements in Europe because they have other morals (Tab. 4). Even for farmers in Europe, many “urban” values for animal welfare are difficult to accept and fulfil. The discussion of the prohibition of battery keeping in cages or the prohibition of tying up cows in organic farming in Germany in the past years has shown the different ethical values in a society. The patho-centric morality (e.g., Schopenhauer, 1977) is the most relevant factor for animal welfare standards. Our compassion for suffering animals exists only for livestock, which can express pain or react to cruelty. We do not experience compassion for mosquitos or snails, and therefore have no moral obligation or animal welfare concept for these creatures (Badura, 1999).

Table 4: The different moral philosophical concepts of man – animal relations (source: Badura 1999)

- Anthropo-centric: Moral relevance: how animals are treated has an impact on humans (e.g. product and process quality) (Kant, Christian religions).
- Bio-centric and physio-centric: Moral relevance: dignity and respect for every animal and plant (bio-centric) or even every thing (physio-centric). There can be no advantage for humans. (Intrinsic value, ecological ethics, deep ecology, religions) (Schweitzer, animalism, jainism, hinduism, American indigenous religions).
- Patho-centric: Moral relevance: compassion; if an organism can feel, it can also suffer. (Schopenhauer, Krebs, Regan, Utilitarianism).

The socio-economic framework conditions have to consider the ethical values of the societies they are not always in the historical context of the Western world (ethnocentric perspective). For example, in a Muslim society, pork is not eaten, and, in a Hindu society, beef is not consumed. Western cultures do not like to eat guinea pigs, dogs or insects, like the people in the Andean regions of Ecuador, in Korea or in Zimbabwe. In the Masai culture, the horns of cattle are more important than the milk yield for the status of the owner. In biodynamic farming, horns have an important role in the processing of biodynamic preparations. Even the land property rights influence the standards of animal husbandry. Private, communal, state or even free property rights on land use have a direct impact of animal husbandry, health care, nutrition, housing and breeding.

On the other hand, the environmental framework conditions determine the animal husbandry standards. In tropical, semi-arid, humid or arctic climates, the standards are adapted to the circumstances. There is no straw available in arctic areas, and zero-grazing in sub-tropical areas is accompanied with vector transmitted or soil-borne diseases (e.g., East Coast Fever, trypanosomiasis, anaplasmosis, anthrax, botulism). In Europe, the endo- and ecto-parasites or infections like foot rot limit the outdoor keeping of animals (apart from climate limitations in summer and winter seasons).

Conclusion

In organic farming, the on-farm functions of manure production, by-product utilisation and attraction for visitors are relevant for the animal husbandry structure. The multi-functionality of livestock includes the anthropocentric ethical values of the society. Consumers expect high animal welfare standards because of their compassion for creatures in human control, environmentally sound production to secure the biotic and abiotic resources (water, soil and air) and high product quality at low prices. To meet these expectations simultaneously is not possible.

The holistic view of the multi-functionality of livestock on farms does allow us to determine standards for organic animal husbandry under several circumstances. These must respect the socio-economic and ecological framework conditions as well as the physical situation of the farm and the goals, needs and resources of the farmer. This has mostly been forgotten in the past. The EU has for six years discussed the regulation 1804/99/EC because of different perspectives and attitudes on "good organic animal husbandry practices". The common standards of organic animal husbandry are a compromise. They have to be interpreted and developed under the local conditions of the regions in the EU.

References

- Badura, J. (1999). Moral für Mensch und Tier. Tierschutzethik im Kontext. München, pp 86
- Bartussek, H. Haiger, A. and Storhas, R. (1988). Naturgemässe Viehwirtschaft. Stuttgart, pp 112
- Becker, B. (1996). Ethical Norms and Values behind the concept of Sustainability. *Der Tropenlandwirt* 56, Witzenhausen, 7-14
- Clauss, E., Kleeberg, A. and Stier, K. (1999). Funktionen der Tierhaltung im Ökologischen Landbau – Warum halten wir Nutztiere? Different perceptions of students and teachers of the Faculty of Organic Farming at the University of Kassel and the conventional Faculty of Agriculture of the University of Göttingen. Internal report, Uni Kassel, Witzenhausen, pp 65
- Capell, J. (1998). Funktionen der Tierhaltung im Ökologischen Landbau. Eine kritische Diskussion: Warum halten wir Tiere? An organic farm study. Diploma thesis, University of Kassel, Witzenhausen, pp 82
- FAO (2003). FAO Statistic-Databank download from September 2, 2003; www.fao.org, Rome
- Fischer, J., Claus, C., Herrera, A. and Rahmann, G. (1999). Ecological and socio-economic aspects of hair sheep keeping in the tropical rainforest of Ecuador. *GTZ-TOEB F-V/9*, Frankfurt/Rossdorf, pp 91
- Groenefeld, E. and Glodek, P. (eds) (2000). Animal Breeding and Animal Genetic Resources. *Landbauforschung Völkenrode, FAL Agricultural Research, Special Issue 228*, Braunschweig, pp 94
- Krebs, A. (1993). Haben wir moralische Verpflichtungen gegenüber Tieren? *Deutsche Zeitschrift für Philosophie* 41, 999-1007
- Loftus, R. and Scherf, B. (eds) (1993). *World Watch List for Domestic Animal Diversity*. 1st edition. FAO, Rome, pp 376
- Luke, K. (1989). Die Entwicklung der Tierhaltung in Deutschland bis zum Beginn der Neuzeit. *Forum* 19, Saarbrücken/Fort Lauderdale, pp 122
- Rahmann, G. (1993). Ökonomisches Handeln von Nomaden. Mobile Tierhaltung unter Dürrebedingungen in der Butana/Sudan. *Sozioökonomische Schriften zur Ruralen Entwicklung* 111, Kiel, pp 288
- Rahmann, G. (1996). Praktische Anleitungen zur Biotoppflege mit Nutztieren. *Schriftenreihe Angewandter Naturschutz* 14, Lich, pp 116
- Rahmann, G. (1997). Contribution of rural tourism to the market for livestock products in LFAs in Germany. Laker, J.P. and Milne, J.A. (eds.). *Livestock Systems in European Rural Development*. LSIRD Network., Aberdeen, 57-61

Rahmann, G. (1998). Meat produced under agri-environmental schemes. Problems to fulfil consumer expectation. In: Waterhouse, A. and McEwan, I. (eds.). *Landscapes, Livestock and Livelihood in European Less Favoured Areas*. Auchincruive, Ayr, Scotland, 161-165

Rahmann, G. (2000). Biotoppflege als neue Funktion und Leistung der Tierhaltung. *Agraria* 28, Hamburg, pp 384

Rahmann, G. (2002). The standards, regulations and legislation required for organic ruminant keeping in the European Union. EAAP publication 106, 15-26

Rahmann, G. (2003). *Ökologische Tierhaltung*. Stuttgart, pp 154

Rahmann, G. and Tawfik, E. (2000). Landschaftserhaltung mit Nutztieren im sozio-ökonomischen Kontext. Dargestellt am Beispiel ausgewählter Dörfer im Biosphärenreservat Rhön. *Schriftenreihe Agrarwissenschaftliche Forschungsergebnisse* 20, Hamburg, pp 284

Schopenhauer, A. (1977). *Preisschrift über die Grundlage der Moral*. Zuerich

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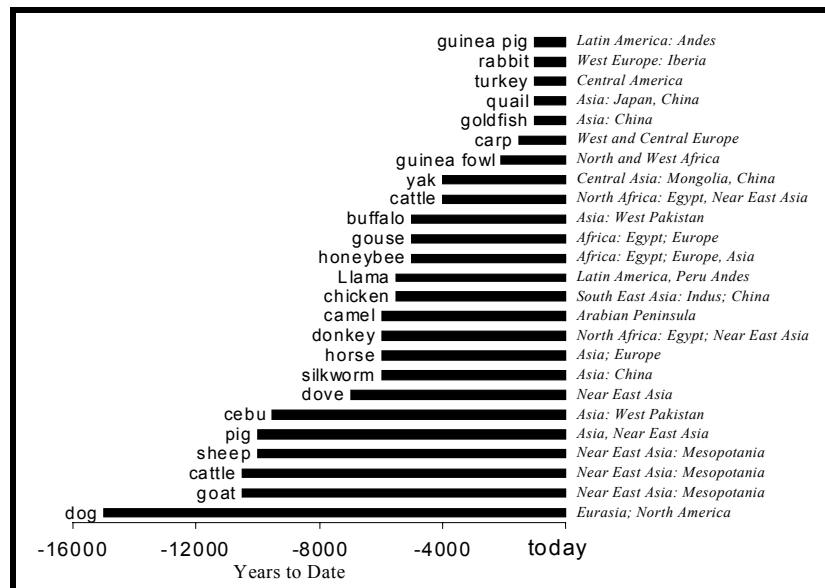


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Table 2 Development of farm livestock in the world over the past 40 years (in millions of animals) (Source: FAO, 2003)

Species	Year	EU 15	Europe	North America	Latin America	Africa	Asia	World
Cattle	1962	87		144	147	124		957
	1982	97		178	246	177		1,241
	2002	81	141	161	311	237	475	1,267
Sheep	1962	89		39	117	133		997
	1982	82		21	103	185		1,129
	2002	105	141	16	74	240	407	1,034
Goats	1962	12		15	19	94		364
	1982	10		14	19	143		480
	2002	12	18	14	23	217	470	743
Pigs	1962	73		80	38	6		423
	1982	114		92	52	10		770
	2002	124	196	97	56	21	566	941
Chickens	1962	669		956	251	282		4,041
	1982	915		1,463	774	608		7,760
	2002	1,005	1,815	2,842	1,808	1,307	7,963	15,854
Turkeys	1962	8,7		40	2	1		113
	1982	54		66	5	2		207
	2002	98	112	100	16	8	13	251
Horses	1962	5		9	12	3		60
	1982	2		14	13	4		59
	2002	2	7	14	16	3	16	56



Figure 2 Thousand of years of breeding have changed the phenotype, behaviour and physiology of animals, for example of wild boars in comparison with domestic pigs (Fotos: Marek, Rahmann)

The functions of livestock on organic farms

In the course of history, the functions of different livestock species have changed. The answer to the question “Why do humans keep these animals?”, seems easy, particularly in agriculture, but following the initial reaction, many more reasons emerge (Clauss *et al.*, 1999; Capell, 1998; Tab. 3).

Table 3 Products and functions of farm livestock (Source: compiled by Clauss, 1999 and Capell, 1998)

Food products	meat, blood	milk,	eggs,	honey,
Non-food products	feathers, wool, skin, hair, bones, silk, medicine, biogas, wax, propolis			
Off-farm services	transport, therapy, recreation, landscape maintenance, hunting, protection, sport, status, research, religion			
On-farm functions	manure production, utilisation of by-products from crop farming and processing, pollination, pest control (e.g., insects, rodents, snails), herding, marketing, attraction of guests, biodynamic preparation processing (e.g. horns)			

In the last century, farm animals have changed from multi-purpose to single purpose animals. The majority of modern farm livestock is high yielding and specialized for only one product, even on organic farms in the Western world (Rahmann, 2003). This development has only been possible through a mutual development of the farm environment and the animal. Improved breeds were in need of better feedstuff, protection, health care and housing conditions and vice versa. The functions of livestock changed not only in a historical context, but even in terms of different socio-economic and environmental framework conditions.

The cost of the improved keeping conditions could only be paid for by higher animal productivity. This feedback system resulted in the modern animal production conditions of cost intensive and high yielding animal production. However, there seems to be a limit to this up-streaming. In the past decades, Western society – which is dominated by non-farmers and citizens - has substantially changed the framework conditions for farming. Animal welfare, environmental protection and landscape management play an important role in farm practices. The multi-functionality of stock has become more important; not in production sense but in soft functions, like on-farm impact, tourism, on-farm attractions, “edu-tainment”, landscape management, renewable energy production and/or hobby and recreation (Rahmann, 1998; Rahmann and Tawfik, 2000; Rahmann, 1997). This has also had an influence on the animal husbandry conditions. For example, organic farming has re-integrated livestock in the whole farm organism with respect to the on-farm functions. The traditional concept of farming system development focuses on the mutual relations of physical farming elements: soil, plant and animal (Fig. 3).

A holistic approach needed for organic farming system development

The farm-focused development concept for animal husbandry, as described in Figure 3, does not include some important aspects that influence the farming system substantially: the farmer himself and his family with their resources, goals and needs, as well as the socio-economic and the ecological framework conditions (Fig. 4). For example, dairy cattle kept in wealthy, humid Germany is different from dairy cattle kept in a poor, tropical country like Bangladesh. The inter-cultural and supra-regional definition and development of standards and regulations has to respect local socio-economic and ecological conditions. Livestock keeping standards for different framework conditions can only be at a minimum level of consensus. Locally adapted interpretation of these standards has to be made (see 2092/91/EEC and 1804/99/EC). With an interdisciplinary approach, like the Farming System Research and Development concept (FSR+D), holistic problems of improvement and development of farming with different framework conditions can be better understood and, therefore, better solved (Rahmann, 1993; Rahmann, 1998; Fischer *et al.*, 1999).

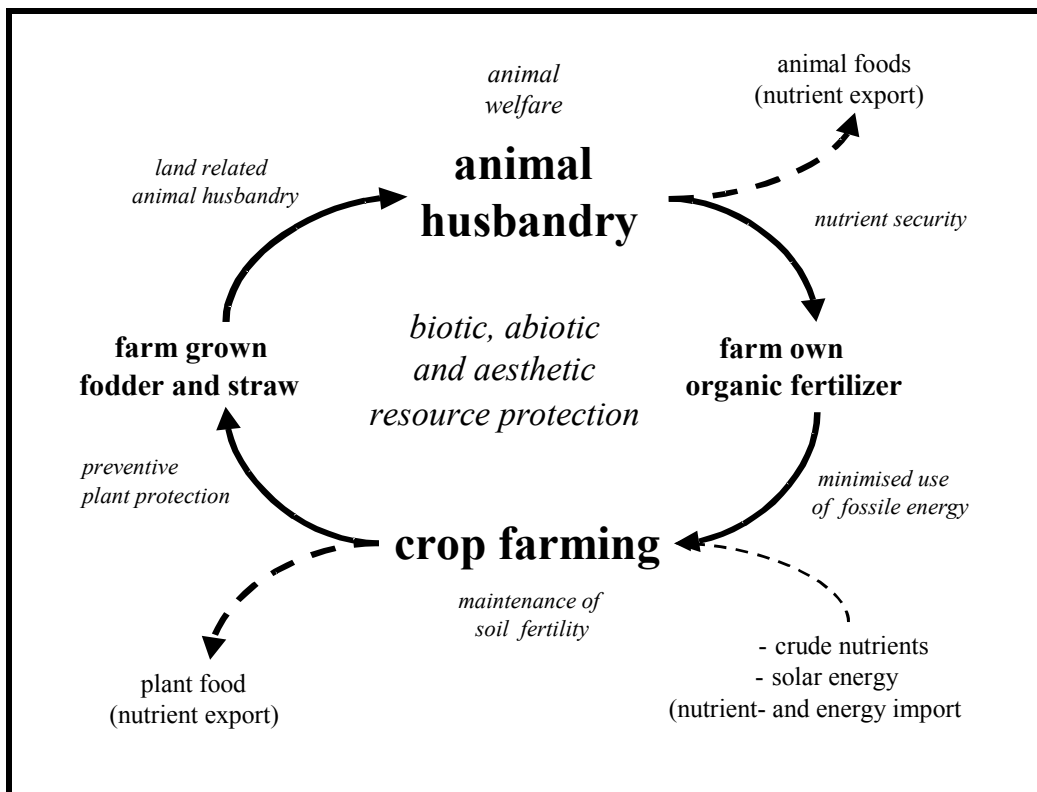


Figure 3 Animal husbandry at the production level of an organic farming system (Source: Rahmann, 2003)

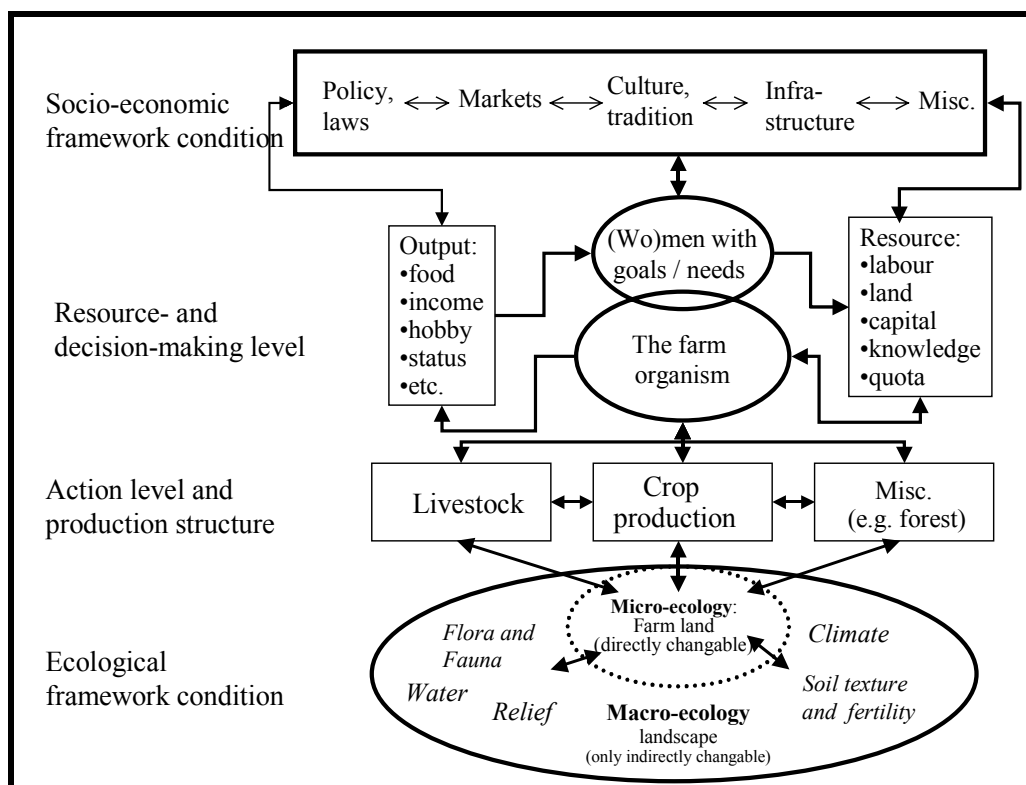


Figure 4 The holistic approach of Farming System Research and Development (FSR+D) (Source: Rahmann, 2000)

The ethical impact of standards definition in animal husbandry

Standards for animal husbandry and welfare mainly have an anthropocentric perspective (e.g., Kant, 1925; Krebs, 1993) and background. Product and process quality, compassion and morals are concepts of Western human society. It is difficult for some cultures to understand the animal welfare movements in Europe because they have other morals (Tab. 4). Even for farmers in Europe, many “urban” values for animal welfare are difficult to accept and fulfil. The discussion of the prohibition of battery keeping in cages or the prohibition of tying up cows in organic farming in Germany in the past years has shown the different ethical values in a society. The patho-centric morality (e.g., Schopenhauer, 1977) is the most relevant factor for animal welfare standards. Our compassion for suffering animals exists only for livestock, which can express pain or react to cruelty. We do not experience compassion for mosquitos or snails, and therefore have no moral obligation or animal welfare concept for these creatures (Badura, 1999).

Table 4 The different moral philosophical concepts of man – animal relations (Source: Badura, 1999)

- Anthropo-centric: Moral relevance: how animals are treated has an impact on humans (e.g., product and process quality) (Kant, Christian religions).
- Bio-centric and physio-centric: Moral relevance: dignity and respect for every animal and plant (bio-centric) or even every thing (physio-centric). There can be no advantage for humans. (Intrinsic value, ecological ethics, deep ecology, religions) (Schweitzer, animalism, jainism, hinduism, American indigenous religions).
- Patho-centric: Moral relevance: compassion; if an organism can feel, it can also suffer. (Schopenhauer, Krebs, Regan, Utilitarianism).

The socio-economic framework conditions have to consider the ethical values of the societies that are not always in the historical context of the Western world (ethnocentric perspective). For example, in a Muslim society, pork is not eaten, and, in a Hindu society, beef is not consumed. Western cultures do not like to eat guinea pigs, dogs or insects, like the people in the Andean regions of Ecuador, in Korea or in Zimbabwe. In the Masai culture, the horns of cattle are more important than the milk yield for the status of the owner. In biodynamic farming, horns have an important role in the processing of biodynamic preparations. Even the land property rights influence the standards of animal husbandry. Private, communal, state or even free property rights on land use have a direct impact of animal husbandry, health care, nutrition, housing and breeding.

On the other hand, the environmental framework conditions determine the animal husbandry standards. In tropical, semi-arid, humid or arctic climates, the standards are adapted to the circumstances. There is no straw available in arctic areas, and zero-grazing in sub-tropical areas is accompanied with vector transmitted or soil-born diseases (e.g., East Coast Fever, trypanosomiasis, anaplasmosis, anthrax, botulism). In Europe, the endo- and ecto-parasites or infections like foot rot limit the outdoor keeping of animals (apart from climate limitations in summer and winter seasons).

Conclusion

In organic farming, the on-farm functions of manure production, by-product utilisation and attraction for visitors are relevant for the animal husbandry structure. The multi-functionality of livestock includes the anthropocentric ethical values of the society. Consumers expect high animal welfare standards because of their compassion for creatures in human control, environmentally sound production to secure the biotic and abiotic resources (water, soil and air) and high product quality at low prices. To meet these expectations simultaneously is not possible.

The holistic view of the multi-functionality of livestock on farms does allow us to determine standards for organic animal husbandry under several circumstances. These must respect the socio-economic and ecological framework conditions as well as the physical situation of the farm and the goals, needs and

resources of the farmer. This has mostly been forgotten in the past. The EU has for six years discussed the regulation 1804/99/EC because of different perspectives and attitudes on “good organic animal husbandry practices”. The common standards of organic animal husbandry are a compromise. They have to be interpreted and developed under the local conditions of the regions in the EU.

References:

- Badura, J. (1999). *Moral für Mensch und Tier. Tierschutzethik im Kontext*. München, pp 86
- Bartussek, H. Haiger, A. and Storhas, R. (1988). *Naturgemässe Viehwirtschaft*. Stuttgart, pp 112
- Becker, B. (1996). Ethical Norms and Values behind the concept of Sustainability. *Der Tropenlandwirt* 56, Witzenhausen, 7-14
- Clauss, E., Kleeberg, A. and Stier, K. (1999). Funktionen der Tierhaltung im Ökologischen Landbau – Warum halten wir Nutztiere? Different perceptions of students and teachers of the Faculty of Organic Farming at the University of Kassel and the conventional Faculty of Agriculture of the University of Göttingen. Internal report, Uni Kassel, Witzenhausen, pp 65
- Capell, J. (1998). Funktionen der Tierhaltung im Ökologischen Landbau. Eine kritische Diskussion: Warum halten wir Tiere? An organic farm study. Diploma thesis, University of Kassel, Witzenhausen, pp 82
- FAO (2003). FAO Statistic-Databank download from September 2, 2003; www.fao.org, Rome
- Fischer, J., Claus, C., Herrera, A. and Rahmann, G. (1999). Ecological and socio-economic aspects of hair sheep keeping in the tropical rainforest of Ecuador. *GTZ-TOEB F-V/9*, Frankfurt/Rossdorf, pp 91
- Groenefeld, E. and Glodek, P. (eds) (2000). Animal Breeding and Animal Genetic Resources. *Landbauforschung Völkenrode, FAL Agricultural Research, Special Issue 228*, Braunschweig, pp 94
- Krebs, A. (1993). Haben wir moralische Verpflichtungen gegenüber Tieren? *Deutsche Zeitschrift für Philosophie* 41, 9995-1007
- Loftus, R. and Scherf, B. (eds) (1993). *World Watch List for Domestic Animal Diversity*. 1st edition. FAO, Rome, pp 376
- Luke, K. (1989). Die Entwicklung der Tierhaltung in Deutschland bis zum Beginn der Neuzeit. *Forum* 19, Saarbrücken/Fort Lauderdale, pp 122
- Rahmann, G. (1993). Ökonomisches Handeln von Nomaden. Mobile Tierhaltung unter Dürrebedingungen in der Butana/Sudan. *Sozioökonomische Schriften zur Ruralen Entwicklung* 111, Kiel, pp 288
- Rahmann, G. (1996). Praktische Anleitungen zur Biotoppflege mit Nutztieren. *Schriftenreihe Angewandter Naturschutz* 14, Lich, pp 116
- Rahmann, G. (1997). Contribution of rural tourism to the market for livestock products in LFAs in Germany. Laker, J.P. and Milne, J.A. (eds.). *Livestock Systems in European Rural Development*. LSIRD Network., Aberdeen, 57-61
- Rahmann, G. (1998). Meat produced under agri-environmental schemes. Problems to fulfil consumer expectations. In: Waterhouse, A. and McEwan, I. (eds.). *Landscapes, Livestock and Livelihood in European Less Favoured Areas*. Auchincruive, Ayr, Scotland, 161-165
- Rahmann, G. (2000). Biotoppflege als neue Funktion und Leistung der Tierhaltung. *Agraria* 28, Hamburg, pp 384
- Rahmann, G. (2002). The standards, regulations and legislation required for organic ruminant keeping in the European Union. *EAAP publication* 106, 15-26
- Rahmann, G. (2003). *Ökologische Tierhaltung*. Stuttgart, pp 154
- Rahmann, G. and Tawfik, E. (2000). Landschaftserhaltung mit Nutztieren im sozio-ökonomischen Kontext. Dargestellt am Beispiel ausgewählter Dörfer im Biosphärenreservat Rhön. *Schriftenreihe Agrarwissenschaftliche Forschungsergebnisse* 20, Hamburg, pp 284
- Schopenhauer, A. (1977). *Preisschrift über die Grundlage der Moral*. Zuerich