



## Stewardship, Stockmanship and Sustainability in Animal Agriculture

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**ABSTRACT** : Sufficient food supply for all humans was, is, and will remain one of the main priorities for mankind. The choice between food from crops or animals is related to philosophical, religious and ethical, but also cultural and economical, values. However, the concept of sustainable agriculture takes into account the organization of food supply through future generations. Not only quantity, but also quality is important, especially in relation to food safety and the method of production. Specifically, the aspect of animal welfare is becoming increasingly important with the focus on stewardship and stockmanship, i.e. responsibility of humans for their animals. In the future, implications for sustainability in animal production may be of more concern to stewardship paired by stockmanship, responsibility, consciousness and morality. The moral as a basic concept of sustainable agriculture is to maintain continuous development in harmony with nature to meet requirements in the world for living creatures including human beings to live in and steward. The objective of this paper is to discuss the above issues from different viewpoints on sustainable food supply, increasing food consumption and environmental protection. (**Key Words** : Animal Welfare, Sustainability, Bioethics, Morality, Human Responsibility, Stewardship, Stockmanship)

### INTRODUCTION

Approaching future and global vision by humans may be different within the society. Referring to different views within the society, the Report of UN's Brundtland Commission "Our Common Future" published in 1987 alerted the World to the urgency of making progress toward economic development that could be sustained without depleting natural resources or harming the environment. The Report provided a key statement on sustainable development, defining it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The statement highlighted three fundamental components of sustainable development, such as environmental protection, economic growth and social equity. Others argued that the statements would counteract to each other, a view which is represented by the Roman Club (established 1968) in the book entitled

"Limit of Growth" and published in 1972 proposing that for the sake of sustainability, human society should abandon economic growth and halt population growth. The UN report emphasizes the need to realize environmental conservation and economic growth, while the Roman Club's concept on civilization points out that its activities seem to exceed the natural capacity of the Earth: "if the World's consumption patterns and population growth continued at the same high rates of the time, the Earth would strike its limit within a century". The Club of Rome is a global think tank and centre of innovation and initiative. As a non-profit, non governmental organization (NGO), it brings together scientists, economists, businessmen, international high civil servants, and heads of state from all five continents who are convinced that the future of humankind is not determined once and for all and that each human being can contribute to the improvement of our societies. Thus, the issue seems to have a global concern and includes a wide range of biosciences, ecology, philosophy and theology. It means a complete overview of comprehensive interpretation of creation and nature, which provides theological background e.g. of Christian obligation and commitment towards the created world (Bolyki, 1999). The author emphasizes that at first basic principles have to be cleared as human beings are parts and parcel of the

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Received October 31, 2008; Accepted April 10, 2009

nature: "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground" (Genesis 1:28) prompting several questions such as that freedom may have limitations in the created world depending on our views and way of thinking. In other words "it is man's responsibility to cultivate, protect the Earth and take care of it" (Genesis 2:15). Man is part of creation, his right of disposal is limited, and he has to take responsibility for other human beings, animals, plants and inanimate nature (New International Version, 1984). This statement refers to the term of stockmanship and the duty to take care of nature including farm animals. Considering the terrifying horror the mankind has to face with, the human society has to cope with ecological crisis. Response to the crisis of scientific-technological civilization including natural environment ought to be elucidated by theological approach the author declared. The Greek word 'crisis' has several meanings such as to separate, decide, judge. From ecological point of view it means lack of commitment. Consequently, human beings as part of created nature have to save, preserve and sustain the nature - the author stated - by all efforts which one has been endowed. Due to interdependence between humans and nature in relation to general principle of solidarity human beings have practical consequences to the community/society and the surrounding nature in terms of their declared responsibilities. The present status of deep ecological crisis may be the consequence of the false view that it can be restricted only to technical treatment. The crisis of nature equals to crisis of our culture and not only that of technocracy (Bolyki, 1999).

As far as the post modern era is concerned Wals and Bawden (2004) listed views on the significance and quintessence of agricultural sustainability as follows: i) for protectionists sustainability relates to sufficient food supply. For them agriculture is simply an instrument for food just for continuous increase of agricultural productivity by sustaining capacity of technological innovation. ii) Others recognize sustainability within an ecological scope and concern minimizing disruptions of biological ecological balance. iii) The concept of sustainability is even further extended by Douglass (1984), his term includes "promoting vital, coherent, rural cultures, and encouraging the values of stewardship, self-reliance, humility and holism which have been most associated with family farming". iv) Formulation of Cotgrove (1982) and Miller (1983) on environmental problems agricultural practice reads as being "rooted in individual conciseness and mortality; in a reflection of our twisted, mentalities". Thus, views on sustainable development can be classified in an ethnocentric, ecocentric, holocentric and egocentric way (Bawden, 1997). More

recently, Sossidou (2002) stated that agricultural systems are mixtures of soil, water, atmosphere, animals, plants, people, and money. Therefore, to successfully plan a sustainable livestock system, the planner should understand that it has to be planned under the umbrella of a whole physical resources system. That is a unique combination of practices and management that when applied will protect the resource base and environment, provides solutions to all identified resource problems and meets the decision maker's and public resource use, conservation and maintenance objectives". The above systems approach also implies interdisciplinary efforts in research and education. This requires not only the input of researchers from various disciplines, but also farmers, farm workers, consumers, policymakers and others.

Nowadays, social-economic framework suggests that all value, economy, income and property would belong exclusively to humans without any responsibility towards their fellow-men and created nature, even though their freedom should aim to serve the community using the values given us for use according to instructions to regulate economy to avoid social injustice. In line with the criteria the most often definition on sustainable agriculture reads as an agriculture system that incorporates the best economics, environment, and social issues. Economics have to include long term profitability and quality of life, environment has to look at the long term impact of farming systems on ecosystems, and social issues should take into account the long term community building aspects. The list of requirements is a real challenge for farmers. Thus, future perspectives should involve wide range of social, economical, and environmental issues with bearing in mind moral and ethical dimensions, as well. Realizing these goals is an actual and real challenge that is equally important for the public, politicians, scientists and all stakeholders involved in production of animal foods. Thus, human beings have a unique role in the world namely stewardship. The term stewardship includes human beings' duties and responsibilities, how one behaves towards the natural environment even under the pressure of discrepancies of economical and ecological pressures (Ruissen, 1998).

As far as ethics and values in relation to animals are concerned one has to refer the statements formulated by Webster (2007) with two fundamental starting principles:

- human beings have moral right to rear other species for the production of food, and
- the majority of animals for food are sentient creatures with capacity to experience well-being and suffering.

The "moral view of the production of food from animals should also embrace a proper respect for the living environment", thus, agriculture can be considered as an

integrated process, because it comprises organized systems which include biophysical and socio-economic components from natural and anthropogenic resources activity. Novel consumer oriented approach of rural development tend to culminate in business. "With the advent of money economy, the most tragic human paradox has been accomplished: virtual wealth can be indefinitely accumulated in the form of money, whereas real wealth in the form of bio-physical, non material richness and earth habitability can be increasingly destroyed" (Wals et al., 2004a, b).

Thus, humans have a moral responsibility to recognise the nature and implications of sentience in farm animals: "Welfare matters to them and it matters to us" (Webster, 2007). In this regard, farms should not be viewed simply as food factories, but as one of the most powerful forces for good or bad in relation to environmental quality. Farmers who own the land now are the stewards of the land for all of us, for ever. We are justified in criticising them if they destroy the habitat of wildlife or pollute the rivers. However we cannot expect them to sustain and enrich the quality of the living environment simply on the money that we (the consumers) pay them for producing food as a commodity. If we wish to 'save the planet' then we must all make our contribution. As always, we shall need some help from legislation. One of the more promising new trends in this regard is the evolution of the EC Common Agriculture Policy (CAP) to encourage and reward Environmental Stewardship Schemes, which recognise the need of society.

## RELEVANCE

The European landscape is characterized by a range of diverse farming systems. These relate not only to varied geographical environments, but also to different social and cultural environments for farming and food production. This diversity is unique to Europe and underlines the importance of European agriculture and the rest of the world. Increased demand for a plentiful supply of cheap food that also maintains a diverse and sustainable supply represents a challenge for traditional agricultural systems. In the field of livestock farming, demands for high welfare production systems (EC, 2007a) and the maintenance of landscapes in the face of outbreaks, or the fear of outbreaks, of animal disease and of increasing international competition, threaten the European model of agriculture. These are also challenges for the European livestock breeding as a whole, which has long been recognized as a world leading industry, while new technologies offer the possibility of accommodating the divergent demands of European consumers. However, new technologies can stir strong emotions. It is important for society to discuss technologies that are controversial in nature in the light of

its own demands and ethical standards. Not all new technologies, however, need to be controversial, and the exploitation of information on the genomes of animals, as for humans, represents an opportunity to revolutionize science.

Attempts have already been made to bring together a wide range of interested parties to produce a vision of how livestock breeding might develop in the next 20 years, and to constitute the first step in achieving the goals as Potočník (2006) stated. Aspects have to be considered such as i) growing demand for food of animal origin, ii) significance of animal production, iii) socio-economic aspects of animal breeding, and iv) organization of animal breeding. Factors that have to be taken into consideration are discussed in the publication "Sustainable Farm Animal Breeding and Reproduction. A Vision for 2025" published in 2006 (FABRE, 2006). For the forthcoming decades, these factors are sustainable breeding and reproduction and integration of animal agriculture; safe and healthy food; robust, healthy animals with high adaptation ability; balanced breeding and biodiversity; social responsibility; competitive and distinctive Europe; and benefits of diversity based on an agenda formulated in series of research topics and technology with a wide range of disciplines from genetics to socio-economic issues. The implementation for the vision for 2025 would last from innovation to delivery focusing on strategic priorities of Europe's main short-, medium-, and long-term animal breeding and reproduction objectives with additional priorities to be set for further debate, as well as safe exploitation of the genetic diversity in order to:

- produce better-quality, healthy, affordable, diverse food offering consumers in and beyond Europe real options for improving their quality of life;
- strengthen animal production through improved breeding and reproduction in their interactions with other fields;
- promote environmental agricultural sustainability, including new applications for pleasure, leisure, or in the medical area;
- enhance the competitiveness of European agriculture organizations.

To meet the strategic priorities the project focuses on:

- developing and implementing a pertinent long-term research agenda based on identification of the priorities of the sector and of European citizens;
- enhancing the transparency of R&D at the regional, national, and European levels;
- promoting collaborative research efforts and a coherent policy and supportive regulatory; and
- addressing public concerns and developing societal consensus based on a mutual understanding among all

stakeholders.

Moreover, requirements towards sustainable food have been summarized by Levett and Therivel (2005) as follows:

- produce safe, healthy products in response to market demands, and ensure that all consumers have access to nutritious food, and accurate information about food products;
- support the viability and of rural and urban economies and communities;
- enable viable livelihoods to be made from sustainable land management, both through the market and through payments for public benefits;
- respect and operate within the biological limits of natural resources;
- achieve consistently high standards of environmental performance by reducing energy consumption, by minimizing resource inputs, and use renewable energy wherever possible;
- ensure a safe and hygienic working environment and high social welfare and training for all employees involved in the food chain;
- achieve consistently high standards of animal health and welfare;
- sustain the resource available for growing food and supplying other public benefits over time, except where alternative land uses are essential to meet other needs of society.

In response to the challenge of Agenda 21 and in the context of the world exposition Expo 2000 in Hanover, with the theme "Humankind - Nature - Technology" a Research Consortium "Sustainable Animal Production" has been established to seek develop and disseminate a global vision of animal husbandry and health based on scientific facts (Visions for the 21<sup>st</sup> century, 2008). In a virtual conference the aim was to discuss the production of animals and food derived from animals, e.g. animal and food sciences, agriculture, veterinary medicine, biology, sociology, political science, agronomics, ecology and others in relation to sustainable development, the global challenge for the next century formulated in Rio de Janeiro, and develop a global vision of modern intensive animal production that is grounded in scientific fact and committed to finding solutions for the world food crisis. The aim is to develop sustainable animal production systems which preserve the basis of life of future generations. The foundations, conditions and perspectives for animal production are exceedingly variable in different parts of the world. The project focused on the future supply and quality of food for humans and animals, animal welfare and health, the effects of animal production on the environment, the influences of new technologies, future animal production sites and global

trade.

The time being there has been a tremendous increase in the consumption of food of animal origin (Money and Neville, 2008). To meet the growing requirements for production is projected to double by 2020. In response to the increase, industrialized animal production systems are developing. This tendency results in global issues in relation to environmental sustainability of animal production. Even though per capita consumption is leveling off in developed countries, per capita demand in developing countries seems to increase rapidly as a result of population and growing income. At present, one-half of all pork and poultry production is industrialized in the global markets, as is about three-fourths of the global egg supply. Factory farming of animals takes place in large scale systems, where animals are raised in confinement of high capacity operations. Feeding practice is highly dependent on cereals and fishmeal from arable land and oceans. The trends and structural changes have enormous consequences for society and the Earth system. Considerable impacts affect the quality of the atmosphere, water and soil due to nutrient overloads and terrestrial ecosystems directly and indirectly.

Issues address:

- atmosphere, water and soil
- interactions with coastal and marine systems
- global trade in animal products and feed grain, resource use, subsidies and demand for food and feed grain
- human health (zoonoses, food safety, occupational health, nutritional quality, public health impacts)
- animal health (disease control and prevention) and welfare (stress and well-being)
- economic and social systems (local to global scales)
- institutional dimensions (industry influences, regulatory enforcement)
- scenarios including global development, ecology and human well-being
- national differences.

Large scale animal production systems are characterized by efficient conversion of high quality feed into animal product. Those systems are particularly prominent in areas with a comparative advantage, resulting from a well developed infrastructure, technical knowledge and high demand for products. In general these systems are operated in areas with good access to large quantities of low-cost feed and close to urban centers and are requiring large investment, resulting in high labor productivity, but generating work for few people. The large-scale nature and the intensive production imply large volumes of waste and high animal health risks. Animal wastes may pollute soil, water and air. Most effects are caused by emissions from

manure in the form of nitrogen (N), phosphorus (P) and heavy metals (copper, zinc and cadmium) in sheds, during storage, after application on soils. Manure has potential effect on air (ammonia, greenhouse gases and smells), on ground and surface water (leakage, run-off, leaching) and on soil (saturation with minerals, toxicity). There is a potential effect on vegetation (acid rain) and biodiversity (as a result of soil and plant ecosystems). Through eutrophication and oxygen depletion of surface water there is potential loss of aquatic resources (e.g. fish). Further potential environmental impacts of industrial animal production are loss of biodiversity (local breeds), soils (local contamination), water (use of fresh water resources, and contamination of drainage and ground water), and air (smell). The energy requirements are high especially for application and processing of manure. The system requires inputs in fossil energy for transport, heating, ventilation etc. as it reads in the website for Industrial Animal Production Systems (Livestock and Environment Toolbox, 2008). On the other hand existing guidelines encourage better handling of manures treating them as resource management rather than disposal problem. The aims are i) reduction of pollution, ii) utilization of manure nutrients, iii) improve economic benefits/costs incurred, and iv) suitability of approach to farming conditions (Burton and Turner, 2003).

In conclusion animal wastes from large scale operations exceed assimilation capacity of surrounding landscapes resulting in pollution of air, soil and water affecting both humans and wildlife. Stored liquid manure produces over 13 million tons of greenhouse gas methane per year. There are strong interactions among terrestrial-based animal production systems and the effects on marine and coastal systems created by effluents from facilities located in coastal plains to the heavy utilization of fishmeal in production of animal feeds. Large scale animal production reduces production cost of meat, milk and eggs. In a global economy this can lead to increased international trade in the products and in the feed grains involved affecting the supply of grain available for humans. Industrialized animal production systems have direct and indirect impacts on human physical and psychological health (injury, respiratory disease, neurological impairment and other health issues). Further problems may be due to use of antibiotics, hormones and various chemical compounds in animal production systems having serious impact on human wellbeing. Large scale animal production may have potentially impact on health status and welfare of animals. Concentrations of livestock increase animal stress, the risk of infection, and promote disease transmission. There are ethical and public health concerns, too. Global development and human well-being include ecological feedbacks and aspects of concern for human well-being by integrated

analysis identifying the principle drivers of animal production systems taking into account the social dimensions, economies, and production scales. Animal production systems have varied through time and among nations and cultures. There is currently a demand-driven revolution in livestock consumption and production of foods of animal origin in many developing countries, impacting nutrition, health, the environment, national and international agricultural marketing and research systems. Therefore multi-scale approach to assessing practices and economies is needed to highlight responses to demands and to the role of large factory farming in Brazil, China and other countries.

## IMPLICATIONS

Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. Therefore, stewardship of both natural and human resources is of prime importance. Stewardship of human resources includes consideration of social responsibilities such as working and living conditions of laborers, the needs of rural communities, and consumer health and safety both in the present and the future. Stewardship of land and natural resources involves maintaining or enhancing this vital resource base for the long term.

In the future, implications towards sustainability in animal production may have more concern to stewardship paired by stockmanship, responsibility, consciousness and morality (Szűcs, 2009). In conclusion, the moral as basic concept of sustainability is to maintain continuous development in harmony with the nature to meet requirements in the world for living creatures including human beings to live in and steward. Thus, the message of this statement does not mean endless exploitation of natural resources, on the contrary it equals stewardship supported by stockmanship and responsibility of challenge for our moral obligations considering in one hand of world hunger and the other hand the intemperate prodigality. Consequently, stewardship refers to management's responsibility to properly utilize and develop its resources. In commercial practice sustainability includes stewardship, a term currently being used to describe sustainable agricultural techniques that may accomplish to continue without causing damage to the environment recognizing that animal producers have a role to play as moral stewards, an assumption of responsibility for the welfare of the world due to our moral obligations.

In the way towards sustainability stewardship has to be supported by stockmanship in an effort to identify skills and competencies in commercial practice through the full food

production chain of animal origin, and suggesting practical steps that may be appropriate for them in moving toward sustainable animal production. When doing this our duties and obligations address careful and responsible management. Farm animals are sentient creatures. Therefore attention has to be paid to a variety of factors, such as standards of stockmanship, especially animal welfare. Good welfare status can be achieved through a high standard of stockmanship, effective management, adequate housing and well-maintained equipment. The knowledge to attain such a standard of welfare is available and how conditions may be met requirements. The welfare of farm animals can be assessed in the context of the guidelines known as the Five Freedoms such as i) Freedom from hunger and thirst; ii) Freedom from discomfort; iii) Freedom from pain, injury and disease; iv) Freedom to express normal behavior; and v) Freedom from fear and distress.

The key to animal welfare is stockmanship as it reads in the homepage of Farm Animal Welfare Council, an independent Advisory Board established by the British Government in 1979 (FAWC, 2008) as follows: "Stockmanship, plus the training and supervision necessary to achieve required standards, are key factors in the handling and care of livestock. A management system may be acceptable in principle but without competent, diligent stockmanship the welfare of animals cannot be adequately safeguarded. We lay great stress on the need for better awareness of welfare needs, for better training and supervision".

## ACKNOWLEDGMENTS

This paper was supported by the Pilot Project HU 2004-L-B-PP-170001 "Promoting Quality Assurance in Animal welfare, Environment, Food Quality Interaction Studies Through Upgraded e-Learning" within the framework of the Leonardo da Vinci Community Vocational Training Action Programme of the European Commission (2004-2007).

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