

## **Sustainable Agriculture and Food at Risk<sup>1</sup>**

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Agriculture and food face both bright prospects and life threatening risks. These hazards have an entirely new origin. They result from human activity – not from the identifiable decisions of any individuals but from the system under which Western agriculture is now managed. That system poses real threats to sustainability.

### **Agriculture reshaped**

Agriculture is being restructured at an incredibly fast pace as we enter the 21<sup>st</sup> century. The pace has been and continues to be higher in the West where innovations during the 20<sup>th</sup> century, especially during the last 50 years, have changed farming from the oldest, even the original, human activity of civilization into a new world of economic drivers and values. The process involves not only technological change but also the sociological movement of millions of people from rural to urban lifestyles. This massive migration continues in the developing world and in the New Independent States (NIS) of the former USSR. In the West it has already resulted in a strange isolation of farmers who are now numerically a very small minority of national populations. The contrast is shown by the former 15 country member and the new 10 country member states of the European Union. In the 15 member EU, where only about 5% work on farms, few city dwellers were born on a farm and very few have any relatives who farm today. In the 10 new EU countries, the rural population is still around 25% and many people come from a farm background. Further east in the states of the former Soviet Union, the percentage is higher at 30-50%.

In the West farmers are becoming an endangered species as intensification and scale are driven by the large public companies which now control the up-stream and down-stream flow of resources and income to farmers under the banner of Cheap Food. What are the prospects for the next 10, 20 or 50 years? Most obvious is a growing level of unsustainability.

### **Unsustainability**

The present pattern of continuous change in farming and food production cannot go on indefinitely without serious consequences. All thoughtful people, both inside and outside agriculture, acknowledge that the current pace of change is a high risk process. Naturally, the hazards are not so obvious to those who control the economic drivers. They appear to be unaware that they are on a collision course with reality and that collapse and maybe calamity are strong possibilities. One reason for their blindness is that lack of sustainability creeps up slowly and is therefore less evident to those who are within the system. A second reason is that those who drive the system are focussed primarily upon economic returns which continue at present. Corporate executives express frustration with those who talk about unsustainability, sometimes calling them prophets of doom who are out of touch with the realities of the market – which is still doing very well. The profits of the large supermarkets and the upstream suppliers of seeds and chemicals to farmers are thriving. They feel that opposition comes from uninformed minorities who have limited, marginal or personal agendas. A third reason is that the decision-makers in the up and down stream power centres provide themselves with moral arguments for their existing ideology of increasing intensification, scale, cheap food and global trade in food. The view commonly expressed from the Boardrooms of the large and economically successful food chain companies in the West is that the world needs more food and therefore it is imperative to pursue economic and biological efficiency in food production. They seem able to ignore the fact that the West already has over-capacity for food production and, despite over-consumption and growing obesity under the pressure of massive advertising, the fantasy that they are feeding the poor provides a feel-good factor for their business success.

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But the system is unsustainable. The pursuit of ever cheaper food to the Western consumer is driven primarily by competition among a small clutch of large supermarkets in the West who seek market dominance and are not called to account for the effects of their agenda on the agro-resources, the farming community, the commons, and the environment which are the foundation resources for agriculture. Consequently there are many external costs which are carried by society through taxation, health, reduced environmental standards and depleted rural life.

### **What are the longer-term risks of continued unsustainability?**

We are not speaking of tragedies of natural origin like hurricanes Katrina and Rita nor the Tsunami in the Indian Ocean on 26 December 2004. We are thinking rather of tragedies which have their origin in human behaviour. Progress in human society is imperative. Everyone would agree that, in principle, it should be progress which improves the quality of life for all, builds community on a foundation of respect for universal human rights, acknowledges the integrity of the biosphere and the dignity of sentient species and pays positive attention to the inanimate resources of the earth. However, despite these high aspirations, human history records that the perverse nature of mankind, particularly those who seek and then use power for selfish ends, has repeatedly marred the achievement of those high ideals. The human story is a sorry one – full of noble aspirations and goals and short on fulfilment. The tragedies of man's inhumanity to man is well documented in the archives of centuries past and resides in the living personal memories of millions alive today who suffered at the hands of other men in the 20<sup>th</sup> century. But even in the recent past of the 20th century the abuse of other humans, though horrific, was limited in time and space.

The prospect for damage in the future is far greater. The world is shrinking. Globalization makes the earth a village. The scope for petty dictators is still restricted even though they may have global ambitions. But the threats we describe here have a new origin and dimension and they are frighteningly powerful and wide in their effects. They will come from an error, lack of foresight, mistaken judgements, inadequate scientific understanding, sheer greed or collapse of the economic system. Because the food chain is going global their impact will be enormous.

Climate change is a current example of such a world-scale tragedy which is already upon us. Largely caused, to date, by the economic and lifestyle behaviour of the West, climate change is affecting the whole world population. Who is responsible? It is a collective responsibility because the tragedy which is still building derives from the system of economic lifestyles embraced by millions – mainly in the USA and Europe. In such a global situation everyone is a stakeholder and liable to suffer. Similarly, tragedies in the global food chain will also impact everyone. The unsustainability of our lifestyle of excessive energy usage will increasingly affect future generations in many unpleasant ways some of which are unforeseen.

### **Risks to the agriculture and food systems**

Risks of three types threaten agriculture and food as we enter the 21st century. The origin of each risk lies within the economic system now being pursued in the West with singleness of purpose for immediate benefits. The three likely causes of potential tragedies are briefly discussed here without full details which are available elsewhere.

1. Environmental damage
2. Gene-technology in food production
3. Capitalist economic system for agriculture and food on a global scale

### **Environmental damage**

The damage to the natural resources of the earth is overstressing the ability of the environment and its complex life-supporting systems. The recent Millennium Ecosystem Assessment (MEA, 2005) is the result of 1,200 scientists studying the global ecosystems over four years. Their conclusions are

devastating. They issue a stark warning that irreversible damage is being imposed upon the biosphere, that the natural machinery which recycles life processes is being degraded, and that the planet will no longer be able to sustain future generations. The UN Environment Program (UNEP), (1995), reported to the Convention on Biodiversity that there are 1.7 million known species of plants and animals and, including all other lower forms of life such as insects and micro-biological species, there are an estimated 12 million not yet identified. All species, classified or not, are disappearing at an accelerating rate. UNEP also gave the following expected loss of species: mammals (25%), reptiles (20%), amphibians (25%) and fish (34%). Wilson et al., (2005) are so concerned at the rate of extinction of mammals and primates that they wrote to the US Senate asking for the Endangered Species Act to be strengthened rather than weakened.

The conservation of agro-bio-resources has become a major activity of biological science in the last decade. Part of this concerns the increasing loss of the diversity of livestock used for food. Loss of livestock breeds is a measurable benchmark of other irreparable damage being inflicted upon our capacity to produce food. The loss of breeds is serious for they have been thousands of years in the making and their unique adaptation traits are valuable. Because there are no detailed records it is not possible to know the precise numbers of breeds that have gone but at least 1,000 breeds have disappeared in the last 100 years. The rate is accelerating with 300 breeds gone in the last 15 years. Today 2,000 breeds are at risk (FAO, 2000). Those who suffer most from this long-term threat of lost biodiversity are the four billion rural poor people in developing countries, 50% of whom are dependent upon livestock to maintain basic quality of life. The lives of these people are being placed at risk by the Western agricultural system as domestic markets in their mega-cities are targeted by Western food exports (Hodges, 2005a). So far the programmes for conservation of animal genetic resources have not stopped the loss as shown by three successive editions of the FAO World Watch List from 1995-2000. Even from an economic point of view it is foolish to discard unique genotypes which may have commercial value in the future. These examples are but an indication of how the environment and biodiversity in general are being eroded by human activity and how the resilience of the natural cycles is overloaded. There is a certain risk that if we continue as we are going we will destroy the capacity to farm effectively (Hodges, 2005b).

### **Gene-technology in food production**

The topic of Genetically Modified plant foods has been discussed in previous Editorials in some detail and will not be repeated here (Hodges, 1999, 2000). However there is one new aspect to the threat of great moment for animal scientists and for livestock production. The new issue is the use of transgenic animals in the food chain. To date genetically modified food has been of plant origin. But scientists and the large multinational companies in this area have been working for some years to produce and eventually market genetically modified meat and milk and eggs from genetically modified animals. Symptoms of this policy can be seen, for example, in the vast investment in gene-transfer technologies creating transgenic seeds and soon transgenic domestic animals. These products are accompanied by patent applications which will eventually turn staple foods into proprietary products with royalties. An example of this type of business is shown by the pending multiple applications made by Monsanto in many countries in 2005 for patents affecting pig production (Monsanto, 2005). These patent applications are very extensive covering some aspects of pig management systems as well as genetic material. If granted they will give Monsanto rights over some genetic breeding and selection tools that have been developed over many years by scientists supported by public funds and that are currently in the public domain, for example Marker Assisted Best Linear Unbiased Prediction. Monsanto argue that their application to patent their particular approach to the use of these algorithms is made together with some specific genes for which they claim patent right because they have developed a particular approach in applying many of these elements together with other innovations. Monsanto blandly state that their primary interest is in protecting their freedom to practise these approaches in the particular way described by the applications.

This Monsanto approach raises some new issues for animal scientists, for livestock production and for the consumption of animal products. On the issue of conservation, patented transgenic farm animals will hasten the demise of the traditional breeds and the issue of conservation of animal genetic

resources will be completely reshaped. Although some consumers may now eat crop plant GM food without concern, the issue of transgenic livestock products will raise a new and negative image in the public mind about animal products and probably turn more people off eating meat altogether or to eating organically produced animal products.

These business intentions to create monopolistic trade within the food chain, protected by intellectual property rights, are already becoming plain to farmers, small processors and retailers whose survival is threatened. Gene-transfer technology, like all technologies, has potential both for good use and for abuse (IAEA, 2005). Doubtless it can make contributions to improved food production under the surveillance of independent scrutiny where Due Process is practised and all stakeholders are represented. The problem is that gene-technology has been launched into the staple foods of the world food chain, without public consultation, by a few private interests who take unethical legal protection and a proprietary stance over major components of agriculture and food.

Many may be comforted by the attractive but false argument that gene-technology is only doing more quickly what breeders have been doing for a long time. That statement is, of course, untrue. Gene technology moves genes across the boundaries of widely separated species which is an entirely novel technique for breeders to use. The threat of risks arising from this technology are evident in principle since species have been millions of years in the making and have achieved a remarkable level of genetic homeostasis within the reproductive boundary of each species. Abnormalities caused by mutations (natural analogues of transgenes) are usually negative and have been ruthlessly culled from the population genome by natural selection. When mutations are created artificially by human intervention using gene transfer technology, the process of natural selection is changed. The modified genome, chosen by human rather than natural selection, is multiplied by massive and rapid breeding programmes and released on a large-scale into the natural gene pool of the food chain. Although the immediate effect may appear to be benign, the longer term results are uncertain and risky. Later, when an unexpected and negative genetic consequence occurs in the modified genomes of the food chain, the impact will be wide-spread, even global, and containment will be impossible. We now have glimmerings of new knowledge about the potential dangers now emerging from recent research into BSE, vCJD and CJD (Hodges, 2005c). There are unsuspected genetic interactions between the genomes of cattle and humans, and experimentally with mice, which affect the health and survival of individuals.

When genetically modified food, plant or animal becomes the normal fare in the diet of the global population, which is clearly the business plan of some multi-national companies, the occurrence of a genetic error with deleterious effects upon the human populations or upon the agro-resources used for food will be awful. It will be too late to stop the tragedy which may be a global epidemic or kill-off. The terrible experience of BSE is a warning of the enormous difficulty involved in tracking down the mechanisms of a new and unsuspected aberrant genetic process which silently insinuates itself into the human food chain and is already established in the animal and human populations before recognition and continues to defy diagnosis.

### **Capitalist economic system for agriculture and food on a global scale**

The intention to globalize the world food market is clear. It is a major item on the agenda of the World Trade Organization (WTO) as well as the business plan of the multi-national companies that are currently building control of the staple food market using intellectual property rights (IPR) associated with Terminator Gene Technology to give themselves near monopoly rights. The risks associated with this approach are clear. Based upon self-interest, capitalism quickly responds to the inevitable economic fluctuations, unpredictable cycles and variation in interest rates, exchange rates and returns on investment. Multi-national companies trading in the large food markets of the developing world will quickly stop activities to avoid losses when the world economy changes against their interest. Their prime contract is to their shareholders, not to feed their customers. Cutting supplies of non-essential manufactured goods is not fatal. Cutting supplies of food when local agricultural capacity has been diminished can be tragic. Future large-scale wars and terrorism will also disrupt world food trade leaving hunger in large urban populations who have neglected their local resources for growing food.

There is no world government to ensure poor people are fed when the international trading system collapses. Division of labour offers no remedy for these inevitable tragedies. The West knows from experience that capitalism is volatile. World food supplies cannot be subject to such uncertainty any more than food in the West. In 2007, for the first time, 50% of the world population are living in urban areas. Prudent global socio-economic policy for feeding both the urban and rural halves of the world population is needed to supply affordable food in cities and ensure market access and a viable lifestyle for the billions of small-scale farmers in rural areas. Steinfeld et al. (2006) considered the pollution released by livestock in large-scale intensive units and by small-scale farming. It is clear that, in addition to the socio-economic factors, endless expansion of intensive systems is not a feasible option to supply livestock products for the whole world.

## Question

How can the risks confronting agriculture and food be averted? The power-structures are fully committed to the idea of progress through the present system of intensification, scale and cheap food. The three risks of environmental collapse, of gene-technology producing large-scale tragedy, and of starvation following a severe economic recession all flow from the same source. The threats come from the ideology of capitalism which is a superb system for creating new wealth but which lacks any inbuilt mechanism to avoid excess and abuse by those who own the capital. Today most of the world's capital is held by the West. Vast sums of capital are largely owned by share-holders who are remote from the technical and economic management of the business and whose only interest is in profit and increased equity. The use of the capital is in the hands of a relatively small group of anonymous business executives who, unlike politicians, are neither elected nor accountable to the stakeholders and communities affected by their decisions about the food chain. Customers are the only group with power to influence these executives' decisions and most customers are lulled into a sense of ignorant contentment and complacency about what is happening to the food chain by intensive advertising and the low price of food.

So what can be done? We may take encouragement from what happened once before in the West when the industrial capitalist barons of the 19th century were practising slavery and exploiting their workers ruthlessly (Hodges, 2005b). The system was modified by a small group of individuals, many motivated by their Christian values, who changed the socio-economic shape of Western culture by pressing for the abolition of slave trading and then of slavery itself. During the 19th century in the UK these few men and women of high moral conviction and social concern inside and outside parliament confronted the hard face of capitalism that grew under the influence of the British Empire. They include William Wilberforce, Lord Shaftesbury, Elizabeth Fry and others. Over a period of a few decades, against the prevailing economic interests of business, these few individuals led parliament to ban child labour in the mines, stop the exploitation of women in factories, limit the length of the working day, introduce prison reform, start compulsory and free education and make it illegal for ships to be loaded beyond the Plimsoll line painted on ship sides and named after the Member of Parliament who fought for it in 1876. Outside parliament these individuals pioneered the first care homes for the elderly and opened free hospitals for the poor. These proposals to improve the quality of life, to introduce equity and justice and to facilitate community activities were opposed by many of the owners of factories and mines who argued that these changes should be decided by the market and that the costs of such radical legislation would cripple the economy. As a result of much new legislation, ethical behaviour appeared in the market place. Changes in the socio-economic system were thus introduced which would never have been promoted by economic forces alone. Slowly life changed for the better.

## Answer

The only answer is for Western society to stop treating agriculture and food as though they are normal manufactured products driven only by market forces. Prudent new legislation is needed for agriculture and food to provide freedom to the food industry to work on intelligent solutions to benefit everyone and freedom for each society and individual to choose their own lifestyle within the constraints of sustainability. The food chain must be recognized as a very special sector of socio-economic activity. Food and agriculture are not part of the Commons which might be regarded as a resource to be made

available to all without charge. The Biblical view is that food is not free and people unwilling to work have no claim upon being able to eat. But there are many ways of ordering the economic production of food without allowing farmland, farmers and their products to be treated solely as disposable resources by unregulated capitalism. Short of war, that is the quickest and surest way to destroy both the resources and civilized life. Today the over-abundance of cheap food in Western society has blinded the sensibilities of the present generation to the precarious nature of a society that fails to guard its ability to produce food.

A fundamental change is needed in the philosophy of national food production and supply. Such a change will not come top down from the leaders of the multinational companies now taking ownership of food nationally and globally – their larger vision of life is besotted by the dominance of profit and shareholder value. It is equally unlikely to spring upwards as a large-scale grass-roots movement from consumers who, with minority exceptions, are currently victims of massive advertising and incentive campaigns to buy food that is allegedly ever-cheaper – but which actually is costing society dearly through indirect and unseen costs.

A cultural swing is needed based upon the reality of looming tragedy. Such a cultural change, that reverses current economic trends and limits vested interests, needs men and women of vision with deep moral concern for the future of society who also have courage to initiate legislative change to reshape the food chain. If such legislative changes seem unlikely one may be encouraged by recalling the 19th century reformers. Or, in the 20th century, one may reflect upon the remarkable cultural change in smoking habits brought about by legislation even against vested business interests and in the face of a populace largely dependent upon tobacco.

The open question is whether today there are such people of high moral character and social conscience, inside and outside parliament, who have an informed grasp of what is happening. And are they willing to act to ensure a future for agriculture and food supply? Regrettably, in recent years Western governments have preferred to listen to business leaders in the food chain. The only route is for reformers to act in parliament and in government to take up this challenge in the way that rare and courageous legislators have done in the past.

## **Zusammenfassung**

### **Nachhaltige Landwirtschaft und Ernährung in Gefahr**

In seiner Analyse von Entwicklungstendenzen in der Landwirtschaft und Humanernährung setzt sich der Autor mit drei konkreten Gefahren auseinander: (1) Zerstörung der natürlichen Umwelt durch rücksichtslose Landnutzung und Umweltbelastung durch überhöhten Tierbesatz; (2) Anwendung der Gentechnik in der Pflanzenzucht ohne ausreichende Prüfung der Konsequenzen; und (3) kapitalistische Strukturen in einer globalisierten Nahrungsmittelproduktion.

Der Anteil der Bevölkerung, der sein Einkommen aus der Landwirtschaft bezieht und somit auch noch ein natürliches Verständnis für nachhaltige Bodennutzung und intakte Umwelt hat, wird mit zunehmendem Wohlstand immer kleiner. In westlichen Ländern ist der Bauernstand vom Aussterben bedroht, und der preisbewusst Lebensmittel einkaufende Verbraucher begreift kaum, welche Konsequenzen dies mittel- und langfristig haben kann.

Da die Entscheidungen führender Köpfe in der Lebensmittelindustrie in erster Linie darauf ausgerichtet sind, Gewinne aus dem eingesetzten Kapital zu erwirtschaften und die meisten Verbraucher damit zufrieden sind, dass dieses System ihnen preiswerte Lebensmittel liefert, appelliert der Autor an eine Bewusstseinswandlung bei Verbrauchern, die weitsichtige Politiker darin bestärken, für Rahmenbedingungen zu sorgen, die bessere Lebensqualität für mehr Menschen in intakter Umwelt nachhaltig ermöglichen.

## References

- FAO. 2000: World Watch List for Domestic Animal Diversity, 3rd Edition. Ed: Beate Scherf. FAO, Rome, Italy.
- Hodges, John. 1999: The genetically modified food muddle. *Livest. Prod. Sci.*, 62.1. December 1999 1-6.
- Hodges, John. 2000: Polarization on genetically modified food. *Livest. Prod. Sci.* 63. April 2000. 159-164.
- Hodges, John. 2005a: Cheap food and feeding the world sustainably. *Livest. Prod. Sci.* 92. 1-16.
- Hodges, John. 2005b: Conservation of genes and culture: Historical and contemporary issues. *Jour. Poultry Sci.* 85. 200-209.
- Hodges, John. 2005c: Developments and mysteries of BSE (Mad Cow Disease) and vCJD. *Livest. Prod. Sci.* (October 2005). 97. No.1. 27-34.
- IAEA (International Atomic Energy Agency). 2005: Eds: Harinder P.S.Makkar and Gerrit J. Viljoen. Applications of Gene-Based Technologies for Improving Animal Production and Health in Developing Countries. Proceedings of an FAO/IAEA Conference in Vienna, 2003. Springer, The Netherlands with IAEA and FAO.
- Millennium Ecosystem Assessment (MEA). 2005: Project Leader: Walter Reid. [www.millenniumassessment.org](http://www.millenniumassessment.org)
- Monsanto. 2005: Patent application No. WO 2005/017204. Use of single nucleotide polymorphism in the coding region of porcine leptin receptor gene to enhance pork production. Monsanto Technology LLC. World Intellectual Property Organization. [www.wipo.int/patentscope/en/data](http://www.wipo.int/patentscope/en/data)
- Steinfeld, H., P.Gerber, T.Wassenaar, V.Castel, M.Rosales and C. de Haan. 2006. *Livestock's Long Shadow: Environmental issues and options.* FAO, Rome, Italy. 390 pp.
- United Nations Environment Program. 1995. *Global Biodiversity Assessment*, UNEP, Nairobi, Kenya.
- Wilson, E.O., P. R. Erlich, S. Pimm, P. Raven, G. Orians, J. Diamond, H. Mooney, D. Simberloff, D.Wilcove, and J. Carlton. 2005. *Environmental News Service.* [www.ens-meewswire-com/ens/may2005/2005-05-19-inslstr.asp](http://www.ens-meewswire-com/ens/may2005/2005-05-19-inslstr.asp)

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