



Livestock farming with care

Summaries from a collection of essays



WAGENINGEN UR

For quality of life

Colophon

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Summaries of essays

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Livestock farming with care in summary

Introduction

In the Netherlands today there is a public debate about the intensity and the scale of livestock farming systems. The Netherlands have a high density of people and of livestock. This means that in the rural area many citizens have a farmer close to their back garden. Due to incidents like the outbreak of Q fever and the influence of a political party for animals discussion about meat production with pigs, poultry and cattle is initiated in the media. Wageningen UR wants to play a role in the discussion on future livestock systems.

Wageningen UR (University & Research Centre) is a research organisation that conducts fundamental research, research for government agencies and contract research in the domain of 'healthy food and living environment'. Our mission is 'to explore the potential of nature, to improve quality of life'. One of the strengths of Wageningen UR is its combination of natural and social sciences. This enables integrated research and breakthroughs to be put into practice and incorporated into education.

Wageningen UR is the country's major research organisation in the field of livestock farming, providing the knowledge base for innovative livestock farming in our country and beyond and, as such, keen to play a role in the above mentioned debate.

To this end an interdisciplinary task force was formed embodying a range of expertise, from livestock technology to system analysis and from economics to public administration. As one of the task force activities, Wageningen UR colleagues were invited to write an essay with their vision on specific aspects of this debate, based on their views and expertise. The result was a series of 30 essays, providing a wide overview of relevant issues with possible directions for solutions.

The aim is to work out some of the essays in a scientific article in the Netherlands Journal of Agricultural Science. Here we give a summary in English for all the essays written in the Dutch language.

We have structured the summaries in five groups:

1. livestock farming with care
2. human and animal health
3. respect for animals
4. attention for the environment
5. prospects for farmer and product

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Nearly all authors are active with Wageningen UR. Authors marked with a (*) are from outside Wageningen UR.

We do hope that this summary offers you an interesting 'bouquet of ideas' which stimulates further contact and discussions. We are looking forward to that.

Martin Scholten, PhD and Prof. Herman Eijsackers
(Editors of the book 'Livestock farming with care')

Foreword



*Prof. Rudy Rabbinge (Wageningen University)
Pieter Winsemius, PhD (Scientific Council for Government Policy) (*)*



Dutch livestock farming has seen a tendency towards animal and environmentally unfriendly farming on a massive scale with dire consequences for human health. The public debate on the future of livestock farming systems is key to coming to terms with many of the problems perceived by the scientists of Wageningen UR. Scientists can offer a range of perspectives and scenarios, to counter the current tendency and actually contribute to solving global issues. In that way they can fulfil their role as honest broker. This publication is a collection of contributions from researchers at Wageningen UR aimed at tackling the challenges and facilitating public dialogue both actively and positively to prevent dogma's dictating the future and allow societal goals to guide the future.



1.1

Conscientious livestock farming

Martin Scholten, PhD (Animal Sciences Group)
Prof. Herman Eijsackers (Scientific Advisory Board)
Kees-Jaap Hin, MSc (Schuttelaar & Partners) ()*



The Netherlands has a reputation for modern, efficient livestock farming, a sector of some 380,000 employees and contributed for € 27 billion Euro to the Dutch gross national product. But it is also a sector that is a topic of public debate, about farming practice, human health, animal welfare and the environment central issues as major concerns. In the public debate there contrasting scenario's projected to solve these issues. The major challenge is to create a mutual respect of issues raised by the different stakeholders and find a common language to describe these issues. To contribute to this process Wageningen researchers expose the issues related to modern animal husbandry in a symphonic overview in 30 movements.

Driven by rising global demand, livestock farming will continue to grow, with expansion virtually unstoppable. So how can we accommodate this trend in a responsible way? Organisations like the FAO, CGIAR and the Global Research Alliance call for knowledge sharing, best practices, best ecological means and best animal health means. And from the global perspective the question arises to what extent the Netherlands is able and willing to play a leading role in helping to shape the future.

Solutions must provide answers to justifiable public concern and demonstrate the positive impact that technology can have in generating reliable solutions. The slogan of research at Wageningen UR is 'to explore the potential of nature, to improve the quality of life'. Livestock farming is an important component of research into animal production systems from various angles and disciplines – agricultural, operational, economic, ethical and more. The resulting kaleidoscope of scenarios is based on facts and perceptions that aim to achieve trust and confidence in responsible livestock farming where the focus is not only on public health, animal welfare and the environment but equally on the farmers, raw materials and the end product.

1.2

Careful trusting in intensive farming

Prof. Katrien Termeer (Public Administration and Policy)

Gerard Breeman, PhD (Public Administration and Policy)

Maartje van Lieshout, MSc (Public Administration and Policy)

Despite the attempts of farmers and researchers to develop innovative, sustainable and animal friendly husbandry systems, many citizens and interest groups remain negative about intensive farming. Consequently, policymaking on intensive livestock farming progress very slowly and especially the construction of mega stables causes societal commotions, protests and even distrust. In our contribution we show with a case study how the decisions about the settlement of a mega-stable resulted in a spiral of distrust between a municipality, stakeholders, and local protest organizations. Humans base their interpretations of events like intensive farming, on previous experiences, their identity, and their background values and frames. These phenomena constitute their 'worldview' and trust is won if others appeal to this worldview with the right words and deeds. In our case we found five different worldviews:

1. Mega-stable as mega-sustainable
2. Mega-stable as mega-wrong
3. Innovative, sustainable company in our area
4. No mega-stable in this area
5. Following procedures

All five groups reasoned and acted in different ways, and they were not able to speak to each other although they communicated intensely. The more information and knowledge by means of research reports and information exchange evenings became available, the more people began to distrust their administrators and vice versa. We draw the following conclusions. Trust building requires knowledge of each other's worldview. Policy-makers should not only stay with their own line of reasoning, but they should take the other ones' positions and crawl in their worldview. And finally, only providing information or producing research reports does not take away suspicion; on the contrary, it may even contribute to the uncertainties, which make it even harder to gain and maintain trust.



1.3

Care about intensive livestock farming

*Prof. Bart Gremmen (META-Methodical Ethics and Technology Assessment)
Martin Scholten, PhD (Animal Sciences Group)*



The way by which general normative values, like food security and food safety, were translated into intensified livestock farming has been an important concern over the last decade. With agriculture becoming more and more intensified, this had to affect, for example, the quality of animal life or biodiversity. Outside the industry the assumption was that economic gains dominated the caring about the animals.

In intensified livestock farming, the caring about the wellness of the animal, in broadest sense, is of utmost importance. The quality of animal life is key. Values like responsibility, trust, commitment and operating carefully are held in high regard. These values must be an important part of the whole industry and in turn add value to the economic value of the industry. This caring livestock farming has to counter the general concerns and create awareness under various stakeholders (e.g. consumers, government).

Animal husbandry industry rests on three *caring pillars*:

1. *caring about* – this refers to the social attention of the animal and their values
2. *taking care of* – being responsible and active in both the industry itself and being active and raising awareness in the social debate
3. *care giving* – the actual carefulness of professionals towards animals.

A caring animal husbandry industry requires accuracy.

This means that, although there are protocols and standards of the industry itself, the final remark this section has is to stimulate the quality of work by professional caring.

1.4

The facets of carefulness

Hanneke Nijland, MSc (Communication Strategies & Applied Philosophy)

Sustainable animal agriculture requires economic viability, ecological soundness, and social acceptability: a hard-to-reach balance. In the debate the position 'we have to focus only on empirical facts, no matter what is found ethical or aesthetical' is brought forward. This perspective encompasses - besides a notion of 'good scientific practice' - the danger of self-referentiality: selectively seeing only one of the facets of the spectrum of sustainable agriculture.

To make all facets insightful, Ken Wilber's four quadrants are introduced. The natural sciences traditionally focus on the objective quadrant (exterior, individual), looking at the tangible, the empirically observable. Systems approaches also incorporate interaction between individual actors, composing the interobjective quadrant (exterior, collective). However, to know what people think and feel (the subjective quadrant: interior, individual), or what is socially/culturally considered good (the intersubjective quadrant: interior, collective), interpretative analysis is needed: the area of social sciences and philosophy. There is no unambiguous solution to make animal agriculture sustainable; rather, diverging solutions, such as alternative protein production via insects, fungi and algae, extensive organic farming, and adapted intensive farming are argued to provide most progress. To reach a truly careful approach of animal agriculture, cases need to be studied from the perspective of all quadrants and subsequently integrated by means of a dialogue, in which a distance is taken from right/wrong-schemes and that starts from acceptance of dilemmas and ambiguity.



1.5

Towards a sustainable livestock production: based on fact or fiction?

Bastiaan Meerburg, PhD (Plant Research International)

Marjolein Neuteboom, MSc (European Forum of Animal Farm Breeders) ()*



Our society has changed dramatically over the past century. Until the 1960s, farmers were the backbone of the Dutch society, but today this is quite different and the number of farmers has decreased drastically. As a result, citizens have less contact with farmers and have little or no knowledge about what exactly is happening on the farm. This gap of unfamiliarity leads to a discrepancy between what citizens think that happens on the farm and what actually happens there. Because of this, the debate on the animal husbandry sector is often based on emotions, and not based on underlying facts or values. In this essay we state that in order to improve the quality of the debate on the future of farming, this gap should be closed.



2.1

Animal health and sustainability

Ferry Leenstra, PhD (Livestock Research)

Ron Bergevoet, PhD (Agricultural Economics Research Institute)

Tjeerd Kimman, PhD (Central Veterinary Institute)

Paul Vriesekoop, MSc (Livestock Research)

Throughout the last decades of the previous century highly contagious diseases like foot and mouth disease and swine fever changed from being endogenous to rare incidents (outbreaks varying from once per 5 years to once per 15 years). However these were major outbreaks of epidemic livestock diseases which were accompanied by massive culling of animals. This contributed to questioning the sustainability of current animal production and confronted the livestock sector with limited social acceptance.

Meanwhile food borne pathogens originating from animal products like Salmonella and Campylobacter are a severe human health burden. Antibiotic resistance of common bacteria (MRSA and ESBL) is a recent and urgent challenge since it threatens vulnerable humans. Therefore the use of antibiotics in animal production has to change from a cheap and easy treatment of herd management problems to a selective and curative application to individual animals.



Health problems are often due to multiple factors. Solutions like vaccination and pathogen eradication work for clearly identifiable infectious diseases. However, for more complex problems management measures like breeding for robustness, functional feeds, adequate housing systems have to be combined with vaccination and eradication.

Solutions are not simple and panaceas do not exist. The societal focus on animal health has changed. It provides new dilemma's like the more frequent occurrence of parasitic diseases in free range systems, which are, however, applauded by society for welfare reasons. Increased contact between citizens and animals (production and companion) is desirable, but might be related to a higher risk for zoonotic diseases. Meat and bone meal is a highly valued feed resource for pigs and poultry, and is now because of food safety, burned instead of used because of the extreme risk averseness of policy makers and society.

Therefore there is an urgent need for processes and structures to assess increased animal health from the perspective of sustainability and acceptability by animal producers and society.



2.2

Designing well-balanced control of highly transmissible diseases in livestock

*Prof. Mart de Jong (Quantitative Veterinary Epidemiology)
Thomas Hagenaars, PhD (Central Veterinary Institute)*



Well-balanced contingency planning for the control of highly transmissible diseases in livestock requires quantitative insight into the effect of the measures planned. Of particular interest is the measure of emergency vaccination, designed to replace the preventive culling of healthy animals that was applied during the most recent large epidemics in The Netherlands and other European countries such as Great Britain, Belgium and Italy. For vaccination against the three most important highly transmissible diseases, Classical Swine Fever, Foot and Mouth Disease and Avian Influenza, quantitative knowledge on disease transmission and vaccine properties is available. Model calculations based on this knowledge show that controlling between-farm transmission of Classical Swine Fever, and Foot- and Mouth Disease through emergency vaccination is possible without increasing transmission risks to livestock areas elsewhere. This implies that trade of vaccinated animals and animal products after termination of an epidemic should be allowed. It is especially important that such trade is allowed throughout Europe in order to show that it works and to set an example for other countries. In contrast, control of avian influenza with vaccination alone is problematic because timely vaccination of enough poultry is difficult, the virus can evolve to escape from vaccination, and other species including humans can become infected also. Hence for the control of avian influenza vaccination and culling may have to be combined.

2.3

Public health risks from animal husbandry: how to deal with real risks and their perception?

Tjeerd Kimman, PhD (Central Veterinary Institute)

Andre Bianchi, PhD (Central Veterinary Institute)

The Netherlands has experienced a severe epidemic caused by Q fever from 2007 -2010. From infected goat farms the epidemic spread to humans. Approximately 10 persons died in the course of the epidemic, which was eventually stopped by massive killing of infected goats. In the course of the epidemic a fierce debate came up on the risks of animal husbandry for human health and the quality of control measures to reduce and control such risks. Other public health risks were included in the discussion, amongst others the risks of antibiotic resistance due to high antibiotic use and the spread of antibiotic resistance from animals to man. It is well known that certain infectious diseases, so called zoonoses, are able to spread from animals to man. Indeed, over the centuries animals have been a source of many diseases in man. Many of such diseases have been eliminated, including brucellosis, tuberculosis, and leptospirosis. While many health risks have thus been brought under control, the public opinion appears to reflect a feeling of anxiety and mistrust in authorities and producers to deal with the remaining public health risks. To restore public confidence, an animal husbandry that is “healthy” for humans and animals (in that order) is urgently needed. It not only requires that disease prevention takes a central role in designing animal husbandry systems, but also warrants a rapid and adequate response on perceived and real risks, as well as complete and open communication.



3.1

Animal welfare: no hype but a persistent driver of transition

Prof. Hans Hopster (Animal Welfare, Van Hall Larenstein)



Animal welfare is not a hype, but a global social development to respectful treatment of animals. The subject is not new, but it is subject to a new dimension by changing human-animal relations. Minimum levels of farm animals welfare are regulated by European legal frameworks, but future tightening will be difficult because of different ambitions of member states. It's much more effective as market and social parties jointly agree on how the welfare of animals should be upgraded and guaranteed at a certain level above the statutory minimum. A reliable assessment of animal welfare, based mainly on animal characteristics that can be measured on the farm and/or in the slaughter line, provides the best guarantee for quality improvement, public accountability and substantiation for claims in the area of animal welfare. In addition, this approach allows entrepreneurs in the animal production chain to use their skills, entrepreneurial qualities and operating conditions to realise the alleged welfare goals within the social conditions for sustainable animal production.

Compared with the development of animal welfare in Europe, the welfare of animals worldwide develops in a similar way. Animal welfare starts with the problem of stray dogs and cats, then follow animal transport and killing and finally the focus will be on the housing and care of farm animals. Since the Netherlands is one of the leading countries as far as animal welfare research and farming systems innovation is concerned, the Netherlands has long-term global opportunities in the area of marketing of integrated concepts for sustainable animal production, metropolitan agriculture, integrated models for sustainable production and integrated quality systems and innovative forms of animal management. Our present experiments and the knowledge and experience we develop is therefore an attractive export product.

In a world where the relationship between people and animals continues to change, the welfare of animals will remain a vital driving force behind the development of sustainable animal production. Wageningen can exploit the world's leading knowledge position to do what the world asks: sustainable livestock production, including animal welfare, close to consumers.

3.2

Animal welfare: economic considerations

Henk Hogeveen, PhD (Business Economics and Utrecht University)

Currently there is much debate about modern animal production systems and animal welfare. Animal welfare can be defined in various ways and can be discussed from different viewpoints. When talking about improvement of animal welfare, the animal is the central agent. However, in economic reasoning, the main levels of reasoning are the farmer and the consumer. When talking about production efficiency, the farmer is the central agent. When talking about image of animal production, the consumer is the central agent. This means that we should be very much aware of the viewpoint, when discussing animal welfare.

The economic consequences of changes in welfare of production animals are often mentioned in the debate but hardly quantified. Quantification might uncover some of the mist around the economic consequences and may make decision making on welfare of production animals easier. At least, decisions will be made with more insight in the economic consequences.

In this contribution, animal welfare is discussed from an economic point of view. The economic effects of a change in animal welfare are discussed based on four basic scenarios. Measures lead to improved welfare and an improved production efficiency (1), measures lead to improved welfare but also to a less efficient production (2), the concerns about animal welfare lead to a change in the image and consequently in the demand of animal products (3) and a differentiated market (4). Only in the first scenario, the improvement of animal welfare will lead to (economic) benefits for all agents involved.



3.3

Robustness

Douwe de Goede, MSc (META-Methodical Ethics and Technology Assessment)

In modern livestock production systems, robustness is increasingly being seen as a solution to a diversity of sustainability problems. Robustness is loosely used in various contexts, but it generally refers to the condition of available strategic options to cope with specific disturbances.

In this essay the conceptualisations of robustness in animal husbandry and corresponding robustness strategies are discussed in view of three vulnerability aspects. These robustness strategies, here termed 'Avoid', 'Resist' and 'Recover', are management strategies that aim to enhance robustness states based on either shielding from, resistance to, or recovery after exposure to a specific perturbation within normal bandwidth.

In animal husbandry robustness is conceptualized as a system feature, rather than as a relational property, somewhat comparable to what has been called 'engineering resilience' in relating it to both resistance and time to recover. It is however narrowly related to animal welfare and animal health. As a consequence, current robustness strategies are limited to the animal subsystem and the social sustainability aspect. *Vis-à-vis* other aspects of sustainability robustness strategies of animal husbandry systems should not remain limited to re-prioritizing breeding criteria.

For a transition to more sustainable and socially accepted livestock production systems robust animals are not a solution, but a necessary step to discard unwanted external control and improve the larger system's capacity to comply with dynamic expectations of its stakeholders.



3.4

A chicken-or-egg issue?

Prof. Henk Jochemsen (Applied Philosophy)

Ferry Leenstra, PhD (Livestock Research)

Henri Woelders, PhD (Livestock Research)

In laying hen production in The Netherlands annually 45 million male chicken are killed immediately after 'birth', because meat production with these specialised animals is not economically remunerative. The dead chicken are used as feed for beasts of prey. New technology could make it possible to sex the embryo's a few days before 'birth'; this could make it possible to kill male embryo's after 18 days of incubation. Would this be ethically less problematic than killing the one day old male chicken?

Central principles/values in animal ethical analysis are 'intrinsic value', animal well-being and freedom to demonstrate natural behaviour. Intrinsic value implies the intention to do justice to something for its own sake, independent from its usefulness for people. Animal well-being means the promotion of the so-called five freedoms for animals from Brambell.

In an analysis of the present ethical dilemma in light of these principles in which also the 'relational value' of animals is proposed as a relevant criterion, it is argued that killing the one day old chicken is ethical slightly more problematic than destruction of the 18 incubated eggs. However, the analysis also leads to the conclusion that both practices are the consequence of specialised poultry farming that as a whole is ethically problematic. Multi-stakeholder consultation and policy making at the European level is needed to develop an ethically more acceptable practice.



3.5

Friendly foragers or violent villains?

Bas Rodenburg, PhD (Animal Breeding and Genetics)

Liesbeth Bolhuis, PhD (Adaptation Physiology)

Piter Bijma, PhD (Animal Breeding and Genetics)



To improve animal welfare, animals are increasingly kept in group housing systems. This is positive for their welfare, but only if they behave properly. Positive and negative social interactions among group members have marked effects on animal welfare. In laying hens and pigs, behavioural problems such as cannibalism and tail biting can spread through the group like an epidemic. Beak trimming of laying hens and tail docking in fattening pigs are frequently used to control these problems, but do not offer real solutions. The development towards group housing systems and the wish to ban beak trimming and tail docking means that the risks of damaging behaviours will increase considerably. In this essay, we propose to combine improvement of rearing and husbandry conditions with a novel strategy to breed social animals. By offering pigs and laying hens a challenging environment with appropriate substrates for exploratory and foraging behaviour, such as straw or wood shavings, damaging behaviours can be reduced considerably. Such improvements in husbandry conditions are even more successful if they are combined with improved rearing conditions. Reducing stress in the parent stock and rearing young animals in an appropriate environment, if possible with maternal care, considerably improves their behavioural development and reduces negative social interactions in later life.

Damaging behaviour is not only affected by rearing and husbandry environments, but also by the animal's genetic make-up. Recently, we have developed novel methods to breed animals that have positive effects on traits of their group mates. These methods enable breeding companies to select animals that have positive effects on group performance. This is a promising way forward to combine improvement of social behaviour and animal welfare with productivity.

3.6

Farm animal genetic diversity for the future

Sipke Joost Hiemstra, MSc (Centre for Genetic Resources, The Netherlands; Livestock Research)

Jack Windig, PhD (Livestock Research)

Jan ten Napel, PhD (Livestock Research)

Kor Oldenbroek, PhD (Centre for Genetic Resources, The Netherlands)

Farm animal genetic diversity is under threat. According to FAO at 2007, about one-third of global livestock breeds is 'at risk' and within-breed genetic diversity is also often limited. The latter is the case for many local breeds, but also for the dominant dairy breed (Holstein Friesian). Moreover, Muir et al. showed that commercial chicken lines harbour only 50% of the genetic diversity of the original, founder breeds. These trends in genetic diversity go together with increasingly uniformity of animal production systems and animal products at the global level, associated with continuous pressure on quality of nature, landscapes and cultural diversity. In this essay, the authors explain why it is important to conserve and sustainably use farm animal genetic diversity for the future.

Development of farm animal breeds has always been a dynamic process. The high-productive breeds of today were developed through continuous exploitation of the available genetic base. Future challenges for the livestock sector will also require sufficient genetic diversity, within and between breeds. Maintenance of farm animal genetic diversity is needed to be able to deal with (unpredictable) changes in the livestock systems and their environments.

In order to feed the growing world population we will have to (further) increase the efficiency of livestock production systems, and at the same time to reduce the ecological foot print. Next to increasing the efficiency of intensive animal production systems, more emphasis should be given to 'adaptive agriculture'. Adaptive agricultural production systems take into account the opportunities and limitations of a variety of local ecosystems, looking for possible synergies between biodiversity and agriculture. Both intensive and adaptive systems need to be robust and resilient. For both development strategies, a wide spectrum of genetic variation – between and within farm animal populations – is needed for future exploitation.



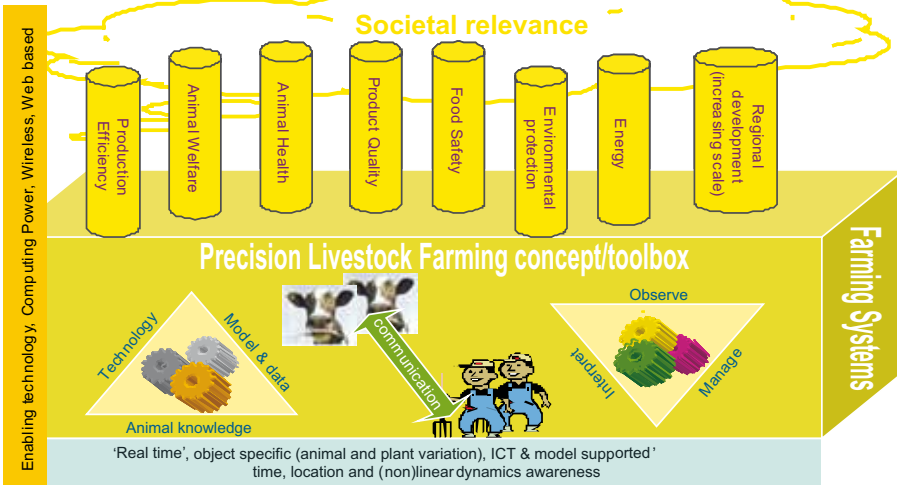
3.7

Precision Livestock Farming: focus on individual animals

Kees Lokhorst, PhD (Livestock Research)



This essay introduces the concept of Precision Livestock Farming (PLF) and discusses the potential for operational management support in livestock production chains where the primary focus is on the care for the individual animal. Based on the international developments of Precision Livestock Farming in which Wageningen UR Livestock Research is very active different paradigms (from group to individual: think in variation instead of uniformity) are discussed and brought into the perspective of livestock chains and management support for individual animals. Key is thinking in managing differences between individual animals. To manage this supporting tools are needed. Tools can be differentiated between sensing (extra eyes, ears and noses) and dynamic modeling (extra brains). The concept of PLF is fundamentally a basic way of thinking. Investment is needed in data measurement (real time sensing), data handling, modeling and transformation into real time management actions that focus on individual animals that live in a group. The practical implication is that this basic development can contribute to the areas of production efficiency and energy, animal welfare, animal health, product quality and food safety, environmental protection and regional development. This implicates that PLF is an essential and integral part in the sustainability discussion. To address the potential impact the driving forces in the ICT (computing power, wireless sensing, location awareness, internet) and the critical processes in livestock production systems need to be identified. So, development in Information and Communication Technology can be of value for livestock production systems. Prerequisite is that also the social and political acceptability of the PLF concept should be addressed. However, this essay addresses the fundamental issue that is also crucial in modern livestock production system to give attention to individual animals whenever or where it is needed. The animals are perfectly capable of asking for this attention, but humans have to learn to speak and understand this language.



4.1

Finding strength in differences: diversity in sustainability of animal production systems

Prof. Imke de Boer (Animal Production Systems)

Henk Udo, PhD (Animal Production Systems)



The main function of animals in the Western World is production of animal-source food. The majority of these animals are kept in large-scale, intensive systems (i.e. high animal productivity per unit of land, labor or capital). Is large-scale, intensive animal production the solution to feed a growing world population in a sustainable way? We don't think so. Sustainability is a complex issue, and each animal production system has strengths and weaknesses regarding sustainability. Improving welfare of laying hens or fattening pigs in intensive systems, for example, increases land use requirements and emission of greenhouse gasses (GHGs) along the production chain. High-tech industrial systems that produce with care for animal and environment are not generally accepted by Western society. These trade-offs among sustainability issues ask for moderation of production and consumption, and open and transparent systems embedded in their agro-ecological and socio-economic environment. This is also true for developing countries in which smallholders produce the majority of current meat and milk demands. It is often stated that these smallholders produce less environmental-friendly and can't fulfill the growing demand for animal-source food. A comparison of the environmental performance of smallholders and industrial systems, however, is not straightforward. Per kg of milk, GHG emissions are lower in Europe or Northern America than in Asia or Africa. For smallholders, the number of cows generally is just as important as daily milk production. Expressed per cow, GHG emissions are substantially lower in Asia or Africa than in Europe due to substantially lower body weights of individual animals and the limited use of concentrates. Our western animal production, moreover, can't fulfill the growing demand for animal-source food which occurs especially in Asia and Africa. Its growth is limited by its local environmental impact, and exporting animal products to developing countries paralyzes sustainable development of their local economies. We advocate to stimulate local farmers to develop new production systems that fulfill the growing animal-source food demand while sustaining the environment and livelihoods of smallholders. Feeding the world in a sustainable way, therefore, uses the strength of diversity in (new) production systems worldwide.

4.2

Carnal desires impose a burden on nature

Jules Bos, PhD (Plant Research International)

Jaap Schröder, PhD (Plant Research International)

Bert Smit, PhD (Plant Research International)

Intensification of agricultural production is a global phenomenon. At best, intensification improves the utilization of resources. However, it also tends to increase emissions per ha. Adding to the problem, agricultural intensification is often associated with an increase in the scale of farming operations and regional concentration. Not surprisingly, a wide range of environmental quality indicators shows unfavourable values in regions dominated by intensive agriculture.

A typical example of a sector characterised by intensification, scale enlargement and regional concentration is the Dutch livestock sector. This process is still continuing, linked with constant efforts to further improve economic and environmental efficiencies through farm size enlargement and adoption of additional technologies. Referring to the Triple P model of sustainability (People, Planet, Profit), some label this on-going rationalisation as contributing to sustainable development of the Dutch livestock sector. However, increasing efficiencies is in no way a guarantee that earth's finite carrying capacity is not exceeded. Rather than efficiencies, it is total throughput in the economy that is determining the total claim on earth's carrying capacity.

Questioning human population size and consumption levels of animal products still is a taboo in many circles. However, a sound debate starts with the acknowledgement of trade-offs between population size, consumption levels of animal products vis-à-vis vegetable products and land spared for nature. If human impact on nature is to be kept within limits, mankind has to opt for birth control or for restricting consumption of animal products to levels that are strictly needed for human health.



4.3

Ecological opportunities call for increased red meat production on grassland to ensure food security

Prem Bindraban, PhD (ISRIC-International Soil Reference and Information Centre)

Some currently proposed strategies to resolve foreseen global problems tend to neglect basic eco-physiological processes and even basic physical, chemical and biological laws. They succumb to economic arguments, by ignorance or sentiment, or by vested interest of, for instance, powerful industries, lobby groups or other societal groups. This however generates false hope (e.g. organic agriculture), stimulation of counter-productive measures (e.g. biofuels), and pleas for unnecessary extreme options (e.g. vegetarian diets). The intentions may be honourable, the means could be mistaken. Ecologically durable options can be arrived at only when basic processes and laws are respected. Here I claim that the call for vegetarianism should be discouraged as it jeopardized the exploitation of the production potential of grasslands for red meat production.

The additional amount of water needed for the extra food production for the coming four decades will reach up to 5,000 km³, depending on diet and water productivity increase. This amount is equivalent to a production area of about one billion hectares of land, at grain yields of five tonnes per hectare. This additional water can be 'incorporated' in our food through increased water productivity on the current arable area by some 70% and/or through expansion of the arable area. Enhancing the use of grasslands for increasing red meat production by ruminants may be an essential way to capture part of this additional water to increase the availability of healthy food products especially for poor and food insecure people. It does call for improvement of soil fertility, which in addition, provides a means to sequester carbon in grasslands. Though these gains may not be easily achieved, this is true overall for any option to enhance use efficiency of natural resources to increase productivity and improve food security.

4.4

The spatial dimension is a crucial aspect of concerned livestock farming

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Livestock farming can only be exercised with environmental concern if the spatial aspects, with its perspectives and constraints, are included in the assessment of its sustainability. With spatial aspects we refer to: (1) the use of space by livestock farming; (2) the spatial relation of livestock farms with other functions and needs, like nature, recreation and healthy living in the area; (3) the laws and regulations that direct the spatial development of the business activities at their locations; (4) the requirements and preconditions of livestock farming of the physical environment.

We found trends in livestock farming that show decreasing numbers of farms, whereas the numbers of animals and the area per farm increase. The spatial concentration of animals results in less frequent outdoor grazing, more manure removal from the farms, and longer distances of supplying and processing locations, which leads to an increase in tractor and transport trips on public roads. These trends have a potential for a negative pressure on the quality of the environment and the perception of the local inhabitants.

Concern for logistic movements, allocation of the farm within the environment, necessary infrastructure, presence of supplying and processing industries and landscape structure, have so far barely played a role in the zoning of the areas that are designated for livestock farm development.

A better spatial setting can reduce the risk of the spread of animal diseases, prevent health risks for citizens, reduce the odour pressure on urban areas and reduce environmental pressures on nature areas, and consequently, improve the quality of life in the rural areas.



4.5

Biological livestock farming as sustainability accelerator

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Organic intensive livestock farming is a young and innovative sector, with a market-oriented strategy whose ambitions take account of the environment, animal welfare, nature and conservation, food and health. The yearly Dutch consumption increased with 12% against 5% for conventional in the last 5 years. However the organic sector can learn from the pioneers of the conventional sector in terms of comprehensive sustainable systems. Combining developments in these two chains could accelerate sustainable farming. Indeed, close collaboration and cooperation among stakeholders in both sectors could stimulate and inspire, on aspects like health, welfare and sustainability. This optimises the complementarity that exists and benefits from understanding the different principles and perspectives. In other words, take a common approach where this is effective and a separate one where this is necessary.

So how can this link be best organised? A key role will be played by how the newly formed Ministry of Economic Affairs, Agriculture & Innovation (EL&I) steers the research and is able to facilitate joint organic and conventional research programmes. Furthermore, the implementation agenda for Sustainable Livestock Farming would be a good instrument to enable the organic and conventional sectors/chains to cooperate with the commodity boards towards developing a multi-annual programme of research. This would prompt the executives of these parties to shift from the issues of the day to harmonised innovation agendas. Like the new chain organisation for the organic sector that will be responsible for articulating, prioritising, supervising and evaluating research demands, thereby fulfilling a key role in structuring the connections and so accelerating the sustainability of intensive livestock farming as a whole.

4.6

Manure digestion: a consideration of economic, social and ecological interests in manure digestion

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At the request of a Dutch non-governmental environmental organisation (Stichting Natuur & Milieu Aalten), researchers of Wageningen UR made an analysis of aspects of sustainability in respect to manure-digesters in the Netherlands. What are the local and global effects of co-digestion on people, nature, biodiversity, environment and the landscape, in respect to requirements for sustainability? The results show a wide range of effects and considerations in connection with perspectives of diverse stakeholders, that take part in or are affected by intensive farming.

On a local level, the realisation of a co-digester can have positive sustainable effects on employment opportunities, the generation of 'green energy', reduction of transport kilometres, reduction of the exhaust of greenhouse gasses and the processing of manure surplus in a way that saves the local environment. From this point of view it would contribute to sustainable farming, although the effects on the landscape and the concentration of transport movements have to be taken into account as negative factors.

From a wider point of view, however, this local solution can contribute to a continuation of intensive farming, which in general affects sustainability negatively compared to closed production cycle farming. Intensive farming needs mineral import, increasing pressure on the soil and increasing energy use to grow and transport feedstuffs. Some feedstuffs for animal feed can also be used in food for people, thus negatively affecting global food security. The production of feed also contributes indirectly to deforestation, negatively affecting reduction of greenhouse gasses.

Thus, the advantages and disadvantages of co-digesting cannot simply be crossed out against each other. They are not easily comparable in scale and effect and will impact on different levels. These, sometimes very opposite effects, coupled with the interests of a variety of stakeholders, need to be weighed carefully. The key to sustainable intensive farming will lie in involving all stakeholders in an early stage to know and discuss all arguments in a transparent and trustful way.



4.7

Concerned livestock farming thrives of regionalisation

Monica Commandeur, PhD (Alterra)



All stages of the food production chain are jointly responsible for the performance of agriculture; it does not lie unilateral at the consumers. The historical trend is the emergence of production chains at the beginning of the 20th century, caused by the industrialization. This enabled the production processes and conditions to get standardised per chain component.

There are two principal orientations towards sustainable development which seem to diverge from each other: one in the direction of metropolitan food clusters, the other of multifunctional and small-scale agriculture. They are distinguished by a different vision of the concept of sustainability. While the one thrives for 'people, planet, profit'; the other seeks for 'people planet, persistence'. Profit-seekers evaluate their expected returns on investments; whereas persistence-seekers evaluate their dependency on industrialised inputs. However, there are also two important similarities. Although they thrive for different outcomes, they put in similar entrepreneurial skills. Second, they are both dependent of local, physical and ecological balances and local stable social relations to secure the perspectives of their farm.

The reorientation of the supplying and processing companies lags behind in the development of livestock farming towards regional adhesion. They operate still large scale and centralistic towards efficiency improvements. However, if they were present and flexible in the regions, they could contribute to the local stability and social relations. Likewise the existing policy instruments do not seem well equipped to take into account different views of sustainability or to support the regionalisation process.



5.1



Consumer concerns with intensive livestock farming: threat or an opportunity for enhancing product differentiation?

Prof. Hans van Trijp (Marketing and Consumer Behaviour)

Paul Ingenbleek, PhD (Marketing and Consumer Behaviour)

Consumers are increasingly concerned with intensive livestock farming and these concerns are quite diverse in nature as well as in intensity. Whereas for some consumers it may not be an issue, for others the concerns may relate to animal welfare, food safety, esthetics (e.g. large scale buildings in rural area), as well as intensive production per se (conflicting with a nostalgic idea about farming). Importantly, these concerns are real and need to be addressed. In our view they cannot be ignored as the concerns form part of a broader changing consumer attitude; namely the quest for honesty, transparency and authenticity. In this essay we analyze the marketing and consumer behavior aspects of intensive livestock farming along three main questions: (1) why now?, (2) is this a threat or an opportunity for stock farming and (3) how can these opportunities be exploited?

Our conclusion is that consumer concern with intensive livestock farming provides plenty of opportunity for the sector, also as a way to escape competition on commodities. Acknowledgment of diversity in consumer concerns can be profitably matched with a differentiated product supply to cater for consumer segments at a differentiated and more customized level. However, this can only be achieved as a focused, joint and coordinated action between all chain partners.

5.2

Colliding scale frames in the decision making about intensive agriculture

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In the at times fierce discussions about intensive agriculture people define this issue in many different ways. As a result it is almost impossible to discuss the issue in a neutral way. It is difficult to determine who is responsible for what, who should be involved, who is steering the process and in which directions we should look for solutions. The aim of the is essay is to make policymakers, researchers, farmers, and societal organizations aware of the different scale frames (i.e. interpretations of actors involved, in which they situate the issue on a particular scale and level) regarding the intensive agriculture and the consequences for decision making processes.

In our analysis we looked at the scale frames of a municipal alderman, the founder of a local action group, and one of the agricultural entrepreneurs in a municipal decision-making process about a so-called New Mixed Company (NMC). The construction of different scale frames enable the inclusion of some actors and the exclusion of others. The different scale frames make it possible to compose many different arguments, but also result in the blurring of interests. The use of these various different scale frames can be explained as actors speaking different languages, expressed in different frames, resulting in incompatible stories that fit diverging interests. As a result of the use of different scale frames without explication, scale frame mismatches occur. We conclude that scale frame mismatches play an important role in the stagnation of the decision-making process. The appearance of incompatible scale frames result in discussions in which the different parties talk at cross purposes. It is indistinct on which scale and which level the problem should be tackled and as a result who should take the lead. Although the different parties still talk to each other, all groups have the feeling they are not listened to and all feel unrecognized. Amongst the citizens this has resulted in discontent and fierce consternation, resulting in the founding of an action group. The action group and the generated media attention have caused severe delays and obstacles in the decision-making process.



5.3

Innovation for a conscientious livestock production

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The 90's of the last century showed major changes in applied research. To become demand driven, governmental research institutes were transformed to contract research organizations and the major goal of knowledge production shifted from production efficiency to sustainable development and innovation.

Notably a contract research organization as Wageningen UR Livestock Research is by being demand driven pre-eminently situated to combine participatory approaches with contextual learning for sustainable development. However in achieving its position, the contract research organization sees itself confronted with the challenge to combine effective project management, with initiation and guidance of innovation processes fitting in sustainable development and its ambition to maintain an internationally recognized scientific and market position.

In projects, tasks include stakeholder participation and management of interfaces between amongst others entrepreneurs, governments and knowledge institutions. By additionally organizing reflection on results and methodology and providing a broader platform for learning and achieving strategic knowledge, as inspired on the philosophy on systemic innovation instruments by Smits and Kuhlmann, the contract research organization can fully fulfill its new task in a world searching for sustainability.

5.4

The fully sustainable shed as a yardstick for diligent livestock farming

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Ernst Bos, PhD (Agricultural Economics Research Institute)

A fully sustainable (FS) shed incorporates several sustainability features that go beyond current compliance requirements. Wageningen UR has played a key role in its development through innovative shed system design, technological research and scenario studies. Because the shed is at the heart of our animal holding system, in various FS sheds major steps towards sustainable livestock farming are made. And the importance of shed innovation in this respect has been acknowledged by the scientific world, farmers, chain parties and politicians alike. Hitherto the new coalition government's stance on efforts to encourage the development of FS sheds is not clear. Nevertheless, experts stress the need for continued support for multi-annual research programmes and vital policy tools (economic, fiscal, legal, environmental) to ensure the broad implementation of FS sheds.

The challenge for Wageningen UR is to work on new designs and practical implementation of shed systems so that they score significantly better on sustainability than the current shed systems. Hence the technological research leads into new innovations, like the performance of air-cleaning systems and automatic milking, which are incorporated into the FS shed. And the identification of the environmental, technical and economic effects of future environmental policy. In terms of shed management, too, Wageningen UR explores how organic management might improve sustainability in the shed.

An essential factor in the contribution Wageningen UR makes is retention and development of expertise and to increase commitment among several actors (e.g. administrators, market-leaders) through funding. Wageningen UR has expertise in abundance to be able to realise the FS-shed policy objectives, and therewith sustainable livestock farming.



5.5

On markets and government power: the useful power of the market mechanism

Krijn Poppe, MSc (Agricultural Economics Research Institute)



There are many images of the animal husbandry sector, and many observers are unhappy with the outcome of the market processes. Instead of explaining why the market generates the current outcomes, it is better to be prepared that politics will reorganise property rights in order to obtain a different outcome of the market mechanism. This essay shows that there are market processes that contribute to sustainable development. These include businesses that exploit heterogeneity in consumer demand and farmers' environmental performance by introducing products under a sustainability label. These market processes could be reinforced. An obligation for sustainability reporting could help.

There are also government policies that lead to unsustainable developments, those could be liberalised. Government policies that lead to unsustainable production include market protection in the Common Agricultural Policy, energy and biotech policies. The low VAT rate for meat is also an interesting case.

And where the market fails, the state has to act, but can use market oriented policy instruments. In environmental policy (CO₂, Nitrate, etc.) the use of economic policy instruments could be strengthened.

Scientists should help to design an optimal policy mix and be able to do a proper impact assessment.

5.6

Strategic options for the Dutch livestock sector

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This essay presents some strategic options for the Dutch livestock sector based on an analysis of its Strengths, Weaknesses, Opportunities and Threats (SWOT). The number of livestock may decrease in the future. However, based on its strengths, the sector could increase its economic activities if it succeeds in realizing market opportunities in an innovative way. The main strengths are the skills and entrepreneurship within the value chain. It is necessary that the societal wishes and demands such as sustainable production, animal welfare, landscape, will be fulfilled and that the societal threats in not having the license to produce and license to deliver are averted. Production should take place under appropriate conditions with respect to human health, animal welfare, preventing pollution so that nature, the landscape and surrounding citizens will not be negatively affected. This is especially important in a heavily populated country like The Netherlands. A better image of the sector is needed to obtain permission from public authorities for spatial enlargement as well as for implementation of technological innovation. Innovation and cooperation in the production chain are necessary preconditions. Simultaneously, 'new' products are needed which fulfill the demand of consumers and for which consumers are prepared to pay. This can be supported by new applications of ICT for better and faster communication of firm-level production methods, product characteristics, sustainability, etc. Not only within the supply chain but also with other stakeholders like citizens, consumers and people living near production areas.



Conclusion: a better future for all of us



Aalt Dijkhuizen, PhD (Chairman Executive Board)

Political sway in the factory farming debate may have gone some way to placating objectors and creating a 'clean' image in the Netherlands but what are the unseen consequences? Like mink farming, now banned in the Netherlands. Where does demand turn to fill the supply gap? Poland and China gratefully step in, so the Dutch mink farmer, the Dutch economy and the mink lose out. Well intended but the wrong outcome. But what's the alternative? The most obvious is for the market and consumer awareness to take the lead. As in the introduction of an intermediate segment in the pigmeat market that takes a large consumer group into account, therefore improving animal welfare and producer prosperity as well as our international position and the Dutch economy.

This collection of essays provides insight into the options and prospects, helping to inform and enrich the debate and find various appropriate answers that are not pre-emptive. While not all roads will lead to Rome, many could. Collaboration between government, industry and knowledge institutions – the golden triangle – will, Wageningen UR believes, responsibly boost the leading position gained by the Dutch agrifood sector and enable industry to supply the increasing demand for animal products prompted by rising levels of prosperity around the world.

The issues confronting us are complex and international. To ensure a better future for man and animal, we must pull together and explore the different roads. Wageningen UR is committed to helping us get to our destination in good shape!

Research



Industry



Government

