

Animal Sciences Group

Divisie Veehouderij, kennispartner voor de toekomst



process for progress

Report 72

Discomfort among cattle, pigs, poultry, mink and horses

Inventory and prioritisation and possible solution strategies

October 2007



ANIMAL SCIENCES GROUP
WAGENINGEN UR

Colofon

Publisher

Animal Sciences Group van Wageningen UR

POB 65, 8200 AB Lelystad

Tel: +31.320.238238

Fax: +31.320 .238050

E-mail Info.veehouderij.ASG@wur.nl

Internet <http://www.asg.wur.nl>

Liability

Animal Sciences Group does not accept any liability for damages, if any, arising from the use of the results of this study or the application of the recommendations.

Losse nummers zijn te verkrijgen via de website.



De certificering volgens ISO 9001 door DNV onderstreept ons kwaliteitsniveau. Op al onze onderzoeksopdrachten zijn de Algemene Voorwaarden van de Animal Sciences Group van toepassing. Deze zijn gedeponneerd bij de Arrondissementsrechtbank Zwolle.

Referaat ISSN 1570-8616

Abstract

Late 2007 the Dutch Ministry of Agriculture, Nature and Food Quality presented a Policy Document on Animal Welfare to the Parliament. In this report a number of building blocks on how to deal with farm animals are described:

A discussion of similarities and differences in the perception of animal welfare from social and animal science perspective.

An inventory of discomfort items, and their prioritizing for cattle, pigs, poultry, mink and horses and some steps to solve animal welfare problems. An integral design plan for several sectors, where integral design is most necessary to diminish discomfort to animals.

Keywords

Animal welfare, discomfort, integral design, farm animals

Referaat

ISSN 1570 - 8616

Auteur(s) F.R. Leenstra, E.K. Visser, M.A.W. Ruis, K.H. de Greef, A.P. Bos, I.D.E. van Dixhoorn, H. Hopster

Titel: Discomfort among cattle, pigs, poultry and horses

Report 72



ANIMAL SCIENCES GROUP
WAGENINGEN UR

Report 72

Discomfort among cattle, pigs, poultry, mink and horses

Inventory and prioritisation and possible solution strategies

F.R. Leenstra, E.K. Visser, M.A.W. Ruis, K.H. de Greef, A.P. Bos, I.D.E. van Dixhoorn and H. Hopster

October 2007

Contents

1	Background and introduction	1
2	Overall summary and conclusions	2
2.1	Introduction	2
2.2	Methodology	2
2.3	Prioritisation from a human point of view	3
2.4	Prioritisation of discomfort for the animal and possible solution strategies	3
2.5	Surgical interventions	5
2.6	Integral design	5
2.7	Advice as regards overall prioritisation	6
3	How to prioritise welfare problems and what plays a role in this respect?	7
3.1	Introduction	7
3.2	Prioritisation on the basis of knowledge about and observations of the animal	7
3.3	Prioritisation on the basis of other social perspectives	7
3.4	Animal welfare from a human perspective	9
4	Cross-species assessment of discomfort to cattle, pigs, poultry, mink and horses	11
4.1	Introduction	11
4.2	Discomfort across species	11
4.3	Nutrition in relation to discomfort and solutions	11
4.4	Naturalness, animal comfort and safety: free range facilities as a case	12
4.5	An integral look at floor configurations	12
4.6	Health management	12
4.7	Best practices	12
4.8	Internationalisation of attention to welfare	13
5	Integral design as a possible solution strategy	14
5.1	Introduction	14
5.2	The RID method	14
5.3	Adding environmental requirements to integral design strategy projects	15
5.4	Dairy cattle - introducing integral sustainability: RID for cattle, designing for sustainable dairy farming ..	16
5.5	Farrowing sows, integral farrowing sow farming design: RID sow	16
5.6	Bringing pregnant sows and weaned piglets to ComfortClass as well	17
5.7	Broilers - towards a sustainable farming system (incl. animal adjustment)	17
5.8	Laying poultry, Industrial eggs, Sustainably Safe Egg (<i>Duurzaam Veilig Ei</i>)	18
5.9	Communication	18
5.10	A summary of activities:	18

Annexes

Annexes

Criteria for severity and duration of discomfort and for percentage of the population affected

Items of discomfort per species

- Dairy cattle
- Beef cattle and veal
- Farrowing sows and piglets
- Weaned and pregnant sows
- Fattening pigs
- Pigs, all categories
- Laying hens
- Layer parent stock
- Broilers
- Broiler parent stock
- Poultry, all categories
- Mink
- Horses

1 Background and introduction

In late 2007, the Dutch Ministry of Agriculture, Nature and Food quality presented a Policy Document on Animal Welfare (*Nota Dierenwelzijn*) to the Dutch Lower House. To draw up this Policy Document, the Agricultural Department (*Directie Landbouw*) needed a number of building blocks for dealing with farm animals and horses.

The full report is in Dutch and available on

<http://www.asg.wur.nl/NL/publicaties/Eigenpublicaties/Rapporten/default.htm>

The report provides the following building blocks:

- A discussion of similarities and differences in the perception of animal welfare from social and animal science perspectives
- An inventory of the major welfare problems and drawing up priorities as regards discomfort among cattle, pigs, poultry and horses
- An analysis of how surgical interventions carried out on cattle, pigs and poultry such as dehorning, castration, tail docking and beak trimming can be made redundant or can cause less discomfort and how to achieve this
- An integral design plan for those sectors where that is most necessary, explicitly making use of the current projects (group housing of sows, dairy cattle).

This English version consists of the summary of the Dutch version, the discussion on similarities and differences in the perception of animal welfare from social and animal science perspectives, the across species conclusions on discomfort and the chapter on integral design plans. In addition the tables that list items of discomfort per species and category of animals are given.

2 Overall summary and conclusions

2.1 Introduction

Animal welfare is not the exclusive domain of animal scientists. Animal science is based on observations of the actual animals. But regardless of how much science can determine *about* the animal; science cannot pretend to be the only voice *for* the animal. The debate in our society about animal welfare is also about ourselves, about our values and ideas of what is a good life. In short, about –often disputed– values where animal scientists do not have an exclusive say.

That is why we will be distinguishing between ‘animal welfare problems’ and ‘discomfort’ in this report. Every form of discomfort is an animal welfare problem, but not every animal welfare problem actually has to result in discomfort to the animal. ‘Discomfort’ refers to those forms of the physical and mental health of animals being affected, whose nature and existence can be established and substantiated scientifically. We have estimated the severity and the duration of the *discomfort* for welfare problems for individual animals, and which share of the population is affected by it. This has resulted in a prioritisation per species, based on animal sciences.

In addition, we can consider a second assessment category: that of the human perception of what animals are entitled to and what harms them. This covers a wide range of ethical and aesthetic views, intuitions and ideals which play a role in the public debate on animal welfare. The aspects within this category that specifically apply to the problem in question are identified for the welfare problems. This gives an impression of the possible dimensions and backgrounds of public concern about the specific problem. In the context of this assignment we have limited the second way of prioritisation to fact-finding.

2.2 Methodology

The further prioritisation looks at discomfort as experienced by the animal according to animal scientists, with this discomfort being evaluated from a scientific perspective using the classification of the European Welfare Quality¹ programme. Every species and type of animal and every type of housing was looked at to determine which of the individual items² resulted in discomfort, to which extent and during which life phase the animals experienced the discomfort and which percentage of the population was exposed to the discomfort. We used three categories: 0, 1 or 2 for severity, duration, and the share of the population, describing strictly which value to award when. We deliberately chose to indicate a percentage of the population and not the absolute number of animals, because the number of animals kept in the Netherlands varies greatly per species of animal.

We found that several items could be combined for each species, because they had a common cause. For every species, starting points for improvement have been provided for the high-scoring items or groups of items. The actual surgical interventions and living with such an intervention are not included in these high scores. Surgical interventions are problematic by definition as they violate the animal's integrity. For this reason, surgical interventions are dealt with in a separate chapter.

We would like to state explicitly that, in consultation with our customer, the chapters have been drawn up on the basis of an expert view (specifically based on the animal science knowledge at Wageningen UR) and that we have not worked from a social point of view, e.g. a public dialogue and/or wide consultation, from which to achieve a certain degree of consensus.

¹ Behaviour: 1) natural behaviour and behavioural problems; 2) social behaviour; 3) general fear; 4) fear of human beings; Health: 5) disease; 6) injuries; 7) surgical interventions; Physical and physiological comfort: 8) rest and lying comfort; 9) ease of movement; 10) thermal comfort; Feed: 11) feed; 12) access to water
‘Brambell's five freedoms’ (free from hunger and thirst, free from physical and physiological discomfort, pain, injury and disease, fear and chronic stress, and free to express normal behaviours) are reflected in the criteria listed above.

² Statutorily prohibited systems or actions are not considered in the prioritisation

2.3 Prioritisation from a human point of view

An aspect of animal welfare can become a social issue if it brings about a feeling of unease among the public. Such a feeling can result in controversy. The problem of such issues is that they often only become noticeable in a very late stage. They develop depending on attention from the media and interactions among stakeholders. Although no general and hard conclusions can be drawn from the limited inventory carried out in the context of this report, we are taking the liberty of identifying some outlines. Firstly, we have seen that the opinions of experts, including animal experts, on the degree of discomfort often match the extent to which the discomfort in question is a matter of public concern. But our expert knowledge of discomfort as experienced by the animal does not always match the degree of public concern awarded. There are two sides to this.

On the one hand there are a few subjects which explicitly give rise to public commotion, such as the housing of pigs in 'mega' (multi-storey) farms, or killing day-old cockerels, although they are not or do not have to be an issue as regards animal discomfort.

On the other hand, there are quite a lot of forms of discomfort which are characterised as very severe in this report, but which have not played a role in the public debate so far. Examples are infection of poultry with ectoparasites and endoparasites, the poor climate in virtually all animal houses -including horse housing- or the hard and slippery floors in dairy cattle and calf houses.

It is our opinion that problems with a high public profile but a low severity assessment are definitely not nonsensical problems. The public debate in this regard underlines that discomfort is not the only criterion regarding animal welfare. Such values as naturalness, respect for and the intrinsic value of animals also play a role. When setting priorities as part of a political programme it may be convenient to clearly indicate the perspective from which a situation is considered to be undesirable and to challenge the different parties to explicitly formulate what they have based their values on and what their assumptions are in this regard (reflexivity).

2.4 Prioritisation of discomfort for the animal and possible solution strategies

High discomfort scores have been established for several items concerning pigs, poultry and mink, but cattle and horses are showing some high scores as well. Causes of discomfort to dairy cows include the house design, e.g. restricted cubicles, slippery floors, mobility problems. The main issues for horses are, in addition to the negative consequences of lack of knowledge among horse owners, particularly their social isolation, individual housing, lack of exercise and the mismatch between the breeding purpose (inherent predisposition) and the use of most horses. The low-stimulus surroundings and the restricted space are a source of discomfort for pigs, veal calves, mink and poultry.

Common causes of discomfort not restricted to a single species of animal (including horses) are farm-specific pathogens, the house climate and the insufficient amount of feed or the fact that the feed is over-concentrated (not enabling the animal to spend a lot of time foraging). Such discomfort includes respiratory disorders, gastrointestinal disorders and animals' natural behaviour being restricted. The vegetarian feed to which poultry is restricted is also mentioned as a source of discomfort (sub-optimal health leading to feather pecking). The success of selection for efficient meat production is a source of discomfort to meat poultry and, to a lesser extent, pigs.

Discomfort caused by transporting animals and the state of affairs regarding stunning and killing animals (slaughter and killing to contain epidemics) has been described separately and are not included in the 'discomfort tables'. There are specific rules for these aspects.

In recent decades we have seen noticeable improvements in the production methods for food-producing animal species and mink, as a result of which their discomfort has lessened. The introduction of group housing (dairy cattle, sows, veal calves), the transition from cage housing to free-range housing for laying hens, the covenants between the government, the industry and sometimes NGOs for calves, mink and broiler parent stock, laid down in product board directives, but also the further development of Dutch and EU regulations are concrete examples of the growing importance of awareness of and attention to animal discomfort. Many of those improvements in the Netherlands seem to be a typical product of the 'consensus model': a combination of public pressure, initiatives and creative solutions originating in the business and research world enabled a new threshold to be defined for animal farming in the applicable regulations. In addition, market-oriented ancillary side chains have come into being for several species of animal. Free-range farming (egg production) is a good example of a successful break-through.

Depending on the sector there are different approaches which may lead to further improvement. Wherever we state that improvement can be sought, this does not mean that the authors would like to set any standards or feel that the current situation is unacceptable. We have worked much more from the point of view that society (including the sector) sees lessening discomfort as a moral obligation where this is reasonably possible (looking for a balance between production objective, economic feasibility and animals' interests). The degree to which animal discomfort is accepted by mankind is and will continue to be a subject of political and public debate. The main sources of discomfort and the possible ways to reduce discomfort are identified below per species.

Various problems experienced by **food production animals** have been known for quite some time, but no acceptable compromise between or synthesis of sustainability criteria has yet been achieved. Drastic steps will then be required to achieve substantial improvements.

Most cubicle housing for **dairy cattle** has been constructed such that it cannot be easily adjusted to create room for unhindered cow traffic, possibilities of avoiding each other, lying comfort and structurally fewer claw problems by implementing improvements to the floor, although this could bring substantial improvement. Grazing can reduce many of the health problems involved, while enabling cattle to engage in their natural behaviour. In view of the social preference of having cows in fields, grazing also seems to be a solution which combines lots of different advantages, besides improving indoor housing of dairy cattle.

A good climate (in house) and controlling the infection burden is important in order to reduce health problems among dairy cattle and veal calves. Restricting a number of important calf needs (roughage intake, movement) is inherent in the current production of white **veal**. There are clearly more possibilities where pink veal is concerned. The low-stimulus environment with hard and slippery floors is a major cause of discomfort for **pigs** (sows, piglets and fattening pigs). Recently implemented regulations on distracting materials are a step in the right direction, but it is a limited step. A further source of discomfort for sows is the aggression resulting from animals being mixed in group housing. A possibly feed-related problem is the high percentage of pigs with ulcers and osteochondrosis. Just as with cattle, the house climate and diseases resulting from farm-specific pathogens are a source of discomfort due to the animals' less than optimal health.

Possible solution strategies could be adjusting and/or integrally designing animal houses, their interiors and the working methods. Steps in this direction are already being taken for fattening pigs (Comfort Class) and are being researched for sows. More knowledge of nutrition and other factors to enable gastrointestinal problems, respiratory disorders and skeletal deformations to be reduced, is desired.

Housing systems which match the requirements of laying chickens better than cage housing are available in **poultry farming** (free-range, aviary and similar systems with free range facilities). However, there is still a great risk of feather pecking and health disorders (gastrointestinal disorders, ectoparasites and endoparasites) in such systems. Preventing (controlling) parasites could be taken up as an autonomous subject of research. Preventing feather pecking and, as a result, making beak trimming redundant requires an integral approach with no certainty as to its eventual success. The sector itself has drawn up a plan of action for this.

Specifically for industrial eggs there is a demand in the market for a system with sharper guarantees as regards hygiene than are offered by free-range systems. Combining such a system with sufficient compliance with the animals' requirements calls for an integral design strategy project.

The major sources of discomfort for meat poultry are anchored in the production system: the predisposition for a high rate of growth and building up lots of breast meat cause problems as regards occupancy, leg problems and breast blisters, as well as the sensation of hunger in parent stock and damage to the hens due to parent animals' rough mating behaviour. To find solutions it seems to be desirable to look at the total production system. The discomfort experienced by broilers and parent animals (hunger sensation) in the '*Volwaard*' segment and for organic meat poultry is less.

Mink is the only production species that lives solitary when adult and is not really domesticated. Discomfort results from housing (bare) and nutrition (restricted feeding of breeding females). Mortality among pups is high and might improve by improvements in housing climate and management. Especially in housing and cage design major improvements have been realized due to welfare regulations by the commodity board. A relatively simple improvement is increasing of the age of weaning, preferably by self regulation. Housing in family groups of dam and pups might be an improvement. If lack of swimming facilities are really a source of discomfort is not yet known.

It is expected that a lot can be achieved in the **horse sector** via knowledge transfer and by raising awareness by putting this topic on the agenda *and* self-regulation (e.g. animal welfare to be a part of quality assurance of riding stables and boarding stables) can be important factors. This may be supported by legislation regarding some aspects (minimum standards for box sizes, regulation for use of riding and training aids, and time spend in the field) in due course. Legislation does not seem to be able to make a major contribution for other points (breeding purpose, human / animal interaction, diet and care).

Transport is a source of stress and possible injury for the animals being transported (incl. horses). The European Directive (2006) has proved to be effective as regards preventing excesses. For all species of animal, loading and unloading seems to be a greater source of discomfort than the actual transportation. The loading, reloading and unloading methods and, primarily, the attitudes of the people involved are important factors in reducing discomfort.

Where **stunning and killing** animals for consumption are concerned, correct handling of the animals and adequate stunning are essential factors in preventing discomfort. An exception to the stunning obligation has been made for slaughter in accordance with religious considerations. Cattle and horses are stunned using a stun mask. This has proven to be adequate. Electrical or gas stupefaction is used to kill several animals at a high speed (pigs, poultry). Ensuring that all individuals are stupefied properly is a point for improvement for both methods. The research which has recently been started in this field is expected to produce some starting points for further developments.

Seriously ill or wounded individual animals (animals past saving) must -as laid down in statute- be killed on the farm to limit the discomfort to the animal. A 'shooting mask' (can be applied by the farmer himself) or euthanasia by an injection (only to be carried out by the vet) are the best methods for large animals, whereas the 'blow to the head' is also effective for poultry. It is very important in this respect that the sector assumes responsibility for this, while being facilitated by the government.

When highly contagious animal diseases break out, the acute killing of large groups of animals on the farm may be necessary. A number of methods are allowed for this by law. Cattle, sheep, goats and horses are killed individually by means of an injection or using a special mask to shoot them. These methods are also used for pigs, as well as electrocution. Modified killing using gas (CO₂) might be better. Methods which work well have already been developed for poultry.

2.5 Surgical interventions

This report only discusses the surgical interventions that are legally allowed. Several surgical interventions (dehorning of cows, routine caesarean sections of double-muscled cattle, beak trimming and amputating toes of poultry, tail docking and grinding the teeth of pigs) are being carried out, because there is a high risk that not carrying out these interventions will lead to more serious disadvantages than the actual intervention. In general, there is a willingness not to carry out such interventions, but the risk of injury/damage to the animal is seen as unacceptable. With our current knowledge it is not yet possible to do without the interventions without risks of discomfort for the animals. Finding solutions for this calls for an integral approach, involving experiments, developing best practices, adjusting breeding programmes and housing systems.

Piglets are castrated to prevent the meat getting a boar scent. This intervention is not intended to prevent the risks of more serious discomfort but is based on commercial considerations. There are alternatives (immunocastration, slaughtering boars at a young age possibly in combination with grading for boar scent on the slaughter line), but none of these methods seems to be satisfactory in industrial practice, at home or abroad. In addition, interventions are carried out to identify animals, either as a result of statutory obligations or on the farmer's initiative (ear labels, chips). Externally visible markers may specifically cause discomfort. Replacing them by internal chips may be an improvement.

2.6 Integral design

If the causes of discomfort for the animal are deeply and fundamentally rooted in the production system, only changing selected elements is often not an effective way of achieving substantial improvement. Since integral design may offer some options in this respect, indications for taking up such design strategy projects have been formulated for some categories of animals. There are examples to show that although such strategy projects are fragile and intensive and take a long time, they can successfully bring about considerable welfare or sustainability improvements.

Such strategy projects may be implemented in connection with new housing systems, but also as regards feed (composition and strategy), breeding and/or the total system up to and including new products. In addition to purely animal-specific values, such notions as naturalness, respect for and the intrinsic value of animals also play an important role in such strategy projects. At the same time, other sustainability aspects such as the environment, labour conditions and economic considerations have to be incorporated as well.

By definition, more parties, such as NGOs, the business world, including suppliers and chain parties, researchers and the government, have to work together on such strategy projects. Ownership will depend on the subject, but will preferably be with companies and NGOs.

Possible design strategy projects have been described in detail for dairy cattle, pigs and poultry, which will result in sample systems with integrally improved sustainability.

2.7 Advice as regards overall prioritisation

Improving the welfare of animals, including production animals, is the result of interactions between the farmer, his surroundings, his buyers, knowledge institutions and the government. This is always an integral approach and synthesis, which means possible gains in addition to animal welfare for other interests (environment, working conditions, the economy). Which other efforts are required to actually achieve an improvement and how are the pre-conditions for desirable farming determined?

In spite of the discomfort in dairy farming, the actual sector or the farming system is not a subject of discussion. In view of recent developments, the same applies to laying hen and pig farming, be it that there will always be discussion about specific elements. The problems as regards discomfort to the animal are most inherent to the farming systems for meat poultry, veal calves and double-muscle cattle. This relates to the options and ambitions for substantial improvement and alternatives. As regards double-muscled cattle or '*dikbilleri*' (a specific type of meat cattle, hardly present in Sweden due to prohibition of routine caesarean sections) one might ask whether keeping such animals is acceptable if the sector itself is not actively working on solutions.

A number of *quick wins* as regards improving welfare seem to exist in the horse sector; they are less obvious for animals intended for consumption. This means that change strategies have to be introduced carefully and with realistic expectations of results, deciding whether one should also try to bring about a public dialogue on how and under which conditions a production sector in the Netherlands should produce and how they can work on adjustments.

3 How to prioritise welfare problems and what plays a role in this respect?

3.1 Introduction

Animal welfare is primarily about the quality of life as experienced by the animal. But there is not a single person, not even the 'expert', who can claim that they know exactly what animals experience. This policy document has been drawn up to enable substantiated priorities to be set in government and other policies, to deal with animal welfare problems associated with animal farming. To be able to do that, an estimate has to be made of the *relative severity* of the welfare problems we identify in this report. However, objective measures for this relative severity are neither available nor possible since we cannot ask animals what they experience and we, people, can set different standards to weigh the severity of suffering since we apply different value hierarchies. That is why we have deliberately chosen to prioritise on the basis of two perspectives:

Knowledge about and observations of the animal

Other social perspectives of what animals are entitled to or what harms animals

The first perspective concerns only knowledge which can be objectivised³ (possibly *intersubjectively*), e.g. by observations or by extrapolation from established (animal science) theories. The second perspective concerns all other forms of knowing and valuing which cannot be objectivised empirically.

3.2 Prioritisation on the basis of knowledge about and observations of the animal

Although animals cannot speak for themselves, experts can make use of observations of and knowledge about the animal to make a substantiated *estimate* of the extent to which an animal finds its environment pleasant or distressing. This enables animals' state of health, any fear or acute stress they experience and deviant behaviour to be determined reasonably well. In addition, behaviour studies have taught us a lot about the importance of certain innate behaviour for the animal and of the consequences of the animal being denied the possibility to engage in such behaviour.

On the basis of this information we have assigned welfare items in the survey a value to express the severity of the problem for an individual animal at a certain time in its life. We do not talk about 'welfare problems' here, but about 'discomfort' because we see welfare as a notion where human views on what would be a good life for animals have become intertwined with the actual condition of the animal. This actual condition is the result of both positive (fulfilment of needs, 'natural behaviour') and negative experiences (surgical interventions, chronic stress etc.). In the context of this policy document we will only use the word *discomfort* where the animal fails to be able to get positive experiences which are important to it, or gets negative experiences.

We decided to indicate the degree of discomfort by three categories. 0: there is no actual discomfort to the individual animal, but there is something that *people* experience as problematic; 1: the animal is experiencing discomfort; 2: the animal is experiencing severe discomfort. We then indicate how great a share of the animal's life it is suffering from the problem. Finally, we indicate how many animals suffer from this welfare problem in the Netherlands on an annual basis, expressed as a percentage of the entire population of the category of animal concerned. This has been outlined in more detail and specified in the 'Criteria' table (Appendix 1 to this report). These three figures are then entered into a multiplication to generate one value indicating the severity of the discomfort for all animals of the species in the Netherlands, to the extent that this can be estimated or substantiated on the basis of scientific data. A higher value means that the discomfort in the population as a whole is more severe⁴.

3.3 Prioritisation on the basis of other social perspectives

To prioritise policy it is not only important to establish what we think is the discomfort to the animal, but it is also important to consider the other -ethical, aesthetical and cultural- social perspectives on animal farming. The

³ Our idea of objectivity is based on the ideas of science philosopher Karl Popper. Here objectivity is specifically *not* equal to truth, but objectivity refers to intersubjective agreement. This agreement is achieved by empirically testing hypotheses against the material truth. According to Popper we can never permanently establish whether a knowledge statement is true. A scientific statement may be objective, but can be found to be untrue afterwards.

⁴ Note: this formula gives equal weights to severity, duration and extent. This choice was made for pragmatic reasons and is definitely open to discussion. One could also reason that it is better to give priority to the very severe discomfort to a small share of the animals instead of to the lesser discomfort to many animals or vice versa.

debate on animal welfare is multi-layered: people's opinions on what animals are entitled to or what harms them are also important in the social debate. Views on naturalness, scale, industrialisation, intrinsic value and integrity of animals and our responsibility in respect of wild animals held in semi-natural conditions or in respect of animals which have been 'engineered' genetically in accordance with our preferences can form a legitimate contribution to assessing whether a certain welfare problem should be given priority – apart from the question whether this problem is the most urgent for the animal now or actually still exists.

We see these social perspectives as a necessary complement to prioritisation on the basis of animal science. In spite of our scientific knowledge there will always be some uncertainty as to what the animal actually experiences and what this means to the animal. If we *exclusively* made use of expert knowledge to prioritise animal welfare problems, the risk would be that these problems were *reduced* to measurable units. This would not do justice to the multi-layered nature of the debate on animal welfare.

The way in which people treat animals is subject to growing concern about animal welfare. Ethical standards and values as regards people's interaction with animals depend on people's basic ethical attitudes, which may vary from anthropocentric to bio-ecocentric, i.e. based on a far-reaching technological control of natural processes by mankind as opposed to leaving as much room as possible to the self-ordering power of natural processes. This means that people can have different opinions, based on basic ethical attitudes. In addition, communicative elements (images of grab cranes clearing away dead animals) and media attention play an important role in how social issues come into being.

Social perspectives of what is important as regards animal welfare (for the animal or for ourselves) are an indispensable addition to the analysis based on animal science. It is our scientific role to integrate these perspectives into the analysis next to animal science, without doing away with social perspectives as being 'irrational' or 'subjective'⁵. This is more than just taking these perspectives into consideration. Our starting point is that social, ethical or aesthetic views *also* stem from people's implicit knowledge of animals. This knowledge may be the result of compassion (*empathy*), but also of recognition (*homology*): man can imagine what animals may feel like because we have important characteristics in common with animals. It goes without saying that this knowledge is not 'objective' in a scientific sense and it is probably mixed with views which say more about us than about animals. Although this makes such knowledge difficult to use, this is not enough reason to consider such convictions as being irrelevant.

We distinguish the following categories of social perspectives which are currently relevant in the social debate on animal farming and specifically as regards animal welfare. These categories have not been strictly defined in respect of each other and tend not to be clearly separated in concrete discussions on animal welfare.

1. Ethical principles
 - a. virtue-ethical views
 - i. intrinsic value of animals
 - ii. care ethics
 - b. deontological views
 - i. animal rights
 - c. consequentialist views
2. Imputation without actual indications
 - a. Animal suffering or needs imputed to them by people, for which there are currently no indications to prove that this suffering or these needs actually exist among animals. They can be perfectly anthropomorphic projections, but such an imputation may also point at hiatuses in our knowledge. Such imputation may lead to us granting the animal 'the benefit of the doubt' as part of a precautionary approach.
3. Views on naturalness and its importance
 - a. naturalness as actual or desired 'archetypical status' of the animal
 - b. naturalness as inherent behaviour and ambition of the animal⁶

⁵ This is typical of *mode II science* (Gibbons 1999): not only producing 'reliable knowledge' within one's own field of expertise, but also 'socially robust knowledge' which can be used in a social context and is recognised as relevant there.

⁶ 'Natural behaviour' is a category in the (scientific) Welfare Quality project. Doesn't this aspect actually belong to the first category? Yes and no. The adjective 'natural' itself is problematic; domesticated animals differ in important aspects from non-domesticated specimens of the same species in the wild, giving cause for debate as to what is exactly meant by the natural behaviour of production animals. Are we referring to behaviour which is expressed in natural circumstances, behaviour which animals should actually display to be natural or behaviour which happens to be a part of the repertory with which these specific animals are born? In the first two cases we consider natural behaviour to be a people's conception of animals (belonging to the second category as a result); in the latter case it is possible that such behaviour is important to the animal's welfare or its experience of discomfort. An extreme example: if we had bred production animals with a strong and urgent preference for all editions of the animated film *Shrek*, and this preference could be demonstrated to exist in the animal, denying such films could in principle be a relevant welfare problem under the first category. In our analysis of discomfort, we have included behaviour which forms a demonstrable part of the repertory of needs of animals in the first

- c. naturalness as a system characteristic (ecological connection, cycles)
- 4. Opinions on the relationship between animals and technology
 - a. technology as inherently opposed to animal friendliness
 - b. technology as an instrument in connection with behaviour which is inherent to the animal.
 - c. technology as the opposite of what people think livestock farming should look like. Think of classic idealisations of rural life in the past (the pastoral idyll).
- 5. Aesthetic opinions
 - a. Aversion to practices or conditions of animals and/or ideas on what animals and their surroundings should look like as regards aesthetics.

Different - even radically opposed positions - are possible within each of these five categories. A further discussion of these positions is beyond the scope of this policy document. The essence is that five –inherently debatable– perspectives are part of the framework of assessment for the priorities which the government could set as regards improving animal welfare, in addition to the priorities resulting from knowledge about and observations of the animal.

In a limited survey we tried to estimate two things:

1. The extent to which the welfare problem in question can, *in principle*, be the subject of human concern and of social debate. The acid test is whether the problem could serve as an example in a debate between opponents regarding this perspective⁷.
2. We are making an expert's assessment of whether the welfare problem concerned has ever *actually* been or could shortly become the subject of public concern and social debate.

On the one hand, this will give us an indication of the manner in which the welfare problem in question could be assessed using social criteria and on the other hand it provides a factual assessment of whether this has actually happened or will happen. This latter assessment enables the prioritisation of welfare problems to be supported by a wider base than only veterinary-scientific knowledge, which only represents a limited part of the story.

3.4 Animal welfare from a human perspective

In the context of this report a limited survey based on the Delphi method was carried out among the parties involved about the question whether the forms of discomfort discussed in this report have also been the subject of social concern and public debate or whether this can be expected to happen in the near future. Due to the limited nature of this survey no general, hard and fast conclusions can be drawn from it. We are taking the liberty of identifying some outlines. Firstly, we have seen that the opinions of experts on the degree of discomfort often match the extent to which the discomfort in question is a matter of public concern. But our expert knowledge of discomfort as experienced by the animal hardly ever matches the degree of public concern it gets. There are two sides to this.

On the one hand there are a few subjects which explicitly give rise to public commotion, such as the housing of pigs in 'mega' (multi-storey) buildings or killing animals en masse (day-old cockerels, killing animals to contain epidemics) although they are not or do not have to be an issue as regards animal discomfort. And there is discomfort which this report considers as limited (such as castrating piglets, dehorning dairy cattle, clipping piglets' canines) but which leads to much more public resistance than is justified solely on this experts' judgment. On the other hand, there are many forms of discomfort which are typified as very severe in this report, but which have not played, and are not easily expected to play, a role in the public debate. Examples are infection of poultry with ectoparasites and endoparasites, the poor climate in virtually all animal houses -including horse housing- or the hard and slippery floors in dairy cattle and calf houses. A possible explanation for this is that it is much harder to get such forms of discomfort on the public agenda because they are of a less visual nature and their severity is much harder to understand than discomfort with a high public profile, such as castration without stunning, tying up animals or the lack of free range facilities.

Three groups of welfare problems can be distinguished as a result:

1. Discomfort where the experts' judgment matches the social attention to such discomfort
2. Discomfort which experts perceive as more severe than would be deduced from the public attention

category. And this also works the other way around: if wild specimens of the same species have a great urge for long-distance walks, whereas domesticated animals do not demonstrably share this preference, this 'natural' behaviour should be assigned to the second category.

⁷ It must be stressed that the assessment of the relevance of a perspective for a certain welfare problem does not imply any statement by the authors as to the correctness or normative basis of the perspective. This would be impossible by definition in view of the different positions which can be taken up under every perspective.

3. Discomfort about which there is more public concern than is to be expected on the basis of the experts' judgment.

The discrepancies between the degree of social concern and the experts' judgment of the actual degree of discomfort as referred to in (2) and (3) above may confront us with a fundamental political question as regards prioritising these welfare problems: do we prefer to choose problems with a high social profile (3) or problems considered to be very severe by experts (2)?

It is our opinion that problems with a high public profile but a low severity assessment (3) are definitely not nonsensical problems. The public debate in this regard underlines that discomfort is not the only criterion regarding animal welfare. Such values as naturalness, respect for and the intrinsic value of animals also play a role. When setting priorities as part of a political programme it may be convenient to clearly indicate the perspective from which a situation is considered to be undesirable and to challenge the different parties to explicitly formulate what they have based their values on and what their assumptions are in this regard (reflexivity).

4 Cross-species assessment of discomfort to cattle, pigs, poultry, mink and horses

4.1 Introduction

The diversity of welfare problems in animal farming, the growing attention to this and the -by definition- limited means to handle these problems require an overall approach to welfare problems for all species of animal. This will enable priorities to be set and an understanding to be achieved of comparable problems which might be handled for several species of animal at a time. The following sections sketch the main causes of discomfort to each species of animal and identify some points which cause discomfort to more animal species.

4.2 Discomfort across species

Mixing social animals which build up and maintain dominance relationships results in stress and fear for most animal species, and sometimes even injury. In addition, mixing animals of different origins has proved to be an important cause of (sometimes severe) health problems such as respiratory disorders and gastrointestinal disorders for various animal species.

Individual housing of social animals brings frustration and stress for many animals, since they cannot carry out or complete their innate and learnt behaviour. In the event of chronic isolation this will lead to deviant behaviour and the formation of stereotypies.

The floor on which the animals are housed is important for the health of their locomotive systems. Insufficient grip due to wet, hard and slippery floors will cause infections and injury, which may be of a chronic nature, a lesser lying comfort for the individual animal and will restrict them in carrying out behaviour which is typical of their species.

Young animals are separated from their mothers at a very young age in intensive farming systems. This results in direct stress to both animals and there are ever more indications that the long-term effects are negative (deviant behaviour at a later age). The most suitable weaning moment and method depend on the animal species in question.

For most animals the climate in the house brings a risk of respiratory disorders and eye irritations with the direct causes being ventilation, draughts, excessively high concentrations of ammonia and dust. The interaction with any pathogens present also plays an important role.

Adjusting the feed rations administered to animals farmed for production purposes does not consider animals' natural desire to forage. The gastrointestinal system has not evolved along with the adjusted feed ration, which is often rich in energy, leading to health problems e.g. due to acidification in the stomach/rumen. In addition, feed restriction -which is sometimes severe- is a direct discomfort to some animal species.

As a result of housing and feed restrictions, many animals have tried to find other ways to deal with their situation, which often results in deviant and stereotypical behaviour.

Horses seem to be different from the other animal species dealt with in this report, since considerable awareness progress has to be made in the horse farming sector, which has already taken place in other sectors. This also means that good progress as regards welfare can be booked in horse farming in the short run.

We can identify the following elements in this cross-species assessment:

4.3 Nutrition in relation to discomfort and solutions

The composition of the diet, the feed quantity or the feeding pattern failing to match the animals' needs can cause discomfort. Examples of this can be given for all species of animal discussed, e.g. anaemia among calves, stomach ulcers among horses and pigs, hunger among broiler parent stock/poultry, pigs and breeding females in mink etc.

The solution to these problems may lie in the administration and composition of the feed, such as e.g. more roughage and less concentrated feed and the specific effects of certain polysaccharids on pregnant sows or broiler parent stock.

Accurately mapping the extent to which discomfort actually occurs and which countermeasures could be taken is a valuable first step in tackling this point which has not really received sufficient attention. The explicit intention here is to do this on a cross-species level. This cross-species approach might well offer unexpected solutions. The interaction between food and animal interests is a difficult issue, since the practices in question have often

been considered as accepted practices for quite some time. For instance, reducing the feed intake of gilts and sows in pig farming has hardly ever been qualified as a welfare problem. The Brambell statement 'Freedom from hunger and thirst' requires a more accurate definition of hunger to substantiate the existence of possibly avoidable or unreasonable discomfort or to prove that this does not apply.

4.4 Naturalness, animal comfort and safety: free range facilities as a case

The human side of animal welfare includes more than just the discomfort which animals may experience. Such notions as naturalness, respect and intrinsic value also play a role in this. Several 'alternative' systems have taken this into account by creating a more natural farming environment, e.g. by offering 'free range' facilities. From a scientific point of view it is not known whether the lack of free range facilities, grazing etc. causes discomfort to animals if the housing meets the animals' requirements via other means. It is a known fact that the general public and possibly consumers appreciate free range facilities. For the animals concerned, this is not welfare-neutral: in addition to the possible advantages, it often also involves disadvantages for their health and their possible thermal comfort. And offering free range facilities can be opposed to environmental and food safety interests.

Substantiating the value of offering free range facilities to the animal by providing a transparent listing of the advantages and disadvantages offers starting points for solutions. Developing possibilities for compensating disadvantages can offer an added value (such as e.g. the covered free range facilities for poultry which have come into existence).

4.5 An integral look at floor configurations

The configuration of the floor of the house is very important to the degree of animal welfare. Walking and lying comfort depend on it and it is closely related to foot and claw problems suffered by several species. The floor configuration is an important element of constructing the building skeleton, which is transparent but still knowledge intensive from a technological point of view. From a cross-species perspective, representatives of the supply chain together with veterinary and animal scientists, biomechanicists and civil engineers could review existing types of floor to find possible improvements which have not been thought of before (e.g. as regards the choice of materials, multi-zone systems etc.). An extra advantage is that this is a positive approach to common discomfort as a result of inadequate floor configurations (blisters due to burns, crippled animals etc.).

4.6 Health management

Establishment-specific disorders cause discomfort to all species of animal. Often there is complex interaction between the housing, the animal, animal management and pathogenic conditions. Where animal health is concerned, the interests of the various parties are largely parallel (health, animal welfare, food safety, working pleasure, export image, environmental impact). The major impediments seem to be a lack of knowledge (or a lack of integration of knowledge flows). Coordination between animal welfare and animal health policies may result in a 'win-win' situation.

As regards the infection burden, more knowledge is required of 'disease ecology', taking such factors as climate change into account. The pathogen and the host are not the only factors which determine whether a disease will actually develop; the environment also has quite a significant influence in this respect. Disease breaking out is the expression of a disrupted ecosystem. Fighting this requires a more integral approach, which does not only address the pathogen and the host.

4.7 Best practices

Several disorders (health and welfare) are related to complex interactions between the animals' needs and their surroundings (incl. feed!). Often there is not just one solution. 'Best practices' can play a positive role in a phased approach. Best practices must be drawn up, offered and adjusted in the field. Such an approach can build a bridge between handling hobby animals and handling production animals. The horse sector may be a good case for this.

4.8 Internationalisation of attention to welfare

Animal welfare is not only a Dutch matter. Substantial efforts in this field are undertaken in many countries. Internationalisation of attention to welfare can bring 'win-wins' for both the Dutch and the European positioning. There is already strong European integration in the field of knowledge at a scientific level through research networks and the EU programme 'Welfare Quality'. The interaction between networks, which are put to use more at the practical level, seems to be less than in the past. Exchange by the representatives of the sectors themselves takes place by means of exchange through the representative layers and through European networks (EDF: European Dairy Farmers; EPP: European Pig Producers). An explicit elaboration of the theme of Internationalisation for animal welfare would be useful to achieve effective use of the various instruments on national and EU levels. It is recommendable to not only gain a better insight into the existing knowledge, sector and policy networks, but also into the desires, the views of the future and the manner of using the instrumentation which has been identified. The quite limited exploration for this report revealed that there are already differences in how stimulation instruments are applied. Scandinavia (Sweden) in particular has specific, national regulations on certain themes, e.g. grazing for cattle and horses.

5 Integral design as a possible solution strategy

Context

There are several forms of discomfort, which do not seem able to be solved through a simple approach. The cause of the discomfort is often complex or stems from measures taken in connection with other sustainability characteristics such as the environment, animal health, food safety and the economy. Fundamental changes to the housing system, management and, in some cases, the entire production system are required to achieve a substantial reduction of discomfort and to make various surgical interventions redundant (such as dehorning and amputating tails, tips of beaks, toes and spurs). An approach which offers a good chance of success for such changes is the animal-oriented designing of housing and production systems. For that reason, we are giving a short introduction to integral designing in this chapter. All integral design strategy projects deal with different sustainability themes in an integrated manner and their processes explicitly address such dilemmas/choices. So far, the environment has not been given a lot of attention as a sustainability theme in integral design strategies. It has been included explicitly in the set-up described here. Since a lot has happened as regards the environment as an autonomous subject as well as in combination with economic feasibility, the possibilities of using the available environmental knowledge more efficiently throughout more sectors is described. Set-ups for integral design strategy projects for dairy farming, farrowing sows, pregnant sows and piglets, for the poultry meat sector and for the production of eggs intended for industry are described next. Since communication is of major interest in design strategy projects and the initiatives in the various sectors can learn from each other in this respect, a cross-sector description of the subject of 'communication' has been given. At the end of the chapter a proposed time table for activities is given.

5.1 Introduction

One of the ambitions expressed in the policy programme of the Balkenende IV administration in the Netherlands is that 5% of all livestock farms will be producing in an integrally sustainable manner to standards higher than required by statute in 2011. Here, 'integrally sustainable' means that different sustainability characteristics and their correlation have improved compared to the regular system. This concerns farming systems complying with social pre-conditions such as animal welfare, the environment, animal health, labour conditions, the possibility of integration with the landscape and economic feasibility.

Reducing discomfort to animals in general and achieving the 5% ambition requires efforts to inspire the design of such systems (primarily by knowledge institutions in close collaboration with other parties) and to introduce them into the sector and the market (primarily by market and chain parties supported by NGOs and knowledge institutions).

Experience has already been gained with research/design strategy projects where animal farming systems have been interactively designed, starting from a blank situation and working from a wide range of perspectives. Examples are ComfortClass (ideal design for animal welfare and the economy) and *Houden van Hennen* (Laying Hen Farming - integral design for farmers, chickens and the general public). These examples (sources of inspiration) are already being developed further in practice by chain parties (adoption), usually complemented by other dimensions, such as e.g. explicit environmental ambitions as part of the '*Houden van Hennen-Plantage*' [Loving Hens Plantation] initiative.

We will outline how basic starting points (bills of requirements) and sample designs can be created for some animal species. In most cases this concerns animal-specific housing and management systems with integral attention to other sustainability themes. In some cases the entire production system is considered because bottlenecks occur at that level. The follow-up steps (market development, legal and social embedding etc.) are not included. But it is essential that attention is consciously paid to the environment surrounding the innovations from the very beginning: which parties have to be involved and what changes have to be made to the culture and structure to give the innovations some chance of success?

5.2 The RID method

General

The perspective of the RID (Reflective Interactive Design) method is used as the starting point. In short, the RID method implies that attention is not only paid to technological aspects, but also to the current and future

embedding of innovations. The culture and structure surrounding the farming system are not only explicitly taken into consideration, but they are actually objects of the design themselves as well. The interactive component means that the analysis and design activities are explicitly carried out through close interaction with stake-holding parties, other than livestock farmers and organizations representing the interests of animals, e.g. animal house builders, veterinary surgeons, breeding companies and the mixed feed industry and their advisers, but also the government. These parties have to be encouraged to assume a reflexive attitude: to explicitly formulate what they have based their values on and what their assumptions are in this regard. Actual or relative outsiders are often involved to achieve this latter point and to promote creativity.

The design strategies are intended to provide an integral approach to the problems in question. In principle this means gains for all themes, including sustainability themes, such as animal welfare, the economy, the environment, labour conditions and food safety. Upholding current standards or standards laid down for the near future is definitely a pre-condition.

Communication

Communication is essential in RID projects. This communication is twofold. The communication between the various parties involved in the projects is important for reflexivity. It is by exchanging views, values and visions that joint arrangements can come into being. Because this aspect of communication is explicitly connected to the separate RID projects it is usually given explicit strategic and operational attention. In addition, there is the more common communication (information transfer) aimed at the sector and the general public, as well as within the government, since the projects concerned touch on the policy fields of different ministries, including the Dutch Ministries of Agriculture, Nature and Food quality (*LNV*), Housing, Spatial Planning and the Environment (*VROM*) and Social Affairs and Employment (*SZW*) and possibly local or regional authorities. An integral approach to communication on the different projects can achieve gains as regards impact and cost-effectiveness. Good communication strategies for this partly still have to be developed and form part of the process in this respect. Involving communication experts is necessary. That is why 'communication' has not been listed as a specific part of every proposed project, but is dealt with separately.

Internationalisation

Intensifying European and intercontinental information exchange and collaboration in farming design efforts can help to enable maximum utilisation of the available expertise and to achieve an impact that goes beyond national boundaries. Some strategy projects which have been suggested may also be relevant for WTO *non-trade issues*. See also the last section of chapter 4 on internationalisation.

Timeframe

By definition, an RID project requires a certain lead-time, but it is always possible to achieve sample designs within two years. It is advisable to have parties in the supply chain take over ideas and opportunities as soon as bills of requirements and draft designs are available. This reduces the need for having everything 'rolled out' publicly/collectively oneself. Getting the sector to act in that phase not only requires market appeal, but also calls for financial support for the pioneers/parties taking the initiative, as well as support in helping to eliminate obstructions.

The success of actually implementing sample designs in a (trial) house depends on the route to be chosen. The chances of rapid implementation might be better, but the risk of the initiative 'not being adopted' also becomes higher. The same applies to leaving everything to 'the field' (including the necessary permit processes), but having the government facilitate the permit processes and possibly the funding, or having the strategy project fully implemented as a 'trial house' commissioned by the government.

5.3 Adding environmental requirements to integral design strategy projects

The environment is one of the main sustainability themes for livestock farming and a great deal of knowledge is available on standards and desires. The intensive livestock farming industry has achieved a lot as regards ammonia emission-reducing systems. At present, progress is also being made as regards the emission of smells and fine dust. These systems have been added to and integrated with the economically optimised regular farming components. A more fundamental and integral approach to the environment is required for integral design strategy projects. The working methods for interactive and integral designing are less well developed for the environmental theme than, for example, for animal welfare. Bills of requirements for environmental impact are necessary for virtually all sectors, but they can be drawn up quickly thanks to the knowledge which is already available.

Procedure: Step 1. The environmental problems related to livestock farming are listed and ordered roughly, and then they are detailed on the basis of their impact, technical and social appreciation and the available instruments. This is done with a broad panel of stakeholders and experts inside and outside the livestock farming industry. Step 1 is expected to result in some five themes: 1. minerals burden, 2. gaseous emissions; 3. smells, dust and fine dust; 4. contribution to climate change and the use of fossil energy and 5. global competition for resources (soy/bio-diesel problems). This first step has a short lead-time and leads to step 2: drawing up the bills of requirements to minimise the environmental impacts identified.

Result: this strategy project should result in a bill of requirements to minimise the impact of each theme. These bills of requirements can then be used in later integral design strategy projects in the various production sectors.

Demarcation: pig farming is concentrated on to achieve overall feasibility. Expertise from poultry and dairy cattle farming is incorporated to keep the spectrum as broad as possible.

Timeframe: start as soon as possible, so that the RID projects can also benefit. If feasible, to be completed in 2008 (provide further nuances or details at a later stage if necessary).

5.4 Dairy cattle - introducing integral sustainability: RID for cattle, designing for sustainable dairy farming

RIO-Melkveehouderij (Kracht van Koeien) is an RID project which was started in 2007 on behalf the Netherlands Ministry of Agriculture, Nature and Food quality to contribute to sustainable dairy farming in the Netherlands. This is to be achieved by developing new concepts for dairy farming which will simultaneously generate a significant improvement in several sustainability characteristics.

Procedure: An academic team will initiate analysis and design strategy projects in ever closer collaboration with the sector and outsiders. This involves reconsideration and redesign of dairy farming technology as well as its structure. Key roles are expected to be played by three design challenges in this project:

- Making use of low-value vegetable production (grassland)
- Increasing cows' life spans
- Climate neutrality
- Minimum emission of other undesirable products (ammonia, fine dust)

The objectives are expressly formulated as part of the preconditions of being able to function in an economically efficient manner in a liberalised dairy market.

Result: the project should lead to attractive farming concepts whose added value is certain to be recognised by the sector and by the public. Such concepts may in themselves lead to alternative systems, but it should be noted expressly that they may also serve as points of orientation for modifying existing systems.

Parties involved: knowledge institutions, the industry, NGOs, outsiders.

Timeframe: This project was started in 2007 and has been included in the policy-supporting programme of the Dutch Ministry of Agriculture, Nature Management and Fisheries. The project will continue until the end of 2008.

5.5 Farrowing sows, integral farrowing sow farming design: RID sow

Uniform farrowing sow housing, greatly optimised to achieve productivity, is used all over the world. Technologies for a better environmental performance (low NH₃ emission) have been added to this in the Netherlands. At the same time, farrowing boxes show some serious welfare defects. An integral design strategy project may simultaneously generate gains in several sustainability fields. The result may serve as a reference point for alternative farming concepts.

Procedure: Step 1. An ambition and a general bill of requirements are drawn up for every sustainability theme. This is always promoted by an NGO or an interest-promoting party for the theme concerned, such as cost price and labour conditions, animal welfare, the environment and animal health, and integration with the landscape. The bills of requirements are worked out into simple, sometimes even caricature-like, sample designs. These sample designs are communicated externally; the focus will be on pointing out the, sometimes single-issue, sustainability gains.

Step 2. The single-item bills of requirements are integrated with an interactive design strategy project. This is a collaborative effort between the parties who 'promoted' the first phase.

Step 3. External parties (e.g. market and chain organisations, companies supplying animal house interiors, building advice organisations) are challenged to contribute to the design. Some mutually competitive complete sample designs of the farming system and the necessary surroundings are delivered.

Note 1: Because explicitly taking housing initiatives in other countries into account is to be recommended, extensive exploration should be carried out in parallel to step 1 and, if possible, some activities must be taken up

together with foreign parties (e.g. Scandinavia). This latter element can also be used to show Brussels that this type of sustainability improvement is actively being worked on.

Note 2: This is a systems innovation strategy project and is about more than only technology. A survey of the needs and views of the parties concerned has to be made in an early phase and the institutional or cultural obstructions that may play a role (reflexivity) must also be identified at this point. The process must aim at breaking through some existing barriers (e.g. 'sows must be locked up to keep the piglets intact'). Good design strategies may also neutralise a part of the economic restrictions ('room for sows costs money') or lead to views with better substantiation. These ambitions imply that the ownership and ambassadorship of the project must be placed with the authoritative organisations/persons for the sector. The ambition to improve sustainability in the farrowing phase seems to have little urgency among stakeholders and the intended actors. That is why embedding the project in the sector requires explicit attention.

Result: A bill of requirements is made available for every sustainability theme; each bill of requirements can separately serve to improve farrowing sow farming as regards the theme in question. The integration results in an integrally improved sample system. The interactive working method contributes to the target group feeling that they are the co-owners of the results. It is not very likely that the regular sector will soon trade in its optimised boxes, but a reasonable alternative is being positioned next to these boxes.

Parties involved: The individual strategies are always promoted by an NGO or an interest-promoting party for the theme in question: cost price and labour conditions: farmers' organisations; animal welfare: animal interest organisation; the environment: environmental organisation etc. The major share of the actual work is provided by knowledge institutions, both scientific (animal and technology) and socio-scientific institutions, coached by representatives of stake-holding organisations. In view of the nature of the project (aimed at creativity and system leaps) outsiders should be involved as well.

Duration: A lead-time of 2 to 2.5 years is necessary for steps 1 and 2 (the steps which can be ordered by the Dutch Ministry of Agriculture, Nature and Food quality). At present this project is being worked out in more detail under the working title *RIO-Kraamzeug* [RID Farrowing Sow] for the policy-supporting research programme for 2008.

5.6 Bringing pregnant sows and weaned piglets to ComfortClass as well

There are several market-oriented small-scale initiatives for animal-friendly pork production methods (e.g. pig houses with sawdust litter – JumboBewust; Livar). Animal welfare is also being added to some other added-value approaches (as is the case with the "De Hoeve- Milieukeur" environmental quality mark).

The ComfortClass principle seems to offer an accepted and recognisable concept to give these initiatives a joint welfare reference (pigs' requirements). So far, ComfortClass has only focussed on meat pigs. On the basis of the experience gained and the available expertise, delivering bills of requirements and sample designs for pregnant sows and rearing piglets seems possible as well.

Procedure: Step 1: The *Diergericht Ketenontwerp (Welzijn)* [Animal-oriented Chain Design (Pig Welfare)] project which ran in 2001-2003 will also be implemented for pregnant sows and weaned piglets. Under the supervision of an expert stakeholder (animal protection organisation?) the bill of requirements for the needs of weaned piglets and pregnant sows will be formulated by a team of veterinary scientists. This bill of requirements will be distributed externally, where necessary with some simple sample designs. In this phase an assessment can be made of the extent to which the systems allowed under the pig directive for 2013 are compliant for pregnant sows or the extent to which further design will be necessary.

Step 2: Interactive design of practically feasible systems cannot be detached from the other sustainability themes. An integral design strategy for pigs would be the logical result for mid 2009. Then all animal phases of pigs can be entered at the ComfortClass level and the environment can also be included at a high level pursuant to the environmental bill of requirements.

Duration: The lead-time of step 1 is approximately one year (2008).

Continuation incl. duration: In addition to farrowing sows and provided that at least draft bills of requirements are available, step 2 - an integral pig approach - will have a lead-time of two years (2009 and 2010).

5.7 Broilers - towards a sustainable farming system (incl. animal adjustment)

The poultry sector is small, is under great pressure from global competitors and suffers from a number of problems which have become integral elements of the farming systems such as production-related disorders and hungry parent animals. Due to its export position, the Netherlands is a major global player.

An integral design strategy project can also be initiated for this sector. Not only does the housing system have to be changed, but, in view of the system defects, the type of animal as well. This means that the design has to consider the total production system, including the parent animals.

Procedure: The method directly depends on the sector's ambition. A plan of action would fit well in a Poultry Farming Innovation Agenda (*Innovatieagenda Pluimveehouderij*). The project could start with an exploration of, specifically, the European opportunities (compare the success of free range and 'Freiland' in laying hen farming). But a design process starting from a technical angle is feasible as well, provided that the sector/chain representatives participate in it.

Timeframe: Implementing the design strategy at the systems level has not been outlined in full detail, but its duration will not differ greatly from the other RID projects. In view of the type of farming system and animal the lead-time is estimated at 2 to 2.5 years.

5.8 Laying poultry, Industrial eggs, Sustainably Safe Egg (*Duurzaam Veilig Ei*)

Challenge: Designing an egg production system which will book sustainability gains on various fronts is useful in order to be able to distinguish them from eggs from the global market. The most obvious thing to do seems to be to link the production of an optimally safe egg to environmental and occupational health and safety objectives, while also paying attention to the level of animal welfare.

Procedure: An RID project, a highly reflective project, where redesign is not hindered by existing dogmas and obstructions (aversion of cage systems, 'safety is only possible by protection/in cages'), but focuses much more on leaps (e.g. breaking the link between manure contact and health risks).

Parties involved: The project must be explicitly linked to the industrial egg parties, while leaving plenty of room for free thinkers and doers, like in the *Houden van Hennen* project. Input by the authorities on food safety, including microbial food safety, is a must.

Result: Challenging alternative to current production systems. An opportunity for the sector to improve its international profile. Possibly eliminating certain intrinsic obstructions (mainly as regards health / pathogens).

Timeframe: has not been outlined in full detail but the estimated lead-time is equal to that of other RID projects: approx. two years to achieve sample designs.

5.9 Communication

Procedure: A communication strategy will be designed and initiated together with communication experts (incl. the Dutch Ministry of Agriculture, Nature and Food quality) in 2008. Communication will be tailored specifically to each of the various projects, but it will also be integrated. Project communication (reflexive interaction between the parties) will be linked to regular external communication, with lessons learned from prior design projects being used as a starting point.

Timeframe: the communication strategy project will be from 2008 to at least 2010.

5.10 A summary of activities:

The main activities to be started up will be:

2008

- o International exploration of pig housing
- o Environmental themes and general bill of requirements concerning the environment
- o ComfortClass - bill of requirements for pregnant sows and weaned piglets
- o Start up RID sow
- o Exploration of opportunities for a meat poultry design strategy project
- o Exploration of opportunities for an industrial egg design strategy project
- o Communication strategy and actual communication

2009

- o Integral design activities in most sectors

2010 and beyond

- o Delivering sample projects and translating them into projects which can be used in the sector (cf. the current ComfortClass practical phase)