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QUALITATIVE STAKEHOLDER ANALYSIS FOR THE
DEVELOPMENT OF SUSTAINABLE MONITORING SYSTEMS FOR
FARM ANIMAL WELFARE

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ABSTRACT. Continued concern for animal welfare may be alleviated when welfare would be monitored on farms. Monitoring can be characterized as an information system where various stakeholders periodically exchange relevant information. Stakeholders include producers, consumers, retailers, the government, scientists, and others. Valuating animal welfare in the animal-product market chain is regarded as a key challenge to further improve the welfare of farm animals and information on the welfare of animals must, therefore, be assessed objectively, for instance, through monitoring. Interviews with Dutch stakeholder representatives were conducted to identify their perceptions about the monitoring of animal welfare. Stakeholder perceptions were characterized in relation to the specific perspectives of each stakeholder. While producers tend to perceive welfare from a production point of view, consumers will use visual images derived from traditional farming and from the animals' natural environments. Scientists' perceptions of animal welfare are affected by the need to measure welfare with quantifiable parameters. Retailers and governments (policy makers) have views of welfare that are derived from their relationships with producers, consumers, non-governmental organizations (NGOs), and scientists. All interviewed stakeholder representatives stated that animal welfare is important. They varied in the extent to which they weighted economic considerations relative to concern for the animals' welfare. Many stakeholders emphasized the importance of communication in making a monitoring system work. Overall, the perspectives for the development of a sustainable monitoring system that substantially improves farm animal welfare were assessed as being poor in the short term. However, a reliable system could be initiated under certain conditions, such as integrated chains and with influential and motivated stakeholders. A scheme is described with attention points for the development of sustainable monitoring systems for farm animal welfare in the long term.

KEY WORDS: animal welfare assessment, housing and management systems, monitoring, on-farm, stakeholder analysis

1. INTRODUCTION

In last decades the production-efficiency has been improved considerably. With intensified livestock production, societal concern for animal welfare has also increased. In an attempt to solve this ethical problem, several

strategies may be taken. Many governments, including the Dutch government, have tried to improve animal welfare with legislation, but this has not fully succeeded. Recent developments (e.g., the Freedom Food scheme being adopted by Tesco in the UK) have indicated that more progress may be made when stakeholders in the production chain take up the responsibilities to improve animal welfare. In order to make the required ethical decisions, stakeholders need reliable information about animal welfare. Present-day policy in the Netherlands (LNV, 2002; Report Wijffels, 2001) aims to improve animal welfare, and reduce the societal concern, using market forces and a welfare index or monitoring system for animal welfare.

The sector developed initiatives to monitor animal welfare. In the Netherlands, for instance, “*Keten Kwaliteit Melk*” and the “*DierVeiligheidsIndex*” (SKOVAR, later incorporated into IKB 2003 for pigs) did so, whereas abroad, for instance, the “*Tiergerechtigheidsindex*” (Austria, Germany), the “*Swine Welfare Assurance Program*” (National Pork Board, USA) and the “*Freedom Food Label*” (RSPCA, UK) could be mentioned. Initiatives to develop monitoring systems have often been met with resistance. In the different parts of the chain, a large number of actors are involved in the production of food products of animal origin. Stakeholders include banks, feed-suppliers, system designers, producers, meat processors, the food industry, retailers, consumers, policy makers, and scientists. These stakeholders may have different interests and different views about how animal welfare should be monitored. Objections to monitoring systems concern mainly that the system is either not valid(ated) or that it is not feasible.

Research at several places, therefore, pays attention to monitoring animal welfare on livestock farms, not only at the national, but also at the European level. Although for many years biological research on animal welfare has been conducted, only recently the importance of the perceptions of consumers and other stakeholders in the chain has been recognized. At this stage, however, knowledge is lacking about specific objectives of different social actors or stakeholders, and thus about their demands for the monitoring of animal welfare at livestock farms. Since stakeholder acceptance may be a bottleneck for the realization of sustainable monitoring systems for farm animal welfare, information is needed about the stakeholders’ demands and worries as well as about opportunities and strengths of welfare monitoring.

This paper aims to specify stakeholder perceptions and attitudes towards the monitoring of animal welfare. To this end, we conducted a qualitative stakeholder analysis, including a conceptual analysis of our own perceptions (about stakeholder perceptions) and interviews with important stakeholder groups, namely producers, retailers, the government (policy-makers), con-

sumers, and scientists. The stakeholder characterizations were made to clarify which specific needs for information and technology persist to realize a high-quality, i.e., valid, feasible, upgradable, generally acceptable, and long-lasting, monitoring system that is realized and supported by the different stakeholders. Based on the interviews, we formulated a number of activities that we ordered into a development scheme for a sustainable monitoring system or label that may help improve animal welfare and reduce public concern using market operations.

2. METHOD

2.1. *Project Approach*

We formulated our views as scientists in two stages. First, the authors of this paper described their views on stakeholder perceptions from an animal welfare science perspective (Anon, 2001; Wiepekma, 1987). Later, the views from the social sciences were added by involving the members of the project team.

In this first phase of the project, we characterized stakeholder perceptions into stakeholder characterizations, recognizing that there are large individual and sub-group differences within stakeholder groups in their beliefs and interests as regards (the monitoring of) animal welfare. In drawing up the stakeholder characterizations, we tried to imagine ourselves in the position of the stakeholders, used brainstorming sessions, and drew up an analytical framework about monitoring, about livestock production chains, and about stakeholder perceptions. For this, we identified relationships between the stakeholders in the production chain in relation to monitoring, and we related a stakeholder's perceptions to his/her objectives and behavior (which was assumed to be mostly functional for obtaining the stakeholder's goals as much as possible). This analytical framework was modified along the way (learning by doing).

The stakeholder characterizations included the stakeholders' interests and beliefs regarding animal welfare, and also their information needs and roles for information supply as regards the monitoring of animal welfare.

In the second phase of the project, we interviewed 27 stakeholders and experts. These experts were selected based on their known involvement and their role in their interest group, e.g., the one veterinarian in Table 1 is the representative of the Dutch Association of Veterinarians dealing with animal welfare. We also asked respondents to give names of other relevant persons for further interviewing. The interviews were held by phone. In these interviews, we focused on how the stakeholders, as representatives of their stakeholder group, regarded animal welfare and the development of a monitoring system as if it were developed specifically for them.

Table 1. Numbers of stakeholders and stakeholder-experts, i.e., scientists who are knowledgeable about this stakeholder group, participating in the interviews.

Stakeholder group	No. of stakeholders	No. of experts	Totals
Producer-representatives	3	3	6
Retail-representatives	3		3
Government	3		3
Animal protection	2	1	3
Consumer organizations	1	1	2
Monitoring developers	5		5
Meat processing industry	3		3
Bank	1		1
Veterinary profession	1		1

The results from the interviews were used in the third phase of the project to verify and refine our analytical framework and the stakeholder characterizations, and to specify a scheme for the development of sustainable monitoring systems. The analytical framework was revised by comparing the original construct with the points raised by the respondents (with particular attention for points that did not seem to agree with the original framework). The notes taken during the interviews were thoroughly re-examined twice to minimize the risk of missing relevant points. A development scheme was formulated as a direct result of the classification procedure in which the different statements made by the stakeholders in the interviews were ordered according to the activity to which these statements referred.

In summary, in the course of the project we did the following:

1. We described stakeholder perceptions and a development plan from our own background as animal welfare scientists.
2. We consulted social scientists to comment on our views.
3. We interviewed stakeholders by phone.
4. We upgraded our preliminary ideas about stakeholder perceptions and worked out the development plan consisting of activities that were used to categorize the statements the respondents had made in the interviews. A first draft of the paper was sent to all interviewed stakeholders asking them for comments.
5. The final version of the paper was produced.

This paper presents the stakeholder characterizations resulting from our own analysis, including minor revisions based on the interviews. The paper includes references to what has been stated by the respondents in the interviews in two ways. Firstly, remarkable statements from the interviews have

been ordered in the development scheme and these statements are given in italics. Secondly, the reference-code “(iv)” is sometimes stated in the text. This code abbreviates the word “interview” and indicates that the statement was supported by at least one interviewed respondent. It is added both to statements resulting from our own prior analysis and later confirmed in the interviews, and to statements that modified our prior views. The code (iv) resembles an anonymous “personal communication” reference used in scientific publications. All references to the interviews in this paper (marked as (iv) or given in italics) are interpretations made by the first author of this paper. As a consequence, this paper is best regarded as the opinion of the authors with an attempt to identify what was stated in the interviews.

2.2. Interviews

In the interviews, the following questions were asked after the aims of the project had been explained to the interviewed stakeholder:

- How do you, as representative of your stakeholder group, regard animal welfare and its monitoring?
- Monitoring involves the generation of a flow of information. What can such a flow of information mean to you? What disadvantages do you perceive?
- What information do you need and for what purpose? (What do you want, what do you not want?)
- What is your role in the development of a monitoring system and its implementation?
- What obstacles and opportunities do you perceive, e.g., with yourself or in relation to other stakeholders?

These questions address the stakeholder’s beliefs, interests, information demands, and information supply as regards animal welfare and its monitoring.

In total, 27 persons from different stakeholder groups were interviewed (cf. Table 1).

3. AN ANALYSIS OF STAKEHOLDERS, MONITORING, AND LIVESTOCK PRODUCTION CHAINS

3.1. *An Analysis of Monitoring Welfare in Livestock Production Chains*

A monitoring system is the “guarantee of quality that aims at closing the gap between intention and realization in a societal development program” (Rossi and Freeman, 1989, cited from Cornelissen, 2003, p. 11). We include under the monitoring of animal welfare all activities aimed at disclosing

welfare relevant information, especially when such information is generated repeatedly over time. The disclosure of information involves data acquisition, transfer, aggregation, and transformation of information into marketable products like quality labels or images. Information transfer implies communication.

Livestock production chains are the result of the industrialization process that has changed livestock production since the 1950s. Modification of husbandry systems was technology driven, where production efficiency and market forces resulted in confined and barren housing of animals, with farmers attending large numbers of animals specially bred for high production (De Jonge and Goewie, 2000). Farmers had to either follow the common trend of bulk production or go out of business. The production process was optimized so as to offer “top” quality products (with properties that are analogous to what in biology has been referred to as “superstimuli”) to consumers at low prices.

Livestock production chains now have an hourglass shape (Figure 1), consisting of many, relatively independent producers and many independent consumers with a relatively small number of (feed and food) companies in between. The implication is that individual producers and consumers can hardly make a difference. Consumers pay much more for welfare-friendly products than producers receive for actually improving welfare (e.g., Bell, 2002; this is sometimes perceived by consumers as rake-off, while retailers point to the high costs involved in generating separate product flows).

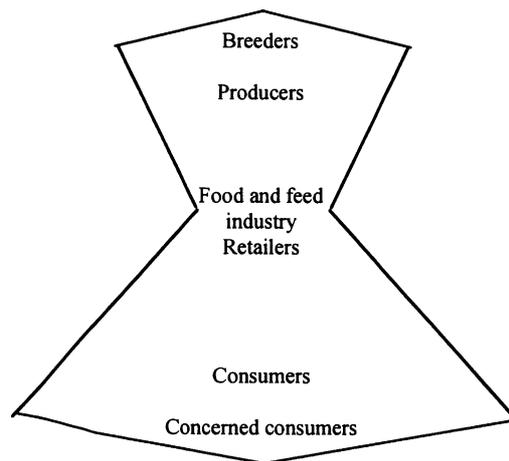


Figure 1. Livestock production chains have the shape of an hourglass. Its width represents the number of actors.

Both groups, producers and consumers, largely depend on the government to protect collective interests. Producers have mainly lobbied to protect the economic interests of the sector, while consumers have lobbied to protect issues like low prices and food safety. Issues like environmental pollution and especially societal issues like child labor and animal welfare, have received relatively little attention. However, husbandry systems are complex systems where many interests are involved, i.e., concern for animal welfare must be balanced against many other aspects, such as economic constraints, animal health, environmental concerns, food safety, and other (e.g., ergonomic) interests of producers and other humans. The government has turned to scientists to determine what are necessary requirements for animal welfare. However, to date, scientists have not been able to resolve disputes prevalent among stakeholder groups, leading to problems in determining uniform welfare standards. The dispute about how to determine the factual level of animal welfare and how to monitor it has hampered ethical and political decision making about animal welfare.

Different stakeholders and product-stages are linked within the livestock production chain. A monitoring system must generate information flows between the different stages, e.g., collect information on the farm and provide it to the retailer, but also vice versa.

Important life-stages of monitoring systems include the development, maintenance and improvement of the system. In the development, the distinction between perception and reality is important. What is (ex ante) intended as a good and useful welfare measure, may (ex post) turn out to be (partly) mistaken, e.g., the abolition of beak-trimming and claw-amputation in male breeder cocks may perhaps unexpectedly lead to increased feather damage in the hens.

Monitoring may take many different forms. We give three examples.

- On selected farms animal welfare is periodically registered. These farms are representative of the sector as a whole (cf. periodic figures of the Agricultural Economic Institute in the Netherlands about the economic status of Dutch farms). The information derived from such a sampling monitoring system may be especially relevant for policy making by governments and animal protection societies.
- Animal welfare may be monitored in (prototypes of) new housing systems in order to determine whether these new systems are sufficiently welfare-friendly to be allowed on the market (an “ex ante” evaluation; “preventieve toetsing”).
- Monitoring may be conducted for the purpose of certifying farms and/or the labeling of products as welfare-friendly (a “plus” on welfare). Such a system should contain technical details, which producers can use to

make management decisions, but should also be easy to communicate to consumers (e.g., distinguishing only 3 levels of welfare).

The aims of monitoring can be classified into cognitive and prescriptive aims, both of which must address each stakeholder in order for the monitoring system to be viable.

The cognitive aims of monitoring systems are to generate welfare-related information about animals, farms, products, and stakeholders, to aggregate (and interpret) this information (for various prescriptive purposes) and to transmit this information to the various stakeholders, including to consumers and (back) to producers.

The prescriptive aims of monitoring systems are the following:

- To increase the level of knowledge, i.e., to inform and educate stakeholders about what really matters to the animals and so enhance the level of knowledge and promote consensus in society about animal welfare.
- To increase the level of ethical and political decision making, e.g., by providing the factual information required for better ethical decision making about animal welfare, and by reducing the government's effort spent on negotiating and realizing improved welfare measures.
- To reduce public concern about animal welfare and improve confidence in the sector, thus allowing producers to “earn” a license to produce and/or retailers to “earn” a license to sell animal products on a level playing field for international trade. It allows chain actors to earn money not by reducing costs, but by increasing benefits (including niche-market farming) and by realizing acceptable welfare levels in cost-benefit optimized and farm-specific solutions.
- To increase the level of animal welfare, i.e., to modify housing and management systems so as to improve the welfare status of the animals.

3.2. *Relationships Between Stakeholders*

A stakeholder may be defined as “any group or individual who can affect or is affected by the behavior of the system” (Mitchell et al., 1997; Greenwood, 2001, cited from Cornelissen, 2003, p. 71). For the characterization of each stakeholder we used two pairs of categories, namely “welfare-related norms” and “beliefs about welfare,” and “information need” and “information supply” as regards the monitoring of welfare. In relation to these categories, we shall highlight some aspects of relationships between stakeholders based both on our own analysis, the stakeholder characterizations, and the interviews. First, however, we will give some illustrations of how stakeholders have related to the monitoring of animal welfare in practice.

3.2.1. *Monitoring Experiences in Practice*

The Austrian Tiergerechtheitsindex (TGI) was initially developed by Helmut Bartussek (1986). This TGI was adopted by Austrian legislators and by several organic farming associations. Later, Bartussek and other researchers constructed many improved versions of the TGI (e.g., Sundrum et al., 1994; Bartussek, 1999). Scientists have questioned the validity of the TGI-concept (e.g., Blokhuis et al., 2003). Another example is Freedom Food, which was an initiative of the Royal Society for the Prevention of Cruelty in Animals (RSPCA) in the UK. They consulted scientists, producers, and veterinary surgeons to develop the scheme. They targeted retailers and found Tesco initially willing to adopt the scheme. Later, scientists tried to validate the Freedom Food scheme for dairy cattle by comparing it with animal-based parameters (Whay et al., 2003), but similar “validation” comparing Freedom Food and non Freedom Food units for poultry and pigs has not yet been conducted. The schemes “Free Farmed” and later “Humane Raised” in the USA were modeled on the UK Freedom Food initiative, but here it was the producers who were targeted initially. At first, producers were reluctant to adopt the scheme, but initially others followed once the first few had a positive experience. In the USA McDonalds and Burger King, possibly under pressure from organizations like People for the Ethical Treatment of Animals (PETA), seem to have followed the Tesco example. Burger King set its standards (for space allowance per hen) just a little more stringent for the farmer to comply with than McDonalds did. In response to this potential arms-race situation and in response to increased pressures from society both in the USA (Food Marketing Institute and National Council of Chain Restaurants) and at an international scale (OIE, Office International des Epizootie) initiatives have been taken to start developing collective standards. Both in Europe and in the USA various programs have been or are being developed (cf. Blokhuis et al., 2003; Mench, 2003). The National Pork Board (NPB) in the USA, for example, has developed a Swine Welfare Assurance Program (SWAP) based on several expert meetings and field tests (National Pork Board, 2003). SWAP is conducted by a certified SWAP Educator, e.g., the producer’s own veterinarian. SWAP could possibly satisfy retailers’ and restaurants’ requirements. In order to do so, the demands from the various stakeholders need to be matched (e.g., whether external auditing is required), and continued refinement of the welfare assessment tool is recognized as an integral part of its development. These examples illustrate how scientists, animal protection societies, producer organizations, governments, consumers, and retailers all play important roles in the development of monitoring systems for farm animal welfare in Europe and the USA.

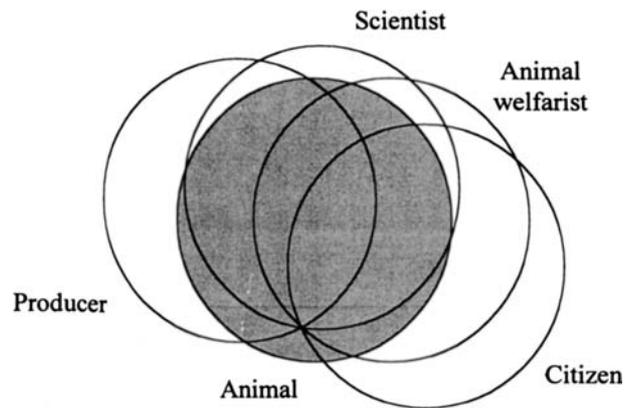


Figure 2. Overlapping perceptions of animal welfare.

3.2.2. *Beliefs from Different Stakeholders about Welfare Overlap and Differ*

Figure 2 gives a schematic representation of how stakeholder perceptions about animal welfare partly overlap and also show differences. Some part of what matters to animals is unknown to humans. Scientists take a somewhat intermediate position between producers and the public. Like producers, scientists relate to the facts about animals themselves. At the same time, scientists share the basic human intuitions about animal welfare prevalent in society and relate to a biological framework, the homology between animals and man, and the relevance of natural behavior for animal welfare. Compared to other citizens, animal welfarists tend to have more knowledge of the facts from practice and from science. Consumers and retailers are not represented in Figure 2, because in their respective roles, they may not have opinions about animal welfare (i.e., in his role as scientist, a person does not have opinions about politics and religion). The opinions of consumers and retailers derive from their own perceptions as citizens and from what scientists and producers tell them about welfare. The government is also a stakeholder that is informed by producers, welfarists, other citizens, and scientists.

As regards animal welfare, producers tend to focus on technical (re)production parameters. Scientists tend to focus ultimately on quantifiable, animal-based (patho- and stress-) physiological and behavioral parameters. Citizens conceive welfare based on their own sense of welfare together with visual and emotionally laden images of traditional farming and natural-living conditions for animals. As a result, some non-visual types of information like genetic, developmental, and chronic stress factors are respectable welfare indicators for scientists, but less so for citizens. Citizens will, accordingly, place more emphasis on visual images like space and

events like transport, slaughter, and surgical interventions such as castration and tail docking. Despite these differences, however, overall, there is probably a wide basis of consensus about animal welfare, which ultimately refers to what matters to the animals from their point of view (Anon, 2001).

3.2.3. *Welfare-related Norms, or How Stakeholders may have Opposing Goals*

Producers will want the monitoring system to show how well they are doing as regards animal welfare, given the fact that they must produce food, i.e., something they perceive as a necessity to feed the (world) population. Consumers, on the other hand, will tend to perceive food as something that is abundantly available. To them, food items appear to be luxuries rather than necessities, e.g., because many items are exchangeable. Accordingly, consumers set the highest demands to production. Animal welfare groups may want the monitoring system to indicate that intensive farming should be abandoned or change considerably. The same monitoring system, therefore, may have to serve almost opposing goals for different stakeholders. Whenever stakeholders do not like the outcomes of the monitoring system, they will dispute its definitions and methodology, whenever possible (iv). Among the most sensitive aspects of a monitoring system is the transformation of singular data into an overall welfare judgment or label. To maximize acceptability among stakeholders it may be necessary to construct a flexible system that allows stakeholders to control the assembly of single parameters into an overall welfare judgment.

For monitoring welfare, consumers may demand certain types of information, which producers may be reluctant to provide, e.g., about disease levels, about the use of antibiotics, and about surgical interventions such as castration and tail docking. Transparency for the consumer may conflict with the producer's need for autonomy. In theory, the "market" could resolve this problem by matching the consumer's willingness to pay with the producer's willingness to supply the required information.

3.2.4. *Information Supply: Stakeholders may be Inclined to Perform Window-dressing*

A monitoring system is a tool to improve transparency and traceability, but these ideals may conflict with the habit of "window-dressing" and "facading" currently practiced by several stakeholder groups (Dagevos, 2002). For chain actors, it is their way of marketing their products. Policy makers may use welfare research (including as the development of monitoring systems) as an excuse for not taking action. Scientists may utilize welfare concerns to raise funds for research. Consumers may claim they care for animal welfare without buying welfare-friendly products, and, when they are buying such

products, this may be done for other motives, such as health and taste-perception rather than animal welfare. Animal welfare lends itself to window-dressing, because the portrayal of having altruistic concern for animals is difficult to define, measure, and verify.

3.2.5. *Information Need, or at What Level should Welfare be Monitored?*

Different stakeholders may require information at different levels of aggregation. For example, policy makers and interest groups may need information about the sector as a whole. Individual consumers and producers may require information at the herd level. Animal welfare, in the end, is a property of the individual animal. It may be difficult to construct a monitoring system that generates information on all levels of aggregation including the sector as a whole, the herd level, and the level of the individual animal.

4. DEVELOPMENT SCHEME

The development scheme described in this section was constructed on the basis of the interviews with stakeholders. The development scheme includes the following activities involved in developing a sustainable monitoring system for animal welfare: initiation and planning (1), defining concepts and methods (2), reviewing the knowledge base (3), selection of parameters (4), knowledge integration, index construction (including testing and periodic upgrading) (5), on-farm application (6), administration, certification, and labeling (with a tracking and tracing system) (7), taking actions for farm adjustment (8), incentive and sanction regime (9), communication (10), and the buying and selling of products based on the monitored information (11). The scheme includes both activities involved in constructing a monitoring system and activities dealing with the running of the system. Different stakeholders play a crucial role in different activities. Important stakeholders include developers of monitoring systems (including scientists), producers, retailers, the government, and extension. The activities in the development scheme were used to organize remarkable statements made by the respondents in the interviews. These statements are given in sections in italics (where every new paragraph refers to a separate statement). Note that these statements are not exact quotations, but rather interpretations of what the stakeholders told the first author of this paper (MB) in the interviews.

4.1. *Initiation and Planning*

In order to start the development of a durable monitoring system the subject must be put on the agenda of the relevant stakeholders. These include

scientists, animal protection and consumer organizations, producers, retailers, and the government. They all need the capability and motivation to participate. The participants must specify common end-goals and adopt responsibilities for achieving (intermediate) milestones. The goals of the assessment will affect not only stakeholder involvement, but also the development and assessment methodology. For example, certifying for positive welfare clearly differs from identifying the “bad apples” (iv), and collecting generic information at the sector level differs from collecting information about specific farms and products.

4.1.1. *Putting Monitoring on the Agenda*

The Dutch government has put the development of welfare index systems on the agenda with two policy documents (LNV, 2001, 2002). The main reason for the government to promote the monitoring of animal welfare is to increase transparency and to facilitate consumer decision making as regards animal welfare. The government does not intend to enforce a welfare index onto the sector or the market. Animal welfare is perceived as being over-regulated and a monitoring system may help reduce regulations while maintaining the government’s responsibility to guarantee minimum norms and to be informed about animal welfare.

For the government it is important that it is clear which are public responsibilities and which are private responsibilities in the monitoring of animal welfare.

4.1.2. *The Development Time may take Longer than Expected*

Initiatives to develop a monitoring system are not only complicated by the fact that different stakeholder groups may have different interests, but also by the fact that leaders of stakeholder organizations are not always clear as to what their members want and by the fact that, for example, NGOs may have different points of view, because they are not organized in a larger, professional, and representative organization.

4.1.3. *Responsibilities and Motivations to Participate in the Development of a Monitoring System*

An animal welfare representative complained that the government maintains that the transition to welfare-friendly production should be realized in the market. For many decades the government has promoted and stimulated intensive production. According to the animal welfare representative the government has the responsibility to solve the problems she has helped to create.

A representative of the meat industry stated that some companies of sufficient size and suitable markets (e.g., UK, possibly Germany, versus

many other countries where welfare is not so much of an item) want to put welfare products on the market, but also that they cannot do so at present. One major problem is limited compliance of regulations and limited validity (sensitivity and specificity) of tracking and tracing systems and of monitoring systems. Another major problem is the high costs of creating separate product lines in an infrastructure that has been optimized for bulk.

A representative of the bank stated that welfare is a fashion item and that it derives part of its attention from the hype around food safety. Welfare is overrated in that the attention does not match the common consumer's opinion and that it relates to unrealistic ideals about how animals should be kept. He expected that the monitoring of animal welfare will probably cost more than it returns, e.g., in terms of financial credits raised from the bank. Banks see themselves as suppliers of capital. They see themselves as playing a following role with respect to society and legislation. Animal welfare plays only a very small role in the bank's assessment about financing a farm. Image is an interest of the sector that is largely outside the influence sphere of the banks. The bank representative claimed that the influence of the banks in this respect is often overrated.

According to a representative of the producer's union, monitoring should be a market demand, not a tool for image improvement. The image as producers was claimed not to be as bad as researchers and the media sometimes suggest it is. (Note: this claim was supported by recent research by Ter Berg et al. (2003) and Verhue and Verzijden (2003)).

Several respondents identified arguments given by other stakeholders in the welfare debate as strategies to protect other interests. One representative of the meat processing industry suggested that the idea that we do not have a golden standard for welfare may be used as an attempt to hide a lack of motivation to do something about it. One "government" representative said that raising issues of sustainability, i.e., integrating welfare with other considerations, is like throwing sand in the wheels ("radertjes") of the welfare debate.

Welfare measures that do not clearly result in economic benefits, e.g., by enhanced production or added value of products, are met with skepticism and resistance from producers. Many examples can be given where welfare improvements were made only after it had been shown to be profitable. Examples include unloading of calves, stable groups of pigs, group housing of sows, and aviary systems for laying hens. It seems to be characteristic of producers that they often fear negative economic consequences of suggested welfare improvements.

A developer of monitoring systems stated that the development of a monitoring system strongly benefits from being introduced at a time when the sector is doing well economically.

4.2. *Defining Concepts and Methods, and Reviewing the Knowledge Base*

Concepts such as welfare and the domain of application of the monitoring system (e.g., only farms in the Netherlands or all farms in the EU) must be defined and an inventory must be made about what is known about welfare (i.e., the knowledge base must be identified and relevant information must be extracted).

4.2.1. *Definitions*

Scientists realize that they have disputed how to (operationally) define animal welfare. However, underlying this dispute there is believed to be a consensus basis that is sufficient to monitor animal welfare. The same scientist making this claim, stated that it is unethical to wait until all doubts and uncertainties as regards animal welfare have been resolved.

4.2.2. *Knowledge Base*

A producer representative and a representative of an animal welfare organization independently stated that sufficient knowledge about animal welfare is available.

4.2.3. *The Domain of Application may Affect Stakeholder Motivation to Co-operate*

A system developer stated that certifying all but the worst farms implies setting very low norms, which are difficult to communicate to the public. It also generates a negative sanction-based attitude, since its purpose is to eliminate the “bad apples.” A monitoring system designed for the progressive farmers has a much narrower domain of application and generates a positive attitude (“look how good we are”). Its problem concerns benchmarking in that it lacks the negative reference points. In order to show that you are doing well, you need to expose others who do not do so well. These will not be motivated to comply.

4.3. *Selection of Parameters*

Welfare-relevant parameters must be identified and procedures must be described of how to perform the measurements. Parameter selection may include defining cut-off points, but scientists perceive this as problematic (cf. Mendl, 1991). Alternatives include using fuzzy logic (Cornelissen, 2003), and using heuristic rules (cf. Bracke, 2001, 2002a, b).

The validity, reliability, and feasibility of each parameter must be determined (*iv*). Reliability includes inter- and intra-observer reliability, i.e., the parameter must give the same results when applied by different observers and also at different observation moments (when welfare has not changed).

Validation means that the parameters actually measure what they are intended to measure, i.e., animal welfare. Validation includes experimental work and conceptual analysis. Based on scientific knowledge a conceptual analysis of the value of a welfare parameter may be conducted, relating the parameter to the animal's welfare needs and to confounding factors. Experimental work provides the building blocks for such a conceptual analysis and may be used to verify that the parameter responds as expected in known welfare situations. This is expected to lead to scientists accepting the parameter as reliable and valid. Feasibility refers to aspects such as cost, time, and expertise needed to apply the parameter. Feasibility also includes constraints set by the end-users, e.g., parameters must be ethically acceptable (e.g., safe and not causing harm to the animals) and fit within the stakeholder's belief network.

4.3.1. *Parameter Selection and Feasibility*

Most interviewed stakeholders have difficulty specifying what they would like to see monitored. Sometimes they reply they think that's a job for the scientists to find solutions that are satisfactory to the relevant stakeholders. Many stakeholders seem to prefer animal-based parameters over environment-based ones. Those who disagree do so mainly for feasibility and communication reasons.

4.3.2. *Validity of Parameters and the Index as a Whole*

Scientists distinguish between the prevalence and the incidence of a condition such as lameness that may be registered in a herd of animals on the farm. The prevalence indicates how many cases there are at a given point in time. The incidence indicates the number of (new) cases over a given time span. A major problem with the validity of monitoring parameters is that normally (occasional) prevalences are being measured, whereas incidences (based on continuous or more frequent monitoring) is required. Another problem identified by scientists is that the sensitivity and specificity of the welfare index should be known (giving indications about its false positive and false negative outcomes). For example, insufficient specificity may imply that the index only detects differences between housing systems that were expected and "known" beforehand.

4.4. *Index Construction, Testing, and (Periodic) Upgrading*

The monitoring system must be constructed from the selected parameters such that the primary data can be transformed into a judgment about the overall welfare status of the animals in the production chain. This requires a reasoning process of knowledge integration and data reduction, which

should follow a validated methodology for index construction. The procedures, instruments, and personnel requirements (e.g., including training programs) for application of the index have to be developed and described. Furthermore, just as with each separate parameter, the index as a whole should be validated and shown to be reliable and feasible. Empirical work must show, for example, that the index has sufficient sensitivity to distinguish between farms (*iv*). Feasibility, again, includes not only time, money, and expertise requirements, but also stakeholder acceptability. The new monitoring systems should not be in competition with existing systems for monitoring such as KKM (chain quality milk), IKB (integrated chain control), and biological farming (*iv*). The added value of the new system should be communicated (*iv*). Important is that the method of monitoring is not disputable and that the outcome is not ambivalent, i.e., that it can be interpreted in only one way (*iv*). This may require the design and application of a verification system ensuring that the monitoring system is in operation (control of control).

A wide domain of application, such as an extended monitoring system including not only housing but also transport and slaughter conditions, will require more extensive knowledge integration. Periodic upgrading of the index will be needed to accommodate updates in scientific knowledge and new insights resulting from testing and applying the monitoring system in practice.

4.4.1. *Feasibility of Assessing Overall Welfare*

A scientist stated that overall welfare judgments and even comparisons of animal welfare across species are needed for solving political issues such as the debate about mink farming (e.g., by answering the question whether mink have lower welfare compared to pigs and poultry).

A producer representative thought that overall welfare assessment may not be feasible for all types of production: An egg may be labeled with a welfare score, but a pig “explodes” in the slaughterhouse (i.e., may be used for many different end products) and the parts of different origins may be used for one product (e.g., sausages).

4.4.2. *Validation*

Scientists tend to focus on technical validation (of welfare parameters and the welfare index). Although scientists are aware of the discrepancy between their welfare measures and public perception of welfare, scientists often tend to disregard stakeholder perceptions in the development of monitoring systems. One scientist compared welfare assessment to the diagnosis of a disease. According to him, the consumer’s perception about health and welfare do not play a role in the assessment. Consumers may have to be

educated such that their perception is “corrected,” if necessary. Another scientist stated that an appreciation of the ethical and political context of the monitoring system is important. For example, at a time when a subject (such as mink farming or enriched cages for laying hens) is a political issue, it may be much more difficult to find support, even among scientists, for a monitoring system dealing with the issue.

4.4.3. *Monitoring Systems may be in Competition with Other Systems and Even with Themselves*

Dairy producers have resisted welfare and health observations on their animals. Checking the barn and the milking parlor is one thing. Checking the animals is another. “It is as if they come to check your wife.” Producers may have limited tolerance because of the history of continued changes (and increases) in regulation demands. One product-processing representative stated it as follows: “the better thing is the enemy of the good.”

A system developer stated, “Certification systems exist. It is uncertain whether these will be supplemented with a welfare module. It is not expected that separate certification- or monitoring system will be developed for animal welfare.”

4.4.4. *Knowledge Integration: Expressing Welfare as a Score*

Stakeholders towards the end of the chain (retailers, consumer-representatives, animal protection advocates) tended to be favorable towards the attempt to express welfare as a score (cf. Bracke, 2001), a number of stars, or a point system (e.g., red–orange–green, cf. De Jonge and Goewie, 2000). A non-typical representative of the retail sector imagined that adopting a scoring system would generate considerable unrest with potential favorable consequences. He added that he personally would want to sell *in vitro* produced meat, if it were available, because it does not have the animal welfare problem.

Higher up in the chain (to some extent retailers, but especially meat processors and producers) there was more reservation about expressing welfare in a score. These stakeholders expressed their concern that there may not be enough shelf-space for different scores, that meat processing (e.g., of a pig carcass) is geared for bulk processing and does not allow differentiated flows (except at very high costs, including the problem of “vierkantsverwaarding,” i.e., how to get a reasonable price for the remainders of the carcass after the “good” parts have been sold as labeled products), and that technical parameters, preferably measured on the animals, are preferred above an overall welfare score, because technical details can be used to improve management practices. (Note that these two views about welfare scores may be reconciled, when the monitoring system

provides both a simple, two or three level, overall score that is derived from underlying technical parameters, which are made available on demand.)

4.5. *On-farm Application*

Once constructed, the monitoring system should be applied on location, e.g., on farms, in slaughterhouses, etc. “On-farm” application may include audits performed by the producer himself, by one of his extension workers (e.g., his veterinarian), or by a third-party auditor (where the latter is part of the control of the control system).

4.6. *Administration, Certification, and Labeling (with a Tracking and Tracing System)*

On-farm application of a monitoring system periodically generates data that must be registered. Other types of information (e.g., involving co-operation by producers and costs) must also be documented. Important is the verification system with procedures ensuring that the monitoring system is functioning as intended (control of control). For these purposes a database system must be used (iv). Based on the monitored information farms may be certified and products may be labeled as welfare-friendly, but this is not necessary. Monitoring may also be performed without certification or labeling (e.g., for the purpose of reporting on welfare developments in the sector). Certification and labeling may imply that farms, animals, and products enter into a separate product-flow (from the farm to the shelves in the shop), identified with a (forward) tracking and (backward) tracing system (iv). Compliance rates of the tracking and tracing must be known and acceptable (iv). The documentation (especially documentation concerning the verification system) will provide the evidence of compliance.

4.6.1. *Administration*

The administrative load is conceived as a major obstacle for welfare monitoring, both by producers and by the government. Several stakeholders suggest monitoring of animal welfare should make use of (database) systems designed for other purposes, e.g., monitoring of food safety and animal health.

4.6.2. *Separate Product Flows with Tracking and Tracing*

When the bulk product is split up into smaller, labeled product flows, this dramatically increases costs because of limited elasticity of supply.

When a tracking and tracing system is in place that allows tracing the product back to a farm, this does not mean that the tracing is valid (the

wrong farm may be identified). Problems with false positive and false negative results (compliance) pose major problems for monitoring of welfare, animal health, and food safety.

A major problem for the formulation of a product-market combination (PMC) is that it must be fraud resistant. Competitors should not be able to claim that they can deliver the same product without meeting the requirements.

4.7. *Taking Actions for On-farm Adjustment*

A plan must be made specifying the corrective actions to be taken when the monitoring system indicates the need for improvement (*iv*). Producers have the final responsibility of adjusting their farm (*iv*). They may use the monitoring information for making farm plans, e.g., to acquire finances from the bank or the government (*iv*) (cf. “Incentive regime”). The economic consequences of the farm adjustments may need to be monitored so as to determine whether the economic viability of the sector is affected (*iv*). Extension may be developed helping producers respond adequately with adjusting the farm and management practices to demands set by the monitoring system (*iv*).

4.8. *Incentive and Sanction Regime*

An incentive regime must be designed. This includes both financial incentives, but also measures to reduce psychological barriers, e.g., against the perception that there are “too many rules” (*iv*). Another incentive may be that stakeholders may believe that the monitoring system may help them improve their image (and provide them with a “license to produce”).

A sanction system is needed when producers (continue to) fail to take corrective actions (cf. “Action plan”). Such a system requires procedures to secure fraud resistance (and “borging”) and procedures to make sure that sanctions are justified (e.g., including the possibility to appeal).

4.8.1. *Image as an Incentive*

Producers have a high motivation to deal with the “bad apples” in the sector. “Bad apples” are those producers who give the sector a bad image, e.g., by systematically and knowingly taking economic advantage at the expense of common interests.

4.8.2. *Producer Co-operation*

A system developer stated that getting the co-operation of producers and other stakeholders may require psychosocial extension and stimulation programs (offering incentives such as good reasons or even money to

encourage co-operation and compliance). Furthermore, rather than being checked on what they may be doing wrong, producers may be more motivated to distinguish themselves positively from others.

4.8.3. *Consumer Co-operation*

Supply of labeled products on the shelves must be sufficient in all stores of the retailer promoting the product, even when this is not profitable in certain regions. Such policies may add to the costs of introducing labeled products.

4.9. *Communication*

An important facet of monitoring is the communication of information between the stakeholders (*iv*), e.g., consumers need to be informed what a label means, producers need to know what the scheme will mean for them, and the government may use the information for policy making. It must be decided who gets which information (and in return for which price) (*iv*). Because considerable interests are at stake, communication must meet high standards.

Communication programs must not only address the consumer as the buyer of products, but also the citizen with his/her opinions about animal welfare. Ideally, the two roles (of consumer and citizen) should be reconciled, and his/her choice to buy or not to buy certain products should be well-informed.

4.9.1. *Marketing*

Marketing information must be trustworthy. Two respondents gave examples of companies failing to do what they are advertising with respect to welfare.

Marketing is needed to get the consumer's attention, raise the consumer's demand for products, and establish consumer routines of buying and consuming the desired products. The marketing may not only communicate how the animal's welfare has benefited, but also inform the consumer about the costs involved, including not only the costs for improving animal welfare on the farm, but also the costs for marketing, for logistics, and for the (administration of the) monitoring itself.

A monitoring system may, thus, increase transparency about the reasons why welfare-friendly products are (so much) more expensive. Only a small part of these costs are spent on actual welfare improvement. The rest is spent on setting up a different logistic product flow, including the cost of monitoring itself.

Another aspect of marketing is that a welfare label may not match with the brand (e.g., the "fun" image of visticks). A welfare label is, as one

scientist put it, a rather serious (“zwaarmoedig”) issue. (For example, associations with slaughter have traditionally been regarded as distressing for consumers.)

4.9.2. *The Need to be Informed*

A monitoring system may help serve the government’s insatiable information hunger, i.e., its need to be informed about all aspects for which it may publicly be held responsible.

4.9.3. *The Extent to Which Data and Results must be Communicated may Vary*

For taking part in the public debate governments often only need generic information (respecting privacy rules). Consumer trust may possibly be “earned” by installing an internal quality assurance scheme that comes into operation when required (e.g., during scandals). The only thing that is then communicated to consumers is that there is such a scheme, not what the results are.

4.9.4. *Communication must Meet High Standards*

It is to be expected that stakeholders who benefit from monitoring will praise it, while those who get a low score will (try to) dispute the system’s validity and reliability.

Many respondents identified communication of the results as a major problem area for monitoring, e.g., how to ensure that the results are acceptable to all parties and interpreted in a uniform way. (This is undoubtedly an important problem. However, it should be noted that at the start of each interview we explicitly stated that the project goal was to identify the perceptions of the various stakeholders. This may have biased respondents into claiming that communication is an important issue.)

Another problem often identified by the interviewed stakeholders was money: the view that investments will not be returned and will lead to false competition and loss of market share.

A solid basis for the monitoring system is generally recognized as a necessary but not sufficient condition to overcome the communication obstacle. The need for a solid basis (with many technical details) may be in conflict with the requirement to construct a simple system that can be understood by all stakeholders (including members of the public). Simplicity is a requirement especially proposed by producers for the sake of clarity of regulations, by the retail in relation to shelf-space and by consumers in relation to transparency. Simplicity means that a product label should present a simple cue to the consumer, such as a score, a (limited number of)

stars, a green–yellow–red point system, or a picture of the housing system, rather than a list of technical details or a statement in words. It also means that the number of different labeling systems should be limited and uniform. For simplicity reasons and in order to reduce the cost of monitoring it should be linked to or even be integrated with existing systems (e.g., using health tracking and tracing systems and databases; using Hazard Analysis Critical Control Points (HACCP) methodologies, e.g., von Borell et al., 2001). Simplicity requires that a translation is made from technical details to a communicable overall score or that generic regulations are formulated in which the products must meet all specified requirements as in welfare legislation and in regulations for biological farming.

4.9.5. *Risks of Communication*

Within the chain there is an acute awareness of the potential risk of transparency and the risk of welfare niche marketing, because this may threaten general interests of regular farming. When welfare would become the focus of public attention, unreasonable demands may be issued. For example, the public may require that production animals be treated as pets or as small children; even worse a negative image may result in severe image problems and negative economic consequences. One food industry representative made a comparison with food safety: he regarded the issue of food safety as a self-created problem because it had been raised as a discussion topic. Raising awareness may create unnecessary problems (as perceived by the established sector).

4.10. *Selling and Buying of Products*

Once the monitoring system is operational and products have been labeled, the products must be made available in shops.

4.10.1. *Trade*

The monitoring system may be linked to an information system about the sales of labeled products. The World Trade Organisation (WTO) may allow financial compensation for the production of welfare-friendly products, when the monitoring system can show that the labeled products were sold below their production price.

At present, the price difference between regular and welfare-friendly products is too big, says one retail representative. Consumers are spoiled, i.e., the prices of regular products are too low. A consumer representative agreed with this statement and added the point that consumers do not realize what is normal (e.g., with respect to production and slaughter).

One producer representative stated: I do not believe that consumers always buy the cheapest products. Not every consumer drives a Lada either.

5. DISCUSSION

In this section, we will discuss a few points about the characterization of the stakeholders and about the development scheme for monitoring in direct relation to the findings from the interviews.

In this project, we first formulated our own views about stakeholders' perceptions of (the monitoring of) animal welfare, and later adjusted these views based on the results of the interviews. Compared to what we had expected, producers appeared to be more skeptical and retailers tended to have a more constructive attitude. The producer attitudes may be explained in relation to "recent" developments in the economic and political climate in the Netherlands and the (negative) experiences producers may have had with two monitoring initiatives. At the time of the interviews, the economic recession is in the news and producers are having difficulties to survive economically. The Dutch poultry industry was suffering the last phase of an Avian Influenza outbreak, which, for example, also led to crisis teams being active in the government (the Dutch Ministry of Agriculture) and in the Dutch Society for the Protection of Animals. The previously more labor-oriented ("purple") government has changed to a more agriculture-minded government, which, for example, had decided it would no longer promote a leading role in Europe as regards animal welfare when this would negatively affect the farmers' income.

Developments in the monitoring schemes, IKB (Integrated Chain Control) and KKM (Chain Quality Milk), had been discussed in the agriculture media. Producers had resisted the changes, mainly because they perceived them as costly and threatening. A "fight" between two producer unions concerned the degree of control over IKB. Retailers and animal protection organizations stated in the interviews that they considered this "fight" as an embarrassment for the sector. The positively-changed retailer attitudes may be the result of a gradual process of being pointed at, together with recently increased pressure from NGOs (e.g., to ban battery eggs). While the interviews were being taken, the last supermarkets had just decided to ban battery eggs, due to pressure from Wakker Dier (a Dutch Animal Welfare Activist group). A representative of the retail sector responded positively to this decision made by their own members to ban battery eggs from the supermarkets.

The interviews confirmed that most stakeholders consider animal welfare to be important. Stakeholders also avoided making negative statements

about their own group, and they were inclined to shift responsibilities to other groups (cf. Te Velde et al., 2001).

The interviews also confirmed that different stakeholders have overlapping, but also partly different evaluation paradigms. Maybe, these paradigms can be classified into two categories: the economic paradigm (with money and self-interest as the leading principle) and the moral paradigm (with respect and concern for others and for animals as the leading principle).

The authors of this paper are animal (welfare) scientists. Performing a stakeholder analysis and conducting animal welfare science share the starting point of trying to understand the others (humans or animals) from their point of view. Overall we only made minor changes to our previously made stakeholder characterizations, indicating that the approach of putting ourselves in the shoes of other stakeholders may have helped to start to understand their views about (the monitoring of) animal welfare.

We organized the most remarkable statements from the interviews into the activities in a development scheme for monitoring. Our analysis and the development scheme indicate that monitoring of animal welfare is a rather multifaceted problem. It also shows that the problem may be perceived as a challenge. The interviews indicated that the main areas of attention include financial arrangements, communication, and, at its basis, ensuring that the index has a thorough scientific basis.

The most important opportunities for a monitoring system are, as one interviewed stakeholder stated it, “to finally really start dealing with the animal welfare problem” and to regain trust among the stakeholders involved. This requires an appreciation of stakeholder perceptions, which this paper intended to provide.

In view of our experiences in the interviews and the complexity of the problem, we conclude that the development of monitoring systems for animal welfare should not be underestimated. The development of a durable monitoring system will probably be a long-term activity. However, we are not pessimistic about the objective. Simple prototype monitoring system could be developed in a relatively short period of time. Further upgrading will then be required to optimize these systems towards the ideals as formulated in this paper.

6. CONCLUSIONS AND RECOMMENDATIONS

The most important conclusions and recommendations from this project can be divided into what stakeholders think about the content of animal welfare (including their mutual similarities and differences) and their procedural preferences regarding monitoring.

6.2. *Conclusions and Recommendations Regarding Phase 1: “Analysis of Chains, Monitoring, and Stakeholders”*

- The realization of a durable monitoring system for animal welfare that recognizes the perceptions and interests of the different stakeholders is an important, but complicated matter.
- Monitoring requires the collection of welfare relevant information, the aggregation (interpretation) of that information, the exchange (communication) of that information between the different stakeholders, and the use of information for different purposes.
- We distinguish between different forms of monitoring. These include
 1. periodically reporting on the welfare state in the (Dutch) livestock sector based on information that is collected on a selected set of farms;
 2. preventive assessment in which production systems are allowed on the market only after they have been tested;
 3. monitoring for the purpose of certification of farms and/or the labeling of products as welfare-friendly.
- The ultimate aims of monitoring are to increase the level of knowledge (transparency, education), improve ethical and political decision making, reduce social concern about animal welfare, provide a license to produce, respectively a license to sell, and to improve on the level of animal welfare as the animal experiences it.
- Production chains have an hourglass shape: there are many producers and consumers, while in between there are only few, but very powerful, players from the food industry and retail. These latter players have a special responsibility in the developments regarding (monitoring systems for) animal welfare.

6.3. *Conclusions and Recommendation Regarding Phase 2: “The Interviews” and Especially the Factual Wishes of Stakeholders about Animal Welfare (Including their Differences and Similarities)*

- Stakeholders can be described from their specific situation. Producers have a production-related view on welfare, which presupposes that animals with high production rates cannot have poor welfare. Consumers (including animal welfare protection advocates) have a visual and emotional perception of animal welfare that is based on their own perception of welfare and images of traditional farming and natural conditions for animals. Scientists ultimately judge welfare on the basis of what they can measure (quantitatively) about the animal. Other stakeholders such as retailers and the government have welfare perceptions

that are related to the previously described perceptions (i.e., those of producers, consumers, and scientists).

- All stakeholders agree that the way the animal experiences its life determines welfare in the end. This consensus could be the basis for the development of a monitoring system for animal welfare.
- All stakeholders need a system that can give guarantees, and all have values such as validity, feasibility, and simplicity as starting points for the development for monitoring systems.
- Compared to the stakeholder characterizations we had made before we did the interviews, retailers seemed to be more and producers seemed to be less inclined to support the monitoring of animal welfare. Given the hourglass shape of the chains a constructive attitude of retailers is of particular importance for the development of a welfare monitor.

6.4. *Conclusions and Recommendation Regarding Phase 3: “The Development Scheme” and the Procedural Preferences of Stakeholders as Regards Monitoring*

- The statements the respondents made in the interviews were ordered according to the different activities involved in the development of a monitoring system. The following steps were formulated to develop a sustainable monitoring system:
 1. The formulation of a plan for initiation and development of the monitoring system by the different stakeholders.
 2. Definition of concepts and methods to develop the system.
 3. An overview of the available knowledge.
 4. The selection and validation of parameters.
 5. Index construction (including the formulation of a commercially interesting image, label or index system, and the periodic testing and upgrading of the index).
 6. The on-farm application in practice of the index.
 7. Administration, certification, and labeling (including the tracking and tracing).
 8. The adjustment of the farm to meet the requirements of the monitoring system (including advice given to the farmer by extension workers).
 9. Incentive and sanction regime.
 10. Communication.
 11. The selling and buying of labeled products based on the monitored information.
- In the design of monitoring systems account should be taken of the views of scientists, consumers, and producers, because these groups have primary views about animal welfare.

- Given the complexities of the production chains, the multitude of steps and the different interests of the stakeholders, durable monitoring systems for animal welfare cannot be implemented in the short term due to economic and psychological constraints.
- However, because of the complexity and the many aspects revealed in this study, it is at the same time a challenge to find the proper conditions, such as strongly integrated chains, motivated and influential participants, and a “clever” approach, to initiate a reliable and durable monitoring system for animal welfare within the next few years.

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