A methodology to assess the contribution of animal friendly production systems to sustainable development in egg production

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Summary

A decision on the introduction of animal-friendly production systems should consider the combined economic, ecological and societal performance of these systems. In other words, the contribution of animal-friendly production systems to sustainable development in animal production should be assessed. Research generally is focussed only on one item, e.g., environmental consequences of pig production or the assessment of hen welfare. The aim of this research, however, is to develop a methodology to assess the contribution of animal-friendly production systems to sustainable development, based on the combined economic, ecological and societal performance of these systems. As an Illustration, this methodology will be applied to two cases, i.e., the laying hen and the sow. The methodology proposed comprises 4 phases (i) description of the problem situation (i.e., production systems; stakeholders); (ii) identification & definition of relevant economic, ecological & societal issues by stakeholders; (iii) selection & quantification of suitable indicators; and (iv) aggregation of indicator information to assess the overall contribution to sustainable development. Results of this research are essential to support (1) decisions on introduction of animal-friendly pig or poultry production systems in The Netherlands and (2) future policy design for sustainable development in pig and poultry production.

Results

Introduction

Public concern for animal welfare in The Netherlands and other Northern European countries stimulated development and introduction of new production systems. These new systems should improve welfare of, for example, the laying hen compared with battery cages. Examples of these so-called "animal-friendly systems" (i.e., not scientifically proven to be really animal-friendly) include enriched cage systems; alternative systems, with or without outdoor runs; and organic egg production systems. Next to the supposed advantage of improved welfare, however, an aviary system, e.g., shows disadvantages of higher ammonia emission, higher energy costs for lighting, and worse working conditions for the producer compared with a battery cage. A decision to introduce animal-friendly production systems, however, should be based on the contribution of these systems to sustainable development (SusD), i.e., on the combined economic, ecological, and societal performance.

Aim project

The aim of this research is to develop a methodology to assess the contribution of animal-friendly production systems to sustainable development (SusD) of animal production in the Netherlands. Originally, we planned to apply this methodology to two cases, i.e., the case of the laying hen and the case of the sow.

During the first meeting with the research and utilisation group (11-12-2000), we decided to start with the case of the laying hen. In 2012, the battery cage will be prohibited in the Netherlands, and, therefore, it is important to assess the contribution to SusD of various animal-friendly alternative systems. In this research, we include the enriched cage, alternative systems, with or without outdoor run; and organic egg production.
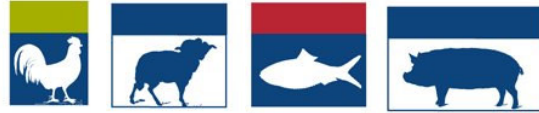
Methodology – The case of the laying hen
Assessment of the contribution of animal-friendly production systems to sustainable development (SusD) of egg production in the Netherlands implies the following steps (see Figure 1):
1.   Description of problem situation and context;
2.   Identification of stakeholders
3.   SWOT analysis with stakeholders (during a workshop on 18-6-2001) to identify relevant issues for sustainable development of egg production in the Netherlands.
4+5.   Identification of Sustainability Indicators (SIs) for each sustainability issues as quantified during step 3.
6.   Quantification of SIs at practical egg production farms.
7.   Aggregation of indicator information into an overall contribution to sustainable development.

Step 1 t/m 3
Step 1 until 3 have be executed during 2001, and are described in a scientific paper entitled " Identifying sustainability issues for egg production in the Netherlands using SWOT analysis". This concept paper has been discussed with the advisory group of the project (4-4-2002), and, approved by the utility group (6-6-2002). At this moment, the paper will be submitted to Journal of Poultry Science for publication. In addition, the step 1 until 3/4 will be presented at the European Poultry Conference in Bremen (6-10/10/2002).

Key issues resulting from this analysis are animal health and welfare, environmental performance, product quality, labour conditions, economy, image, laws and regulations, and knowledge and innovation.

Step 4
From October 2001 until now, we worked on step 4 " Identification of relevant SIs for issues as determined in step 3 as being relevant for SusD of egg production in the Netherlands ". Characteristics of an effective SI are
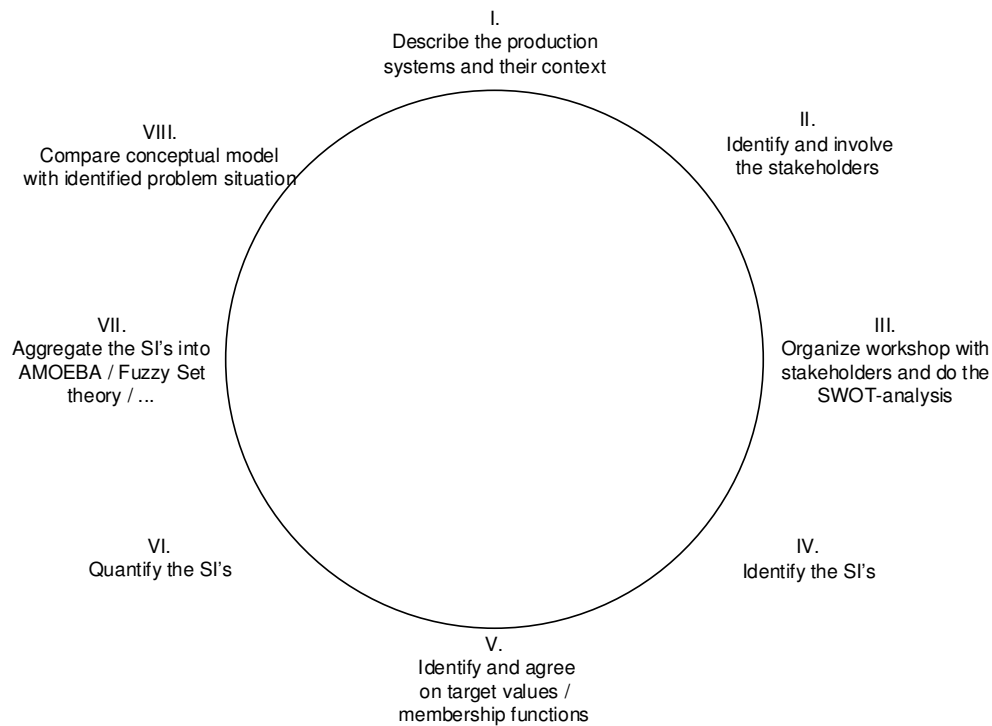   •   is relevant, i.e., they show you information about the systems about something you need to know;
   •   is simple, i.e., is easy to understand, even by people who are no experts; is unambiguous.
   •   is sensitive and reliable, i.e., the SI should be sensitive to changes in a system. In addition, it should be reliable, or in other words, will you arrive at the same results if you make two or more measurements of the same indicator ?
   •   is it possible to define a trend or target value for the indicator?
   •   Are data accessible?

Based on these criteria, we select SI for each issue of SusD. Selection of relevant SI for issues of SusD, however, requires quite some knowledge of various disciplines that correspond to these issues, e.g., hen welfare or egg quality, Life Cycle Assessment. Within this project, we can not develop relevant SIs ourselves, but we have to select the best available SI for each issue, based on current status of disciplinary knowledge.

To effectively select the best available SI for each issue, we started co-operation with various disciplinary research groups, for example, ethology (names: Paul Koene, Bas Rodenburg, Eddie Bokkers, Willem Schouten) and hen health (Lotte van de Ven (student), Bas Kemp, Veterinarian Van Beek).

During the course of the project, we decided to focus on the case of the laying hen only.

Identification of relevant SI is an extremely important step to assess contribution of various systems to SusD. This step needs more time than originally planned, also because it requires in-depth knowledge of various disciplines. The utility group approved during the meeting of 6-6-2002 to focus on the laying
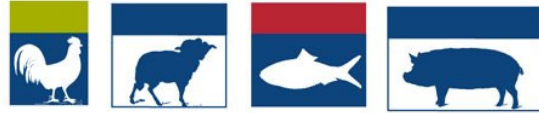
hen only. This decision also affected the original time schedule of the project. A revised time schedule is given in Table 1.

Future (see Table 1)
- Selection of SIs should be finished at the end of 2001;
- In September 2002 we start a first experiment on how to gather data from experimental farms;
- In the third year we plan to quantify SI for a large number of farms for each production systems to be analysed;
- In the fourth year, we will use this information to asses the contribution of animal-friendly production systems to sustainable development (SusD) of egg production in the Netherlands.

I.
Describe the production
systems and their context

VIII.
Compare conceptual model
with identified problem situation

II.
Identify and involve
the stakeholders

VII.
Aggregate the SI's into
AMOEBA / Fuzzy Set
theory / ...

III.
Organize workshop with
stakeholders and do the
SWOT-analysis

VI.
Quantify the SI's

IV.
Identify the SI's

V.
Identify and agree
on target values /
membership functions

Figure 1. Different steps relevant in order to assess the contribution of an animal production system to sustainable development.
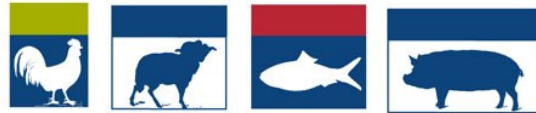
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
2000	✕	✕	✕	✕	✕	✕	✕	✕	✕	▓	▓	▓
2001	▓/🟨	🟨	🟨/🟪	🟨/🟪	🟨/🟪	🟪	🟧	🟧	🟧	🟧	🟧	🟧
2002	🟧	🟧	🟧	🟧	🟧	🟧	🟧/🟩	🟧/🟩	🟧/🟩	🟧/🟩	🟧/🟩	🟧/🟩
2003	🟩	🟩	🟩	🟩	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
2004	🟦	🟦	🟦	🟦	⬜	⬜	⬜	⬜	⬜	⬜	⬜	✕

▓ General introduction and preparing detailed research proposal / Literature review

I 🟨 Description of the problem situation (Step 1&2)
II 🟪 Organize and execute workshop (Step 3)
III 🟧 Identification sustainability indicators and target values (Step 4&5)
IV 🟩 Quantification of sustainability indicators (Step 6)
V 🟥 Aggregation of SIs, using e.g. AMOEBA / Fuzzy Set Theory / etc. (Step 7)
VI 🟦 Comparison of conceptual model with identified problem situation (Step 8)

⬜ Thesis preparation

Table 1 Revised time schedule.