

## Co-innovation in sustainable laying hen husbandry systems: Investigating the interactive framing of sustainability

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**Abstract:** *Many different actors, like businesses, farmers, the government, societal organizations, consultants and research institutes, are involved in the design and implementation of “the Roundel”, which is a sustainable laying hen husbandry system. It is assumed that interactions between these different actors are important to articulate common ideas of which aspects are important for a sustainable husbandry system. The main research question addressed in this paper is: How did heterogeneous actors in the Roundel project frame sustainability aspects over time? We study interaction with a focus on interactive framing of sustainability issues. We limit our study by analysing how framing of three themes related to sustainability change in interaction, namely the outdoor run for hens, the “better life” label and positioning of the Roundel egg in the market for table eggs. Our analysis showed that framing is changing. Via interaction the various actors got acquainted with each others’ frames. This confrontation with other actors’ frames did lead to pruning, compromising and re-framing of sustainability issues. In addition, the socio-institutional context played an important role in the development and implementation of the new laying hen husbandry system.*

**Keywords:** *sustainability, interaction, interactive framing, laying hen husbandry system.*

### Introduction

Sustainability is an important element of many ‘system innovation’ processes which have been induced in recent years (Schot and Geels, 2008; Wiskerke and Roep, 2007). Also in the agricultural sector, sustainability is becoming ever more important. However, sustainability is not a clearly defined term (Parris and Kates 2003) and many, sometimes contrasting definitions exist. This implies that because often many heterogeneous actors are involved in shaping sustainability, the meaning of sustainability is shaped in interaction.

The Dutch TransForum<sup>1</sup> program hosts many projects in which the focus is on sustainability through innovation projects which aim to improve upon ecological, economic and social sustainability, and in which heterogeneous actors, such as the government, societal organisations, businesses and knowledge institutes are involved (Veldkamp et al., 2008). In this paper we study one of the TransForum projects, namely the “Roundel” project, in which a sustainable laying hen husbandry system is developed.

According to the literature on user-producer interaction, active involvement of heterogeneous actors in innovation projects is beneficial for improving the quality of innovation processes (Nahuis, Moors, and Smits, 2009; Vandeberg, 2009; Boon, 2008; Moors et al., 2008; Smits and Boon, 2008; Rohracher, 2005; Oudshoorn and Pinch, 2003; Smits, 2002; Fagerberg, 1995). The early involvement of actors in innovation processes stimulates the innovation process, because integrating users in innovation process makes them important co-innovators in order to really meet their demands (Shapiro 2001,; Von Hippel, 1988) and because innovations can become better embedded in society (Smits and Den Hertog, 2007). While early involvement of heterogeneous actors may thus stimulate sustainable innovation processes, the exact mechanisms of such processes are unknown; we do not know how the perspectives that actors hold on sustainability issues are changed over the course of a project. Several authors indicate that the role of micro-processes in system innovation has not been

<sup>1</sup> TransForum is a Dutch programme with the goal to stimulate sustainability of Dutch agriculture.

examined in detail (Vandeberg, 2009; Kaplan and Tripsas, 2008; Lovell, 2008). Therefore, we study interaction from a micro-perspective as we would like to understand how micro-processes are influencing the outcome of innovation trajectories, such as the Roundel project.

In this paper, we analyse the interaction between the heterogeneous actors involved in the Roundel project, focussing on the way *sustainability is framed*. This paper departs from the perspectives that actors themselves hold on sustainability as articulated in the discourse between these actors. Such an interactive framing approach is based on the idea that meaning is shaped in interaction (Dewulf et al., 2009). The goal of this study was to understand the ways in which heterogeneous actors frame sustainability issues related to the Roundel project in interaction. Our main research question is: *How did heterogeneous actors in the Roundel project frame sustainability aspects over time?*

Understanding how sustainability issues are framed in interaction, can provide us with tools to organise interaction processes and influence innovation trajectories with the ultimate goal to improve the innovation trajectories. In this paper we do a first attempt to get insight in the framing of sustainability.

This paper is structured as follows. In section two we discuss the theoretical background of user-producer interaction research and the interactive framing approach. The third section discusses the background of the Roundel project. The fourth section includes the method we use to analyse the interaction processes in the Roundel case. In the fifth section we present the empirical data (in the form of case vignettes) in order to illustrate how frames change over time in interaction. In section six the results are discussed and conclusions are drawn.

## Theoretical background: Framing in interaction processes

The central idea of this paper is that interaction between actors stimulates the innovation process. Smits and Den Hertog (2007) mention five different reasons for involving stakeholders in the innovation process, namely: more effective articulation of social needs, increased competitive strength of private enterprises, improved acceptance and better social embedding of knowledge and technology, improved learning capacity of society as a whole and enhanced democracy.

Fruitful interaction between different stakeholders is only possible when they have enough knowledge in common. Participants in a project need to have a certain amount of knowledge in common in order to interact with each other (Ensink and Sauer, 2003) and absorb new knowledge (Cohen and Levinthal, 1990). Especially in case of a heterogeneous group of actors, interaction might be difficult as a result of differences between actors in for example availability of information, management styles or cognition (Klerkx and Leeuwis, 2009). Actors use “different ways to make sense of the issues by selecting the relevant aspects and connecting this into a sensible whole, and delineating its boundaries” (Dewulf, Craps, and Dercon, 2004). This process is called framing. Dewulf et al. (2009) distinguish (in nature of frames) between ‘cognitive frames’ and ‘interactional framing’. Cognitive frames are “knowledge structures” in peoples’ head. Interactional framing is “the dynamic enactment and shaping of meaning in ongoing interactions” (Dewulf et al., 2009). Starting from the importance of interaction in innovation, in this paper we use the interactive approach towards framing.

Not only can a distinction be made in the nature of frames, but also on the basis of what it is that gets framed (Dewulf et al., 2009). This can be a) an issue (meaning attached to agenda items, events or problems); b) identities and relationships (meanings about oneself and relationships with a counter part) and/or c) processes (interpretations that disputants assign to their interaction process).

We choose to make use of the interactional issue framing perspective, because we are interested in how the framing of sustainability issues is taking place in interaction. The assumption is that actors in interaction make clear what according to them is the issue and what does not belong to the issue. With regard to sustainability, it might depend on their perspectives towards sustainability how heterogeneous actors define sustainability. About sustainability several views exist of how to reconcile effects on the economic, social-cultural and environmental domains. Hermans et al. (2010)

made an overview of different discourses on sustainable development of the Dutch agricultural sector. They distinguish different views of sustainability: as continuity of a farm, improved organisation of production chains and a broader definition of sustainability in which different elements, like animal welfare and quality of the landscape, are combined in a new view of the countryside.

Actors themselves hold perspectives on sustainability, which are articulated in the discourse between these actors. They define sustainability in different ways. In interaction they are confronted with differences in the way they frame issues. Dewulf et al. (2004) distinguish different ways of dealing with such differences, namely pruning (doing away with all but one of the possibilities), compromising (both elements are given credit but not in their entirety), exploring differences (letting ambiguity exist or surface while questioning the difference) and reframing (combining elements into a new whole). Although avoiding and polarizing are also described as possible ways of dealing with differences (Dewulf et al., 2004), we only use the first four mentioned, as these can be observed in our data and lead to a common frame.

The framing of issues is also influenced by the contexts in which interactions take place. Actors make (explicit or implicit) representations of the socio-institutional space and the bio-physical space surrounding the project. The socio-institutional space consists of cultural, legal, economical, relational and political aspects (e.g. cultural acceptability). The bio-physical space consists of technical, geographical, ecological and temporal issues (Leeuwis and Aarts, 2009).

### **Research context: The Roundel case**

In 2003 and 2004 the Dutch government initiated and financed a project called ‘Keeping/ loving hens’ (In Dutch: Houden van Hennen). In this project an envisioning exercise was done in which two animal husbandry systems for hens were developed with the involvement of heterogeneous actors, such as farmers, egg traders, governmental officials, non-governmental organisations and consumers. The approach used was a so-called “needs approach” (Bos and Groot Koerkamp, 2009), meaning that the needs of different “stakeholders”, namely the laying hen, the poultry farmer (as producer, animal farmers and worker) and the citizen (or consumer), were taken into account in the design of the laying hen husbandry system. These needs were not traded off against each other, but synthesized (Bos and Groot Koerkamp, 2009). A programme of needs was set up in which the needs of these parties were described. Based on this approach all needs of these three main actors involved, were formulated (Bos, 2008).

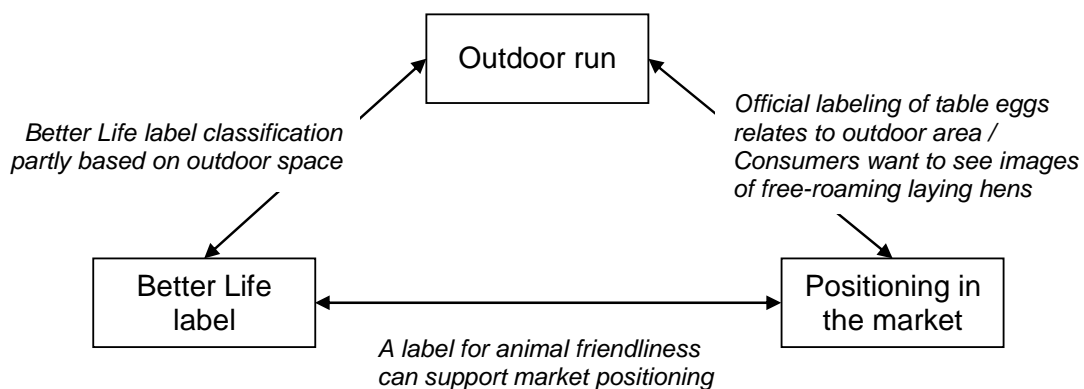
Based on this programme of needs, a consortium was formed in 2005 with a large egg packer, and a husbandry systems developing firm, with the goal to redesign one of the developed systems into a design to be used in practice. This system is called the Roundel after its typical round form (Bos, 2009). Various actors started working on the implementation of the design, and started thinking of how to sell the eggs. Over time, the number of project partners grew. Core participants in the project team were: the stable builder, the Animal Science Group (ASG, part of Wageningen University), TransForum, and a consultant. The project team has a meeting every six weeks in which they discuss the progress of the activities. In addition, workshops were organised by the project team. In these workshops experts in the field were invited and topics like how to position the egg in the market and how to organise the chain were discussed together with the project team. Besides the core participants, also other actors were involved namely the Society for Protection of Animals, some farmers, municipalities, architects, a building contractor, consultants and several facilitators. In spring 2008 the Roundel Ltd. was formed as a daughter company of the stable builder’s firm.

The first aim was to realize a “system innovation” of a part of the egg sector. In a new system the techniques, the regulation and the chain relations would become adaptive, and be determined by the changing requirements of the market (project plan 2007). In 2009 the focus in the project was on the development and marketing of a societal responsible consumption egg, together with the production system and production chain (project plan, 2009).

## Method

In order to analyze the frames of different actors, data were collected through a variety of methods: a) a literature review on laying hen husbandry systems and sustainability; b) interviews with various actors involved in the Roundel project (N=38); and c) notes of project meetings (N=15) and workshops (N=3) in the Roundel project. Qualitative analysis of these data was conducted with the help of coding with Atlas.ti software<sup>2</sup>. The process of coding was a continuous dialogue between literature and empirical material (interviews) (Verbij 2008). We studied literature about sustainability in laying hen husbandry systems in order to get an idea of what types of codes can be used (Voedingscentrum, 2009; Bos and Groot Koerkamp, 2009; Bos, 2008).

Qualitative analysis suggested that there were common ‘themes’ or ‘topics’ concerned with sustainability across these data sets, such as animal welfare, environmental issues and marketing. From these common themes we choose three themes to study more in depth: 1) the outdoor run for hens in terms of space dimensions; 2) the criteria for awarding the “better life” label (partially based on available roaming space) and 3) the positioning of the egg in the market (partially based on awarding the better life label). These three themes were studied because they all illustrate a change in framing and were discussed in interaction. The themes are related to each other, in the sense that each theme fed into the next theme and enabled developments that resulted in the realization of the Roundel concept. The relation between the themes is graphically shown in the next scheme (Figure 1).



**Figure 1.** Graphical representation of the relations between the three described themes.

The fragments related to one theme are described in a case vignette. Case vignettes are used as illustrations of particular events or concepts (Carlile, 2002). We included these vignettes to represent how framing of the sustainability issues is taking place in the Roundel project. We interpreted how the actors go about the differences in framing based on the categories Dewulf et al. distinguish (2004). The vignettes are a selection of the data from the case study. The issues discussed in the vignettes came to the fore after analysing the themes, and are based on an analysis by the authors.

## Results

This section describes three case vignettes. These vignettes show examples of how interactive framing is taking place. It shows how goals set in the design process have to be translated into practical ways of dealing with these goals. Quotes of the actors involved are used as illustrations.

<sup>2</sup> Atlas.ti version 6. source: [www.atlasti.com](http://www.atlasti.com)

### Case Vignette 1: Outdoor run for hens

One of the issues that came to the surface is the access to an outdoor run for hens. Within the Roundel project group this issue is discussed several times.

In the ‘program of demands’ the formulated need was: “Outdoor access for hens”. The initial frame of the stable builder was that outside hens need two square metres per hen, based on the rules for free range eggs. This means that one needs six hectares for one Roundel stable with 30 000 hens. In discussions with for example researchers and consultants new ideas arose about outdoor access, namely that in order to perform natural behaviour a chicken does not necessarily need that amount of outdoor space. Different frames were held by different actors. Some aspects are in favour of an outdoor run:

- An outdoor run has to contain two to four square metres per hen; the underlying assumption is that one needs to fit with the criteria for free range/organic eggs.
- Show the consumer it is possible to keep hens outside; showing the hens are kept outside can be used as a tool to market eggs.
- Outside space is good for animal welfare; the underlying assumption is that hens need a certain amount of space in order to be able to perform their natural behaviour.

Other aspects speak against an outdoor run:

- An outdoor run becomes a mess because of the scratching behaviour of hens.
- Keeping hens outside will be hindered in case of a risk to Avian Influenza.

One of the actors in the project team summarized this discussion as follows:

*That is what [the stable builder] thought: hens outside, you need much space and you have to deal with regulations. There are a lot of implicit thoughts behind this idea, which came to the fore when the design made it possible for the hens to go outside. But we draw a square around [the stable] and that does not have to be six hectares, if they have the possibility to go outside. So when there is a border of ten metres around the stable with green and trees, absolutely fantastic. At that moment “the penny dropped”. (researcher)*

The final common frame was that hens need to have access to an outdoor run, which does not have to be as big as envisioned at the beginning of the project. As one of the researchers said:

*No, we do not realise six hectares of outdoor run. No, the hens have to have the possibility to walk outside, which does not have to be six hectares. (researcher)*

In this case vignette actors thus deal with differences in issue framing by compromising. Different elements are given credits, but not in their entirety. The frame has shifted from what institutions imply as animal friendly (a certain amount of square metres) towards what is animal friendly from the perspective of the researchers (when does the animal perform natural behaviour?). Both the aspects in favour of an outdoor run and speaking against an outdoor run are taken into account when discussing the outdoor run.

### Case Vignette 2: The “better life” label

Another example of how interaction has been influencing the framing of sustainability issues in the Roundel project is the discussion about the “better life” label introduced by the Society for Protection of Animals. Since 2008, the Dutch Animal Welfare Society started with developing a system, with one to three stars, to indicate products that were produced respecting specific animal welfare guidelines. Because the star system requirements were not completely developed at the time of the design of the Roundel project, there still was some room for negotiation.

*[Developing the label system] is partly done in consultation with producers. You need to look at what is feasible in practice. We do not have to think of norms which are not realizable. (Society for Protection of Animals)*

This new focus on having sufficient quality of living environment (instead of having a default large roaming space outdoors) are presented in the quote below of a representative from one of the knowledge institutes involved.

*If you look at the stocking densities in the system, we are approximately organic, but we don't have the free range, whereas organic has four square meter of free range. We don't have that, but we say we don't need it because the hen doesn't use [the space]. A small yard suffices, it's about the quality of the living environment [...]. From experience: if you can keep hens without beak trimming, then you have a good working system. (Researcher).*

In the final report of the project the conclusion is drawn that:

*The behaviour of animals will be the criterion and not the stocking rate in square meters. In terms of stocking rate it will be desired to keep the rule for organic (6 hens per square meter), for the day and night accommodation (final report).*

The issue of the 'better life' label was directly linked to the outdoor space issue discussed in the previous vignette. At the start of the label system the idea was that only eggs from hens with a certain amount of outdoor space could obtain two stars. The frames that came to the fore are:

- a hen needs a certain amount of square metres
- a hen needs to perform its natural behaviour
- when you are able to keep hens without beak trimming, they have enough space.

Discussions between members of the project team and the Society for Protection of Animals resulted in two stars of the "better life" label. In interaction the frames of both the Society for Protection of Animals and the Roundel project team are reframed. When discussing the stocking rate, also the criteria for awarding animal welfare stars were redefined. This can be seen as reframing. In interaction, actors combined different elements into a new element, namely a new definition of "two stars".

### **Case vignette 3: Positioning of the Roundel egg in the market for table eggs**

Related to the issue of access to an outdoor run and the "better life" label is another issue regarding the positioning of the egg in the market of table eggs. The socio-institutional context plays an important role in this discussion by means of rules about the required characteristics of hen husbandry systems. The naming of table eggs as organic, free-range or barn eggs is based on rules and regulations about feed and occupation rates. These aspects constrain the positioning of the egg in the market for table eggs.

*You have cages; hens that live indoors, those are barn hens; then you have barn with outside run and organic. This is how it works. Full stop. (researcher)*

Interactions took place between the knowledge institutes, the stable builder, the government, the egg packager, one of the consultants, the farmers association (ZLTO) and Society for Protection of Animals. Positioning as a barn egg is unattractive because of large competition from barn eggs produced in cheaper stables without any access to outdoor runs. The need to show this outdoor area is stressed.

*I need to sell something to the consumer. And with my knowledge and experience, I want to show just one thing: that this hen can walk outside. (egg packer)*

To sell the egg as a free-range egg, much more outside space would be needed (see case vignette 1). At the same time, many different actors (e.g. the consultants, people from knowledge institutes), considered the Roundel egg as "probably better than organic". Selling the egg as organic, however, is impossible since the Roundel does not take the conditions of organic husbandry (feed and space) into account. Strategically, the choice to position the egg in the market between free range and

organic gives flexibility for future development. Depending on the successfulness of the egg, the position can be adjusted.

One risk of this positioning is articulated as well. Because consumers have little knowledge about the production circumstances of table eggs, and about the meaning of the official egg categories, they may have an idea of egg production which is too optimistic (with regard to space and animal welfare).

*There are many people who do not even see the difference. They are totally surprised that a barn hen does not go outdoors. (Invited expert)*

The project actors struggle with the idea of whether to raise the awareness of the egg consumer, or to leave them ignorant.

*But maybe he [the customer] is awfully surprised when he sees how the Roundel hen is walking around. And he had a totally different image of the barn hen; a much more emotional, a much better image. (Invited expert)*

This vignette shows pruning and re-framing of the issue positioning of the Roundel egg. Different actors had different ideas of how the egg should be positioned and mention the advantages and disadvantages. The first idea was to sell the egg as a barn egg (in Dutch: scharrelei). Then the possibility to sell the egg as a free-range egg was discussed by the egg packaging company. The outcome of the discussion is that the egg will be *positioned* between free-range and organic eggs. A new position is chosen, which is not based on existing positions, what can be seen as re-framing. Pruning can also be seen in this vignette as there is an option to relate to existing types or define a new type, namely in between the other types of eggs.

## Concluding discussion

In this paper we selected a limited number of issues for which we described the framing in interaction. Because of this limited amount of issues we cannot present general conclusions for the Roundel project as a whole. However, we can provide some first insights into the way sustainability issues were framed and re-framed in interaction.

The project involved many heterogeneous actors. These actors have their own frames of how to deal with sustainability issues. Through interaction these actors are confronted with each other's frames. This leads to changes in the frames, so we could observe "framing as transient communication structures" (Dewulf et al., 2009). New facts can result in changes in framing and the opening of new 'windows of opportunities', but on the other hand changes in framing are also needed in order to implement the design in practice.

We studied three themes, all three related to each other. In the case vignettes we find different ways of dealing with the development from a design on paper towards a stable in practice. When implementing the ideas in practice, new actors and as a result new frames came to the fore. An example is the discussion about the 'outside run', in which we saw clear rules about the amount of square meters (outdoor space) per hen. These rules were confronted with the practical knowledge that hens tend to use an outdoor run only partly, and that this space may become messy very soon, which in turn may give rise to sanitary problems.

The same kind of antagonism was seen in the "better life" vignette. Whereas the Society for Protection of Animals started with an outdoor surface criterion for the two-star label, the project team took a more practical view on animal welfare. Animal welfare was framed as hens being able to perform natural behaviour. Animal welfare should, according to the project team, thus not be measured in square meters per hen, but should be observed from the hen's behaviour. Interaction between the project team and the Society for Protection of Animals stimulated the exchange of knowledge and development of new solutions. An alternative view on animal welfare, by focussing on behaviour instead of space, gave a new direction to the requirements for the "better life" label.

In the market positioning vignette, we saw that the concept of the Roundel egg did not fit in the existing institutional structure where a division is made between cage eggs, barn eggs, free range eggs and organic eggs. The solution was to position the egg between free range and organic which fitted the project actors' framing of an animal friendly amount of outdoor space. The fact that the Roundel does not fit within the current rules and regulations (socio-institutional context) is exactly what makes this husbandry system innovative. The actors designed the Roundel system with the rules and regulation in mind, but because of the involvement of heterogeneous actors new insights surfaced. Through interaction the project actors gradually influenced and tried to change this socio-institutional context.

A related problem is the question how to communicate the Roundel egg to (potential) consumers. If the rules are no longer valid, how to communicate to the consumer that your egg may be "better than organic", while it actually can only get the barn egg label? The fact that the average egg consumer does not know a lot about egg production, and that the consumer is not directly involved in the project, makes this aspect even more difficult for the project actors.

Our focus was on the interactive events in the project, so we did not study the events that occurred in the context of the project, unless they came across in the interaction or during interviews. More insight into context factors directly or indirectly influencing the process of framing sustainability issues could give a more detailed picture of how and even more why frames are changing.

Considering the main research question of this paper: *How did heterogeneous actors in the Roundel project frame sustainability aspects over time?*, our analysis showed that the framing of the themes addressed in this paper has changed over time. What becomes clear from the analysis is that the initial framing of sustainability is confronted with practical issues, new frames of actors and new actors. Via interaction the various actors were confronted with each others' frames. The confrontation with other actors' frames did lead to pruning, compromising and re-framing. Not only are actors influencing the framing, during the project events and issues taking place in the context or 'outside world', like avian influenza, were discussed as well and had their influence on the outcome of the project. Especially the socio-institutional environment turned out to influence the interactive framing process. For example, although the rules and regulations were a starting point in the process of developing a sustainable laying hen husbandry system, still rules and regulations are hindering the innovation trajectory. Developing a new stable is a trade off between existing ideas and fitting within existing rules and regulation and being innovative.

Thus dealing with differences in framing is also about compromising in order to enhance the further development of the innovation. This is especially important in case that one issue depends on reaching a common frame in another issue, as was shown by the tree case vignettes which were linked to each other.

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