Critical elements for consumer acceptance of Eco-feed concepts

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PPS RENEW (LWV20147)

May 2022, Dr S. (Siet) Sijtsema (WEcR), S. (Sandra) van der Haar MSc, Dr A. (Anke) Janssen, Dr H. (Hilke) Bos-Brouwers (WFBR)







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Report 2297, Final

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Summary

The PPP RENEW (side- and residual streams for Eco-feed application in the Netherlands, with specific attention for the design of circular food systems and consumer acceptance) was launched in February 2021. The project is a public-private partnership, and its aim is to design and valorise Eco-feed concepts. Eco-feed is conceptualized as a circular feed product for non-ruminant animals, based on side- and residual streams collected from retail and foodservice outlets. In this project, we consider only Eco-feed for pigs and poultry (layers and broilers).

PPP RENEW focuses on 3 main research questions (RQs):

- RQ.1) Which conditions are necessary to create a positive business case for Eco-Feed in the Netherlands, from economic, environmental and animal welfare point of view?
- RQ.2) Which conditions are necessary to create consumer and food value chain acceptance of Eco-feed products?
- RQ.3) Which scenarios contribute to the development of Eco-feed concepts?

This report presents the findings on task 2.1 (related to RQ.2) and addresses elements that influence consumer acceptance (attitude and behaviour) and which are critical for accepting products for human consumption that are based on Eco-fed pigs and chicken. A literature review has been performed to create an analytical framework to explain acceptance, and four focus group discussions were organised to collect first insights from consumers on the topic.

Our findings suggest that elements including personal characteristics, social context, physical context, the product itself, and the production system all matter. However, it seems that consumers are not (yet) very aware of what livestock animals eat, and how feed is being produced. Furthermore, there seem to be no clear difference between more or less sustainability-oriented consumers with regards to their opinion on Eco-feed concepts.



1. Introduction





1.1 The RENEW project

PPP RENEW aims to generate insights on the **use** of side- and residual streams from retail and food service outlets as feed for non-ruminant animals (pigs, chickens), currently not allowed under EUregulation.

Where other research focuses on nutritional and food/feed safety aspects of valorisation towards animal feed, RENEW focuses on the business case for Eco-feed, its acceptance by consumers & business stakeholders and how it contributes to a more circular food system.

This report presents the findings on the task 2.1 to gain insights in the awareness and attitude of consumers with regards to animal feed practice and the acceptance of Eco-feed.

WP1: Business **WP2: Integral acceptance** case Eco-feed chain and consumers 1. Economic 1. Design and acceptance feasibility insights of consumers 2. Climate & 2. Chain- and stakeholder environmental dialogue; support and footprint Eco-feed acceptance 3. Integrated 3. Relevant policy business case development at NL and EU Eco-feed level

WP3: Design of chain concepts Eco-feed

- 1. Operational requirements for Ecofeed chains for pigs and poultry
- 2. Example chain concepts Eco-feed
- 3. Optimization of chain concepts in circular food systems



1.2 Task 2.1 – Insights for consumer acceptance

Overall aim of task 2.1 within the RENEW project is to explore consumer awareness and attitude towards animal feed practices and acceptance of Ecofeed applications.

Research questions are the following:

- Which elements (attitude and behaviour) influence consumer acceptance and are critical for accepting Eco-feed products for human consumption?
- Are there differences between more and less conscious/sustainable consumers regarding the use of Eco-feed?





2. Research methodology





2.1 Literature research



<u>Aim</u>: To **identify critical elements for consumer acceptance of Eco-feed concepts** from recent scientific and grey literature.

- Insights from previous WUR projects on consumer behaviour, Eco-feed and circular animal production systems (e.g., <u>EU H2020 project REFRESH</u>, <u>BO</u> <u>Consumer Value</u>) served as starting point.
- All project members searched for relevant new literature in online databases and through WUR-colleagues and consortium partners.
- WUR library information specialist performed systematic searches in various search engines, including Scopus / Web of Science / ABI/Inform / CAB Abstracts / PsycInfo-Psyc Articles-Psychology and Behavioural Science Collection.



2.2 Search strategy literature research

The WP project members developed a search strategy in collaboration with library information specialist

- Search terms are displayed in the table 1. Combinations of terms:
 - Row 1 AND 4 AND 5
 - Additionally: Row 2 OR row
 3, combined with row 1 AND
 4 AND 5
- The literature search was performed on the 26th of May 2021, results were limited to the past 10 years (>2010).

Table 1. Applied search terms

Terminology	Search key words
Eco-feed	Eco-feed, residual streams, food waste, food loss(es), food leftovers, valorisation, by-products, animal feed*, food co-products
End-product	Meat, dairy, pork, eggs, chicken, non- ruminant animals
Food system	Circular food system, circular economy, food value chain, food supply chain, sustainability, food production
Consumers	Consumer(s), citizen(s), society
Acceptance	Acceptance, perceptions, attitudes, behaviour, determinants, driers, barriers, understanding, opportunities, motivations, abilities, willingness to buy, purchase intentions, preferences



*Only when in combination with 'consumer'

2.3 Focus group discussions (FGDs)



<u>Aim</u>: To test and finetune the theoretical framework with empirical insights from focus group discussions.

- A Focus Group Guide was developed, based on semi-structured discussions.
- Four online sessions of 2 hours were held, with 5-6 participants each:
 - 2 groups with consumers who are relatively **more sustainable** with regards to awareness / behaviour.
 - 2 groups with consumers who are relatively **less sustainable** with regards to awareness / behaviour.
- Participants were recruited via a professional agency.
- Gender and age categories were evenly spread over each group.
- An external, professional focus group moderator led the sessions.
- Approval from the Social Ethics Committee (SEC) of WUR was obtained (see Annex I).



2.4 Selection of more and less sustainability-oriented consumers

- Participants were asked how often they performed certain sustainability related behaviours (e.g., on food, mobility, energy).
- 9 items of the 13-item questionnaire by Laureati et al.¹ were used as selection criteria.
 - ≥3 of 9 items scored at 3* or higher: more sustainable group.
 - <3 of 9 items scored at 3* or higher: less sustainable group.

	1 - never	2 - rarely	3 - some times	4 - often	5 - always
1. Buying regional food					
2. Buying seasonal food					
3. Recycling					
4. Saving electric energy					
5. Buying regional food					
6. Using public transportation					
7. Eating organic food					
8. Buying clothes from ethical fashion					
9. Buying fair trade products					



2.5 FGDs: Discussion topics

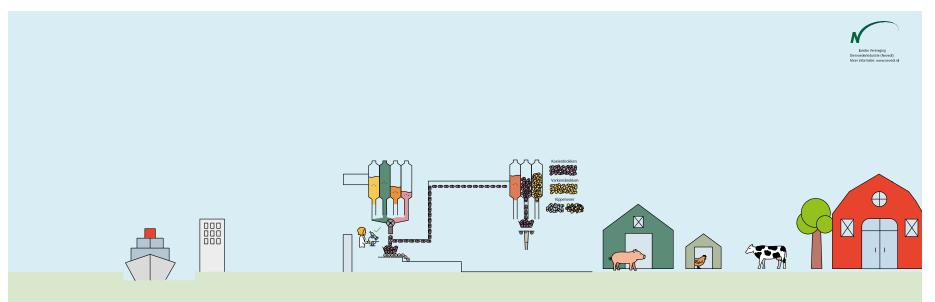
The following topics were included during the FGDs:

- How do consumers view the production of animal products and what position does animal feed have for them?
- How do consumers view different concepts (see next slide for six examples) of Eco-feed from catering and retail for pork, chicken, meat and eggs?
- Under which conditions are consumers open to buy Eco-feed concepts?
- Which sustainability characteristics do consumers link to Eco-feed?
- Is providing information on Eco-feed necessary and if so, what information could be helpful?
- What is the opinion of consumers on Eco-feed as a name and what is their opinion on other alternatives for the concept?



2.6 FDGs: Introducing animal feed production

The following poster was used to introduce animal feed production to the participants:





Source: <u>Nevedi website</u>, accessed on 14th of December 2021

2.7 FGDs: six Eco-feed concepts

The following six Eco-feed concepts were used during the DGDs:

Product in store	Side-/residual stream of which feed is made	Already applied in practice	Feed (form)
1. Chicken escalope	Unserved food in a restaurant		Pellets
2. Chicken breast	Potato peels from the production of fries	х	Mash
3. Minced meat pork	Unsold meat from the supermarket		Liquid feed
4. Pork Chops	Food leftovers from plates in a restaurant		Pellets
5. Egg	Unsold bread from bakery	х	Pellets
6. Egg	Unsold ham cheese croissants		Mash



3. Results





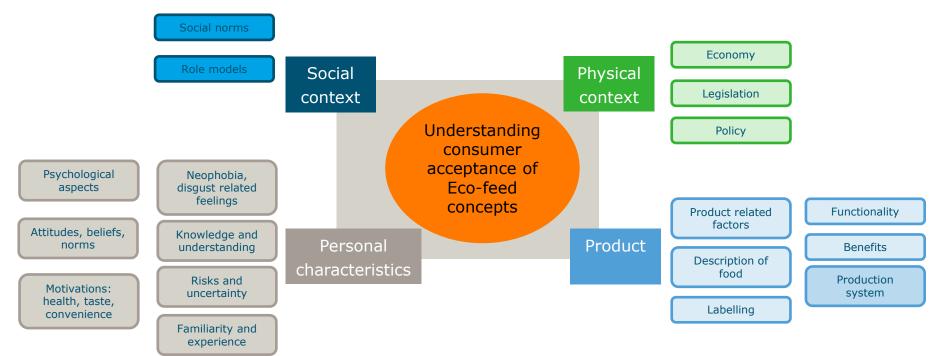
3.1 Findings from literature

- The literature search resulted in 55 papers, of which 18 were relevant in relation to the research questions.
- Only 1 paper (Sasaki et al., 2011) and 1 report (REFRESH Deliverable 1.7) were found to have a specific focus on consumer acceptance of Eco-feed.
- Therefore, the literature used to develop the theoretical framework was expended to include similar topics, such as consumer acceptance of novel plant proteins, meat replacers, insects and other novel circular feed and food concepts.
- The 18 relevant papers were summarized in an Excel sheet and then analysed on elements, factors, drivers and barriers possibly contributing to consumers' acceptance of Eco-feed.
- This resulted in the theoretical framework as shown in the next slides.



3.2 Theoretical framework consumer acceptance (1/3)

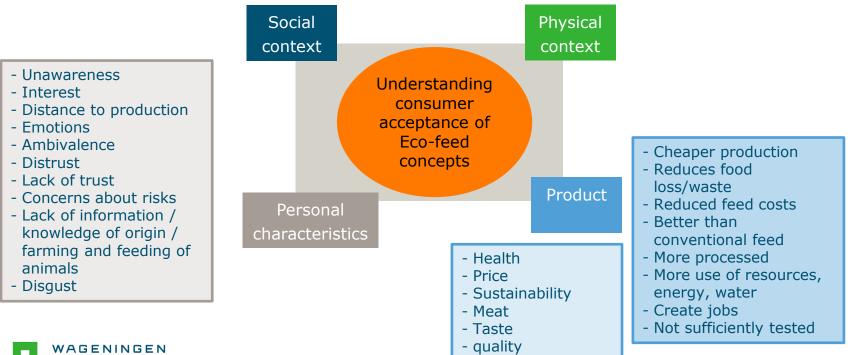
Critical elements for consumer acceptance of Eco-feed include:





3.2 Theoretical framework consumer acceptance (2/3)

Example associations



3.2 Theoretical framework consumer acceptance (3/3)

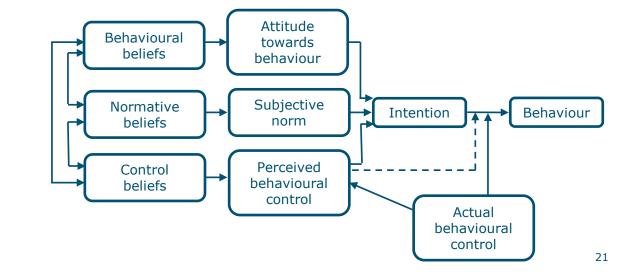


Consumer acceptance ≠ behaviour (in this case, willingness or intention to buy Eco-feed products). This phenomenal is called the `attitude-behavioural intention gap'.

This gap needs to be overcome for (new) behaviour to manifest: food purchase, actual behaviour, habits, behavioural change.

RENEW uses the **Theory of Planned Behaviour** (Ajzen, 2015) to explain this gap:

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3.3 Findings of the focus group discussions



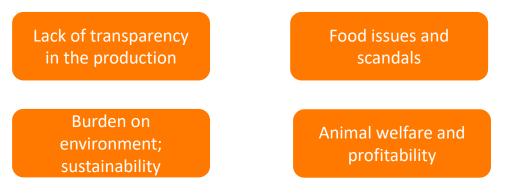


3.4 First impressions on animal production systems





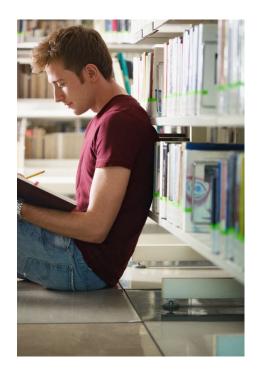
Meat products and production of meat spontaneously evoke several negative associations in four areas:



Reflection:

- The negative associations might be evoked by the word 'production'.
- At the same time, eating meat remains highly desirable: there is a lot of love for the end-product (meat).

3.5 FGDs on animal feed



Animal feed is not a manifest topic for most participants

In the context of meat and meat production, animal feed does not seem on top of mind:

- Hardly mentioned at a spontaneous level.
- Most participants do not recall ever having consciously thought about animal feed.
- Only very few spontaneously mention feed as a topic.



3.6 FGDs on animal feed ingredients





The ingredients of animal feed are unknown to most participants

- Actual knowledge and intrinsic interest in the topic is rather low.
- Animal feed mostly pictured in the original, recognisable form: the seeds, corn, etc.
- The notion of pallets, wet feed or ground fodder is hardly mentioned.
- Some automatically assume that animal feed is monitored or controlled by a specific authority, and thus fine for me.
- Some participants are aware of the use of leftovers/waste as animal feed (but on small-scale, or for own hobby animals).
- Negative assumption: feed contains hormones or antibiotics to make the animals grow as fast as possible
- Meat as ingredient for feed is even less top-of-mind.

3.7 FGDs on feed production process



Information on the general production process of animal feed: nice-to-know, but also nice to forget

- The presented poster succeeds in providing information on the process of animal feed production.
- Nice to know and discuss during the group discussion, but no interest in that much detail in daily life.
- Only incidentally there is a notion of changing one's behaviour, based on the information given.



3.8 FGDs on Eco-feed: understanding





General considerations on Eco-feed

In order to assess if a concept is acceptable, a certain knowledge level about the concept is required, however:

- Knowledge on animal feed is generally low, so there is no clear reference point to compare the Eco-feed concepts.
- This could cause doubts and makes participants draw their conclusion based on own assumptions, which not necessarily are factual.

Many use their common sense or gut feeling to assess a concept:

- Is it something I myself would give to an animal?
- Is it really not fit for human consumption anymore? (e.g., would it still be possible to donate to charity?).
- Is it in line with what this animal would eat themselves naturally? Chickens are typically seen as herbivores (while they are omnivorous) and pigs overall are seen as omnivores (correct).

3.9 FGDs on Eco-feed: first impressions

Accepted / positive impressions

 Ingredients that are recognizable/familiar as foods for this type of animal: bread, potato peels.

Rejected / negative impressions

- Processed products that contain too much salt, or spices, or ingredients that animals normally would not eat are not suitable as feed.
- Meat ingredients in feed is unnatural, specifically for chickens.
- Doubting the ability of industry to separate waste (specifically animal products) to avoid cannibalism.



3.10 FGDs on Eco-feed: positive associations



Recycling, circular use of waste:

- Bigger advantage is attributed to a concept when large amounts of food are wasted: e.g., in restaurants and supermarkets.
- Local sourcing: waste from <u>local</u> shops and restaurants:
- Less transport/CO₂
- Sense of trust and control.
- Better utilization of waste streams.

Less economic costs: assumption that it is cheaper than conventional feed costs, based on 'new' ingredients.



3.11 FGDs on Eco-feed: negative associations



Uncertainty about accumulating ingredients in the end product: will 'bad things' end up in my meat or eggs? (human health risks).

Unspecified ingredients: not clear what is exactly used.

Worries about **animal welfare**: is it in the interest of the animal or in the interest of the industry?

Ethical discussion: animals eating meat or even eating their own species (cannibalism).



3.12 FGDs on Eco-feed: ranking concepts

Product in store	Side/ residual stream of which feed is made	Most accepted	-	-	-	-	Least accepted
1 Chicken escalope	Unserved food in a restaurant						
2 Chicken breast	Potato peels from the production of fries						
3 Minced meat pork	Unsold meat from the supermarket						
4 Pork Chop	Food leftovers from plates in a restaurant						
5 Egg	Unsold bread from bakery						
6 Egg	Unsold ham cheese croissants						



3.13 FGDs on Eco-feed: concept terminology

Concept terminology (NL/English)	Appealing?	Positive associations	Negative associations
Geredde ingredienten (saved ingredients)		Playful, friendly, spikes interest	
Circulaire grondstoffen (circular raw materials)		Descriptive, indicates sustainability, focusses on process	
Co-producten (co-products)			
Eco-feed (Eco-feed)		Re-using waste	"Eco" is misleading (could be read as bio/organic), eco is used too much
Voormalige voedingsmiddelen (former foodstuffs)			Sounds strange
Surplus			Too vague
Food for feed		Clear description, sums it up well, using real food to make animal feed, process oriented, catchy (in English)	
Restjes (leftovers)			Negative association
Reststromen (residual streams)			Too large quantities
Voedselresten (food remains)			Creates unpleasant visual image
Levensmiddelen-afval (food waste)			Sounds spoiled, gone bad
Tegen verspilling (against waste)		literal description	Rather broad/vague

3.14 FGDs on Eco-feed: other suggested terminology





Linked to **recycling/circularity**:

- Voedselrecycling (food recycling).
- van rest tot vlees (from leftover to meat).
- Voedingscirkel (food circle).
- hergebruik in de voedselketen (reuse in the food chain).
- de cirkel in de voedselketen (circle in the food chain).
- de kringloop (the cycle).

Focus on animal welfare:

- Opti-maal (opti-meal).
- Optie-maal; de dieren hebben keuze (option-meal: leaving the choice to animals).

Using **waste**:

- Co-productie (co-production).
- Afval in veevoer (waste in feed).
- Rest- en bijproductie (residual and by-production).

3.15 FGDs on Eco-feed: Emerging topics



When asked what further questions consumers would like to have addressed, three key topics emerge:

- 1. Quality control and reassurance of food safety
- 2. What is in the best interest of the animal?
- 3. The transparency of the process, the reasons behind it and who benefits from it?



3.16 FGDs on Eco-feed: communicating the concept



Using Eco-feed in communication to consumers:

- For most of the participants, the topic of animal feed for meat production has **never crossed their mind**.
- Although most participants indicate it is nice to learn a bit about animal feed, it is not a topic that they are very interested in.
- Very likely, only a small group of people will be intrinsically interested and driven to understand the process better.
- Most participants indicate knowing about this topic would probably not influence their current meat consumption behaviour.



4. Discussion of results





4.1 Adapting the theoretical framework (1/3)

The following elements (either drivers or barriers for acceptance) came forward during the focus groups discussions and were not yet part of our theoretical framework:

- Personal characteristics:
 - Lack of knowledge
 - Lack of interest
 - Lack of awareness
- Physical context:
 - Assumption of monitoring by competent authorities and industry.
 - Quality control.



4.1 Adapting the theoretical framework (2/3)

Product and production system:

- Feed ingredients not known: preference for recognizable and familiar feed for the animal (natural).
- Concerns about separating the waste streams, especially meat, to avoid `cannibalism'.
- Lack of transparency in food production system.
- Issues with animal welfare.
- Food issues and scandals.
- Burden on the environment and on sustainability.
- Ingredients of feed not known. Concerns about:
 - Price
 - Sustainability
 - Taste



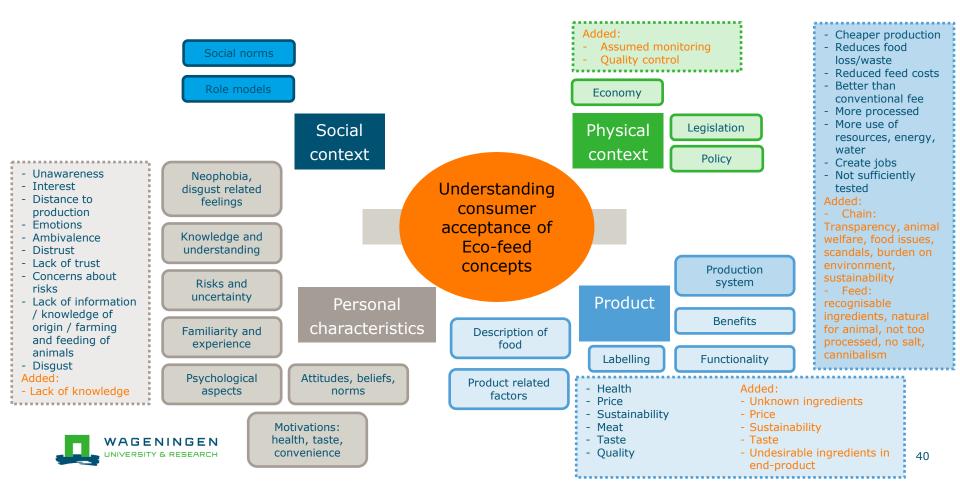
Undesirable ingredients in end-product

4.1 Adapting the theoretical framework (3/3)

- These elements were added to 3 of our 4 pre-defined categories.
- No new identified elements in the category 'social context', meaning this did not come up spontaneously during the focus group discussions.
- These additions resulted in an adapted theoretical framework, as shown in the next slide.



4.2 Adapted theoretical framework



5. Conclusions and recommendations





5.1 Conclusions

- This explorative study provided a complete overview of critical elements (drivers and barriers relating to attitude and behaviour) that influence the consumer acceptance of Eco-feed concepts.
- The elements can be categorized in factors relating to *personal* characteristics, social context, physical context and the product including the production system.
- A lack of knowledge and interest in the topic seems a big barrier.
- There seem to be no clear differences between more and less sustainable consumers regarding attitudes and opinions on Eco-feed concepts.



5.2 Implications for research on Eco-feed

It might be interesting to put the emphasis on the **positive aspect** of circularity/recycling, also in the naming of these concepts Emphasise and show that quality control is in place, a **transparent process**, checked or monitored by an independent entity

Explore the **positioning** of Eco-feed further: stand-alone concept vs. positioned as part of animal welfare label, sustainability score (e.g. Eco-score) or CO2 footprint

ECO-SCORE





5.3 Future research

- Quantification of consumer acceptance findings (survey study).
- Developing propositions for Eco-feed, based on the findings of this study: how to bring Eco-feed to the market?
- More research is needed to identify different target groups and key messages (e.g., towards more sustainability-oriented consumers, flexitarians, etc.).
- Investigating the willingness to buy Eco-feed products, overcoming the 'attitude-behavioural intention' gap.



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Annex I: WUR SEC - Ethical approval





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To whom it may concern

23-09-2021 SUBJECT Ethical approval of research

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The following project proposal has been reviewed by the Social Sciences Ethics Committee (SEC):

Title:RENEW - Circulair ketenontwerp voor Eco-feedProject team:Sandra van der Haar, Siet SijtsemaFunding:TKIPeriod:2021Location:Online

The Committee has concluded that the proposal deals with ethical issues in a satisfactory way and that it complies with the Netherlands Code of Conduct for Research Integrity.

With kind regards,

Menny

Professor Dr Marcel Verweij Chair Social Sciences Ethics Committee

Wageningen University & Research is specialised in the domain of healthy food and living environment.

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Report 2297



The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 7,200 employees (6,400 fte) and 13,200 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.