

A socio-economic perspective on co-product exploitation

Prof. B. Gremmen
Plant Breeding; Methodical Ethics and Technology
Assessment
Wageningen University, The Netherlands



WAGENINGEN UNIVERSITY
WAGENINGEN UR

Overview

1. Introduction
2. Pilot Study
3. Delphi Studies
4. Focus Groups
5. Cost-Benefit analysis
6. Conclusions



1. Introduction

- The Fifth Way
- Great Expectations (Cheap, High Value, Sustainable)



Results

- Need to address issues of food waste generally acknowledged
- Strong concerns about food-safety issues and hygiene
- Difficult to conceive (appeal of) possible end-products
- Industry wants economical water recycling of peels-pulp
- RCT colorant extraction does not answer consumer expectations
- BSG reprocessing is acceptable under conditions.
- Cost/benefit assessments RCT and BSG are negative

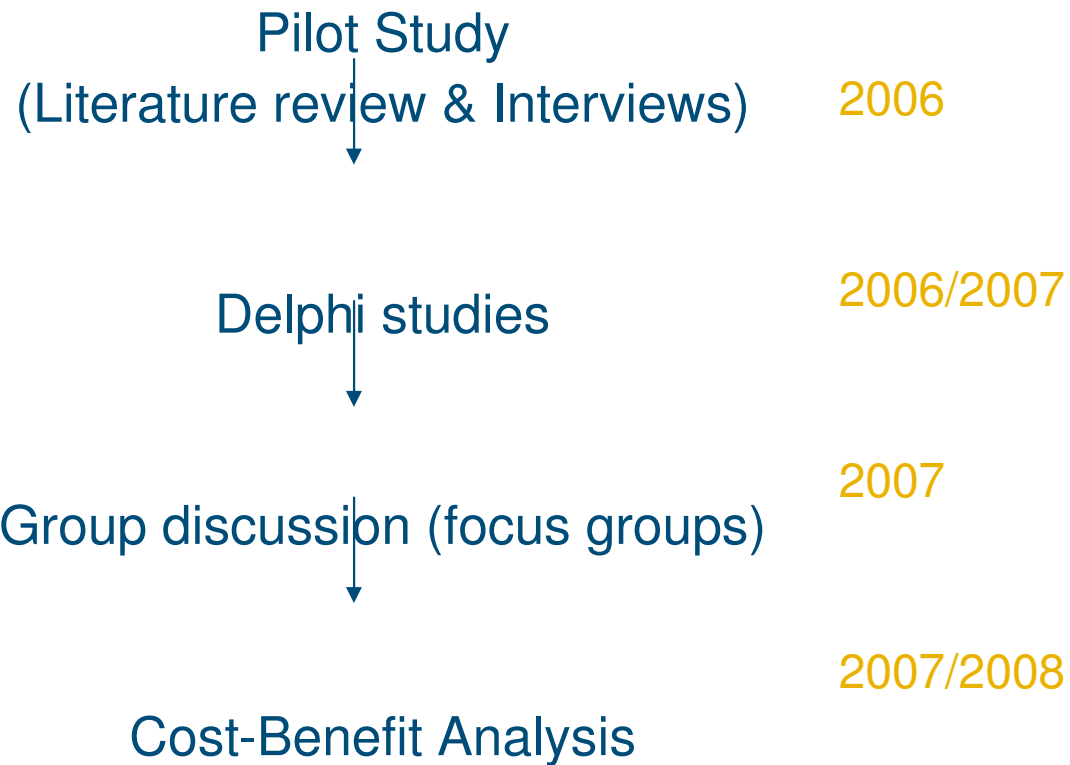


Objectives of socio-economic assessment

- To assess the **societal acceptability** of the processes and products involved in the upgrading of organic waste
- Aim is early involvement society in innovation
- comparing cost and benefits.
- A focus on consumers.



Description of work



Pilot Study



WAGENINGEN UNIVERSITY

WAGENINGEN **UR**

Aim of Pilot Study

- Explore how respondents come to understand the idea of reprocessing food waste
- Identify issues that are unclear or in need of additional explanation/information
- Identify respondents' understanding of opportunities and challenges posed by REPRO's ideas



Interviews: sites & format

- 25 exploratory semi-structured interviews in Netherlands (Eindhoven, Wageningen) and Scotland (Glasgow, Edinburgh)
- Duration: 20-30 minutes
- Respondents: consumers, retailers, 'experts'

Interview format:

- information about REPRO (website)
- short text announcing development of vegetable crisps made of food processing waste
- Text introduced/used as springboard for interview



Pilot: results I

General observations:

- High complexity!
- Respondents express particular difficulty understanding:
 - trimmings/peelings food-graded?
 - pesticides left on trimmings/peelings?
 - what kind of food processing technology is needed?
- Difficult to conceive (appeal of) possible end-products

Pilot: results II

- Need to address issues of food (processing) waste generally acknowledged
- FAQ: is this the most viable alternative to reduce food processing waste? (“sounds complex”; “lot of technology involved”; “does it have to be brought back into the food chain?”)
- Retailers consider relevance in relation to local (in-shop) recycling practices
- Consumers generally express strong concerns about food-safety issues and hygiene



Pilot: results III

Observations about processing technology:

- All retailers express **need for transparency** about the process
 - How sustainable will the reprocessing trajectory be?
 - Will it measure up against possible other solutions for treating food processing waste?

- Majority of retailers less concerned about **hygiene and food safety** in first stage of process
 - Generally assume it to be similar to processes they are already familiar with

- Consumers find processing technology involved **hard to imagine** and typically react with remarks like:
 - “what will they do to it?”
 - “chemical connotations come to mind“



Pilot: results IV

(when talking about concrete products, i.e. crisps, juices)

- Product may fit in with existing product range (retailers)
- Recognisability of actual products (i.e., with crisps: dried pieces of sliced banana and with these products.....??)
- “Not too much weird science” (doubts about appealing looks of the product)
- Emphasis on taste (“It should definitely have to be tasty”)



Delphi Studies



WAGENINGEN UNIVERSITY

WAGENINGEN **UR**

Delphi basics

- “Delphi technique is designed to systematically solicit and collate informed judgements about the future”
- Delphi technique traditionally geared towards reaching **consensus**; current applications show more diversity of use (exploring set of arguments behind opinions, not consensus driven)
- Our aim was to elicit peoples’ **opinions** and have them elaborate on their answers (highlighting arguments-basis for 2nd round)
- Characteristics of the Delphi technique differ from survey (multiple rounds; repeating questions; takes more time; answers often include written comments)



REPRO Partners Delphi

General

- Test the Delphi technique (use as pilot)
- Use the instrument to collect process information

Specific

- Explore partners' views on different areas related to REPRO (varying from project-related aspects to more general aspects)
- Determine the key arguments that make up partners' views by asking for elaboration of answer



Results

- N=34
- 17 returned questionnaires
- Qnaire consists of 42 items

- 30 structured items
- 14 items show 'unity of opinion'
- 16 items show diversity of opinion
 - 14 items show high frequency of answer category neither/nor
 - 2 items show 'minority view'



Minority Views

Explicit difference of opinion on 2 items:

- the project should focus more on developing food products with possible health benefits
- consumers should only receive information when end-products are available in shop



Industrial Stakeholder Delphi



WAGENINGEN UNIVERSITY

WAGENINGEN **UR**

Set-Up: Stakeholder Questionnaire

Questionnaire:

- Recommendations from the pilot integrated
- web-based
- 16 questions: 9 scaled/ 6 ranking/ 1 open

Format:

- Web-Based
- True anonymity
- Data is immediately accessible to respondents
- Click and go

Number of participants:

- 61 invitees
- Recruited through the industrial platform



Results: Stakeholder Questionnaire

- 1 invitation and 4 reminders were sent out, respectively resulting in 3, 4, 6, 4 and 1 returns

Returned questionnaires
18 out of 61

- Response rate = $(61-7)/18 = 30\%$



Set-Up: Questionnaire themes

- HACCP & Reprocessing in relation to:
 - Food safety
 - Waste production
- Need for Communication
 - Product origin
 - Used technology
 - Right of information
- Opportunities and preferences
 - Kind of product
 - Kind of raw material
 - Appropriate technology



Diverging viewpoints

No need for more than the normal communication
VS
Extra communication as a precaution



Diverging viewpoints

No special quality control measures

VS

Extra control to answer consumers perceived safety concerns



WAGENINGEN UNIVERSITY

WAGENINGEN UR

Diverging viewpoints

Technology available, but incentives lacking

VS

Existing techniques lack outlook for acceptable and profitable products



WAGENINGEN UNIVERSITY

WAGENINGEN UR

Results: Stakeholder preferences

Ranking most promising: 1) Water recycling, 2) Medium value products, 3) Volume reduction, 4) High value products

Appropriateness for reprocessing: 1) Peels & pulp, 2) Waste water, 3) Trimmings, 4) Rejects, 5) BSG

Expected cost effectiveness: 1) Water recycling, 2) Volume reduction, 3) Separating dry matter, 4) Other, such as dyes, nutrients etc.

Incentives for reprocessing: 1) Economical, 2) Legislative, 3) Environmental, 4) Sustainability, 5) Other.



4. Consumer Focus Groups



WAGENINGEN UNIVERSITY

WAGENINGEN **UR**

Methodology

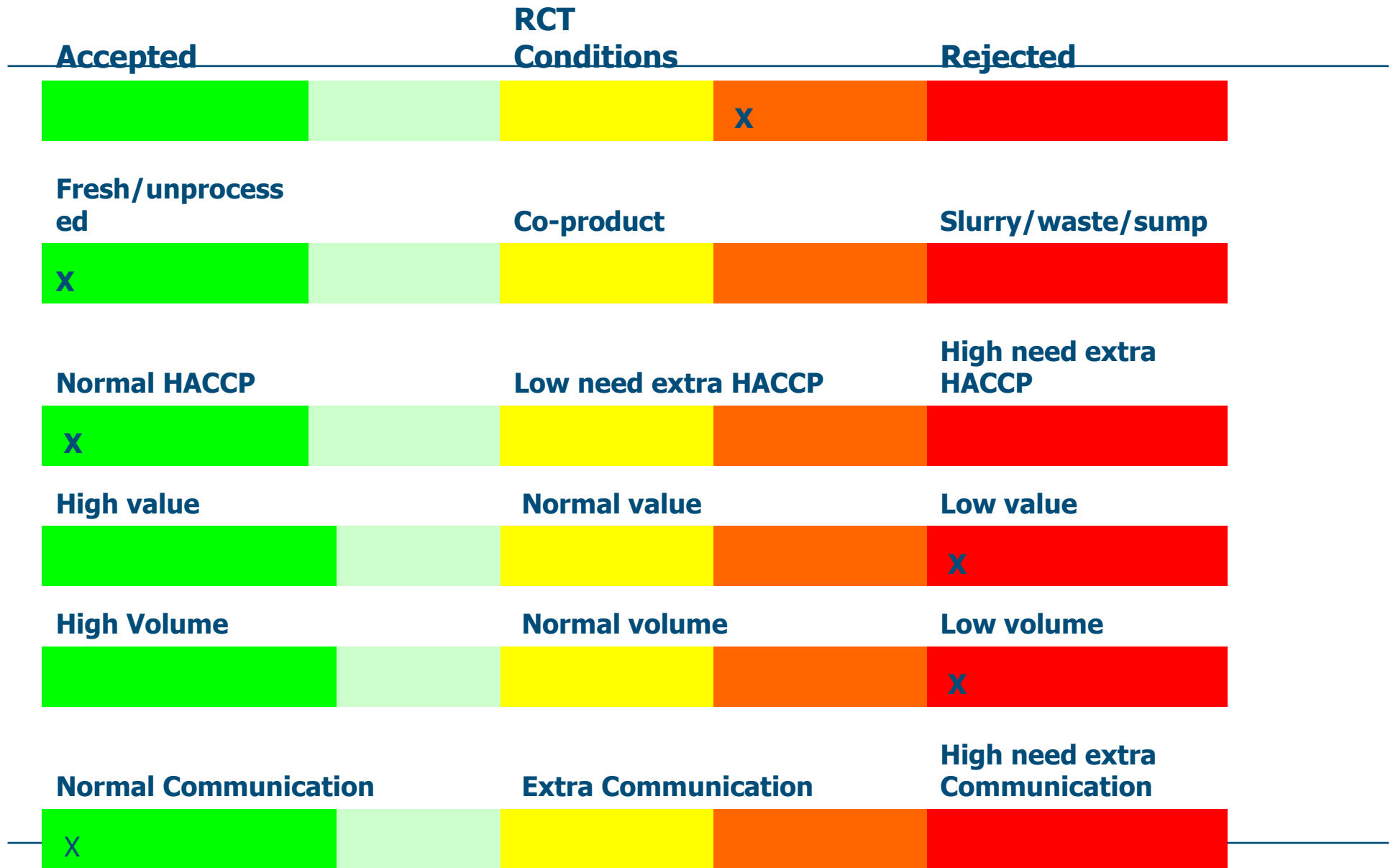
- Four focus groups in The Netherlands of respectively 8, 10, 10 and 9 respondents, which makes a total of 37 respondents.
- After completing the fourth focus group theoretical saturation was reached: the range of ideas was heard, answers overlapped.
- Duration focus group discussions: 2 hours.



Results Red Cabbage Colorant

- Red cabbage colorant extraction does not answer consumer expectations.

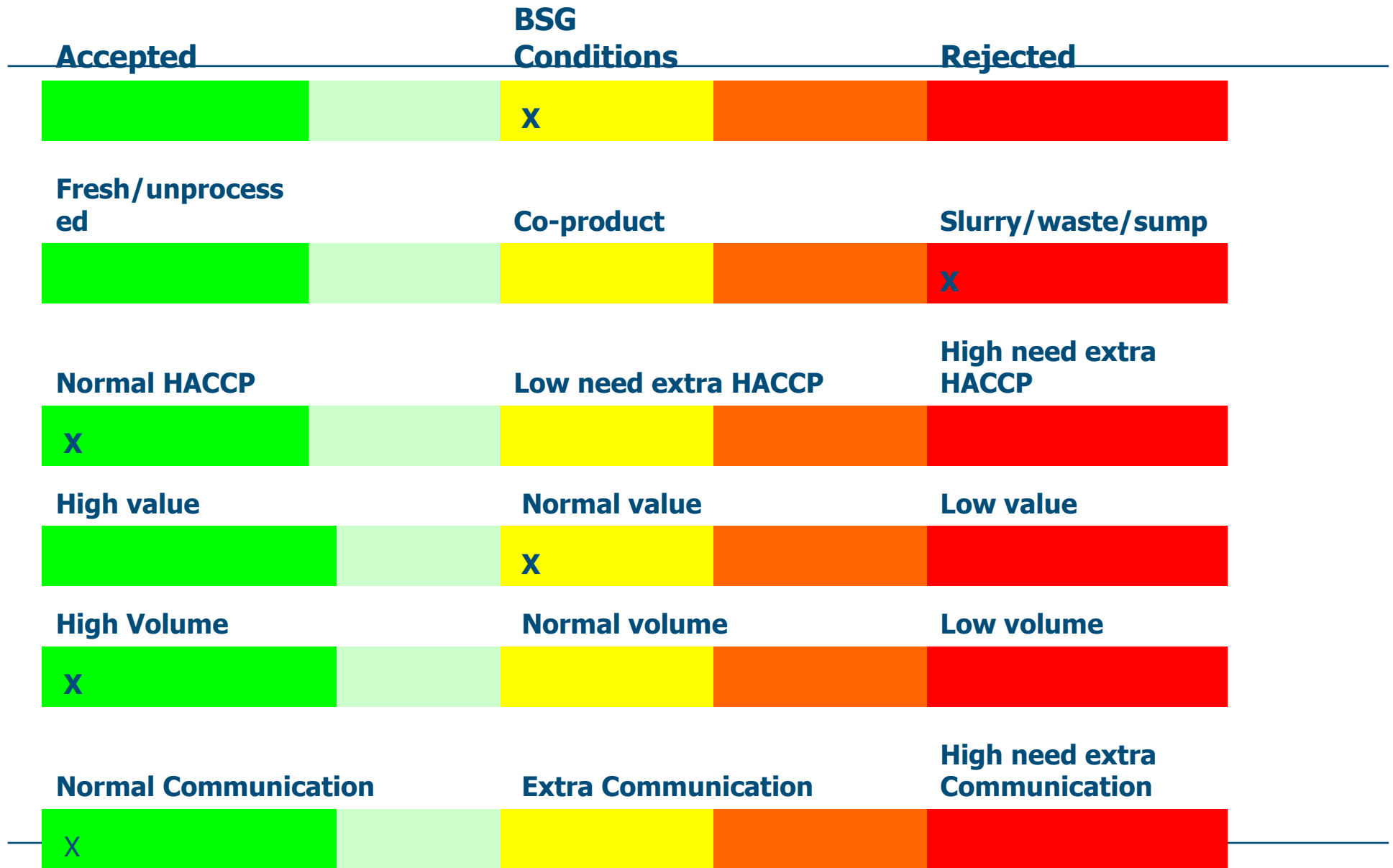




Results BSG

- BSG reprocessing is acceptable under conditions.





5. Cost-Benefit Analysis



WAGENINGEN UNIVERSITY

WAGENINGEN **UR**

Existing disposal routes

- Burn the waste
- Landfill
- Composting
- Feed



BSG

Compare regular snack and BSG snack

- The total costs of 92,6 kg *chickpea snacks* are €7,69 (the rice flour € 1, 16 and the other ingredients and process costs €6,53).
- The total costs of 92,6 kg *BSG chickpea snacks* are €18,30 (other ingredients and process costs €6, 53 and gum Arabic €11 and extra energy €0,77).



Conclusion BSG

- When gum Arabic is replaced by a cheap alternative, the total assessment of the BSG chickpea snacks will be positive



RCT

- In the pectin with MHR scenario, the benefits of €1942 minus the process costs of €3856 show a loss of €1914. The total cost/benefit assessment for this case is negative.
- In the MHR alternative scenario, the benefits of €1872 minus the process costs of € 1381 show a gain of €491. After the inclusion of the other daily costs, the total cost/benefit assessment of this scenario will also be negative



Conclusion RCT

- Energy efficient drying, including pre-concentration, will substantially contribute to cut costs and lower the environmental impact of the process.



6. Conclusions

- The concept of “waste” is context dependent
- Sustainability is conceptually ambiguous
- The need to reduce waste volumes seems to be widely supported
- Clear benefits do contribute to acceptance
- Trust and a relation of mutual responsibility are important for consumers
- Consumer safety concerns are to be dealt with in their own right

Acknowledgements

WU

- Prof. Lynn Frewer
- Paul van Haperen
- Dr. Joyce Lamerichs

IFR

Prof. Keith Waldron

- All members of the **REPRO Team**



Thank you!

© Wageningen UR



WAGENINGEN UNIVERSITY
WAGENINGEN UR