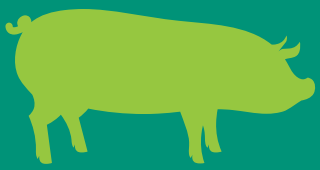
EDIBLE INNOVATIONS

FOOD INNOVATION AND CONFLICTING PRIORITIES BETWEEN TECHNOLOGICAL PROGRESS AND CONSUMER REJECTION

A SUMMARY OF
THE MOST IMPORTANT
RESEARCH FINDINGS



DIE LEBENSMITTELWIRTSCHAFT
WEIL ESSEN GESELLSCHAFT IST

FOREWORD

With the "Edible Innovations" survey, "DIE LEBENSMITTEL-WIRTSCHAFT e. V." has asked consumers their opinion regarding the numerous technological innovations that find their way either knowingly or unknowingly onto their plates.
We wanted to know whether the population is concerned about innovations in the agriculture and food sector and more about their attitudes towards various innovations in particular. The Fraunhofer Food Chain Management Alliance was entrusted with the scientific implementation of the survey.
Based on the resulting data, not only companies and associations, but also scientific institutions can specifically understand how food-related innovations can be better accepted and thereby improve their communication with consumers. The agriculture and food sector has always had a great ability to innovate. It creates technological innovations that are used in everyday life and will also be needed in future, to preserve both national and international resources with the aim of guaranteeing a reliable supply of healthy foods.
For this survey we conducted 1006 interviews between 9 July and 16 July 2015. The interviews are representative for the entire resident population of Germany. Innovations were defined as "technological developments that result in new products, services or processes".
This document presents the essential results of the survey.

You can download the complete presentation of the results of this survey along with the questionnaire at:
http://www.lebensmittelwirtschaft.org/presse/downloads.

Best regards
Stephan Becker-Sonnenschein
Managing Director
"DIE LEBENSMITTELWIRTSCHAFT e. V."

PRELIMINARY STUDY "EDIBLE INNOVATIONS"

In a qualitative preliminary study, between March and April 2015, 20 guided interviews were conducted with government authorities, companies, associations, initiatives and researchers.
Below is a summary of the results, which form the basis for the representative survey:

- Technological innovation with respect to the entire process chain is the core competence of the agriculture and food sector.
- The major companies are specifically expected to take the lead in fields such as bio-economy or Industrial Internet.
- The differences between b2b innovations (e.g. economy) and b2c innovations (e.g. benefit) need to be understood.
- The interlinking with civil society is currently inadequate. Awareness for potential improvements needs to be underlined.
- A better assessment of the impact of innovations on consumers is called for, such as in the case of new sources of protein.
- On one hand, opposition and scepticism towards technology is part of consumer diversity and on the other hand also a plaything for social media users.
- In their own interest, certain NGOs specifically promote fear of technology, which is partly caused by poor communication. However, food manufacturers feel they are being placed under general suspicion.
- Structural barriers to communicating innovation, such as politics or laws, need to be addressed.
- Substantive criteria for improving communication need to be developed.
- The most important innovations of the last 50 years: Food conservation (drying technology, refrigeration), functional ingredients, barcodes, improvements in sustainability (resource efficiency and the processing of residual material).

In addition, two student focus groups from the University of Regensburg have provided detailed descriptions and explanations of their dealings with innovations in the food sector.

The 20 experts and 13 students were interviewed separately to find out what they consider the most important innovations in the food sector over the last 50 years:

In the opinion of experts:

- Food conservation
- Aseptic filling: A sterile product is packaged in a sterile container
- Drying technology
- High-pressure technology and treatment
- UHT and Extended Shelf Life (ESL) milk
- Fresh food logistics, pasteurisation, hygienic properties that contribute towards food safety
- Logistical possibilities for the constant availability of fruit and vegetables
- Cold chain (cooling, freezing) makes a big difference, particularly for convenience foods
- Deep freezing
- Continual production of foods
- Packaging industry: The use of polymers, i.e. less glass and more plastics (deep drawing, sealing, moulding of packagings)
- Beverage cartons (improved food quality)
- New types of marketing guided by civil society, such as Community Supported Agriculture
- Health-promoting products and health claims (cholesterol-reducing margarine)
- Organic farming, as it has meanwhile become part of mainstream society
- Bio-convenience
- MSC seal
- Nanotechnology
- Fast food

In the opinion of students:

- Microwave
- Induction cooker
- Electric kettle
- Pressure cooker
- Bread-making machine
- Thermomix
- Coffee capsules
- Refrigerator
- Cold chain, deep frozen products in general
- CA storage
- Frozen foods sold in small portions
- Constant availability of foods
- Smartphone and laptop in the kitchen
- Barcoding
- Local food-sharing
- Online ordering
- Delivery service
- Organic food deliveries

Derived from the results of the preliminary study, the following representative consumer survey helped us find out:

- What the general attitude towards innovations is.
- What the attitude towards food innovations is.
- Which innovations consumers are aware of.
- How they perceive them.
- Which benefits of innovation are important to consumers.
- Where consumers obtain their information about food innovations.

In conclusion, the attitudes towards innovation show us that there are five basic types of consumer.

RESULTS DERIVED FROM THE REPRESENTATIVE SURVEY

1.

GENERAL INTEREST IN INNOVATIONS

For consumers, the most interesting fields of innovation are not the automotive or IT sectors, but health and healthy nutrition.

Two out of three respondents (**63%**) are either strongly or very strongly interested in the field of health and healthy nutrition, followed by IT/telecommunications (**53%**) and medicine (**43%**).

The production and processing of foods is in fourth place (**41%**). Innovations in commerce follow (**35%**), alongside pharmaceutics and cars/car accessories. The least interesting aspect of innovation is in agriculture (**25%**).

63%
Health and healthy nutrition

52%
IT and telecommunications (e.g. mobile communications, computers, etc.)

43%
Medicine (e.g. diagnosis)

41%
Food production and processing

35%
Commerce

34%
Pharmaceutics (e.g. medications)

35%
Cars and car accessories

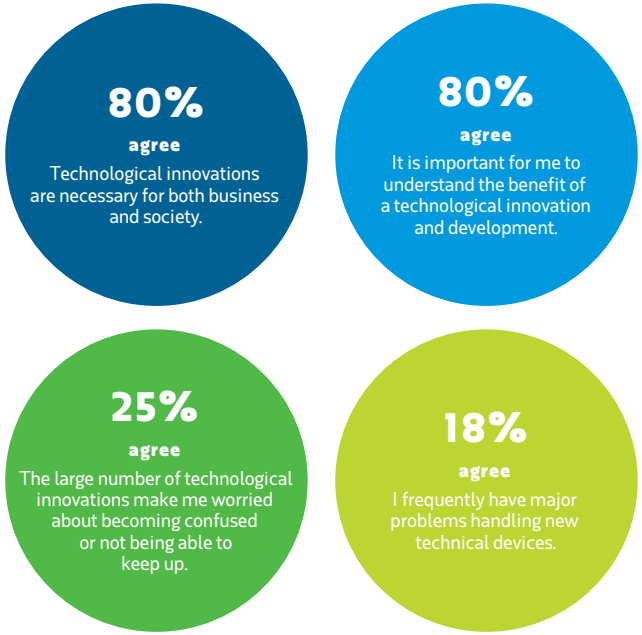
25%
Agricultural production

2.

GENERAL ATTITUDES TOWARDS INNOVATION

**Consumers do not generally oppose technological innovation.
They simply want to understand the benefit of an innovation.**

80 % of consumers regard innovation as necessary and an equal number find it important to understand the benefit of an innovation. Only one quarter of consumers are afraid of not being able to keep up with the fast pace of innovation. Only **18 %** frequently have major problems handling new technical devices.

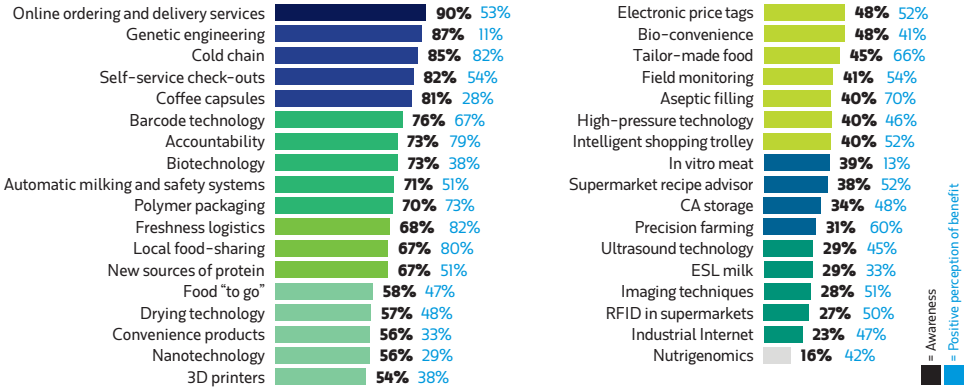


3.

PUBLIC AWARENESS OF FOOD INNOVATIONS

**Consumers frequently fail to perceive food innovations for what they are.
When asked about specific innovations, individual consumers often assess them positively.**

However, when consumers are openly asked about innovations, they often have trouble answering. 43 % and 44 % of participants respectively are unable to name either positive or negative food innovations and 22 % and 23 % respectively did not answer either of the questions.
10 % consider natural or organic cultivation and/or an increased number of organic products as a positive innovation. 8 % consider genetically modified cultivation to be a negative innovation.
The results also show: In the opinion of consumers, technological innovations (e. g. new machines and/or technologies for reducing workloads, genetic engineering, online shopping) and general food-related topics (free trade agreements, factory farming, price developments) are mixed with each other.
In closed questioning, however, a number of innovations that affect the entire food production chain have attained a high level of awareness among consumers in some cases, although awareness does not automatically mean a positive perception of the benefits.



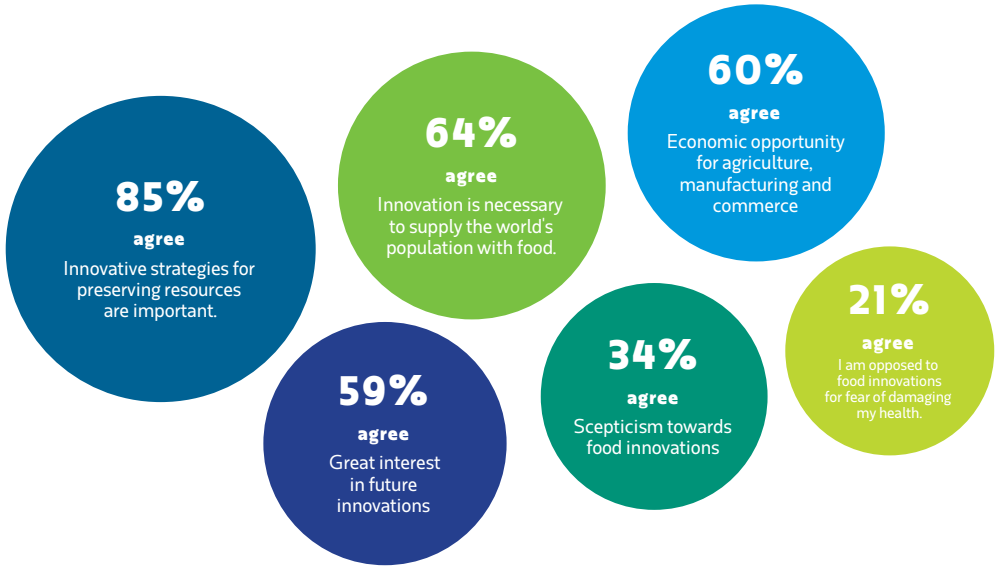
4.

IMPORTANCE OF FOOD INNOVATIONS

One third of those surveyed are sceptical towards food innovations. However, the majority consider innovation as important. Concrete future strategic aims of innovations, such as improving nutrition worldwide, environmental protection and livestock farming, met with widespread approval.

Almost two thirds (**64%**) see innovation as necessary for supplying the world's population with food. **60%** see innovation as an economic opportunity, whereas **59%** are very curious about future innovations.
A good one third (**34%**) tend to be sceptical about food innovations. One fifth (**21%**) are opposed to technical food innovations for fear of damaging their health.

When asked about the future importance of innovation strategies for food manufacturing, **85%** put the preservation of resources in first place, followed by environmentally compatible packaging, improvements in livestock farming and the safeguarding of sustainable food production.



5.

COMMUNICATION OF INNOVATIONS

Consumers want to have more information and greater transparency regarding the way food innovations are communicated. They need the focus to be on the benefit of the innovation and want to be involved at an early stage. The majority do not see tradition and innovation as contradictions.

Three quarters of those surveyed (**76%**) are of the opinion that the food sector (farmers, manufacturers and retailers) should communicate innovations more transparently. **28%** feel they are sufficiently informed about technical food innovations, **37%** feel they are not sufficiently informed.

77% are interested in the greater benefits of innovative foods, **73%** find that consumers should be more closely involved in this topic. **67%** do not see a contradiction between innovative and traditional food manufacture.

77%
Before I buy an innovative food, I want to understand the greater benefit.

76%
Agricultural producers and other players should communicate innovations more transparently.

73%
Consumers should be more closely involved in technical innovations.

67%
Innovative and traditional food manufacturing do not contradict each other.

6.

PERCEPTION OF INNOVATIONS – CHANNELS OF COMMUNICATION

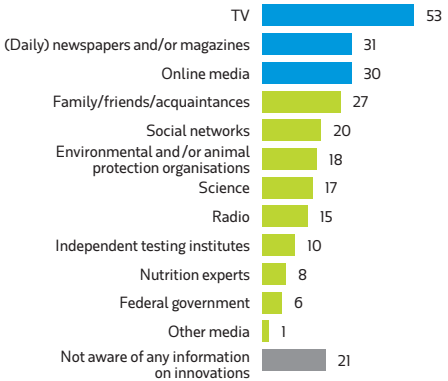
The most important sources of information are still the conventional media, i. e. TV and print. Consumers also want to gain personal impressions at trade fairs, farms, or by visiting companies and research institutes. The scientific expertise of researchers and research institutes should be taken more into consideration.

More than half of consumers obtain their information about innovations from TV (**53 %**). Daily newspapers (**31 %**), online media (**30 %**) and family/friends/acquaintances (**27 %**) are important sources for a large majority. **17 %** of participants obtained their information from scientific sources.

One fifth of those surveyed were not aware of any information relating to food innovations in any of the media sources during the last 12 months. They would like to obtain more information via TV and print. Around every fifth participant would like to gain a personal impression by visits to companies, scientific establishments or farms (**18 – 20 %**).

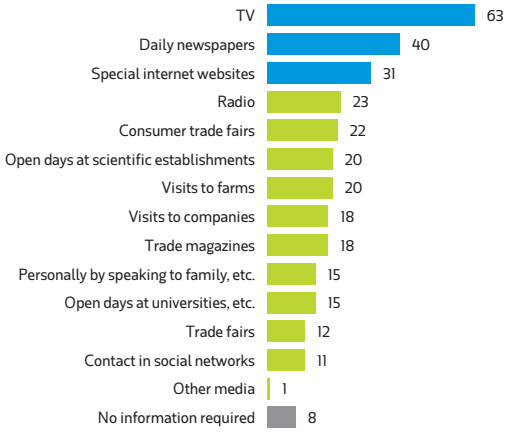
Perception of innovations

Where have you obtained information about food innovations during the last 12 months?



Desired channels of information

In which media would you personally like to see more information on food innovations?



7.

ATTITUDES TOWARDS NUTRITION

Quality and taste are usually more important to consumers than the composition of a particular food. Two thirds are of the opinion that they generally eat a healthy, balanced diet.

75 % say they pay great attention to selecting high quality foods. **66 %** say that they manage to generally eating a healthy, balanced diet, and **60 %** pay close attention to the foods they buy in order to stay healthy.

Taste is the most important point for **80 %** of participants when buying food. Almost half (**49 %**) say that the taste is more important for them than the composition of a food. **29 %** agree that the topic of healthy nutrition is given too much attention, whereas **45 %** reject this statement.

80% **agree**
I usually eat what I like the taste of.

75% **agree**
I pay great attention to selecting high quality foods.

66% **agree**
I generally eat a balanced, healthy diet.

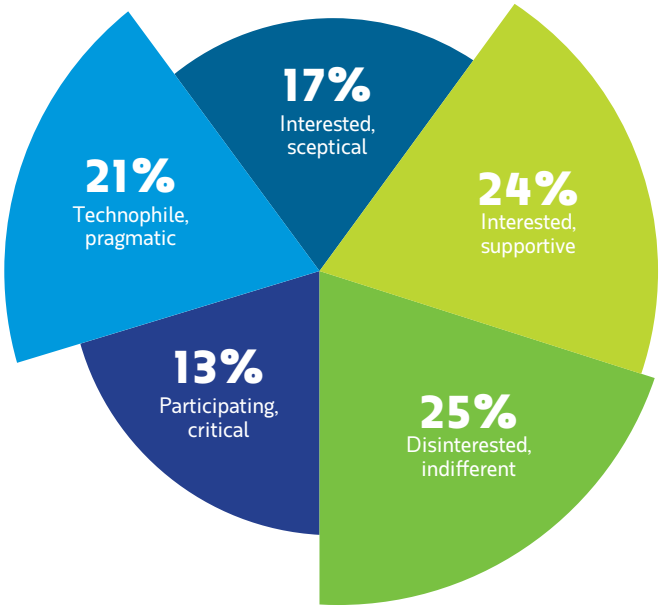
60% **agree**
I pay close attention to the foods I buy in order to stay healthy.

49% **agree**
Taste is usually more important to me than the composition of a particular food.

8.

CONSUMERS AND INNOVATION – A TYPOLOGY

Our representative survey showed that there are five different consumer groups among the population of Germany when it comes to technological innovation. It describes for the first time the groups to which the topic of innovation can be more strongly and specifically communicated:



Interested, sceptical consumers think food innovations are necessary and although they are interested in groundbreaking innovations, they are somewhat sceptical towards them. They consider themselves adequately informed about innovations, but dislike having to deal with new technical devices.

Interested, supportive consumers are highly interested in innovations and are technophiles. They see the necessity of innovations and have a positive attitude towards future innovations. Their high level of general involvement is expressed in their wish to be even better informed about upcoming innovations.

Disinterested, indifferent consumers are hardly interested in food innovations and do not find them important. They consider themselves sufficiently well informed and do not wish to be more closely involved. Accordingly, this consumer group notices a lot less information regarding innovations.

Participating, critical consumers are highly interested in innovations in the field of health and food manufacturing. They see the necessity of innovations for commerce and society, but have a sceptical attitude towards them. They consider innovations in the fields of environment and sustainability important. They want to understand the benefit of innovations and want to see consumers more closely involved, in order to achieve more transparent communication from the food sector.

Technophile, pragmatic consumers are interested in innovations in general. However, they are hardly interested in food innovations. They have a somewhat sceptical attitude towards them without categorically rejecting them and treat them pragmatically. They do not have problems handling new technical devices.

CONCLUSIONS DERIVED FROM THE SURVEY

The communication of innovations has been neglected

Neither science nor commerce have given sufficient importance to the topic of communicating food innovations in a way relevant for consumers.

Consumers perceive food innovations very differently and assess them in a variety of ways, although a great many consumers are interested in the topic. However, they perceive innovations in a different way to the experts. From the consumer's viewpoint, an innovation needs to have a personal or social benefit, i.e. it should have a meaningful impact.

If a topic is not part of consumers' daily lives, it is unlikely to determine their thinking. The novelty of an innovation must be both perceptible and beneficial for consumers. Only those who are aware of innovations can perceive them as such.

The best way to communicate food innovations is to highlight their health benefit and their contribution towards sustainability. The typology derived from this survey will facilitate a better understanding of the various groups. It is now important to prepare information that will appeal to these target groups.

The majority of consumers do not dispute the fact that technological innovations are important and necessary for both commerce and society. By linking food innovation with the topics of health and resource efficiency, which are particularly meaningful for consumers, the agriculture and food sector can greatly improve how it communicates food innovations to society at large.

APPENDIX

Socio-demographic structure

Information in %		Interested, sceptical n = 172	Interested, supportive n = 241	Disinterested, indifferent n = 252	Participating, critical n = 134	Technophile, pragmatic n = 207
Gender	Male	57	54	38	42	61
	Female	43	46	62	58	39
Age Ø		41	45	43	46	44
School qualification	Low	25	15	28	22	17
	Medium	36	44	41	40	39
	High	40	40	31	39	43
Income	Up to €1,999	35	26	42	46	41
	€2,000 - €3,999	51	51	49	46	43
	€4,000 and above	14	22	10	8	17
Percentage of 1-person households		19	19	24	26	28
Percentage of households with children < 18		49	35	35	36	35
Marital status	Married	49	47	41	50	44
	In a partnership	22	27	24	18	23
	Single	30	26	34	31	33
Preferred party among top 3*		CDU 35	CDU 32	CDU 26	DIE LINKE 31	CDU 27
		SPD 23	SPD 20	SPD 21	Bündnis 90 25	SPD 24
		Bündnis 90 12	Bündnis 90 14	Bündnis 90 14	CDU 15	DIE LINKE 20
	Don't know	10	12	19	10	11
	I wouldn't vote	19	12	16	14	18

*Percentages are based on the valid responses (excluding "don't know", "I wouldn't vote" and "no response")

Perception of innovations

F202: Where have you obtained information about food innovations during the last 12 months?

Information in % of multiple answers

		Interested, sceptical	Interested, supportive	Disinterested, indifferent	Participating, critical	Technophile, pragmatic
TV	53	+4	+13	-18	+5	0
(Daily) newspapers and/or magazines	31	-3	+14	-13	+3	-1
Online media	30	-3	+14	-14	+15	-9
Family / friends / acquaintances	27	+1	+12	-10	+5	-8
Social networks	20	+9	+3	-6	0	-4
Environmental and/or animal protection organisations	18	+1	+6	-10	+15	-6
Science	17	+3	+10	-11	+3	-4
Radio	15	+3	+4	-7	-2	+1
Independent testing institutes	10	+1	+6	-7	+4	-3
Nutrition experts	8	+2	+3	-4	-3	0
Federal government	6	+2	+1	-1	-1	-1
Other media	1	-1	0	+1	+2	-1
Not aware of any innovations	21	-10	-11	+18	-3	+4

Basis: n = Interested, sceptical: 165; Interested, supportive: 237; Disinterested, indifferent: 224; Participating, critical: 124; Technophile, pragmatic: 194

Positive difference from total (>= 10%)
Negative difference from total (>= 10%)

Desired channels of information

F203: In which media would you personally like to see more information on food innovations?

Information in % of multiple answers

		Interested, sceptical	Interested, supportive	Disinterested, indifferent	Participating, critical	Technophile, pragmatic
TV	63	-11	+10	-12	+11	+3
Daily newspapers	40	+1	+3	-14	+14	0
Special internet websites	31	-7	+11	-14	+13	-3
Radio	23	-3	+5	-6	+5	-1
Consumer trade fairs	22	-4	+10	-10	+10	-6
Open days at scientific establishments	20	-4	+12	-8	+5	-7
Visits to farms	20	+1	+7	-5	+2	-6
Visits to companies	18	+2	+8	-8	+2	-5
Trade magazines	18	+2	+8	-8	+3	-5
Personally in conversations	15	+7	+3	-6	-1	-3
Open days at universities, etc.	15	0	+5	-7	+5	-2
Trade fairs	12	+2	+6	-7	+2	-3
Contact in social networks	11	-1	+3	-5	+5	-2
Other media	1	-1	0	-1	+2	0
No information required	8	-2	-5	+11	-5	0

Basis: n = Interested, sceptical: 160; Interested, supportive: 239; Disinterested, indifferent: 206; Participating, critical: 130; Technophile, pragmatic: 182

Positive difference from total (>= 10%)
Negative difference from total (>= 10%)

APPENDIX

Positive innovations

F105: When you think of innovations in the food sector (agriculture, manufacturing, processing and retail), which innovations did you perceive as positive over the last few years?

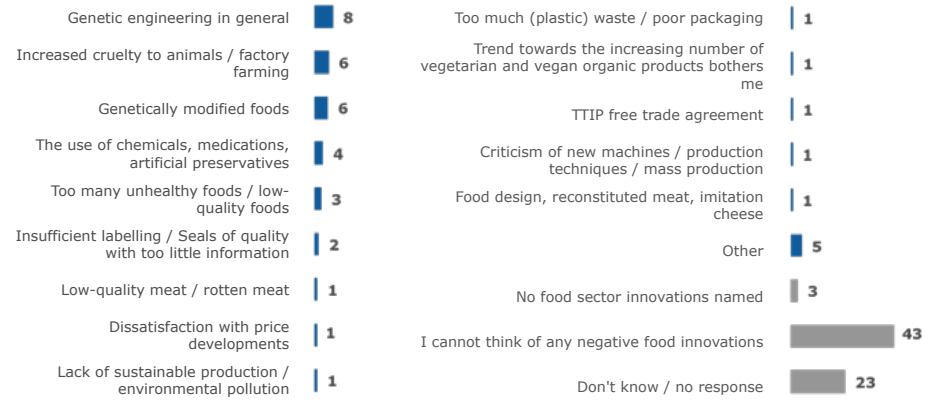
Information in % of open questions

Basis: n = 1,006

Negative innovations

F106: And which innovations in the food sector (agriculture, manufacture, processing and retail) did you perceive as negative over the last few years?

Information in % of open questions

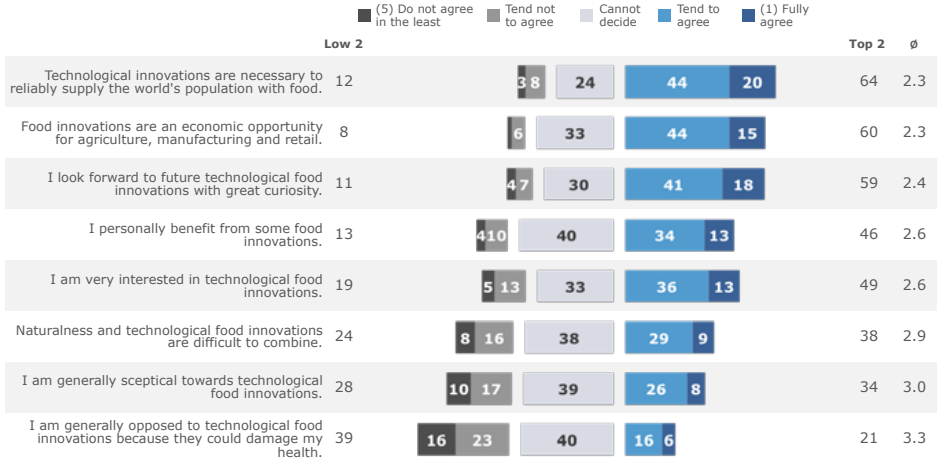


Basis: n = 1,006

Attitudes towards food innovations

F107: To which extent do you agree with the following statements regarding food innovations?

Information in %

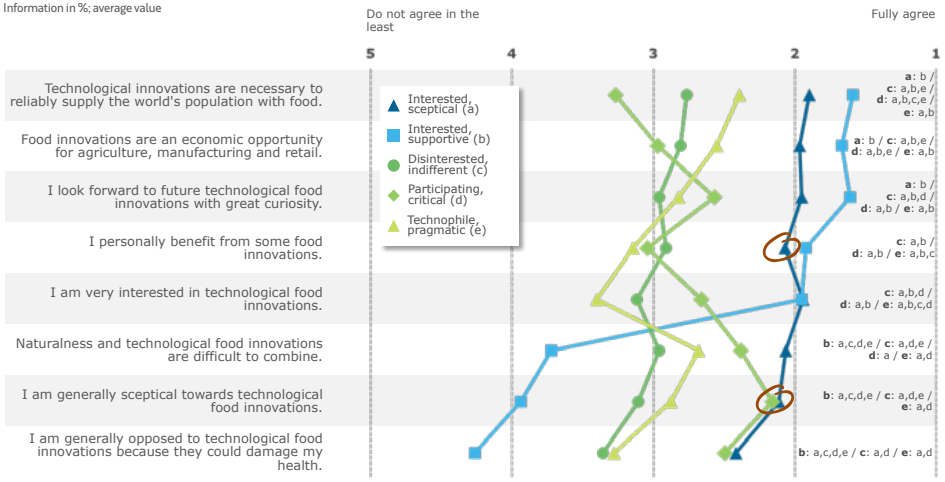


Basis: n = 921 – 984

Attitudes towards food innovations

F107: To which extent do you agree with the following statements regarding food innovations?

Information in %; average value



Basis: n = Interested, sceptical: 169 – 172; Interested, supportive: 226 – 241; Disinterested, indifferent: 220 – 234; Participating, critical: 123 – 134; Technophile, pragmatic: 183 – 203

LEGAL NOTICES

DESCRIPTION OF THE INNOVATION SURVEY
The survey evaluated the results gained from questioning 1,006 participants. In order to obtain an approximately representative sample of the population, quota variables for age, gender, federal state and level of education were predetermined. The survey was conducted online on consumers living in German private households (at least 18 years old) during the period from 9 July to 16 July 2015.

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