

Public perception of agricultural and food technology

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1. Introduction

In the history of technological change public perception of new technologies has often been ambivalent. New technologies have been regarded either as a threat or as a benefit for the society. In our times many consumers are concerned about the production methods in modern agriculture and in the food industry. Against this background it is important to know how consumers perceive the production methods: What are public beliefs associated with the agricultural and food production of today? What are the determinants of these beliefs and how do they affect consumer behaviour and public policy?

2. Beliefs associated with agricultural production methods

An appropriate method to measure salient beliefs is the association test, which can be applied in different ways in order to understand consumer beliefs about food production methods – for instance by asking the question: "What is on your mind, when you hear the word?" We applied this test in a small sample (n = 30) using different stimuli such as "Animal husbandry"(table 1), "Poultry keeping", "Plant protective agents" (table 2) and "fertilizers".

Table 1: Spontaneous associations with the stimulus "Animal husbandry"

1. **Positive** (3): free-range, happy hens (2) – keeping animal free range
2. **Neutral** (17): Hopefully "animal friendly" (artgerecht) – should be kept naturally – breeding beasts – hens – cows (4) – cows on a pasture – keeping dairy cows – rearing cows and pigs – pigs (2) – geese – stable – fertilizer – there are good and bad aspects to it.
3. **Negative** (40): exploitation – factory farming (9) – keeping masses of animals – mass production – animal factories – cows side by side in giant sheds – too small stables – too confined – confined – not "animal friendly" (3) – rarely "animal friendly" (2) – natural animal husbandry rather rare – too many medical drugs – animals stuffed with drugs – too much concentrated feed stuff – unhealthy – pity for the animals – nowadays cruel – nowadays often terrible – cruel to animals (2) – unworthy of animals – unhealthy animals – hospitalism – animals bitten to death – fidgeting hens – squeaking pigs in a lorry – stench – utmost precaution.

Numbers in brackets refer to how frequently items were mentioned

Source: Sies and Mahlau (1997), p. 15 (results)

The answers to the stimulus "Animal husbandry" give an impressive picture of salient beliefs associated with the modern livestock production: Out of 60 associations only 3 have been positive, 17 could be regarded as neutral and 40 were clearly negative: Most of these negative associations were related to animal welfare aspects of production. Results for the stimulus "Poultry keeping" were similar. According to research results in other European countries, the

widespread negative perception of modern animal husbandry seems to be similar across different European countries.

A similar set of beliefs was associated with crop production (table 2). Using the stimulus "Plant protective agents" only 10 associations could be categorized as positive or neutral and 50 as negative. The original answers indicate the widespread latent concerns associated with the application of chemistry in modern crop production. Similar, but slightly less negative results have been obtained for the stimulus "fertilizers".

Table 2: Spontaneous associations with the stimulus "Plant protective agents"

1. **Positive** (5): good, if applied moderately - much grain - necessary to survive - partly necessary (2)
2. **Neutral** (5): can be viewed positive and negative - spraying equipment (2) - spraying.
3. **Negative** (50): poison (8) - chemistry (2) - pesticides (4) - E 605 - insecticides - poisoned food - dangerous (4) - be careful (2) - risk of overapplication (2) - better less application and smaller harvest - overfertilization - to much - should be applied less - should become more expensive, then less application - unhealthy (3) - causing illness of men (3) - causing malformations - harmful (2) - unnatural - monoculture - pollution of the environment (6) - poor plants - sick trees (2) - destroying the soil - objection - terrible - farmers acting too much in good faith - resistance? - expensive.

Numbers in brackets refer to how frequently items were mentioned

Source: Sies and Mahlau (1997), p. 6 (results)

However, not all agricultural production methods are perceived in such a negative way. According to other consumer surveys conducted in 1989 and 2000 in Germany there is a wide variability of the acceptance of agricultural technologies (table 3).

Table 3: Beliefs associated with agricultural technologies 1989 and 2000
(Scale: 1 = much more disadvantages, 3 = midpoint, 5 = much more advantages)

	Average Score	
	1989	2000
Free range pork production	.	4.5
Milking machine	4.1	4.3
Conventional plant breeding	4.0	4.2
Organic agriculture ("Alternativer Landbau")	4.2	3.9
Conventional animal breeding	3.4	3.6
Automatic feeding systems	3.1	3.4
Artificial fertilizer ("Mineraldünger")	2.6	3.2
Automatic milking systems ("Melkroboter")	.	3.0
Genetechnology in plant breeding	2.9	2.4
Chemical plant protection	1.9	2.2
Genetechnology in animal breeding	.	2.1
Vegetable production without soil	2.6	.

Source: Institute for Agricultural Economics, University of Kiel: Consumer surveys in Hannover and Kiel 1989 (n = 326) and in Kiel 2000 (n = 270)

In the opinion of most of consumers, perceived disadvantages are associated with the application of plant protective agents, genetechnology in plant and animal breeding and vegetable production without soil (1989). In the case of artificial fertilizer ("Mineraldünger"), automatic milking systems ("Melkroboter"), and automatic feeding systems in animal husbandry, perceived advantages and disadvantages are almost equal. Other technologies, such as conventional animal and plant breeding, milking machines, but also organic farming and free range pork production are perceived to be advantageous by the majority of the respondents. Comparing the results of the two surveys, public acceptance of gene technology and organic agriculture seem to have declined between 1989 and 2000, while the scores of all other technologies improved slightly.

These results can be generalized as follows (*von Alvensleben and Steffens, 1990*):

- Technologies applied to plants are more accepted than technologies applied to animals.
- Mechanization is more accepted than agricultural chemistry
- Old, well known technologies (combine harvester, milking machine) are more accepted than new technologies (automatic feeding systems, automatic milking systems).
- Conventional breeding is more accepted than genetic engineering.
- "Natural" production methods (organic farming, free range animal husbandry) are more accepted than "high-tech" agriculture and food technology.

3. Determinants

What are the determinants of negative attitudes towards modern agricultural production methods? In the literature reliable results on causalities are rare. Some of the hypotheses that have been generated include the following (*von Alvensleben, 1998*): Consumer negativity is

- A consequence of market saturation in an affluent society (Maslow),
- Caused by a decreasing basic trust in the institutions/authorities of the society, including institutions regulating consumer protection,
- Due to an increasing alienation of consumers from agricultural and food production – as a consequence of the division of labour in the economy,
- The result of distorted perceptions,
- Amplified by negative media reports about modern agriculture and food technologies.

4. Consequences

The ambivalent and often negative public perception of modern agricultural and food technologies has an impact on the food markets and on public policy.

We observe a considerable consumer concern about food. However the link between the concern expressed by consumers in surveys and actual consumer behaviour is in most cases rather weak. Nevertheless consumers' uneasiness about modern agriculture has been important in the development of the organic food market, the market for free-range livestock products and is supporting the marketing of regional products. On the other hand the introduction of GM foods and to some extent of functional food faces considerable difficulties.

Public policies are influenced, too. Politicians' perception and public perception of modern agriculture are rather similar (*Scheper, 1999*). Politicians are subject to the same perception

distortions and prejudices regarding modern agriculture as the general public. This leads to increased doubts about the appropriateness of technological progress and research in agriculture, as well as to inefficient political decisions and laws.

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