Cultured Meat in Germany: Consumer Acceptance and A Nomenclature Experiment

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Summary

1. This study aimed to investigate consumer acceptance of cultured meat in Germany, and in particular to assess potential names which could be used to refer to the product in German.
2. In two studies, we first identified minimally viable names, and then tested four names experimentally in a larger sample.
3. We found overall high acceptance for cultured meat in Germany - of a representative sample (n= 1,206), 60% said they would try cultured meat and 35% said they would buy it.
4. Consumers rated cultured meat highly in terms of its benefits for animals and the environment, but were unsure on safety and nutrition, and rated it low on naturalness and affordability.
5. Four tested names (kultiviertes Fleisch, kultiviertes Protein, Fleisch aus Zellkultur, and zellbasiertes Fleisch) showed no significant differences in terms of willingness to eat. A range of names are appealing to consumers in Germany, including a non-meat name (cultured protein).

1. Background

1.1 Cultured Meat

Cultured meat is one proposed solution to the many problems connected to industrial animal farming. As well as circumventing ethical concerns by avoiding the need for animal slaughter (Bryant, 2020a), cultured meat is likely to be favorable in terms of its environmental impact compared to meat from animals (Lynch & Pierrehumbert, 2019; Tuomisto, 2019). Additionally, removing intensively reared animals from the food system will reduce the spread of foodborne and zoonotic illnesses (Cross et al., 2019). Cultured meat enables us to address these issues associated with animal rearing while continuing to provide consumers with the meat they want.

The nomenclature of cultured meat has been a topic of great discussion in the field in recent years. The Good Food Institute (2016) proposed to adopt the name ‘clean meat’ instead of ‘cultured meat’, demonstrating that this nomenclature led to greater selection by consumers in a study which was partially replicated by Animal Charity Evaluators (2016). Bryant and Barnett (2019) later tested these names alongside others, finding that ‘clean meat’ was significantly more appealing to consumers than ‘lab grown meat’, with ‘cultured meat’ and ‘animal free meat’ somewhere in the middle in terms of consumer appeal.

For some time, ‘clean meat’ gained some traction in the industry, but a coalition of industry players later agreed to adopt the term ‘cell based meat’ in an attempt to be more descriptive of what the product is (Watson, 2018). Research subsequently showed that the name ‘cell based meat’ was less appealing than other names including ‘cultured meat’ (Szejda & Urbanovich, 2019), though this move by the industry highlighted the need to find a name which is not only sufficiently appealing, but also descriptive, successful in differentiating cultured meat from conventional and plant-based meat, and acceptable to regulators. The name ‘cultivated meat’ was suggested as a result of The Good Food Institute’s latest research (Szejda, Dillard & Urbanovich, 2019) because it gels with a narrative that meat is cultivated naturally from starter cells like a plant. That said, quantitative results from this study indicated little difference in consumer appeal between ‘cultured meat’ and ‘cultivated meat’, and in many other languages, these terms are not differentiated.

1.2 Germany

There is an array of recent studies on cultured meat acceptance in Germany in particular. Representative samples suggest quite high acceptance of cultured meat in Germany - Bryant, van Nek and Rolland (2020) found in a survey of 1,000 Germans that 58% said they would try cultured meat and 56% would buy it (compared to 44% and 37% of the French, respectively). They

also found that Germans tended to prefer cultured meat over both plant-based and insect-based meat, and that acceptance was significantly higher amongst younger consumers. Weinrich, Strack and Neugebauer (2020) similarly found that 57% of German adults would try cultured meat and 30% would buy it regularly. They found that attitudes towards cultured meat were generally structured along three dimensions: perceived ethical benefits, emotional objections, and optimism about global diffusion.

Dupont and Fiebelkorn (2020) found that their sample of German children and adolescents tended to prefer cultured meat to insect protein, but broadly reacted with disgust to both. Those higher in neophobia and disgust sensitivity were less likely to want to eat cultured meat, findings which have been replicated elsewhere (Bryant, Szejda et al., 2019; Wilks et al., 2019). Michel and Siegrist (2019) found that subjective importance of naturalness predicted cultured meat acceptance in a German sample. They found that those who consider naturalness important are less likely to consider cultured meat natural, and are less likely to want to eat it. Geipel, Hadjichristidis and Klesse (2019) found that German-speaking participants evaluated cultured meat more positively when reading about it in a non-native language compared to a group who read about it in their native German.

Germany may be a market of particular interest to cultured meat companies, given recent data on overall high acceptance of cultured meat there (Bryant, van Nek & Rolland, 2020; Weinrich, Strack & Neugebauer, 2020). Germany represents a population rife with meat-reducers and those looking to reduce their meat consumption in the future (Bryant, van Nek & Rolland, 2020). At the same time, meaty dishes like schnitzel and bratwurst have played a central part in German food culture for decades. Interestingly, many of these traditional German dishes including sausage and schnitzel may represent forms which are easy to replicate using cultured meat.

1.3 Study objectives

The present study had three broad aims.

1. To assess overall acceptance of cultured meat in Germany, in terms of
 - a. Willingness to eat
 - b. General attitudes/beliefs
2. To identify German names which met a minimum standard of
 - a. Consumer appeal
 - b. Descriptiveness
 - c. Ability to differentiate cultured meat from conventional meat
3. To test the most promising names experimentally in terms of purchase intent.

In particular, we wanted to test one ‘non-meat’ name. Notably, there are legislative efforts afoot in several countries to restrict the use of meat-related terms for non-animal-based products (Watson, 2019). This includes efforts to exclude cultured meat from being classified as meat (Watson, 2019). It is unclear whether the law will make this distinction, though the proposal has been criticised as obfuscationist and likely to create food safety problems, particularly for people with allergies (Bryant, 2020b). Nonetheless, it is worth examining the potential effect of non-meat labels for cultured meat. Therefore, as well as different descriptors, we also tested a non-meat term in this study - ‘kultiviertes Protein’ (cultured protein).

2. Study One: Survey

The aim of Study One was to get opinions from a representative sample on a range of potential names in terms of their consumer appeal, descriptiveness, and ability to differentiate cultured meat from conventional meat. Study one sought to address Objective 2¹.

2.1 Methods

Study One was an online questionnaire in which participants answered questions about 10 different names for cultured meat (see Table 1).

Table 1: The 10 names tested in Study One with English translations.

Kultiviertes Fleisch	<i>Cultured meat</i>	Laborfleisch	<i>Lab meat</i>
Fleisch aus Zellkultur	<i>Meat from cell culture</i>	In vitro Fleisch	<i>In vitro meat</i>
Zellfleisch	<i>Cellmeat</i>	Direktfleisch	<i>Direct meat</i>
Zellbasiertes Fleisch	<i>Cell-based meat</i>	Kultiviertes Protein	<i>Cultured protein</i>
Zelluläres Fleisch	<i>Cellular meat</i>	Klimafleisch	<i>Climate meat</i>

Participants read some information about the study and gave their consent to take part. For each of the ten names in Table 1, participants gave 1-5 ratings for three different characteristics: (1) the extent to which the name is appealing, (2) the extent to which the name is accurately descriptive, and (3) the extent to which it is clear that the name describes cultured meat as opposed to

¹ Since Study Two had a much larger sample, we examined this data for data on Objective 1 regarding overall acceptance.

animal-based or plant-based meat. Finally, participants also answered demographic questions, and were then thanked, debriefed, and compensated.

The survey instrument also contained an attention check question, which was used to filter out automated or low quality responses. From an initial sample of 766 participants sent to the survey, 292 were removed after the basic demographics section as quotas filled. A further 56 were removed for failing to correctly answer the attention check question, 25 incomplete or test responses were also removed, and one participant was removed for an unreasonably long completion time, resulting in a final sample of 392.

2.2 Participants

Participants were recruited through the German survey panel Respondi. We used interlocking age group and gender segmentation to achieve sample quotas which were representative of the German population. For Study One, we aimed for a sample size of 385 to achieve a margin of error below 5% (Taherdoost, 2017). The demographic distribution for Study One is shown in Figure 1.

Figure 1: Study One participants (n=392).

2.3 Results

The main results from Study One are shown in Figure 2.

As shown, the scores for all aspects of the 10 names tended to correlate, perhaps indicating that participants were giving their general feeling towards each name rather than differentiating on the specific aspects we asked about.

Figure 2: Average ratings for appeal, accuracy, and ability to differentiate cultured meat from conventional meat (n=392).

As shown, the names with the highest ratings across the three aspects we asked about were: *Direktfleisch*, *kultiviertes Fleisch*, *kultiviertes Protein*, and *Fleisch aus Zellkultur*. We note the relatively high ratings for ‘Direktfleisch’ (‘direct meat’), although after discussion with the research team and stakeholders, this name was discarded due to low acceptability to some industry stakeholders and too much dissimilarity to other names which are popular in English currently.

We also note the relatively high ratings for ‘kultiviertes Protein’, the ‘non-meat’ name we included. The results of Study One suggest that cultured meat, even when described as ‘cultured protein’, could be appealing to some consumers in Germany.

From the results of Study One, we selected four names to advance to experimental testing in Study Two. We selected the names ‘kultiviertes Fleisch’, ‘kultiviertes Protein’, ‘Fleisch aus Zellkultur’ and ‘zellbasiertes Fleisch’ for a combination of relatively medium-high scores on the measures from Study One, acceptability to a wider group of stakeholders, and similarity to commonly-used English names.

3. Study Two: Experiment

The aim of Study Two was to test these four names experimentally. Given that this would entail recruitment of a much larger sample than Study One, this data was also used to assess overall acceptance of cultured meat in Germany, thereby addressing Objectives 1 and 3.

3.1 Methods

In Study Two, participants were allocated to one of four experimental conditions corresponding to the four different names shown in Table 2.

Table 2: Four different names tested in Study Two with English translations.

Kultiviertes Fleisch	<i>Cultured meat</i>
Fleisch aus Zellkultur	<i>Meat from cell culture</i>
Zellbasiertes Fleisch	<i>Cell-based meat</i>
Kultiviertes Protein	<i>Cultured protein</i>

First, participants read some information about the study and gave their consent to take part. Participants were then randomly allocated to one of four conditions corresponding to the four names in Table 2. After answering demographic questions at the start of the survey, participants read a passage about cultured meat using the term corresponding to their experimental condition and no other terms.

They then answered a series of 1-5 Likert scales indicating their familiarity with cultured meat, and their likelihood of trying, buying, replacing, and paying more for cultured meat. They also indicated their views of cultured meat on a series of 1-5 bipolar items (see Figure 5), where higher scores represented more positive views. Finally, participants also answered demographic questions, and were then thanked, debriefed, and compensated.

The survey instrument also contained an attention check question, which was used to filter out automated or low quality responses. From an initial sample of 2,047 participants sent to the survey, 648 were removed after the basic demographics section as quotas filled. A further 117 were removed for failing to correctly answer the attention check question, and 76 incomplete or test responses were also removed, resulting in a final sample of 1,206.

3.2 Participants

Participants were recruited through the German survey panel Respondi. We used interlocking age group and gender segmentation to achieve sample quotas which were representative of the German population. For Study Two, once we had determined that we would test four different names, we aimed for a sample size of 1,096, which would provide sufficient power (0.8) to detect a ‘small’ effect size ($d=0.1$) given $\alpha=.05$ (Cohen, 1992). The demographic distribution for Study Two is shown in Figure 3.

Figure 3: Study Two participants ($n=1,206$)

3.3 Results

3.3.1 Overall acceptance

First, we examined all 1,206 responses across experimental groups to examine overall acceptance.

Figure 4: Overall acceptance based on a representative sample of 1,206 German adults.

As shown in Figure 4, 60.1% of those surveyed said they probably or definitely would try cultured meat, while 34.7% would probably or definitely buy cultured meat. This compares to just 18.7% who probably or definitely would not try cultured meat, and 25.2% who probably or definitely would not buy it. Further, 32.1% said they would probably or definitely use cultured meat as a replacement for conventional meat, while 18.3% would probably or definitely be willing to pay more for cultured meat.

We also represented participants' overall views of several aspects of cultured meat as rated on 1-5 bipolar scales in Figure 5.

Figure 5: German participants overall opinions of cultured meat on 1-5 scales (5 = positive)

As shown, participants had overall positive evaluations of cultured meat in terms of its environmental impact, its benefits for animals, and tended to view it as ethical, necessary, and practical. Ratings showed less certainty on the points of safety, healthiness and nutrition, which reflects previous literature identifying consumer uncertainty on these points (Gomez Luciano et

al., 2019; Zhang, Li & Bai, 2019). Consumers rated cultured meat overall as unnatural, and tended to anticipate that it might be expensive, again reflecting previous findings (Gomez Luciano et al., 2019; Tucker, 2018; Valente et al., 2019).

3.3.2 Naming experiment

The main results from Study Two are displayed in Table 3 and Figure 6. We used a one-way ANOVA to detect differences in mean willingness to eat scores between experimental conditions. Differences were considered significant where $p < .05$.

Table 3: ANOVA analyses showing mean scores for behavioural measures towards cultured meat.

	Kultiviertes Fleisch	Zellbasiertes Fleisch	Fleisch aus Zellkultur	Kultiviertes Protein	ANOVA
N	302	296	312	296	
Willing to try	3.53 (1.18)	3.45 (1.23)	3.52 (1.17)	3.65 (1.14)	F (3,1202) = 1.444, p = 0.228
Willing to buy	3.11 (1.10)	2.95 (1.12)	3.03 (1.08)	3.16 (1.03)	F (3,1202) = 2.094, p = 0.099
Willing to replace	3.05 (1.14)	2.90 (1.16)	2.91 (1.13)	3.08 (1.09)	F (3,1202) = 2.069, p = 0.103
Willing to pay more	2.46 (1.16)	2.37 (1.12)	2.42 (1.12)	2.55 (1.18)	F (3,1202) = 1.349, p = 0.257

Figure 6: Willingness to eat cultured meat by different names.

As shown in Table 3 and Figure 6, those participants assigned to the names ‘kultiviertes Fleisch’ and ‘kultiviertes Protein’ were slightly more willing to eat cultured meat across a range of measures, though these differences were not statistically significant. This is despite a large sample size capable of detecting quite small effects. Therefore, this indicates that there is little difference between these four names in terms of their impact on purchase intent in Germany.

Notably, the non-meat name ‘kultiviertes Protein’ was actually associated with the highest purchase intent scores overall. Participants allocated to this condition were overall most likely to try, buy, and pay more for cultured meat, though - again - these differences were not significant (see Table 3). Nonetheless, this is good evidence that consumers are not drastically less likely to buy cultured meat when it has a non-meat name as some detractors might wish. That said, this may make it harder for consumers in another context to identify cultured meat without a lengthy description as was provided here.

4. Conclusions

Overall, the data in these studies indicates a high level of cultured meat acceptance in Germany and some lessons about nomenclature.

First, our data is in line with other recent studies (Bryant, van Nek & Rolland, 2020; Weinrich, Strack and Neugebauer, 2020) in finding that about 60% of German consumers would try cultured meat and about 35% would buy it. This adds to the growing base of evidence for solid markets for cultured meat in Germany, marking this country as a likely early target for cultured meat producers.

Second, we established the nature of consumer opinions of cultured meat in Germany. In particular, consumers view cultured meat as good for animals and the environment, but are uncertain about its safety and nutritional quality, whilst they view it as unnatural and potentially expensive. The onus is on producers to prove the product safe and nutritious, and this may be achieved by approval by the relevant government food agencies.

Third, we identified several feasible names for cultured meat in German, and established the four most feasible: 'kultiviertes Fleisch', 'kultiviertes Protein', 'Fleisch aus Zellkultur' and 'zellbasiertes Fleisch'. Further, we established that there were no significant differences in purchase intent resulting from the use of these four names, despite a well-powered experiment. This indicates that demand for cultured meat in Germany may be fairly insensitive to the debate about nomenclature. In particular, it is encouraging that the 'non-meat' name 'kultiviertes Protein' corresponded to the highest scores for purchase intent.

It should be noted that the present research had some limitations. As in all survey and experimental research, there was a degree of separation from the situation in which consumers may actually make these choices. Therefore, the study could be said to have rather low ecological validity, and these differences may have more (or less) impact in real markets. Further, there may be some degree of social desirability bias acting on respondents. That said, data quality measures including attention checks and a high similarity in results when compared to recent studies with similar methods indicates that this data is likely to be reliable and accurate.

Future research could focus on other countries in Europe where less is known about attitudes towards cultured meat. Some research indicates that other countries may view cultured meat very differently (Bryant, van Nek & Rolland, 2020). Further, research in these markets should look beyond cultured meat to other cellular agriculture products such as eggs and dairy.

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