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Consumers more inclined to eat 'alternative' proteins compared to 2015

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Alternative proteins are not widely accepted yet by consumers. Alternative proteins which are already known, like fish and pulses, are most accepted by consumers and insects are least accepted. A comparison across years reveals that consumers have a higher acceptance towards all alternative proteins, and identify less as meat eaters, in 2019 compared to 2015. However, self-reported consumption of alternative proteins shows no differences across years, which indicates a gap between intentions and behaviour. The most relevant drivers of intention are emotions and social norms, indicating the relevance of unconscious and affective factors in understanding consumer acceptance of alternative proteins.

Proteins are a vital part of a healthy diet. Proteins are main building blocks of the human body, and are for example important to build up muscle mass. Animal-based products, such as meat, eggs and dairy are popular and widely accepted protein sources. Consumption of animal-based products like processed red meat is associated with negative consequences for one's health and the environment. Animal-based products are increasingly consumed all over the world. The expected growth of the human population in the coming decades will lead to an increase in demand for proteins. The combination of an increasing demand and the high environmental impact of animal-based proteins has an adverse impact on climate change and human health. Therefore there is a need to replace (part of the) animal-based products in Western diets by alternative more sustainable protein sources.

Alternative protein sources such as seaweed, pulses or insects, are widely discussed in media and policy as well as developed by food manufacturers, and brought to the market for example in supermarkets and restaurants. These trends imply an increased acceptance and consumption of alternative proteins. However, up until now there is no research available that answers how consumer acceptance of alternative protein sources changed over time. Wageningen Economic Research has conducted research to investigate how Dutch consumer acceptance of alternative protein sources has changed between 2015 and 2019.

Our study

A survey was conducted in which a variety of questions were asked on intentions, motivations and associations of five 'alternative' protein sources that can function as replacements of regular meat: fish, pulses, seaweed, insects and cultured meat. We included a wide range of alternative proteins that can be divided in animal versus plant-based proteins and in conventional versus novel or future proteins. We conducted the same study in 2015 (N=2,461) and in 2019 (N=2,000). A subset of 498 respondents answered the same questions in 2015 and 2019. The questions included a variety of items covering, among others, what they eat on a regular basis, how they feel about the consumption of different protein sources and what might be their motivation to do so. This study is funded by the Ministry of Agriculture, Nature and Food quality. It is part of a larger project which is aimed at understanding acceptance of alternative proteins and finding ways to increase acceptance of alternative proteins to support protein transition.

Intention-behaviour gap: Alternative proteins are more accepted by consumers, though not yet consumed more

A range of measures was included in our research to explore consumer acceptance of alternative proteins, including consumption identity, intentions to consume and self-reported consumption.

Consumption identity

In our study, we asked the participants how they would describe themselves with regard to meat consumption. The following two pie charts depict respondents' self-identification level in 2015 and 2019.

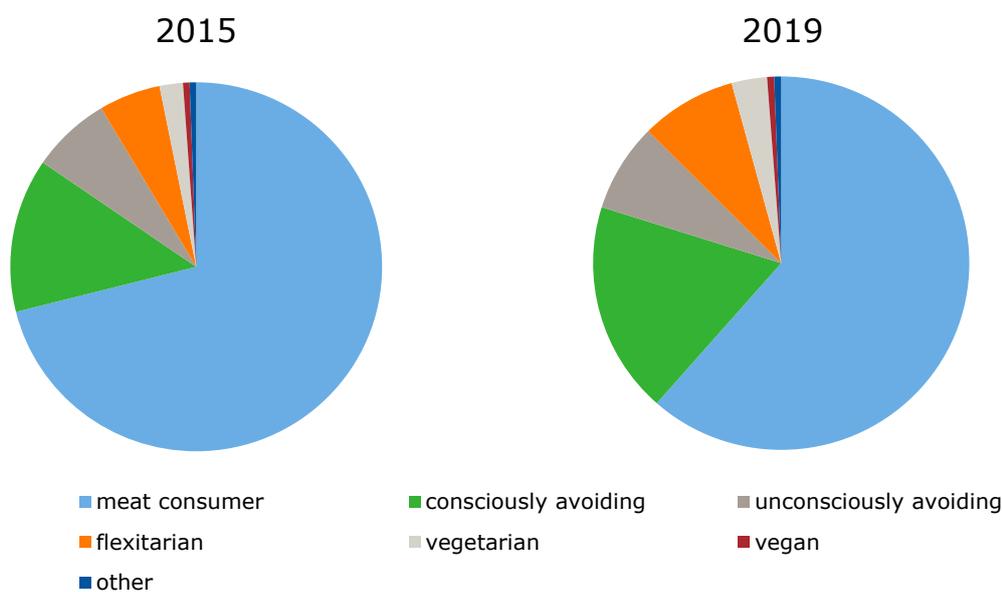


Figure 1 Consumption identity 2015 and 2019

Figure 1 shows that the amount of respondents who identify themselves as meat eaters has decreased while respondents who identify themselves as consciously avoiding, unconsciously avoiding, flexitarian or vegetarian show increasing percentages. This suggests that compared to 2015, participants identify themselves less as meat eaters in 2019.

Intention to consume

A similar pattern is visible for intentions. Respondents were asked to report their intention to consume the various alternative proteins in general (i.e. 'Do you intend to eat seaweed this week?') or prepared as a burger (i.e. 'Do you intend to eat this seaweed burger this week?'). The results reveal that respondents have become more willing to consume pulses, cultured meat and insects between 2015 and 2019, both in general and as a burger. In addition, respondents have become more willing to consume fish burgers and seaweed burgers.

A comparison across the various alternative proteins at a general level shows that consumers are most willing to accept alternative proteins which are already known (fish and pulses), followed by cultured meat. Insects are the least accepted alternative protein.

When respondents are asked to think of a specific burger a different pattern occurs. Interestingly, we see that on a general level, fish is the most accepted alternative protein source, whereas when it entails a burger, cultured meat appears to be the most acceptable alternative. This could possibly be explained by the fact that burgers are associated with meat, and cultured meat most resembles regular meat. Moreover, we see that consumers show higher levels of acceptance in general compared to consuming a specific burger. This finding might be explained by the fact that consumers might think of multiple ways to include proteins in recipes in general, such as included in pasta or noodles compared to a specific burger which is a more specific product. Subsequently, it might have been easier to think of ways to consume the alternative proteins at a general level compared to a specific burger.

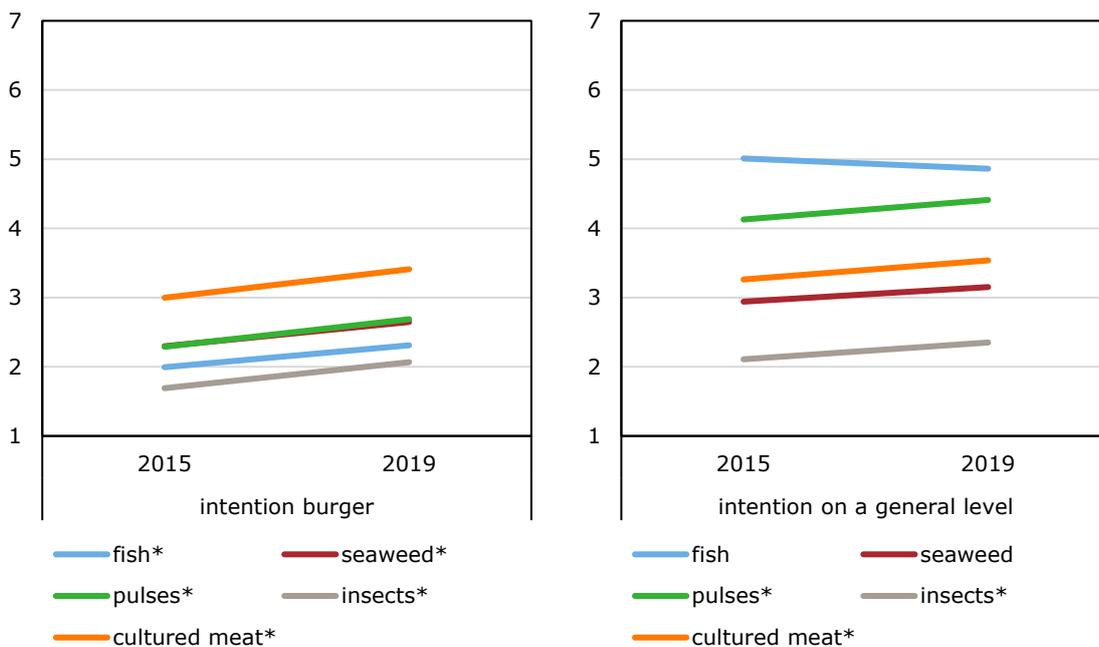


Figure 2 Intention to consume various alternative proteins at burger and category level
 Note that seaweed and pulses have a comparable trend, and therefore seaweed is hardly visible.
 * indicates significant difference across years $p < .05$

Self-reported consumption

Figure 3 shows the self-reported number of days that the participants in our study consume a certain protein source during a week.

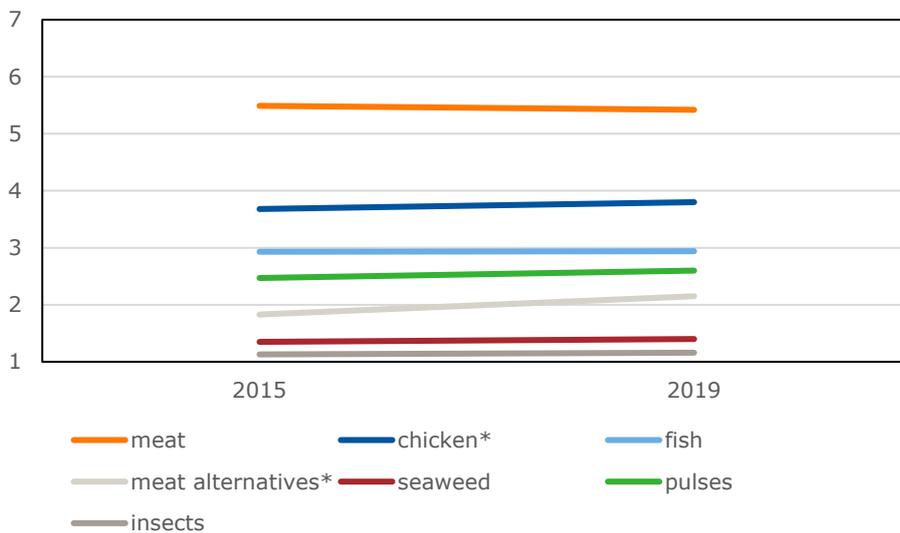


Figure 3 Self-reported consumption of proteins a)
 a) How often did you consume the following products the past week? (0=never and 7=daily).
 * indicates significant difference across years $p < .05$

By comparing Figure 3 with Figures 1 and 2 it can be observed that self-reported consumption does not correspond fully with consumption identity (apart from a slightly upward trend in eating meat substitutes and poultry) and intentions. Consumers seem to have an increased willingness to accept alternative proteins with corresponding decreases in meat eating identity (Figures 1 and 2), though self-reported consumption lags behind (Figure 3). It could be helpful to understand 'inconsistent' results as obtained here. In psychology this phenomenon is called the intention-behaviour gap. This phenomenon refers to the fact that people express certain intentions but do not seem to turn these intentions into actual behaviour. People might intend to consume less meat, but, subsequently, fail to achieve this goal because of all kinds of physical, social or psychological barriers that they encounter when trying to do so. For example, due to meat-eating routines or because they simply like the taste of meat a lot. Changing intentions, however, indicate that behavioural change towards the consumption of alternative proteins may be on its way.

The results do show an upward trend regarding the consumption of chicken and meat alternatives. This trend indicates increased consumption levels of white meat and meat alternatives, both associated with more sustainable consumption patterns than red meat. However, this only applies when consumed as substitute.

Understanding the intention to consume alternative proteins at a general level: The important role of emotions

What determines whether consumers consider eating alternative proteins? How do we understand changing acceptance levels in the course of time? Fully in accordance with previous research, our findings indicate that intentions are the most relevant drivers in understanding self-reported consumption. In our study, we examined several factors that are presupposed to influence consumer intention to consume alternative proteins. This factsheet shows a selection of the most relevant drivers of consumer acceptance of alternative proteins at the general level (food choice motives, emotions, disgust) and at the burger-specific level (attitudes, and social norms). We choose for this set-up as some drivers seem more context-specific than others.

Food choice motives

Respondents were asked to indicate which motives are relevant for the various categories of alternative proteins, including taste and smell (sensory), health, naturalness, sustainability, price, convenience, mood and familiarity.

Figure 4 shows a wide range of interesting findings, some of which we highlight. For all alternative proteins sensory aspects, health and naturalness are the most relevant motives. Health, naturalness and price are most relevant for pulses in comparison to the other alternative proteins. Naturalness, sensory aspects (e.g., taste and smell) sustainability and price are relative important for cultured meat in comparison to the other alternative proteins. Insects and seaweed score lower on all motives. Convenience is relatively important for fish. Insects and seaweed score lower on all motives. Convenience is relatively important for fish.

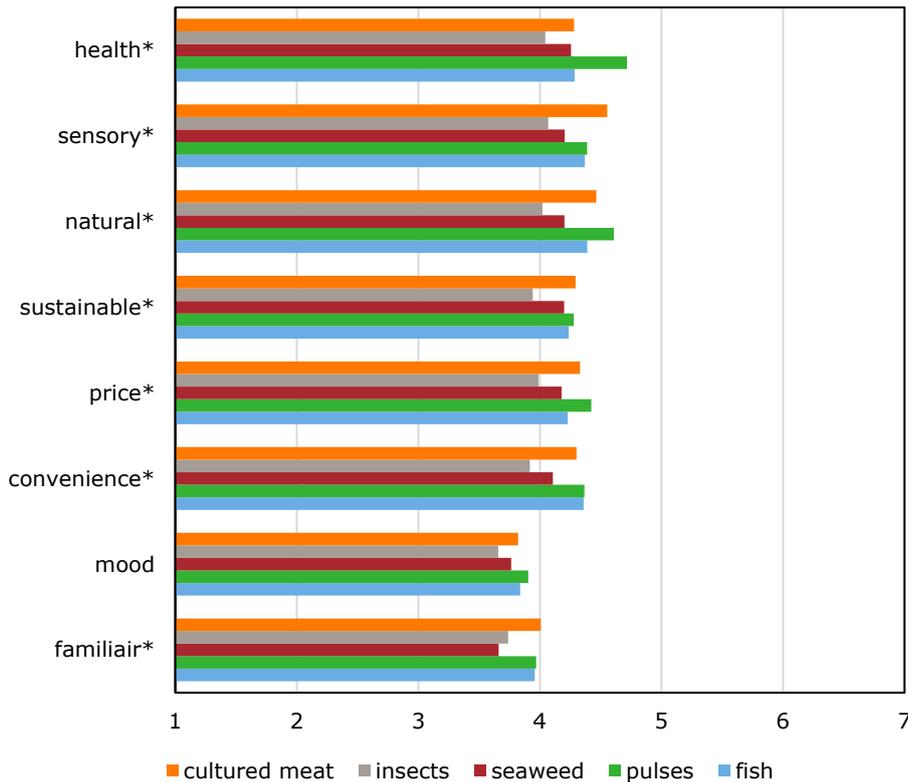


Figure 4 Food choice motives for all alternative proteins in 2019

* indicates significant difference across alternative proteins $p < .05$

Emotions

Another factor that helps to understand peoples' acceptance of the different proteins is their emotional reaction. Figure 5 depicts respondents' positive emotions evoked by considering the consumption of the various protein sources. In accordance with the attitudes and social norms regarding insects, insects as food raise little positive emotion. This indicates that in comparison to seaweed and cultured meat edible insects appear to be the least favourite.

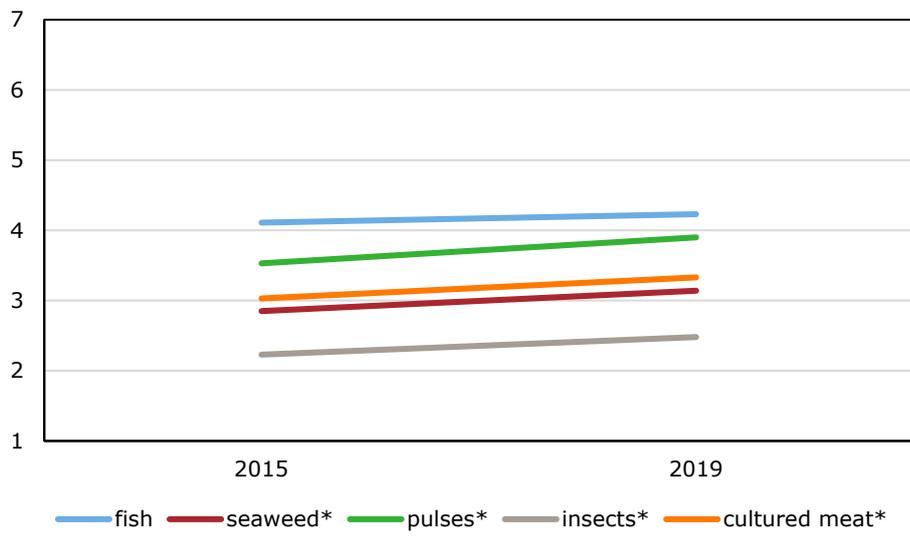


Figure 5 Positive emotions towards alternative proteins
 * indicates significant difference across years $p < .05$

Disgust

The flipside of positive emotions is emotional disapproval or reluctance. Negative emotions towards new food products are frequently included in food studies as important predictor. Disgust is an important negative emotion in this respect. In line with the outcome of insects receiving the lowest level of positive emotions, insects as food mostly elicit feelings of disgust. This response confirms by and large a consistent finding in consumer studies on edible insects in Western diets. Another interesting finding is the level of disgust associated with cultured meat. While cultured meat holds the promise of becoming a genuine meat analogue, the respondents in the present study were still disgusted by the idea of cultured meat. This reaction differs somewhat from more positive reactions found in other consumer studies as well as with the relatively high intentions to consume cultured meat reported above.

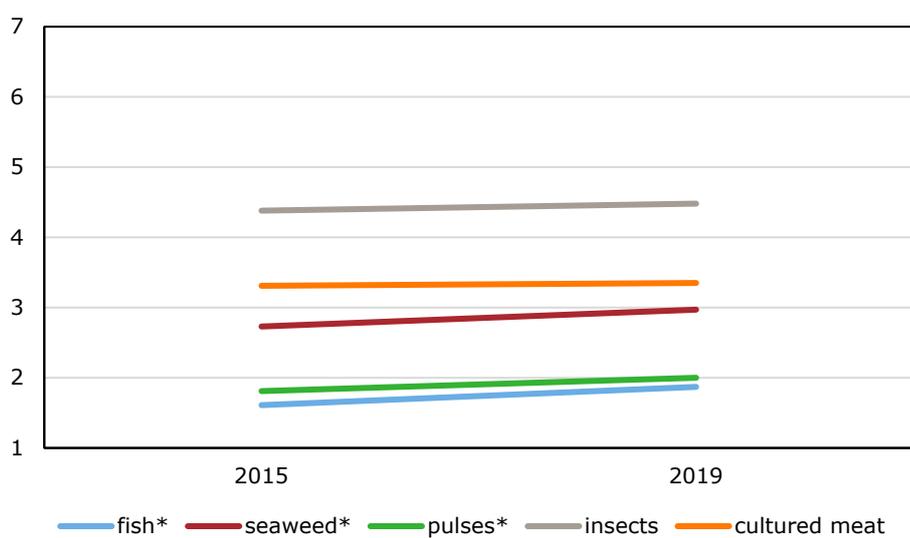


Figure 6 Disgust reaction encountering alternative proteins
 * indicates significant difference across years $p < .05$

The important role of emotions

As noted in the previous section we included a large range of possible explanatory factors, such as food choice motives, positive emotions, negative emotions, and disgust. Closer scrutiny on which factors encourage individuals to consume alternative proteins show the relevance of positive emotions.

Hierarchical regression analyses with intention to consume a certain protein source on a general level (i.e. do you want to eat seaweed in general?), show that positive emotions are the most important explanatory value in comparison to other explanatory factors like food choice motives (e.g. the importance of health, price or taste) and disgust. Positive emotions explain differences across acceptance over time and show to be the most important factor in explaining intentions. Finally, the results indicate the relevance might even increase over time, as the explained variable is higher in 2019 compared to 2015. We found that when respondents express positive emotions (feeling happy and satisfied) towards alternative proteins, their intentions to consume such protein sources increase likewise.

Table 1 Standardised regression coefficients for intention to consume novel protein sources

	Intention 2015	Intention 2019
Positive Emotion	0.474	0.505
R ² a)	0.499	0.552

a) The R² reflects the amount of variance explained. In this case, the R² of about 0.5 indicates that about half of the variance for the intention to consume novel proteins is explained by emotions. In practical terms, these findings suggest that positive emotions explain a big part of the variance of the intention to consume the alternative protein sources.

Understanding the intention to consume alternative protein burgers: The important role of social norms

We also included a range of drivers to understand the consumer acceptance of alternative protein burgers. We included a range of different drivers that are generally known to be predictive at a highly specific level. Attitudes, social norms, perceived behavioural control,¹ all part of the much-applied Theory of planned behaviour, were included.

Attitude

Attitude is an important indicator of whether a person is thinking positively or negatively about a food product – in this case their attitude towards each of the protein sources. As Figure 7 displays, attitudes towards pulses and cultured meat have become more positive. All other attitudes remain stable over time. Again, insects elicit the least positive attitude, whereas all other alternative proteins elicit a more comparable attitude in 2019.

¹ Perceived behavioural control is not reported in this factsheet

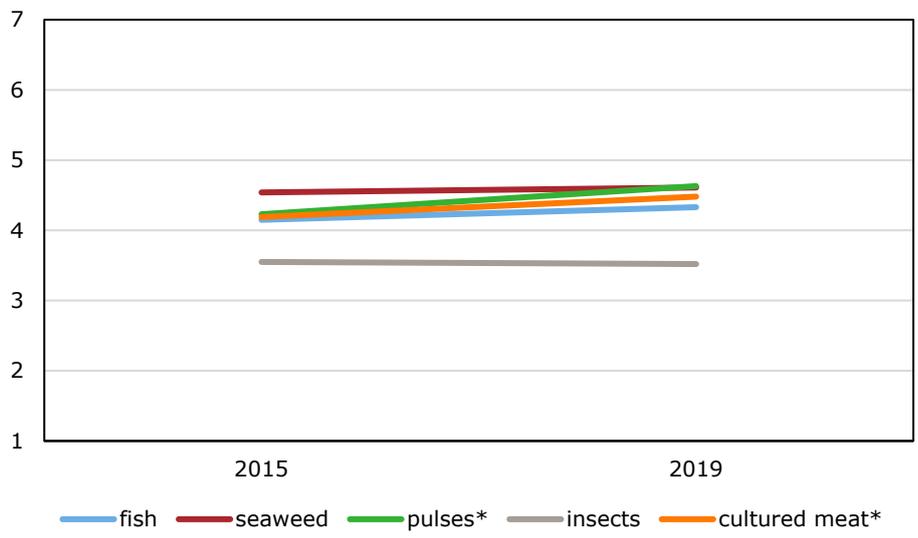


Figure 7 Attitude towards alternative proteins
 * indicates significant difference across years $p < .05$

Social Norms

Social norms are unwritten rules that tell us how to behave. Often, when we are unsure about what to do in a certain situation, we try to understand what is expected and accepted behaviour by observing and learning from others. Social norms play an important role in food consumption. With respect to our willingness to eat alternative proteins, we would like to know if other people have tried it already or what others believe is the right thing to do. Figure 8 shows that social norms regarding all proteins have increased over the years 2015-2019. This even holds for eating insects, despite the just-mentioned negative attitudes towards insects as food.

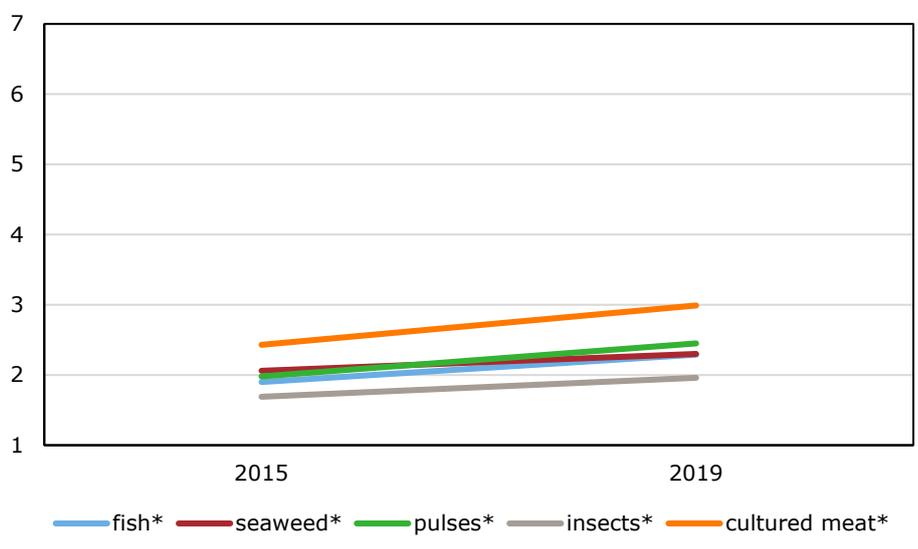


Figure 8 Social norm regarding alternative proteins
 * indicates significant difference across years $p < .05$

The important role of social norms

Social norms appeared the most relevant factor in understanding intentions to eat an alternative protein burger. Hierarchical regression analyses were performed to explore which drivers are most relevant in understanding intentions, both cross-sectionally and over time. Social norms explain differences in acceptance across years and show to be the most relevant factor in understanding intentions to consume burgers. Finally, the results indicate that the relevance might even increase over time, as the explained variable is much higher in 2019. This result suggests that respondents who believe that significant others would approve it when they choose to consume a burger made of an alternative protein source, have a higher intention to choose these products.

Table 2 Standardised regression coefficients for intention to consume novel protein burgers

	Intention 2015	Intention 2019
Social Norm	0.676	0.711
R ² a)	0.456	0.506

a) The R² reflects the amount of variance explained. In this case, the R² of about 0.5 indicates that about half of the variance for the intention to consume novel proteins is explained by social norms (a moderate effect size). In practical terms, these findings suggest that social norms explain a big part of the variance of the intention to consume the alternative protein sources.

Conclusion

When it comes to the consumption of alternative proteins, Dutch consumers seem more receptive to various meat alternatives in 2019 compared to 2015. Consumers' responses show higher intentions and underlying motivations to consume alternative proteins, such as pulses or seaweed. However, increasing intentions and decreasing self-identification with eating meat have yet little-to-no impact on actual food consumption patterns. Consumers themselves do not indicate any changes in the consumption of the various alternative proteins over years. Overall, Dutch respondents seem to get ready for the new, albeit slowly.

Insects are the least accepted alternative protein. Plant-based and conventional alternatives are the most accepted alternative protein. Cultured meat shows to be promising. Although still associated with disgust, according to consumers it is the most accepted alternative to a conventional meat burger.

Interestingly, the results indicate that for a range of different alternative proteins, not the cognitive variables such as attitudes and motives but affective and unconscious factors such as emotions and social norms are most relevant in explaining acceptance of alternative proteins. In terms of explanatory value as well as explaining acceptance of alternative proteins over time these variables show to be of higher relevance compared to the cognitive variables. Positive emotions are personal sensations that clearly influence the extent to which people do or do not intend to consume a novel protein source. The observation that the social norm plays an important role is also interesting. It suggests that accepting alternative protein sources is for a large part based on perceptions of society instead of one's own motivations and beliefs.

Our study highlights that Dutch consumers' inclination to eat alternative proteins instead of meat depends on their personal convictions and feelings on the one hand and their perception of eating alternative proteins as the new normal on the other. Whether the trends identified in this study will continue is uncertain and influenced by many factors, but the potential to eat less meat and to consume more alternative protein is surely there.

Appendix: Definitions of alternative proteins

Novel proteins are protein sources that are less of a strain on the environment than meat. We investigated the following novel protein foods: conventional plant-based (pulses) and animal-based (fish proteins), novel plant-based (seaweed) and animal-based (insects) proteins. We also included a future available protein (cultured meat). The following definitions were shown to the respondents:

Fish are vertebrates that live in water, such as salmon, tuna herring and mackerel.

Pulses are different kinds of edible seeds, such as peas, pods, string beans, French beans, broad beans and garters.

Seaweeds are algae or seaweeds that grow in the sea, they are also called 'sea vegetables'.

Insects are animals with an external skeleton, such as grasshoppers, mealworms and beetles.

Cultured meat is meat that is grown in a laboratory from stem cells of animals. For cultured meat no living animal or farm is needed anymore to produce meat, a piece of steak or chicken breast can also be produced in a laboratory.

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2020-087