

How to create an authentic cheese taste in plant-based (vegan) cheese alternatives?

Taste is clearly the most important purchase criterion for consumers when it comes to choosing food. This is the result of the Nutrition Report of the German Federal Ministry of Food and Agriculture (BMEL) and remains unchanged since the first survey. According to the report, 93% vote for taste as the main motivation for reaching for the shelves. Animal husbandry and fair trade are also mentioned among the top three arguments. (BMEL Nutrition Report 2022, p. 20)

Young consumers in particular are therefore increasingly turning to vegetarian or vegan alternatives (BMEL Nutrition Report, p. 8). Consumers of vegan products are not necessarily living the vegan lifestyle. Flexitarians consciously choose a limited consumption of animal products. This includes not only meat but also dairy products (ProVeg 2021). A simultaneous consumption of animal and plant products is therefore quite possible. Compromises on taste are accepted less and less. Now that plant-based alternatives to cow's milk (made from soy or oats) are part of the standard range in every supermarket, cheese alternatives are also becoming increasingly popular with many consumers. Leading manufacturers and suppliers expect a strong increase in the market share of cheese alternatives in the next few years. The exact development remains to be seen. One thing is certain, however: cheese alternatives are here to stay. The decisive factor for long-term product success is taste. Only what tastes good will be bought repeatedly. (BMEL Nutrition Report, p. 10)



Figure 1: Vegan cream cheese spread on bread.

Currently, various manufacturers are therefore faced with the challenge of giving vegan foods an authentic taste. In the field of cheese alternatives, diverse stages of development can be observed. Initially, the milk protein was replaced by starches in purely plant-based products. In the meantime, however, vegetable proteins are also more frequently used as an ingredient, as many consumers want a diet with a high protein content. The animal milk fat is replaced by vegetable fats such as coconut fat. These dry matter components are finally mixed with water to form a homogeneous mass. In

addition, some companies are already researching cell-based cheese alternatives that are produced by precision fermentation (Utopia 2021). All alternatives have one thing in common. The taste of the base mass has nothing to do with cheese. So the decisive argument for repeated purchase is missing. But how is a typical cheese taste created in the first place and what makes it so special?

Cheese taste is extremely multifaceted and complex. Many hundreds of components are responsible for the characteristic cheese flavour and are therefore also difficult to recreate.

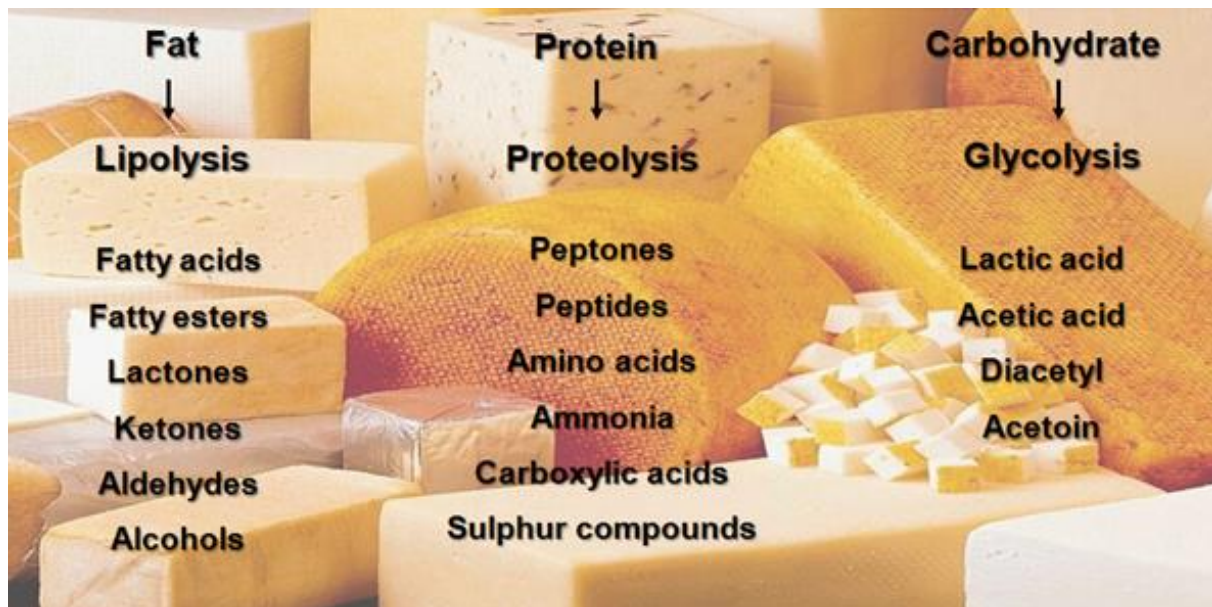


Figure 2: Biochemical changes during cheese ripening.

During traditional cheese ripening, the dry matter (fat, protein and lactose) is broken down by enzymes and bacteria. This metabolism creates flavour components. A multitude of these flavour components results in the balanced cheese flavour. For example, lipases break down fat into various fatty acids. These give many types of cheese their characteristic cheese flavour. The typical taste of blue cheese also comes from the breakdown of milk fat into ketones. Another example is the breakdown of proteins (albumen) by proteolysis. This process can be understood very well in the ripening of traditional Camembert. If stored for too long, the interior of the cheese becomes liquid due to the breakdown of the protein structure. The pungent ammoniacal smell is unmistakable. Numerous sour milk products get their characteristic sour, but also buttery and creamy taste from the targeted degradation of lactose by lactic acid bacteria. Molecules such as lactic acid or diacetyl are responsible for this.

The conditions in ripening cellars (e.g. temperature, water, salt content) are not ideal for microorganisms. After extensive research, the specialists at Jeneil have succeeded in finding the ideal "working conditions" for the bacteria and enzymes. Due to the optimised ripening conditions, the microorganisms produce a concentrate of the desired flavour components within one to five days. This has a much higher concentration than traditionally matured cheese or classically produced dairy products. The obtained "natural cheese flavour" can be offered in different consistencies, depending on the customer's wishes. Free-flowing and thus pumpable, paste-like or dried in powder form.



Figure 3: From cheese to cheese concentrate.

Due to the high concentration of flavour components, even comparatively small dosing quantities of one to three percent are sufficient to give a wide variety of foods a balanced, authentic, intense and also long-lasting flavour. Examples of this are: Processed cheese, sauces, dressings, dips and numerous other products where a cheese flavour is desired.



Figure 4: Application diversity of natural flavours.

The addition of the cheese flavouring to the product is usually extremely simple. The most important thing is an even distribution in the base mass of the respective food. High temperatures are almost always detrimental to the flavour of a food, especially in combination with longer heat retention times. This is also the case with Jeneil flavour concentrates. Therefore, the concentrates should be added as late as possible in the production process. If a closed production line requires the addition of the natural flavours at the beginning of the process, this is also possible. The concentrates are comparatively heat-stable and are already being used successfully today, for example in UHT processes.

For many years, the Jeneil company has been investigating how the flavour profiles of the most diverse cheeses are composed in order to harmonise ideally with each other. Cheese flavours are systematically researched. This knowledge is the basis for mixing plant-based flavour components in such a way that a balanced cheese flavour profile is created. The plant-based raw material (e.g. sugar cane, coconut, maize) is fermented with selected microorganisms after harvesting. This allows the desired flavour components to be extracted in a targeted manner. To concentrate these components, the ferment is distilled or filtered. Finally, the aroma purities obtained in this way are combined to create a unique cheese flavour. Concludingly, the dosage of the aroma in the respective food must be chosen correctly. Depending on the base mass and the production process, a variation of several percent is possible here. Ideally, this not only creates a balanced cheese flavour, but also conceals the undesirable off-flavours of other ingredients such as vegetable fat or stabilisers.

One thing is certain: Suppliers who want to be successful in the strongly growing segment of plant-based cheese alternatives in the long term must offer their consumers a convincing taste. The addition of natural flavours supports this. Leading companies, such as Jeneil, offer these in all facets. Many years of experience and specialisation in various cheese flavour profiles make it possible to produce a wide range of the most popular cheeses Gouda, Emmental, Cheddar and Parmesan, but also specialities such as goat cheese or Camembert on a vegetable basis. In this way, the company is capable to contribute to giving products such as vegan cheese alternatives an authentic cheese taste.

References

Bundesministerium für Ernährung und Landwirtschaft (BMEL). (2022). *Deutschland, wie es isst: Der BMEL-Ernährungsreport*. Ostbevern: MKL Druck GmbH und Co. KG.

Proveg. (2021). Von <https://proveg.com/de/pflanzlicher-lebensstil/vegan-trend-zahlen-und-fakten-zum-veggie-markt/> abgerufen

Utopia. (2021). Von <https://utopia.de/ratgeber/zellbasierte-milchprodukte-eine-nachhaltige-alternative-zu-echter-kuhmilch/> abgerufen