



Potentials and perspectives of meat and milk substitutes from pea protein isolates in food start-ups in Germany

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Introduction

In earlier times, peas were a traditional food in many European countries. However, with decreasing meat prices, peas were used as a source of protein for meat production rather than directly as food. Due to the higher protein content and continuous availability, soya increasingly replaced peas as a feedstuff: today, peas are hardly ever found in crop rotations (DE VISSER ET AL., 2014). In recent years, the use of peas as a raw material in animal nutrition has risen again. The reason for this is the increased demand for GMO-free feeding and the use of regional products. However, when peas are used in animal feed, it is usually only possible to achieve low prices for growing farmers (KEZEZA SEPNGANG ET AL., 2020).

Recently a new development has started, which still needs to be shown if it is a longer lasting trend. Processed peas are used as protein isolates in convenience foods, where they are a quality-determining ingredient, sometimes in considerable quantities. In the course of the trend to eat less animal products, vegetable protein sources are needed to offer alternatives to meat and milk. This trend could be an important lever for the increased cultivation of legumes (MERGENTHALER ET AL., 2020).

The aim of this study is to give a first overview of the potentials and perspectives of the use of legumes in food and to show possible impulses for an increased cultivation of legumes. Open or unresolved points of discussion are highlighted.

Data and methods

The methodological basis of this work is a qualitative-exploratory approach. The homepages of various start-ups, which place their pea-based products on the German market, were studied. Open questions regarding the market entry and the origin of the raw material pea were asked by phone and e-mail to the offering companies. The results of the data collection were compared with information from the literature and discussed.

Results and discussion

An increasing number of start-ups are bringing vegetable meat and milk alternatives to the market. For this purpose, cereals are partially used as a source of protein, but mostly legumes such as soya, pea, lupine, field bean, lentil and chickpea.

Compared to other legumes, peas are preferred in the production of meat and milk substitute products, as technical processes make it possible to achieve higher protein yields and better protein enrichment in food (MUSCHIOLIK, 2018). Furthermore, a complete utilization of the pea grains is possible by separating the components. In addition to the

protein, fibres and starch are obtained, which can also be used in food (TULBECK ET AL., 2017). Pea protein isolate is also perceived to be much more pleasant in terms of taste than other legume protein isolates. The following table provides a non-exhaustive list of companies and products made from pea protein isolate. It is a collection of examples, as the number of companies and products is currently growing rapidly.

Tab.1: Companies that create products from pea protein isolates.

Companies	Product names	Protein (g/100g)	Protein isolate (in %)
Meat Alternatives			
Rügenwalder Mühle	Sliced sausage	3,9 - 4,4	2,0 - 5,0
Rügenwalder Mühle	Spreadable sausage	2,6 - 2,7	2,4 - 2,9
Amidori	Burger	23	
Amidori	Bratwurst	16	
Amidori	Veggie Bällchen	13	
Amidori	Hacksteaks	16	
Vossko	Vegane Burger	15,5	81 (rehydr.)
Veggie Meat	Vegini Burger	16	
Veggie Meat	Vegini Bratwurst	14	
Beyond Meat	Vegane Burger	18	18
Like Meat	Veganes Curry Chicken	18	24
Milk Alternatives			
Vly Foods	Vly	2,5 3,5 5,2	2,1 4,1 6,2
Princess of the Pea	pea-drink	3,2	3,9

The content of pea protein isolates in these products varies from 2 to 24 %. The actual protein content is between 3 and 18 g/100 g. Apart from the listed sausage products, the average protein content of the remaining meat substitutes is achieved, compared to conventional meat-based products. By combining such plant protein-based products with other vegan or vegetarian, protein-rich (and partly other leguminous-based raw materials) products, sufficient protein with a balanced amino acid composition can be obtained even through a meatless diet. In contrast to soy and lupine-based foods, which have to be declared due to the allergens they contain, this labelling is not required for other leguminous products, such as field bean, lentil and

pea. This problem, combined with the good regional availability and the possibility of almost complete utilization of the pea components, is probably the main reason why German food manufacturers in particular use pea protein isolates as the basis for their meat replacement products. The generally higher sustainability of the pea and the marketing potential of an innovative product are the most important marketing levers for all leguminous-based products (OEKOLANDBAU.DE, 2019).

A frequently mentioned obstacle to the market entry of pea-based products is the willingness of consumers to pay more for those products: the purchase price is still comparatively high. However, the current high level of competition from suppliers and the growing, diverse range of alternative animal products mean that prices can be expected to decrease over time (RESNICK, 2019).

Information and the supply chains as well as the origin of the peas or pea protein isolates, for use in the food sector, are still scarce and often not obvious and transparent. Many companies do not provide information on the origin of the peas processed in their products. According to our investigation, it can be assumed that the raw material for the pea protein isolate used, is mostly grown in Europe. Several companies source their protein isolates mainly from France. Germany, Belgium, Scandinavia, and India were also mentioned as countries of origin of the peas. According to OEKOLANDBAU.DE (2019), however, the pea proteins used are also partly obtained from peas grown in Canada and China.

There are currently a few large plants for the processing of peas in Europe. These include the Roquette Group (with production sites in France and the Netherlands), Cosucra (Belgium and Denmark) and Emslandstärke (Germany). Domestic sourcing of peas is usually done by contract farming (AMIDORI, 2020), but little detailed information is available. The companies provide hardly any information about their supply relationships, and on the side of the farmers: secrecy agreements about the contents of the contracts are apparently common. This lack of transparency continues to cause information asymmetries between the players in this production niche.

Fazit

With the currently still small quantities of peas processed in food, domestic production would be easily possible and even advantageous from a plant cultivation point of view. If the demand for pea-based meat and milk substitute products increases, new cultivation and marketing opportunities for peas could arise. Then it could become increasingly worthwhile for farmers to continuously sell the peas they need in the appropriate quality and quantity to processing companies. In particular, the price of peas is expected to be higher for farmers when they are used in food compared to animal feed. It can also be advantageous for farmers to expand their crop rotation with peas as nitrogen-supplying legumes.

For plant breeders, the protein content is a new quality feature that is worth breeding for as soon as the processing

companies make this a purchasing criterion. Overall, the use of peas in food is more valuable in terms of use (and remuneration) than in animal feed.

The potentials and chances of peas are also transferable to other grain legumes. Lupines, soybeans and especially field beans are already being used for a high-quality application in the food sector (RÜWELING, 2019). Among other things, the different crop-specific processing methods, the composition of the ingredients and the production quantities of the raw materials play an important role. In addition, the producers of leguminous-based food have to weigh up between a technology that matches the product and the partly antinutritive ingredients contained in the legume.

The increased interest of start-ups and already existing companies in food based on legumes in Germany and other EU-countries seems to be part of a transformation in the food sector. It would be recommendable for the sector to pay attention to a regional sourcing of raw materials in order to increase the acceptance of this transformation in agriculture. This can be better ensured if farmers and breeding companies are sufficiently prepared. This includes expertise, a wide range of varieties and a greater openness to legumes and their wide-ranging advantages.

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