



Business Innovation Observatory



**Sustainable,
Safe and
Nutritious Food**

**New products with high
added-value**

Case study 54

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Sustainable, Safe and Nutritious Food

New products with high added-value

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Table of Contents

1. Executive summary	2
2. New products with high added-value	3
2.1. Trend presentation	3
2.2. Overview of the companies	4
3. Impact of the trend	7
3.1. The market potential of the trend	7
3.2. The social potential of the trend	7
4. Drivers and obstacles	8
4.1. Strictness and unsuitability of health claims procedures for food industry	8
4.2. Food labelling requirements and demand for “clean-label” products	9
4.3. Rising trend of vegetarian and vegan healthy diets	9
4.4. Healthy ageing	9
4.5. Excessive focus of public support on technical aspects	9
4.6. Rigidity of EU healthcare systems and reimbursements	10
5. Policy recommendations	10
5.1. Reorienting healthcare towards prevention	10
5.2. Adapting health claim procedures to food SMEs	10
5.3. Expanding the scope of public support to commercialisation	11
6. Appendix	12
6.1. Interviews	12
6.2. Websites	12
6.3. References	12



1. Executive summary

Innovation in the food industry can take place at all stages of the value chain, from the identification of new raw materials to advances in processing technologies. A further step in the innovation process is enabled by the advent of novel ways that increase the added-value of foods, enhancing their appeal, nutritional and economic value, as well as optimising their preparation.

This case study focuses on two main emerging approaches that add value to the food chain: valorisation and effective nutrition. Valorisation entails the development of new high added-value foods from by-products and waste streams from the food processing industry. Indeed, these represent a widely underexploited resource with a currently untapped economic potential. Effective nutrition approach focuses on the diffusion of better and more valuable products through the improvement of their nutritional value and innovative and appealing modes of preparation.

The market potential of high added-value products spans a diverse range of segments within the general food market. High-value proteins obtained through the valorisation of waste streams address the global market for protein concentrates and isolates. This is estimated at 4.5 million tonnes, covering about 5% of global protein consumption and being estimated to grow at a CAGR of 5-5.5% between 2012 and 2018. Furthermore, the high-value recovered proteins can be sold at higher prices compared to traditional ones. As for 3D-printing technologies, these can target both the broader market for kitchen appliances, which has an estimated value of EUR 45 billion, as well as the market for food in healthcare establishments (valued at EUR 1 billion in the Netherlands alone).

The development and adoption of high added-value products through valorisation of by-products and effective nutrition entail several social benefits, ranging from environmental protection to the relief of malnutrition. Valorisation results in reduced quantities of organic waste reaching the environment, thus preventing water and land pollution. Furthermore, the recovery of valuable proteins from waste streams can constitute an important complementary protein

source, thus lessening the need for protein crops and decreasing the associated carbon footprint. Effective nutrition through enriched foods and innovative preparation technologies contributes to ensuring a more balanced diet, tailored to the needs of specific target groups like pregnant women, people with food intolerances and the elderly population. This results in improved health and consequently relieves the burden of malnutrition on healthcare systems.

The uptake of food products with high added-value is driven by favourable emerging consumer trends, as well as certain EU policies. The stringent food labelling regulations and the increasing demand for “clean label” products was identified as a strong driver for the adoption of some of the valorised products. Furthermore, the increased awareness that food is a crucial part of healthy ageing contributes to the diffusion of protein-enriched foods and 3D-printing technologies in healthcare establishments.

Nevertheless, the adoption of these innovative products is slowed down by several obstacles. The strictness and unsuitability of health claim procedures for the food industry is a major barrier for SMEs, which cannot leverage on the beneficial properties of their products to boost their commercialisation. Furthermore, the rigidity of the healthcare systems, which do not support prevention through healthy food, constitutes an additional hindrance for the showcased companies. Finally, the major focus of EU subsidies on the technical side of product development rather than marketing was identified as a further difficulty.

In order to overcome these issues and foster the uptake of the trend, several recommendations can be made at the EU level. Firstly, reorienting healthcare towards prevention rather than strictly curative treatments would support the diffusion of healthier and better products, improving public health and ultimately entailing savings. Secondly, health claim procedures should be revised to enable food SMEs to optimally market their products. Finally, public support should be extended to cover the marketing and commercialisation stages of product development.

2. New products with high added-value

The paper is the third of a series that falls under the trend “Sustainable, Safe and Nutritious Food”, which explores the latest advances in the food industry. In particular, this case study focuses on how new ways to add value to food products can contribute to food security and help address certain socio-environmental issues.

2.1. Trend presentation

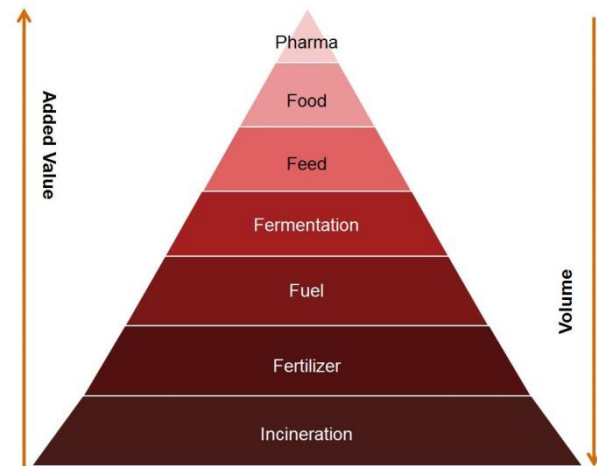
In broad terms, added value represents a business’ addition to the raw materials it purchases, resulting in the difference between the initial cost and the amount received upon selling. In the food industry, value is added in several ways along the value chain. The first takes place when the raw commodity is bought, processed and converted into a product that is suitable for consumption and ready to be distributed. Case study 54 already addressed technological advances in food processing and their positive impact on the value of the resulting products. A second way to add value consists in increasing appeal of the initial raw material to drive (or create) consumer demand. In fact, added value exists if consumers want the product and are willing to purchase it. This is traditionally achieved through effective branding and marketing strategies, aimed to improve the visibility on the market.

The present case study focuses on two new emerging ways that increase the added-value of food products by enhancing their appeal. Valorisation involves the development of new high added-value foods from by-products and waste streams from the food processing industry. Effective nutrition addresses how increasing the nutritional value of existing products and innovating the way healthy food is prepared and presented can promote the diffusion of better and more valuable products.

Valorisation is taking an increasingly important role in boosting the value generation of the European food industry. Currently, a substantial proportion of the raw materials that enter the food processing chain are traded as by-products. As the name suggests, these are not the primary products of the chain, and are therefore often poorly valorised. Indeed, they mainly find use in lower-value applications, such as feeds and fertilisers, rather than in human consumption (Figure 1). This constitutes an underutilisation of resources, since by-products can represent the majority of the yield of the processing of certain raw materials. For instance, fish and shellfish processing is estimated to result in up to 70% of by-products, and the production of certain dairy products up to 85%¹. To maximise the economic value of this abundant resource, animal by-products from meat

processing and dairy production are being valorised and increasingly used as a source of high value-added food ingredients like specialty proteins. An interesting example is the valorisation of acid whey, the by-product of cheese and Greek yogurt production. About 40 million tonnes are produced yearly in the EU, 13 million tonnes which is not used further for the production of lactose². A Danish company, Arla Foods, has developed a solution that enables producers of Greek yogurt to convert their acid whey streams into value-added products such as beverages, desserts and cheese spreads, which can be sold at a high margin on the market.

Figure 1: By-products valorisation pyramid



Source: PwC Analysis

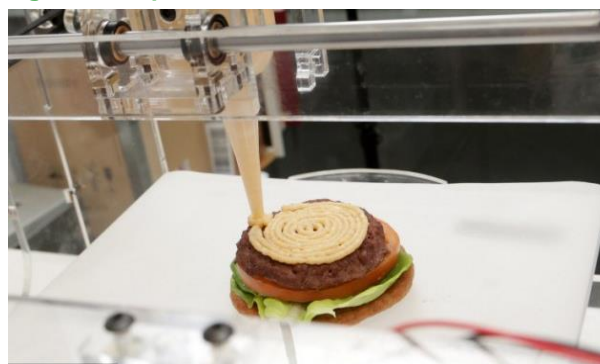
Effective nutrition is also generating growing interest as a means to bring to market foods which have a higher added-value both from a social, economic and nutritional perspective. Nutrient-enriched foods are being introduced in response to the need for functional products that can address nutrient deficiencies or requirements in specific subsectors of the population, whilst at the same time being appealing and ensuring comparable texture and palatability. Particularly promising are protein-enriched foods, which can represent an alternative to traditional complements for pregnant women, athletes and the elderly.

Aside from nutrient-enriched products, innovative ways to prepare food are emerging, allowing to add value to end products while having the potential to increase the appeal of healthier foods and support home cooking. One such instance is 3D printing, a technology for the manufacture of three-dimensional objects, in which consecutive layers of material are deposited on top of each other under the control of a computer. Beside the technological side of 3D



printing, which is more a matter of processes at the industrial level, the focus is made here on the versatility and adaptability of the resulting **3D-printed food products**, which increase added value because they can be adapted to the specific requirements of certain target groups, especially in terms of food preparation (Figure 2). For instance, it is emerging both as a domestic end-user appliance that can rekindle consumer inclination towards cooking, and thus promote a healthier diet, but also as a technology that can be used in public places such as hospitals and care homes. Indeed, 3D-printed “gel” foods are already being served in countries like Germany and Austria to elderly patients. These retain the original shape of the desired food, whilst having a texture that facilitates chewing, swallowing and digestibility.

Figure 2: 3D-printed texture-modified foods



Source: *The Daily Mail*³

European SMEs understood the potential of adding value to the food industry, and are developing solutions to position themselves at the forefront of this trend. The following sections will address some of the emerging players in this area, within the broader context they operate in.

2.2. Overview of the companies

Table 1: Overview of the company cases referred to in this case study

Company	Location	Business innovation	Signals of success
Solanic	The Netherlands	Solanic developed a process to recover potato proteins from potato processing waste water	<ul style="list-style-type: none"> - In 2014, awarded the FSSC 22000 Certificate of Approval for food safety - Solid financial results since its inception - Extensive participation in exhibitions and fairs
Carezzo	The Netherlands	Carezzo launched a series of protein-enriched products for the elderly, from bread to soups and snacks	<ul style="list-style-type: none"> - Partner of the “Cater with Care” consortium - Good acceptance from elderly patients - Its products are distributed across hospitals and care homes
Natural Machines	Spain	Natural Machines developed an innovative 3D printer, “Foodini”, for the preparation of fresh food at home	<ul style="list-style-type: none"> - In 2014, was awarded the Generation Digital Best Initiative Award - In 2015, was awarded the inaugural Barcelona Food Technologies Award - In 2015, co-founder Lynette Kucsma named by CNN one of the 7 “tech superheroes” to watch
Biozoon	Germany	Biozoon developed a 3D printer capable of printing dozens of different meals, targeted at people who have difficulties chewing	<ul style="list-style-type: none"> - Leader of the PERFORMANCE project funded by the European Commission - Already 5 brands on the market: texturePro[®], cocktailPro[®], partyPro[®], seneoPro[®] and myBiosportiv[®] - Distributed in 18 countries around the world

Problem 1 – The increasing global demand for proteins from consumers seeking to maintain a more balanced and fat/carbohydrate-free diet is putting a stress on resources, calling for the need to find solutions to better exploit by-products and waste streams.

Innovative solution 1 – Solanic was established as a subsidiary of the Dutch potato starch processing company AVEBE, to recover high-quality potato proteins from the processing waste waters.

Solanic developed a range of processes to separate and recover two main types of potato proteins (coagulated and native proteins), and upgrade them from feed to food grade, increasing the protein stream destined for food applications. Final products have an increased added-value, since food-grade proteins are worth between 5 and 10 times the value of feed-grade ones.

The technology used by Solanic to separate native proteins was originally utilised in the pharmaceutical industry to separate blood proteins. Being a subsidiary, it can operate



its protein recovery activity owing to the already existing potato processing infrastructure of the mother company. This gives Solanic a competitive advantage allowing protein recovery to be done at an economically viable scale.

Solanic's food-grade potato proteins have properties comparable to those of egg white, and can therefore be used in a broad variety of food applications as a replacement of animal proteins. Examples include meat analogues, vegetable milk and gelatin substitutes. Furthermore, since they are not allergenic, potato proteins are integrated in gluten-free products.

Solanic's high added-value potato proteins are comparable to egg white



Source: Solanic⁴

Problem 2 – The added-value of certain foods can be increased by improving their nutritional content. This process can contribute to delivering better diets, targeted to the specific needs of some target groups.

Innovative solution 2 – Carezzo was founded in 2011 with the purpose of developing a range of protein-enriched products that provide hospitalised and elderly patients with the necessary nutrient requirements, whilst maintaining the palatability and appeal of the foods.

Carezzo is a partner of the “Cater with Care¹” consortium, working in collaboration with nutritionists and knowledge centres to ensure that its recipes satisfy both the patient's appetite and nutrient needs. To validate its products, the company conducted a series of trials with panels consisting of senior participants, to compare their acceptance of the protein-enriched products to that of traditional foods. To further tailor its products to the target groups in question, Carezzo adapted the packaging to elderly consumers,

¹ Cater with Care is a project started in the Netherlands in 2012 and running until the end of 2015, aiming to improve existing and develop new food products to address malnutrition in the elderly population and hospital patients. It is funded through the European Regional Development Fund, among other sources.

making cartons and cans easier to grip and peel for those with impaired strength in the hands.

The very positive results from the trials led to Carezzo's products being distributed in care homes and hospitals in the Netherlands. Namely, soy protein-enriched bread with a protein content of 17% (which represents a 60 to 100% increase compared to traditional bread) has received particularly encouraging reviews and acceptance. Other foods include snacks, juices, soups and dairy products, containing twice or three times the amount of proteins of their traditional counterparts.

Carezzo's enriched bread contains 17% protein



Source: Carezzo⁵

Carezzo's fruit juices contain 10 g of proteins per 150 ml



Source: Carezzo⁶

Problem 3 – Home-made food preparation is increasingly being seen as a time-consuming activity, being replaced by quicker and unhealthy ready-to-eat alternatives.

Innovative solution 3 – Natural Machines was founded in 2012 with the aim of adapting the 3D-printing technology to the preparation of healthy food, as opposed to its initial use for confectionery and cake decorations.

The company thus developed ‘Foodini’, a new-generation kitchen 3D-printer that helps prepare home-made meals in a fun, creative and quick way, starting from fresh raw ingredients. This adds value to home cooking by removing the discouraging time-consuming factor. Foodini looks like a microwave and can be fitted on a kitchen counter. It automatically sets print speeds and is able to work with several ingredients at the same time. Users can directly introduce the individual ingredients of the desired meal into the machine's stainless steel food-grade capsules. This

allows consumers to have knowledge and control over what they eat, thus supporting a healthier diet.

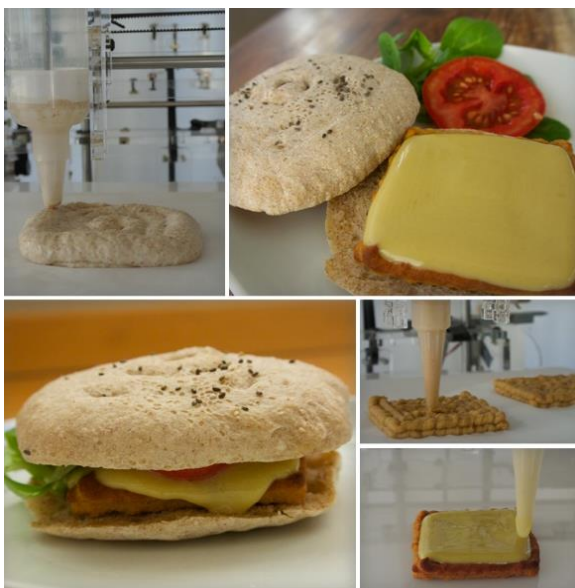
The company expects to start selling Foodini in early 2016, and is targeting culinary professionals and, at a later stage, end users. Foodini will be available for purchasing online, at a price of about EUR 1,300.

The Foodini 3D printer



Source: Natural Machines⁷

3D-Printed vegetarian burger using "Foodini"



Source: Natural Machines⁸

Problem 4 – The ageing population in Europe and the ensuing increase in the number of elderly people with eating difficulties and specific nutritional needs requires new targeted nutritional solutions.

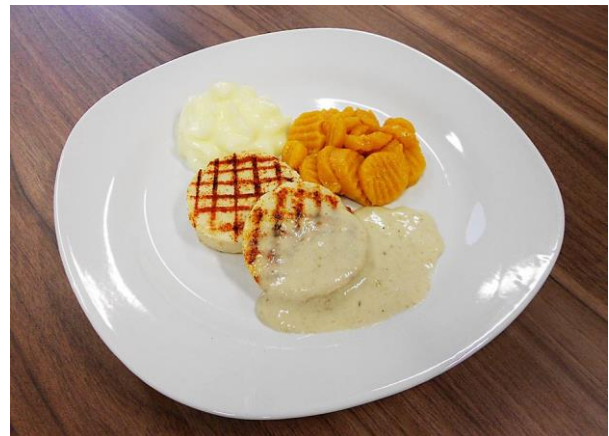
Innovative solution 4 – Biozoon, a German food company, provides food products with a texture adapted to patients with chewing and swallowing difficulties. In addition, the company developed a solution to efficiently enable the preparation of its foods in large centralised kitchens, by means of an innovative 3D-printing technology.

The 3D printer uses a jetting system to extrude a variety of different liquefied foods, "smoothfood", which can then be mixed with a solidifying agent. Each meal can be specifically tailored to match the needs of the individual patient, both in terms of texture (softness/hardness) as well as nutrient content. For instance, the food can be enriched with vitamins and proteins, as required.

Biozoon targets both nursing homes and family carers who need to find affordable and simple solutions to feed seniors patients. The company organises workshops every month in its two locations in Germany to promote "smoothfood". Its products are available on its website and through 22 sales partners in 18 countries.

Thanks to "smoothfood", elderly people regain a better quality of life and can eat more appealing and nutritious meals.

Turkey medallions with carrot and potato mash



Source: Biozoon⁹

3. Impact of the trend

The food and beverage industry is one of the biggest industries in the global economy, with a value of about EUR 7 trillion in 2015, representing nearly 10% of the global GDP¹⁰. The industry is also an essential part of Europe's economy, accounting for 15.5% of employment in the manufacturing sector¹¹.

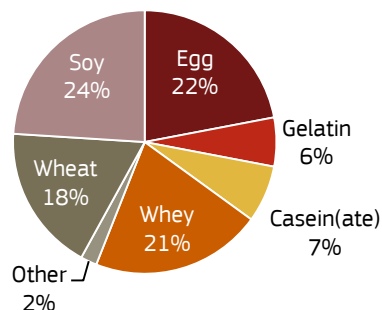
The market and social potential of the trend is discussed in the following sections.

3.1. The market potential of the trend

According to a study by Frost & Sullivan¹², the market size of proteins and amino acid ingredients amounted to approximately EUR 33.4 billion in 2013, accounting for 45 million tonnes per year. The European market is considered mature and represents 33% of the global consumption. Animal-based proteins is the largest segment of the market and is projected to grow at a CAGR of 5-5.5% between 2012 and 2018. Niche ingredients such as rice, pea or potato-based protein ingredients are expected to grow even faster at a CAGR of 23% between 2013 and 2020¹³.

This provides a significant market opportunity for valorised proteins such as Solanic's. In addition, recovered high-added value proteins are sold at a higher price compared to traditional proteins. Indeed, Solanic's proteins are sold at an average of EUR 7-8/kg, since they target higher added-value segments of the market (such as the gluten free market), whereas traditional proteins have an average price of EUR 5/kg, i.e. EUR 5,000/tonne.

Figure 3: Global protein ingredients market: 4.5 million tonnes



Source: Frost & Sullivan, 2014¹⁴

As stated in Frost & Sullivan's report, the health ingredients market is the segment which presents the most opportunities. It includes proteins targeted at people suffering from cardiovascular disease, diabetes and obesity.

The market of sports nutrition is also significant, being expected to experience an 8% growth until 2020. These segments also constitute an important target market for recovered and valorised proteins.

One of the most significant markets for food 3D-printing is the one for kitchen cooking appliances. The global demand for kitchen cooking appliances is expected to increase at a 4.8% per year rate until 2017, and has an estimated value of EUR 45 billion. Improved standards of living in emerging countries are a driver of growth for this market, with the Chinese and Indian segments expected to be especially dynamic¹⁵. The professional cooking appliances subsector currently offers the greatest potential, although in the future food 3D-printing is expected to establish itself in the end-user market segment. The professional market is expected to grow at a fast rate over the next years, as a larger share of the population is moving to urban centres and a larger percentage of meals are eaten away from home.

A second significant market for high added-value 3D-printed and protein-enriched food products is that of food in healthcare establishments, such as hospitals and care homes, valued at EUR 1 billion in the Netherlands alone. However, this segment represents only a part of the market that can be addressed by these products. In fact, in the future a greater proportion of elderly people will be living at home rather than being institutionalised. Indeed, in some European countries, home care has become the dominant mode of care. The number of people over 65 receiving care in establishments and at home is comparable in countries such as France or the United Kingdom, whereas countries like the Netherlands or Iceland have three times more people cared for at home than in institutions¹⁶. This trend will result in the expansion of the market for these high added-value products, from the public to the private sector.

Furthermore, due to their enhanced nutrient content and modified texture, high added-value foods can address the market for food tailored to terminally ill patients, who often have swallowing difficulties and need appropriate nutritional solutions. Indeed, in Germany alone, the number of patients suffering from dysphagia is 5 million. This figure increases to 30 million in Europe, potentially opening a EUR 180 billion market for foods that address the specific needs of these target groups¹⁷.

3.2. The social potential of the trend

Adding value to food products through valorisation of by-products and effective nutrition can help tackle various challenges, from environmental protection, to improved



health of specific target groups and ensuing alleviation of the burden of malnutrition.

From an environmental standpoint, efforts to valorise food by-products have a positive impact on several aspects. Firstly, recovering acid whey from the production of foods implies that fewer quantities of this by-product will enter downstream waters, thus facilitating sewage treatment and preserving their ecological status and biological health. Indeed, whey has been shown to entail a complex biodegradation process, which may therefore cause excessive burden to traditional wastewater treatment installations. Poor management of this effluent may also constitute a threat to aquatic microorganisms in the receiving water streams.

Secondly, the valorisation of by-products can positively contribute to lessening the need for protein crops in Europe. The increased consumer demand for meat in the EU has resulted in the need for greater quantities of plant crops to feed the livestock. However, such demand cannot be supported by traditional cropping systems based on cereal alone. For this reason, increasing the production of protein crops (legumes) has been considered as a necessary step to support livestock rearing. However, although the environmental footprint of legumes is reduced compared to conventional crops, this would entail a further stress on land use availability. In this respect, recovery of proteins from waste streams could provide an interesting solution to complement or even replace protein crops. Indeed, through the valorisation of potato proteins from the waste water of the potato processing industry, Solanic can produce between 25 and 30,000 tonnes of high-value, high-quality potato proteins per year. This valorised source has the potential to replace up to 15,000 protein crops (which have an average

productivity of 2 tonnes per hectare)¹⁸. Furthermore, protein crop yields are unstable, varying significantly each year. The introduction of new high added-value proteins from valorised by-products can therefore decrease the dependence on these crops and help ensure food security.

From a social perspective, effective nutrition through the production of nutrient-enriched food and innovative preparation techniques has important implications for the improvement of the health of certain vulnerable target groups. In fact, these advances allow the adaptation of entire meals to the nutritional and dietary requirements of individuals, from pregnant women to elderly patients in care homes and hospitals. This could have positive consequences for public health, particularly with regard to malnutrition.

Indeed, 33 million people are estimated to be at risk of malnutrition in Europe alone¹⁹. Risk groups include people living in poverty but also up to one third of hospitalised patients and 10% of individuals above 65 years of age. Furthermore, one out of five people over 50 is affected by a condition known as dysphagia (difficulty to swallow food). This figure reaches 60% for nursing homes patients. As a result, 41% of patients suffering from dysphagia feel anxiety or panic during mealtimes and 36% avoid eating with others²⁰. New foods with high added-value could therefore contribute to ensuring a better, more balanced and nutritious diet and relieve part of the economic burden of malnutrition, estimated to cost EUR 170 billion to the EU healthcare system annually²¹.

4. Drivers and obstacles

The adoption of new food products with high added value is supported both by the increasingly stringent labelling requirements, as well as consumer trends related to health awareness. At the same time several barriers can be identified, which are currently slowing down their commercialisation.

Regulation (EC) No 1924/2006 on nutrition and health claims was introduced to ensure that any claims made on food labelling are accurate and based on solid evidence, accepted by the scientific community. Such evidence has to be reviewed and approved by the European Food Security Agency (EFSA), before a company is allowed to make health claims on the health effects of its products.

The showcased companies reported their difficulty in carrying out the studies to supply the evidence required to file such health claims. This implies that they cannot publicly advertise any of the nutritional benefits of their products when putting them on the market, thus limiting their visibility and, consequently, uptake by consumers.

Furthermore, the methodology for the collection of evidence necessary to file the health claim is based on an approach

“Only large multinationals find it possible to file health claims in the EU nowadays” –

Carezzo

4.1. Strictness and unsuitability of health claims procedures for food industry



suitable for pharmaceutical products, rather than for food products. For instance, such procedures require to demonstrate the effectiveness of active compounds, which is a concept applicable for novel drugs, not foods. Moreover, the type of required research and studies can only be covered by the very high margins possible in the pharmaceutical industry. Food SMEs do not have high enough margins to cover these costs, and thus find it impossible to make health claims, as highlighted by Solanic and Carezzo.

4.2. Food labelling requirements and demand for “clean-label” products

A number of food ingredients has been identified by the European Commission as being responsible for a variety of allergic reactions²². To facilitate the identification of these allergens by the consumer, a new regulation (No. 1169/2011) on the provision of food information to consumers entered into force in December 2014, requiring producers to clearly detail the presence of allergens in their products.

This regulation constitutes a main driver for companies like Solanic. Indeed, food producers are increasingly seeking to minimise the allergen content of their products, to be able to display “clean labels”. Since Solanic’s potato proteins are not allergenic, unlike animal proteins from milk and eggs and other vegetable proteins like soy and wheat, they become an appealing alternative for food producers.

For example, the wine industry makes use of extractants to remove harmful polyphenols from the grape juice. However, these extractants could generate allergic reactions and would therefore have to be included on the label. Conversely, Solanic’s proteins can be used to remove polyphenols without having to be indicated on the label.

4.3. Rising trend of vegetarian and vegan healthy diets

Over the last years, consumer preferences have increasingly been shifting away from products of animal origin, towards more sustainable vegetable proteins. More significant proportion of consumers adopts meat-free, vegetarian or vegan diets, following attention towards animal welfare and healthy nutrition²³.

This trend is a big driver for the uptake of high added value products from valorisation, such as Solanic’s potato proteins. Indeed, its proteins can be used in the confectionery industry as a replacement for animal-derived ingredients such as egg albumen, gelatin and whey proteins, resulting in products that are suitable for vegetarians and vegans.

4.4. Healthy ageing

The trend of healthy ageing² which accompanies the European demographic change is a further driver for the uptake of new products with high added value.

Ageing is often associated with a condition called sarcopenia, a degenerative loss of skeletal muscle mass, quality, and strength. Better awareness among seniors of the importance of a healthy and balanced diet as a preventative measure against sarcopenia

“Our business is truly benefiting from these new emerging customer trends” – Solanic

and other age-related conditions boosts the adoption of foods with enriched protein content. This is perceived as an important driver for the inclusion of Solanic’s proteins in foods tailored to senior age groups, ensuring a protein-rich but low-calorie diet.

The healthy ageing trend was also recognised by companies such as Carezzo, which highlighted that medication is no longer being seen as the only way to treat patients. Indeed, better foods are increasingly

“We satisfy both what people need and want” – Carezzo

being recognised as effective ways to care for patients in hospitals and care homes, due to a gradual shift in mentality from “cure to care”. Furthermore, the will to age healthily will result in a greater number of seniors living at home independently, thus expanding the market for high added value products from medical establishments and care homes to private consumers.

Finally, companies active in food 3D printing, such as Biozoon and Natural Machines, confirmed that healthy ageing constitutes indeed an important driver. In fact, future elderly patients in care homes will want better, more nutritious and healthier food because they belong to a generation that has been accustomed to higher standards. Furthermore, due to their significant contribution to the social security system, their culinary expectations will rise, thus paving the way for the introduction of innovative food preparation technologies like 3D printing.

4.5. Excessive focus of public support on technical aspects

Showcased companies would also like to see more public support at the regional, national and EU level in accessing the market. In their opinion, support measures are currently focused mostly on the initial steps of the value chain. SMEs often lack the necessary resources to bring the product from the development stage to its actual commercialisation and marketing.

² This trend is further explored in Case Study 48 on « Active Ageing »



Furthermore, there are very few national subsidies available, which means that most funding is sought at the EU level. This creates significant competition and a considerable entry barrier. Indeed, the showcased companies reported their difficulties in dealing with the complex funding application procedures. As an example, it took Carezzo seven months to enter into the “Cater with care” consortium. In addition, in order to get access to EU subsidies, companies are required to open up to the competition, disclose their practices and share their knowledge, as confirmed by Solanic.

4.6. Rigidity of EU healthcare systems and reimbursements

Currently, insurance systems only reimburse treatments when a health condition is officially diagnosed by a doctor, as dictated by healthcare regulations, therefore excluding preventive measures from being reimbursed.

Since Carezzo aims to prevent diseases related to ageing through a healthier and more balanced diet, its products are not reimbursed by healthcare systems. This means that its

products are more expensive than traditional treatments based on “curing” rather than “preventing”, and therefore hospitals and care homes are not incentivised to adopt them. Moreover, companies that supply conventional treatments for conditions like malnutrition have an established therapy course, and can therefore afford to give important discounts to hospitals and care homes. This competition cannot be faced by SMEs.

Furthermore, a majority of care homes and hospitals in the European Union are already under financial pressure due to restrictions in public budgets. The budget available for food comes after the budget for care and equipment and is usually very low.

Moreover, dysphagia is not recognised as a disease in the EU, so no formal medical diagnosis is required. This means that not many patients are diagnosed with it and only few seek appropriate foods, thus slowing down the diffusion of healthier higher added-value products, as confirmed by Biozoon.

5. Policy recommendations

In the previous chapter, the showcased companies particularly highlighted the rigidity of national and European procedures regarding health claims, reimbursements and financial support, which were not seen as being favourable to innovative SMEs. These barriers can be lifted by taking into account the following recommendations.

5.1. Reorienting healthcare towards prevention

“The lack of harmonisation of the EU healthcare system and its reactive approach to illnesses is dictating where we can and cannot do business” – Biozoon

One way to address this issue would be to place more importance on the contribution of food to wellbeing, and shift the focus of healthcare systems towards prevention rather than cure through traditional treatments. To this end, a revision of healthcare systems would be advisable, particularly in terms of what can be reimbursed. Indeed, in countries like the UK, healthcare is not as supported by the state as it is in France or Italy, being mostly reliant on private insurances.

are centred on curative treatments rather than on preventive approaches. Thus, products which could help people live healthily for a longer time and avoid costly medical cures have difficulties reaching their target customers.

Preventive approaches such as healthier food products should thus be actively supported through reimbursement and/or incentives to hospitals and other medical establishments across Europe. This would help SMEs to expand their market across the EU, without having to turn to more favourable and lenient foreign markets such as the North American.

5.2. Adapting health claim procedures to food SMEs

SMEs in the food industry often do not have the time and resources necessary to abide by the health claim procedures required by the EFSA, and cannot therefore leverage on the health benefits of their products to promote their commercialisation.

This is especially true in comparison with the less stringent procedures in other countries. Indeed, some of the companies are shifting their focus towards the North American market, where health claims can be easily made, as long as they are indicated as being “non FDA” claims. Thus, the exceedingly strict regulations related to health claims could be responsible for a general loss of innovation in the food industry.

It is therefore recommended that the EFSA revise procedures and methodologies of scientific studies related to health claim applications in the food industry, to ensure they are



adapted to food SMEs. This should be done both in terms of content and necessary budget.

5.3. Expanding the scope of public support to commercialisation

Currently, public support only backs SMEs until the pre-competitive stage of product development, but not for the subsequent stages. This is a problem because SMEs do not have the resources for the next steps of marketing and commercialisation. Because of this, many SMEs see their business confined to a more restricted market, being unable

to exploit the opportunities offered by the broader European market.

In light of the above, it would be recommended to rethink the balance between support given for technical product development and market access. Equal importance should be given to all stages of development through EU subsidies, with a greater proportion of the available funds being granted to SMEs for awareness campaigns, marketing and commercialisation. This would ultimately benefit European consumers.



6. Appendix

6.1. Interviews

Company	Interviewee	Position
Solanic	Michiel Puttman	Managing Director
Carezzo	Fred Bergmans	Director
Natural Machines	Lynette Kucsmá	CMO and co-founder
Biozoon	Matthias Kueck	Managing Director

6.2. Websites

Company	Web address
Solanic	www.solanic.eu
Carezzo	www.carezzo.nl
Natural Machines	www.naturalmachines.com
Biozoon	www.biozoon.de

6.3. References

- ¹ Foodnavigator, 2014, Wasted potential? FAO review highlights food and feed uses for fish and shellfish by-products, Available at: <http://www.foodnavigator.com/Science/Wasted-potential-FAO-review-highlights-food-and-feed-uses-for-fish-and-shellfish-by-products>
- ² C. Mollea, L. Marmo, F. Bosco, 2013, Valorisation of Cheese Whey, a By-Product from the Dairy Industry, Available at: <http://www.intechopen.com/books/food-industry/valorisation-of-cheese-whey-a-by-product-from-the-dairy-industry>
- ³ Daily Mail, 2013, The future of cooking? PRINT your dinner: Don't scoff - but now 3D printers can make food, Available at: <http://www.dailymail.co.uk/sciencetech/article-2530195/The-future-cooking-PRINT-dinner-Dont-scoff-3D-printers-make-food.html>
- ⁴ Solanic, 2015, Solanic[®] potato proteins deliver solutions 'free from' allergens and animals, Available at: <http://www.solanic.eu/Markets/FreeFrom.aspx>
- ⁵ Carezzo, 2015, Bread, Available at: <http://www.carezzo.nl/assortiment/brood/>
- ⁶ Carezzo, 2015, Juice, Available at: <http://www.carezzo.nl/assortiment/fruitsap/>
- ⁷ Natural Machines, 2015, Foodini, Available at: <https://www.naturalmachines.com/>
- ⁸ Natural Machines, 2015, Veggie Burger, Available at: <https://www.naturalmachines.com/>
- ⁹ Biozoon, 2015, Available at: <http://biozoon.de/en/products/seneopro/#prettyPhoto>
- ¹⁰ Plunkett Research, Food, Beverage and Grocery overview. Available at: <https://www.plunkettresearch.com/industries/food-beverage-grocery-market-research/>
- ¹¹ FoodDrinkEurope, 2014, 2013-2014 Data & Trends of the European food and drink industry. Available at: http://www.fooddrinkeurope.eu/uploads/publications_documents/Data__Trends_of_the_European_Food_and_Drink_Industry_2013-2014.pdf
- ¹² Frost & Sullivan, 2014, Size, Share, Sources and Segments: Analysis and Forecasts for Value-added Protein Ingredient, Available at: <http://fr.slideshare.net/FrostandSullivan/size-share-sources-and-segments-analysis-and-forecasts-for-valueadded-protein-ingredient>



- ¹³ Ibid, Available at: <http://fr.slideshare.net/FrostandSullivan/size-share-sources-and-segments-analysis-and-forecasts-for-valueadded-protein-ingredient>
- ¹⁴ Frost & Sullivan, 2014, Size, Share, Sources and Segments: Analysis and Forecasts for Value-added Protein Ingredient, Available at: <http://fr.slideshare.net/FrostandSullivan/size-share-sources-and-segments-analysis-and-forecasts-for-valueadded-protein-ingredient>
- ¹⁵ Market Watch, 2014, World Cooking Appliances Market, Available at: <http://www.marketwatch.com/story/world-cooking-appliances-market-2014-04-28>
- ¹⁶ European Centre for Social Welfare Policy and Research, Facts and Figures on Healthy Ageing and Long-term Care, p. 83, Available at: http://www.euro.centre.org/data/LTC_Final.pdf
- ¹⁷ Interview with Mr. Kueck
- ¹⁸ European Parliament, 2013, Technology options for feeding 10 billion people: options for sustainable food processing, Available at: http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/513533/IPOL-JOIN_ET%282013%29513533_EN.pdf
- ¹⁹ European Food Information Council, 2011, Time to recognise malnutrition in Europe, Available at: <http://www.eufic.org/article/en/artid/Time-to-recognise-malnutrition-Europe/>
- ²⁰ Eckberg, Olle et al., 2002, 'Social And Psychological Burden Of Dysphagia: Its Impact On Diagnosis And Treatment'. *Dysphagia* 17.2, pp.139-146.
- ²¹ Medical Nutrition International Industry, 2012, Costs relating to malnutrition in Europe exceed those associated with obesity, Available at: https://www.nestlehealthscience.com/asset-library/documents/newsroom/mni_consumer_release_final_14.09.2012.pdf
- ²² European Commission, Food labelling, Available at: http://ec.europa.eu/food/food/labellingnutrition/foodlabelling/index_en.htm
- ²³ Food Navigator, 2014, Plant-based diets: The rise and rise of flexitarian eating. Available at: <http://www.foodnavigator.com/Market-Trends/Plant-based-diets-The-rise-and-rise-of-flexitarian-eating>