

FUD*in*[®]

PROTEIN TEXTURISATION



DO YOU NEED A STRATEGIC PARTNER TO INCREASE YOUR CHANCES OF SUCCESS IN THE DEVELOPMENT OF A NEW PRODUCT?

FUDin accompanies you through the entire innovation process: we study the market and the consumer to define an initial version of the idea, we elaborate the conceptual definition, prototyping and pre-series samples and we go back to the potential consumer to confirm and get to know in depth the niche you intend to conquer. We stay by your side in the industrial scaling and management of your intellectual property, to turn your idea into a market reality. So that your new products and processes end up in our homes, strengthening your turnover and your margins.

PROTOTYPE

PRODUCT



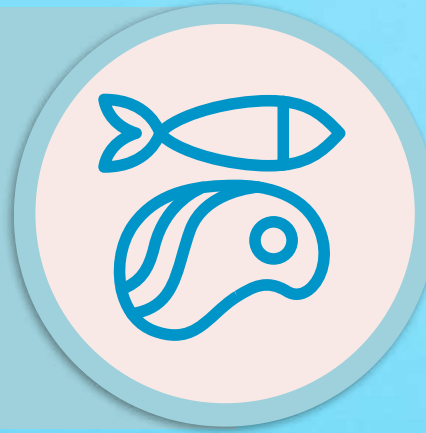
A top-down view of various protein-rich foods including salmon, beef, chicken, eggs, cheese, nuts, and legumes. The salmon is on the left, beef in the center, chicken at the bottom, and eggs, cheese, and nuts on the right. There are also bowls of lentils, peas, and bread on the left.

PROTEIN CHALLENGE

We are facing one of the greatest challenges our species has ever faced: **to feed an exponentially growing population in a healthy, sustainable, tasty, safe and nutritious way**, maximising the yield of the finite resources offered by an overexploited planet.

NOT ENOUGH PROTEIN OF ANIMAL ORIGIN

We do not have enough animal protein to meet the increased demand from the 8 billion human beings on the planet.



CONVERSION EFFICIENCY OF AN ANIMAL IS SMALL

The conversion efficiency of an animal in terms of meat, milk or egg production can be relatively low compared to other ways of obtaining protein and nutrients.



CONSUMERS HAVE CHANGED

Today's consumer is very different from that of past decades. On the one hand, we see **an active population with an increasingly faster pace of life**, and on the other, **a growing ageing population**.



FACTS



CHALLENGES

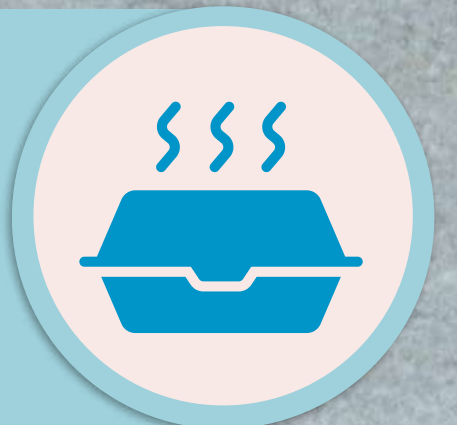
DEMOCRATISING THE CONSUMPTION OF TEXTURISED PRODUCTS

Offer **foods with a high nutritional density and with their own consumption moments.** It is not a question of replacing, but of adapting formats to the needs of today's consumer to complement the offer.



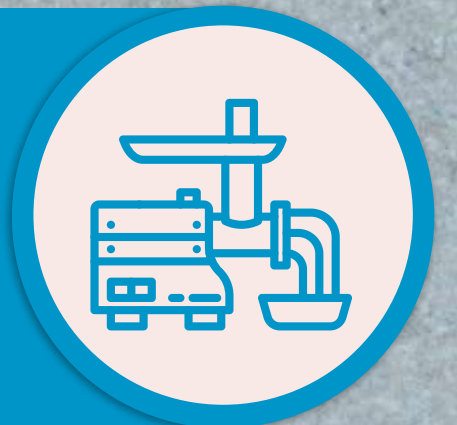
COEXISTENCE

The key is the coexistence of **all types of protein**, which configures a wide range of **attractive, affordable and healthy food possibilities for all** segments of the population.



MODERNISING THE MEAT INDUSTRY

The meat industry needs to explore the texturisation segment to **adapt its offer to the different experiences that the population is demanding.**



YOUR STRATEGIC PARTNER

One of the most complete protein texturisation pilot plants in Europe.

FUD*in*®



MARKET AND TECHNICAL KNOW-HOW

In recent years, FUDin has been developing an important **commitment to the diversification of protein sources**, seeking to position itself as a **national benchmark in the pre-treatment of viable and accessible raw materials and their subsequent texturisation** using different technologies, including extrusion.

With our **focus on the market** and with the aim of reducing the uncertainty that the acquisition and implementation of certain industrial equipment entails for companies, we have concentrated our efforts on **building first-class facilities and equipping them with the most cutting-edge technology in protein texturisation**, managed by a **multidisciplinary team of experts**, whose research, development and knowledge transfer work contribute to improving the efficiency, sustainability and competitiveness of companies, offering them **customised, high-quality solutions**.

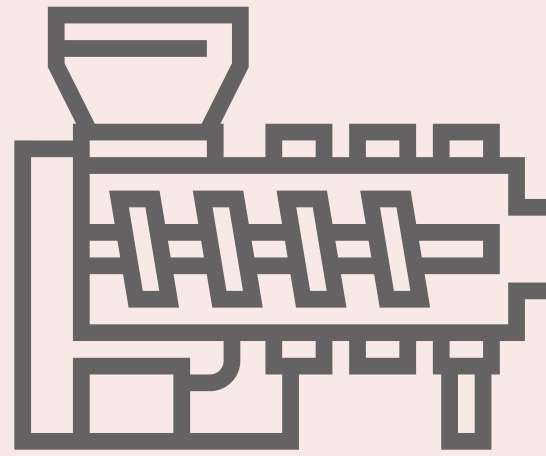
NEW PRODUCT DEVELOPMENT

FUDin walks you through the whole process of developing new products from different protein sources: from market research to the development of an early version of the idea, to the conceptual definition and prototyping, and back to the potential consumer to confirm and get to know in depth the market niche that you intend to conquer. We support you in the industrial scale-up and intellectual property management, to turn your idea into a market success.

We offer you complete pilot-scale solutions for protein transformation into healthy, tasty, safe and sustainable products, with innovative textures, formats, colors, and novel flavors designed to amaze your consumers. Our equipment allows us to build 100% customized products, being able to develop in our facilities pre-series samples to test with your customers so as to adapt the product to the needs of your target market.



PILOT PLANTS



PROCESSES

FUDin has **5 pilot plants** in which we have implemented **state-of-the-art technical processes**, microwaves, ultrasounds, dehydration, fermentation, 3D printing and different extrusion technologies, which make it possible to obtain food by both dry and wet extrusion.



DEVELOPMENTS

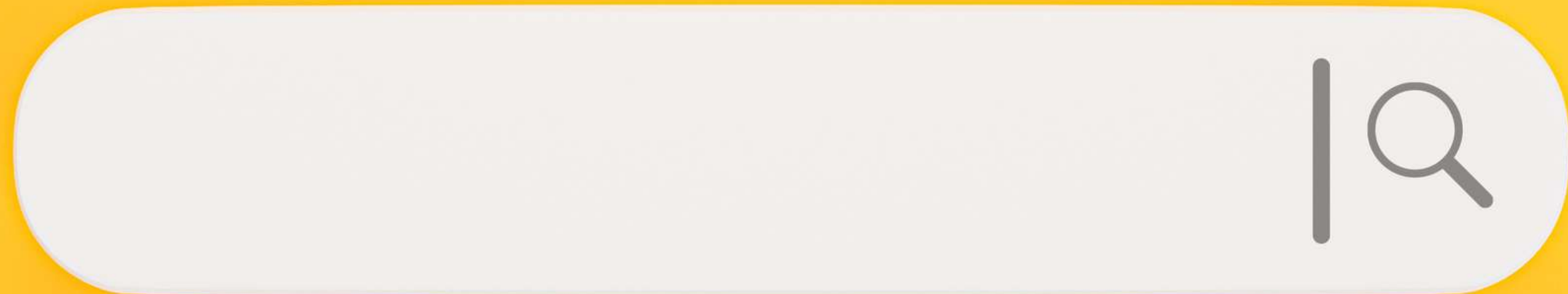
We can design and implement scalable formulas derived from R&D&I that allow companies to **develop their own products from very diverse protein sources** (cereals, legumes, insects, algae, mushrooms, animal protein, etc.) **with different textures, cuts, or seasonings.**



STATE-OF-THE-ART TECHNICAL PROCESSES

GENERATION OF RAW MATERIALS

There are many competitive advantages to **being able to predict, through various analytics, what a protein's capabilities will be during the texturisation process**: it reduces uncertainty from both a technical and financial point of view, minimises trial-and-error times and speeds up processes.



We have generated a **database** that allows us to **compare** the characteristics of the protein you intend to use for your development with those of other commercial proteins, thus being able to **predict how your protein source will behave** when subjected to the texturisation process.



BIOPROCESSES

The centre's new bioprocess line allows the simulation of **fermentation processes in a 5-litre bioreactor** at laboratory scale. The biomasses obtained are of interest as protein ingredients, as well as obtaining metabolites and microbiological cultures of interest in the food and health sector.

ENCAPSULATION (SPRAY DRYER) AND FREEZE DRYING

These technologies **allow the transformation of liquid** ingredients or process intermediates **into solid products**, allowing for better handling or increased shelf life. Encapsulation allows additional **protection of the active compound** with a wall material to prevent degradation of labile compounds, controlled release, or minimise sensory defects, for example.

STATE-OF-THE-ART TECHNICAL PROCESSES



PRE-TREATMENT OF RAW MATERIALS

ULTRASOUNDS

High-intensity ultrasound technology can cause physical and chemical changes in the material to which it is applied, through inaudible acoustic waves.

- **Homogenisation:** they can improve the homogenisation of liquids and emulsions. This is especially useful for the preparation of sauces, creams, and other products that require uniform mixing.
- **Emulsification:** can help stabilise emulsions, useful in the production of dressings, mayonnaises, and dairy products.
- **Extraction:** they can increase the efficiency of extraction of bioactive compounds from food raw materials, such as plant antioxidants, essential oils and natural dyes.
- **Desinfection and preservation:** they can be used to eliminate unwanted micro-organisms and enzymes in food, helping to extend the shelf life of products without the need for chemical preservatives.
- **Quality measurement:** they are used to measure the quality of certain foods, such as determining the texture and physical properties of meats and fruits.



MICROWAVES

The main advantage of microwave technology is an improvement in the heating time of the food and it can also be used alone or in combination with other technologies, which provides great versatility when designing food processes, without forgetting the energy consumption, which is lower compared to other thermal technologies.

- **Quick heating.** It uses electromagnetic energy which, when it reaches the medium, is absorbed and converted into thermal energy.
- Conventional furnaces operate at 2450 MHz. This system **uses 2450 MHz and 915 MHz** with a total power of 8kW, which can lead to new applications.
- It includes application of **other forms of energy**: infrared, variable hot air, refrigeration...
- **Moisture** extraction.
- **Optical** internal temperature measurement **probes**.
- The cavity can operate in **static and continuous** operation.
- Technology **available at industrial level through alliance** with the manufacturer.



ULTRAVIOLET LED

- Improves the **quality** and **functionality** of proteins and biopolymers, **without** the use of **chemical additives** or **high temperatures**.
- Denatures and destabilises proteins, improving their **solubility**, **hydration**, and **emulsification**.
- It can improve enzyme activity, having a positive impact on the **digestibility** and **assimilation of nutrients** in the final product.





STATE-OF-THE-ART TECHNICAL PROCESSES

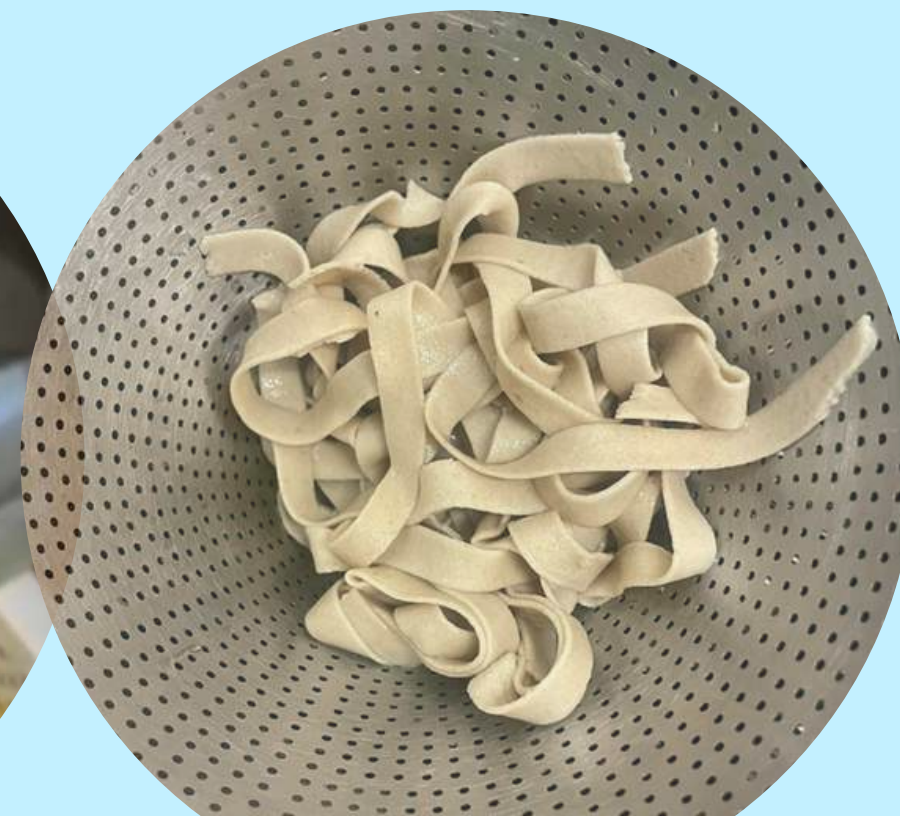
TEXTURISATION

MONFERRINA | FRESH AND DRIED PASTA

The Monferrina P6 is an automatic machine, reliable and suitable for the **processing of any type of flour and semolina**. It is particularly suitable for **short and long doughs** as it only requires a change of the drawing machine.

It is capable of mixing six kilos of flour at the same time and **can produce between 15 and 18 kilos of dough per hour**.

Made entirely of stainless steel, it has a built-in fan for pre-drying, and **operates in two separate mixing and extrusion phases**.



NM FOODINI | 3D PRINTING

It is a **3D printer** capable of printing food and taking culinary creations to a new level. From **pasta** to **mashed potatoes**, through the almost infinite applications that this equipment has in baking: **chocolate, icings, baking dough...** Through a simple but precise system of **five steel capsules** (each capsule with a maximum volume of 100 ml), to use different ingredients in printing, **and several different nozzles to create different shapes.**

All controlled from an app or through the printer's own touch screen, with the option of creating customised designs or using the predefined shapes that Foodini has.



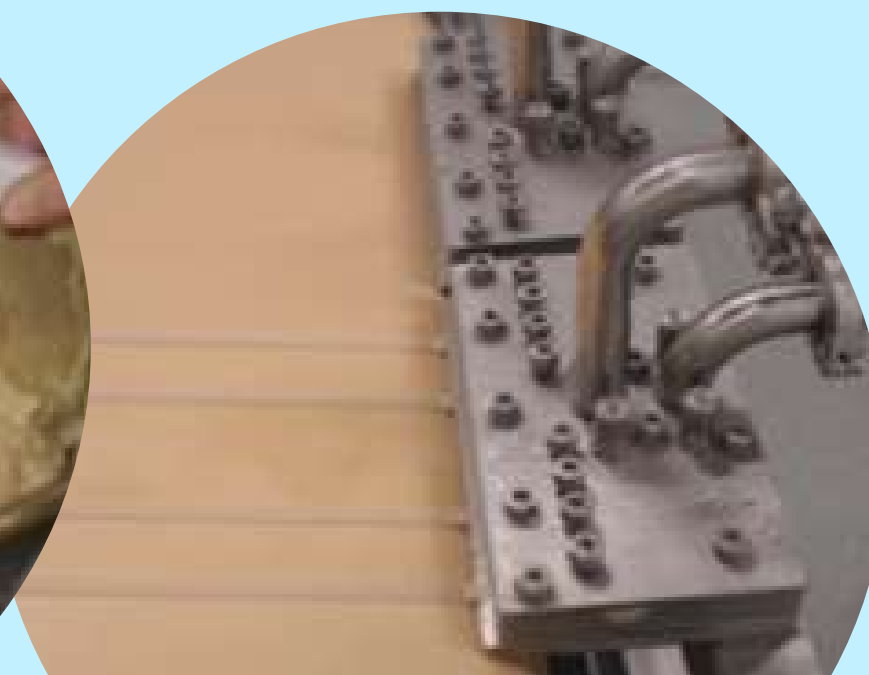
YANAGIYA | EXTRUSION-GELLING

Wet extrusion | Low temperature

Single-screw extruders that allow **the shaping of a multitude of masses**. High humidity products are obtained at the extruder outlet. They can be dried or subjected to **gelling** processes.

A multitude of products have been developed based on different protein sources such as vegetables, seaweed, fish and even meat products with textures aimed at the senior population.

The resulting product is **ready to eat**, chilled or frozen. Healthy, protein-packed, convenient; stir-fry and you're done.



BÜHLER | DRY EXTRUSION

Twin-screw extrusion

Extrusion is a versatile process that combines different unit operations in a single system. The physical and chemical reactions to transform the raw materials occur simultaneously due to the combined conditions of shear, heat and pressure during the extrusion process.

The dry extrusion process can be used in many food processing applications such as **snack foods**, **breakfast cereals**, **texturised vegetable protein (TVP)** development, pet food, etc.



BÜHLER | HIGH MOISTURE EXTRUSION

Twin-screw extrusion

The extruder has a **cooling die** attached to it which allows us to obtain **high moisture, muscle fibre imitation extruded food (HMMA)**.

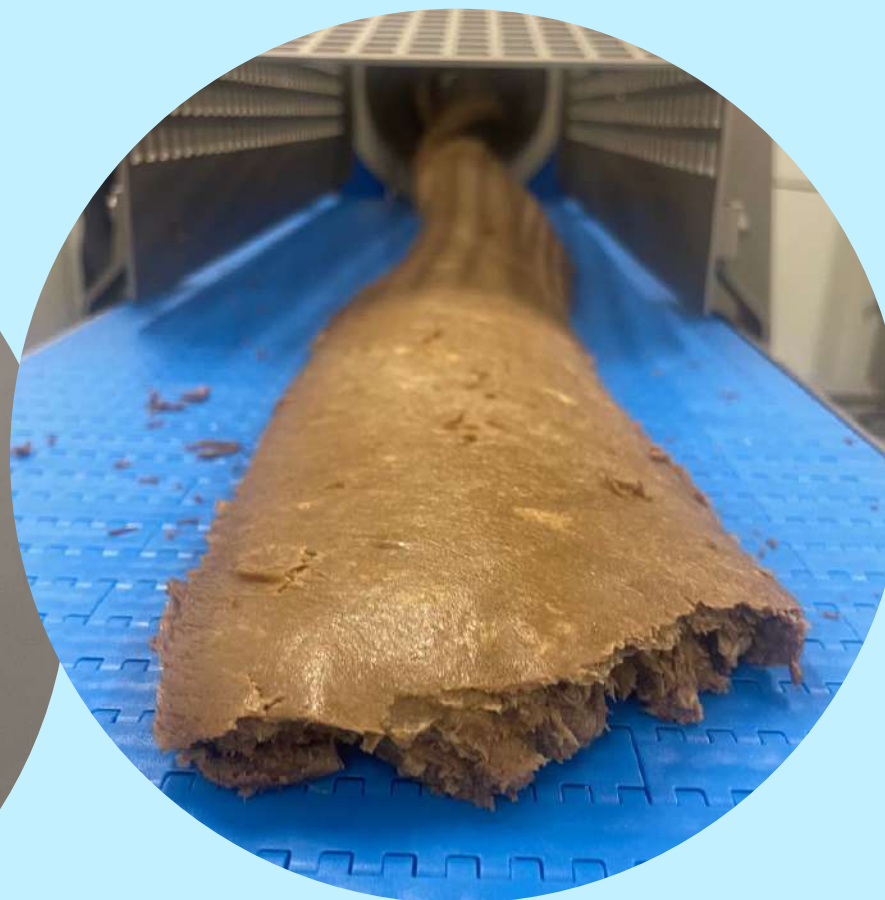
When the protein is ready to expand, we force it through a cooling die causing a **lamellar structure** to be generated. This process allows us to develop meat and fish analogues and even animal-vegetable protein hybrids.



POWERHEATER | THERMAL EXTRUSION

The PowerHeater 100 process is based on the **transfer of mechanical and thermal energy into an emulsion to coagulate protein** and any potential carbohydrate sources. This technology allows simple formulations to be transformed into a highly textured meat-like product.

This technology was initially conceptualised to develop 100% meat products and has a capacity of 100-300 kg/hour.



VEGGIAN® BY FUDin

Veggian® is an original technology developed 100% by the technical team of the FUDin Technology Centre.

Starting from raw materials, mostly from the destruction of vegetables, particles are generated and, depending on the vegetables used, characteristics such as smell or taste can be modified. It is not an extrusion process... and that's as far as we can read. 😊





WINNING THE MARKET

Given the growing consumer demand for 100% personalized food, the industry faces a challenge: to adapt its offer to the demand and to do so in an efficient, competitive and profitable way.

FUDin becomes your strategic ally to ensure that your innovation conquers the market, whether you want to develop a new reference or you are looking to adapt one of your references to new trends, niches or market demands.

FUD*in*[®]

**INNOVATION THAT
WINS THE MARKET**



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