

## **Executive Summary**

CardoonSelect intends to promote innovation in the cheese industry sector by providing new plant enzymatic formulations design for new cheese recipes.

People often recognize cardoon flower by their use in cheese manufacturing, mostly at small scale productions such as Protected Designation of Origin (PDO) cheeses (e.g. Queijo da Serra). The use of cardoon flower in cheese manufacturing is possible due to specific enzymes present in the flower that can clot the milk and form the curd. There are 9 different enzymes in the flowers of cardoon and all of them contain different amounts and also different activities over the milk. Flowers have different amounts of each enzyme which creates variability in the cheese manufacturing process and affects the final properties of the cheese. This constitutes a problem, but also an opportunity.

We will produce each enzyme individually, in an alternative production platform, which allows to control the amount and type of enzyme used in cheese manufacturing. This allows to develop single and combined enzymatic formulations for specific cheese recipes. With these enzymes we want to develop new cheeses with new textures and flavors, expanding the offer in the cheese market.

CardoonSelect intends to be a disruptive innovation, exploring cardoon enzymes in a way that the use of flower fails to deliver. CardoonSelect will allow control the clotting time for each batch of milk as well as the curd properties which influences the final texture of the cheese. Enzyme production will be performed in controlled conditions which guarantee safety and product availability all over the year. These factors will provide batch to batch consistency, custom-made enzymatic formulations for the cheese industry and open the doors to explore new markets in which the flower is not used.

The production of individual enzymes will be performed in plant bioreactors. This technology was developed in our laboratory and already proved to produce the enzymes which were able to clot milk.

We are seeking €400.000 for the next 4 years to further develop and optimize the technology, scale up the production and perform a proof of concept at semi-industrial scale using our enzymes in cheese manufacturing and developing 4 new cheese varieties. We want to expand the possibilities of cheese and provide innovation to a market always demanding new products.