

## **1 Executive summary**

In this deliverable, results of the physico-chemical and technological analysis of diets tested in lab-scale trials on both poultry and fish feed species are presented. First, the formulations of experimental feed are shown. Next, the process parameters and machinery used for feed production are illustrated. Finally, all the analyses to which the feeds have been subjected are explained, specifically the proximate analysis (protein, fat, ash, moisture, and fiber), and physical and technological analyses: density, floating rate, durability, oil leaking, and water stability.

## **2 Introduction**

In the coming years, there will be a worldwide increase in high-quality protein demand for both food and feed. The access to high-quality proteins is, however, becoming harder due to the growing world population and socio-economic changes such as urbanization, increased incomes, resource scarcity, and climate change, to name a few. For this reason, current protein production would have to double by 2050, a huge challenge considering that the European Union still has a deficit for high protein feed materials (30-50%), with severe concerns regarding feed security and the general competitiveness (FEFAC, 2018). It is one of the more pressing issues of our times to ensure a continuous and affordable supply of proteins for animal feed. The traditional protein sources currently used in feed formulations are high-quality protein sources that lead to excessive water use (fish meal) or to wide soil exploitation (soybean meal) as well as biodiversity loss, with negative environmental and social consequences (FAO “The state of the world’s forests”, 2020). It follows that this supply of proteins must be created with a scientific life cycle and circular approaches at its core.

Commercial fish feed is most commonly produced by the use of extrusion technology and studies have documented that processability and end product characteristics are dependent on the physicochemical and rheological properties of the feed ingredients (Samuelsen et al., 2022)

In this document, we investigate the effect of the three alternative proteins source insect meal, microalgae meal, and SCPs meal, on the manufacturing of the feed administered in lab-scale trials on poultry, sea bream, and salmon.

We present the feed formulations, feed production processes, and finally, the results of the physico-chemical and technological analysis carried out on each feed type.