Seafood sourced from aquaculture, acting as a primary provider, contributes significantly to maintaining global food security. Nevertheless, the rapid expansion of the aquaculture industry is currently facing a significant challenge to the supply of fish feed. Traditionally reliant on fishmeal, the industry faces issues of overfishing and the depletion of wild fish stocks, leading to environmental concerns and price volatility. The demand for alternative protein sources in fish feed is escalating due to sustainability considerations and regulatory restrictions. Additionally, the fluctuating prices and availability of fishmeal pose economic uncertainties for aquaculture operators. The quest for suitable and nutritionally balanced alternatives, such as plant and animal-based proteins, is ongoing, but presents technical and cost challenges. As the industry strives for sustainable practices, addressing the fish feed supply bottleneck is crucial for the continued growth and viability of aquaculture, necessitating a balance between economic considerations and environmental stewardship.

In this thesis, the utilization of filamentous fungal biomass introduces a promising and sustainable alternative for fishmeal in fish feed formulations. Filamentous fungi offer a rich source of proteins, lipids, and other essential nutrients that align with the nutritional requirements of farmed fish. Using side stream residues from different industries as cultivation substrates for fungal biomass production provides an eco-friendly solution to the challenges associated with conventional fishmeal production. The resulting fungal biomass not only serves as a protein-rich ingredient but also contributes to the circular economy by converting organic residues into valuable feed resources. As research conducted for this thesis and other developments in this field progress, integrating filamentous fungal biomass into fish feed formulations holds the potential to enhance the sustainability and reduce the ecological footprint of the aquaculture industry.