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Method for the production of fish cells with increased content of highly unsaturated fatty acids and application of these fish cells for producing fish specific products

Key words: highly unsaturated fatty acids, omega-3 fatty acids, fish cells, food, feed

Since the 1990ies, fish catches are stagnating at approximately 90 million t per year. Almost 2/3 thereof are directly marketed as food, while one third (more than 30 million t) are processed to fish meal and fish oil and used as pet food or fish feed in aquaculture. The fish meal and fish oil content in aquaculture feed is varying between 5-50% and 0-16%, respectively. As demand for fish as healthy food source is rapidly rising, and the aquaculture industry is developing at rates of ~ 6-8% per year, prices for the scarce resources fish meal and fish oil will presumably strongly increase in the coming years. The only alternative source for fish meal apart from wild catches is fish waste. Although omega-3 fatty acids, the most interesting ingredient of fish oil, can also be isolated from algae, fish feed is nowadays mostly supplemented with plant oils (rape seed oil, soybean oil, linseed oil) and meat from livestock farming. This untypical feed composition changes the ratio between protein and fat content in the farmed fish. The content of desirable highly unsaturated omega-3 and omega-6 fatty acids is reduced, when fish oil is replaced by plant oil in aquaculture feed. Using in vitro fish cell cultures for obtaining fish protein, fish oil or other fish related products can be a solution to this problem.

The Invention

The invention relates to a method for the production of fish cells with an increased content of highly unsaturated fatty acids by cultivating the fish cells in

- 1.) a culture medium supplemented with at least one short-chained, polyunsaturated fatty acid (e.g. α -linolenic acid) and/or
- 2.) Cultivating the cells at 2 or 3 different temperatures.

The content of highly unsaturated fatty acids is especially high if both conditions are fulfilled. To this end, cells from a fish are first cultured under standard conditions, at temperatures between 20 and 30°C, in a culture medium containing 1- 500 μ m of a short-chained, polyunsaturated fatty acid. After a defined period of time, for example 3 days, cells are transferred into a lower temperature, ideally 5-15°C lower than the standard temperature. Cells are adapting to the new conditions even better, if an additional step of temperature reduction between the high and low temperature is introduced. Typically, cells are cultured 1-3 days under each condition. After this procedure, cells show a significantly increased content of highly unsaturated fatty acids and can be further used to produce fish-specific

products. For example, they can be freeze-dried to obtain fish meal or fish oil can be extracted from them.

Market potential

- In vitro fish meal
- fish oil or omega-3 fatty acids
- alternative for aquaculture feed, pet food, as dietary supplement or supplement for cosmetics

State of Development

Fish cells can be grown as described above at laboratory scale from different fish species. First concepts of bioreactors for producing high amounts of biomass from adherently growing cells are already being tested and partially patented as well.

Branch

Food industry, feed industry, pet food industry, pharmaceutical industry, cosmetics industry

Patent situation

Patent granted (EP, DE)

Offer

Co-operation, Contract research, License, Sale

Contact

Dr. Marina Gebert

Phone: +49 451 384448 15

Marina.Gebert@emb.fraunhofer.de