

USE OF CARASSIO FISH IN THE TRASIMENO AREA: AN EXAMPLE OF CIRCULAR ECONOMY



FOREWORD

In a circular economy, material flows are of two types: the biological ones, capable of being reintegrated into the biosphere, and the technical ones, destined to be revalued without entering the biosphere.

In aquaculture, the circular economy makes use of by-products and waste generated by human food supply chains.

For example, trimmings from fish processing account for about 35% of fishmeal used in aquaculture.

INTRODUCTION

The carassius (*Carassius carassius*; Linnaeus, 1758), also known as “carpa cruciana” or as “rumatera” in Venetian dialect, “Rüगतèra” in Lombard, is a freshwater fish belonging to the Cyprinidae family.

This species is native to Central and Eastern Europe and various Asian regions. In Italy it is allochthonous, it has been introduced for fishing competitions and in recent years a significant increase in waterways throughout the country has been reported. It can be found in areas where no other fish could be able to live, as its oxygen requirements are limited.

It lives in lakes with swampy banks or in the dead arms of rivers, in swamps and ditches. In ponds, in unfavorable feeding conditions it grows very slowly and gives rise to dwarf forms, in favorable environmental conditions it develops more and takes on a more harmonious body.

Fishing at Lake Trasimeno includes the following species:

Carp • Tench • Pike • Royal Perch • Trout Perch • Dairy • Eel • Red Shrimp • Catfish • Carassio.

The latter, at 80%, is disposed of as waste / waste due to the considerable presence of bones and for low demand for food purposes, except for the production of “fishburgher” for school canteens after appropriate processing.

The remaining part could be used for the production of flour for livestock feed, organic substrate for biomass energy production processes, fertilizer, etc.

NUTRITIONAL CHARACTERISTICS OF CARASSIO

Carassio meat, from a nutritional point of view, has a high protein content as well as a high amount of fats, in particular omega-3 polyunsaturated fatty acids, which play an important role in the prophylaxis of cardiovascular diseases, but also arthritis, osteoporosis, diabetes and neoplasms.

Among the fatty acids present in the greatest quantity in the carassium can be found palmitic acid (16:0), oleic acid (C18:1n-9), linoleic acid (C18:2n-6), arachidonic acid (C20:4n-6), EPA and DHA.

FOOD USE

The presence of myospine that characterizes carassium represents a danger for consumption.

This problem can be solved by grinding the meats to make the food safe.

The 'mince' of carassio can be used in the elaboration of preparations based on fish pulp, using a pulp of carassio and carp.

An example of this is a fish preparation of the "burger" type, made with fish species from Lake Trasimeno, which turned out to be a product with a high nutritional quality.

This product has been processed using the following procedure:

an initial peeling of the carp was carried out, followed by manual filleting of both fish, removal of the skin and two grinding cycles with a refrigerated meat grinder. To the uniform pulp obtained, consisting of 50% carp and 50% carassium, mashed potatoes, aromatic herbs (parsley and chives), salt and pepper are added.

According to a study (1) comparing the Lake Trasimeno fish product with a commercially available fish pulp preparation made from Nile perch, a higher fat content was observed in the Trasimeno preparation than in the commercial product, together with a higher omega-3 fatty acid intake.

The local product has also been shown to have higher anti-atherogenicity and anti-thrombogenicity.

Despite the poor quality of the meat of this fish, careful processing can result in a final product that is still pleasing to the consumer and with excellent dietary-nutritional qualities.

In the canteens of schools, municipalities and hospitals these products are consumed, especially fillets, "fishburger", sticks and croquettes.

FISH MEAL

Fish trimmings and scraps can be turned into flour for livestock food, dog or cat food or converted into fertilizers.

Fishmeal is a food that is an excellent source of proteins, essential amino acids, fats, minerals and vitamins and is obtained by grinding fishing waste and fish-based food waste.

All parts of the fish, from the head to the viscera, are used in the process and are subjected to compression, drying, dehydration and grinding.

In the compression phase, another product obtained is fish oil, which is used in the production of food supplements as a source of omega-3.

The preparation of fishmeal involves several steps: initially, all fish and fishery product waste is boiled; compression is carried out to release the liquids and isolate the excess fats (omega-3); the water is evaporated and then the drying process continues under dry heat (80 ° C) or steam (70 ° C) and finally the mixture is ground.

The final product can be used in various sectors:

- animal husbandry (animal feed)
- ichthyoculture (fish farming, feed for aquarium-raised fish)
- agriculture (organic fertilizer, source of nitrogen and phosphorus)
- human nutrition (rarely used in industrial foods, such as surimi, frozen, crab claws)
- feed for dogs and cats (protein source)

COMPOSTING

In composting, fish waste is combined with waste of a plant nature (leaves, branches, wood, bark).

In the composting process, the presence of carbon sources (in addition to fish waste, also wood, bark, leaves, etc.), nitrogen, water and air (about 60% water and 20% oxygen), a pH between 6-8 and a temperature of 55-65 ° C are fundamental.

The degradation activity of organic matter generates heat, which determines an increase in the temperature of the material that makes up the compost and has an effect similar to that of pasteurization, eliminating pathogenic microorganisms.

The resulting product can be used as fertilizer, without any risk to plant growth and human health.

CONCLUSIONS

The recovery and reuse of Carassio fish is therefore an example of a circular economy in which:

- 1) The cost of disposal is avoided
- 2) Fish is recovered to produce products for human consumption
- 3) The discarded mass is transformed into flour for animal feed
- 4) It is added to other organic substances to start a composting process that has as its final objective the production of organic fertilizer.

(1) ("Acidic profile and sensory characteristics of a preparation based on fish pulp from Lake Trasimeno" R. Franceschini, M. Orrù, D. Miraglia, D. Ranucci, F. Asdrubali, S. Altissimi, A. Valiani, R. Branciarì).

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