

# TECHNICAL REPORT: CONVERSION RATE IN THE SALMON FARMING INDUSTRY

Ewos S.A., leader in salmon food  
July 2006

In reference to the report issued by Terram Foundation titled "Piranha-like Salmon", the executives of the EWOS Chile S.A. company, leader in food production and salmon investigation in Chile, watch in that article a series of conceptual mistakes that eventually lead to mistaken and/or ill-disposed conclusions. With the intention of contributing to a discussion with solid foundations, they make the following statements.

By the year 2006, the fish flour (FF) concentration in salmon foods in Chile will average a 27% approximately and that of fish oil (FO) will be 16%. These figures significantly contrast with the 35% informed by Terram Foundation for both inputs. Additionally, Terram informed that the FO levels in salmon diets were increased from 30% in 2004 to 35% in 2005, also erroneous numbers because they actually correspond to 23 and 20%, respectively. The truth is that from year 2000 to date, flour and FO content in salmon diets have diminished substantially.

It is important to emphasize that FF is considered the best protein source for salmon diets due to their high content and good balance of amino acids. Additionally, salmons, due to their carnivorous nature, use this protein source in a very efficient form. In spite of this, the limited availability of this resource, its high price and the principle of economic and environmental sustainability of the industry, have led that replacement of FF in salmons diets by other alternative protein ingredients have been accelerated in the last years. As an example, in 2000, the FF level used in the salmon diets was on average over 50% of the portion. Therefore, reduction in the levels of FF in the last 5 years has been substantial, which has been obtained thanks to a maintained effort on resources for investigation from food producing companies and research centers both in Chile and abroad. This information, that is known by all the Chilean salmon farming industry, is not commented by Terram on its report, which confirms the ignorance of this Foundation on the matter, or it lets glimpse the bad intention of its report.

The replacement of FF by other protein alternatives continues to be a key point for salmon food producers. On the matter, Terram makes another mistake when mentioning here that fish flour cannot be replaced beyond a 25% in the diet. This replacement level has already been surpassed widely thanks to the scientific research performed on the subject. Besides, for the EWOS company, the goal in a two to three year term is to reduce FF levels to 10% of the diet and in a 6 year term, to lower to about 0%. Nevertheless, the level and depth of the investigation required to reduce FF in the fish diets to these levels will demand an even greater economic effort in scientific research. This is because these changes in the diet formulas must be made without harming the productive efficiency, the well-being, and nutritional and sanitary quality of fish. In addition, the substitution of FF must allow to obtain an end product that is accepted by the consumer and with nutritional ingredients that are sustainable and friendly with the environment. For this, important resources in areas such as nutrition, biotechnology, new technological processes for food production, nutritional and vegetal genomics, among others, are being invested to allow

the inclusion of a greater level of protein sources from vegetal and land animal origin in the fish diets.

The above mentioned confirms that Terram is absolutely disinformed about what the industry is doing on salmon nutrition research, because it is very probable that within a six year term, the subject on the presence of fish flour in the salmon diets may no longer be a discussion point.

Among ingredients that have been used in the last years to replace FF and those that will become more relevant in the years ahead, soybean, lupine, canola, peas, sunflowers, corn gluten and wheat gluten, proteins from poultry, bioproteins, etc. are included. Among vegetables, some protein concentrates with high digestibility, as well as value added flours of animal origin will acquire greater importance. The future incorporation level of this type of inputs will be increased, taking advantage of the carnivorous nature of salmon, thus improving turning land origin proteins into salmon.

With respect to the replacement of FO, the investigation available nowadays allows to conclude that this input can be replaced by 50% by vegetal oils without affecting the productive fish performance, their well-being or nutritional quality. At the moment in Chile, between 35 to 50% of oil added to diets it is from vegetal origin and between 50 to 65% come from fish. FO is important in the salmon diets fundamentally due to the contribution of the so-called Omega-3 (EPA and DHA) fatty acids (FA), essential for fish and that are build-up in the salmon muscle. These FA are very important for human health, including reduction of cardiovascular diseases, cancer and diabetes. Additionally, these FAs participate in the development of the nervous system and vision of developing fetus. Some vegetal oils rich in vegetal Omega-3 FAs allow to replace part of FO, but not the totality.

Unfortunately, there are no other abundant and commercially available sources of these FAs nowadays, apart from fish oil. Nevertheless, we count on very encouraging scientific advances in the development of vegetal seeds, yeasts and other FAs being able to generate and to turn themselves into EPA and DHA, which will allow in the future a lower dependence from FAs in the salmon diets. This information, that is also known by both the public and the scientific community, is not addressed by Terram, which proves again the lack of scientific rigor in the information issued by this Foundation.

In relation to conversion rates, Terram omits to inform that one of the main reasons for the improvement in the conversion efficiency is the development of technological processes for salmon food production, that allowed the transition from a pelletized to extruded food in the last decade. This development has had a tremendous environmental and economic impact when reducing food losses significantly. It is also possible to mention that if we compare the conversion rate of food into salmon meat (1.35) with other productive species such as poultry (1.85), pigs (2.7) and bovine (> 7.0), one can conclude that salmon are far more efficient in this process.

In conclusion, sustainability of the fishing resources and the salmon industry in Chile from the feeding view point are being addressed by food producers and the scientific world in a serious and responsible way. This approach contrasts with the points of view of Terram Foundation, which, showing important knowledge gaps on feeding of salmonids, intends to spoil the commitment that this industry has with sustainability of marine resources in Chile.