



Alonim Linseed  
Company

## Omega 3 & 6 in Carp and Tilapia

Omega 3 fatty acids are essential for humans, because our body cannot synthesize them and because they play essential physiologic roles. The main role of omega 3 fatty acids is in preventing serious conditions and diseases including: Heart Attack, Stroke, Cancer, Obesity, Insulin resistance, Diabetes, Arthritis, Depression, Alzheimer's disease and more. In the past humans were able to gain those essential fatty acids from regular food such as milk, meat and eggs, since animal ate varied sources of omega 3 and their products naturally contain those fatty acids. Now days there are hardly any source of omega 3 in animal feed so as a result in our food there is a very low level of the omega 3 fatty acids. In addition the reduction in the omega 3 fatty acids caused lack in the balance between the omega 3 and omega 6 fatty acids.

Fish, in general, are considered as a nutritional source of omega 3 fatty acids. From the laboratory tests that were conducted by the Fish Farmers Association in Israel, we can learn that there is a big different between different kind of fish. The level of omega 3 fatty acids in Carp and Tilapia fish is very low. Since those are very popular fish we think that enriching them in omega 3 fatty acids has a nutritional importance.

Table 1: Omega 3 level in different kind of fish

|                                      | <b>Carp</b> | <b>Tilapia</b> | <b>Trout</b> | <b>Bass</b> |
|--------------------------------------|-------------|----------------|--------------|-------------|
| <b>% fat</b>                         | 6.5         | 5              | 9.8          | 8.9         |
| <b>% omega 3</b>                     | 3.5         | 3.6            | 16.6         | 16.8        |
| <b>Omega 3 in 100 gram fish meat</b> | 0.23        | 0.18           | 1.63         | 1.5         |

Re-entering omega 3 fatty acids to animal feed and in this way enriching it with omega 3 and reducing the ratio between the omega 6 and omega 3 fatty acids is a developed field in the world. We conducted 2 experiments during 2004-2005, in the Unit of Intensive Fish Farming at Ginossar, the Department of Fishing and Water Agriculture the Ministry of Agriculture and Rural Development in Israel.

We used unique linseed that were selected for their high Omega 3 content and are heat-treated and go through extrusion treatment in order to facilitate their digestion by animals. (Valomega 160 - produced by Valorex Company, France).

The first experiment was carried out with Carp and Tilapia fish for 60 days.

The second experiment was carried out with Tilapia fish for 120 days.

The growth conditions on both experiments were:

- ζ Water in temperature of 27-28°.
- ζ The fish feed was based on commercial feed with addition of Valomega 160.
- ζ The experiments were conducted 2-4 month before marketing the fish.

The main targets were to examine the effects of adding vegetal source of omega 3 fatty acids - extruded linseed (Valomega 160) - to the fish diet on the following aspects:

- ζ Fish performances (daily growth, rate conversion).
- ζ Level of omega 3 fatty acids in the muscular tissues
- ζ Ratio between the omega 6 and omega 3 fatty acids in the meat.

The results show that the daily growth of the fish was not affected by the addition of the extruded linseed, nevertheless as shown in tables 2-3 the level

of the omega 3 fatty acids in muscular tissues was significantly higher in the groups that received the addition of the omega 3 in the feed, and the ratio between the omega 6 and omega 3 fatty acids in the meat was reduced.

Table 2 : Carp results experiment 1

|                          | <b>Carp day 0</b> |                     | <b>Carp day 60</b> |                     |
|--------------------------|-------------------|---------------------|--------------------|---------------------|
|                          | Control           | 5% extruded linseed | Control            | 5% extruded linseed |
| <b>% Fat</b>             | 8.8               | 8.5                 | 12.5               | 11.9                |
| <b>% Omega 3</b>         | 3.2               | 3.1                 | 2.8                | 4.9                 |
| <b>% Omega 6</b>         | 21.5              | 21.3                | 20.6               | 19.1                |
| <b>Omega 3 : Omega 6</b> | 1 : 6.8           | 1 : 6.8             | 1 : 7.3            | 1 : 3.9             |

Table 3 : Tilapia results experiment 1

|                          | <b>Tilapia day 0</b> |                  | <b>Tilapia day 60</b> |                     |                     |                      |
|--------------------------|----------------------|------------------|-----------------------|---------------------|---------------------|----------------------|
|                          | Control              | Extruded linseed | Control               | 5% extruded linseed | 7% extruded linseed | 10% extruded linseed |
| <b>% Fat</b>             | 5.5                  | 4.4              | 6.2                   | 6                   | 5.6                 | 4.5                  |
| <b>% Omega 3</b>         | 3.4                  | 3.6              | 3.3                   | 4.7                 | 5.9                 | 5.8                  |
| <b>% Omega 6</b>         | 23.1                 | 24.3             | 23.3                  | 23.5                | 24.5                | 23.8                 |
| <b>Omega 3 : Omega 6</b> | 1 : 6.8              | 1 : 6.7          | 1 : 7.1               | 1 : 5               | 1 : 4.1             | 1 : 4.1              |

The method of increasing the Omega 3 fatty acids level in Carp and Tilapia by adding vegetal source of Omega 3 (extruded linseeds – Valomega 160) to their feed have very clear results, more over this method is very easy to implementation. From marketing point of view this method answers the worldwide trend of healthy food.

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