

Additional Questions from the F3 Webinar:  
Emerging Trends in Alternative Feeds for Carnivorous Fish

**All Panelists**

1. There is likely to be large amounts of canola protein concentrate available from Canada at attractive prices as canola oil is increasingly used as feedstock for renewable fuels. What do you foresee as the challenges of using canola protein concentrate as fishmeal replacement?
  - Ewen McLean, Aqua Cognoscenti Answer: Canola proteins have been reported to have lower digestibility when compared to other plant proteins and concentrates such as soybean. Glucosinolates and their breakdown products have been recorded as having a negative impact on growth and in causing hyperthyroidism, which may influence growth and reproductive performance and abilities to withstand environmental changes. Glucosinolates may also negatively influence gut protease activity. The major issues of using CPC in fish feeds, therefore, are the antinutritional factors and the degree of processing required to rid or reduce their effects which may, in turn, reduce the nutritional value of the product.
  - Neil Sims, Ocean Era Answer: Sorry, don't know enough about canola, but ... the primary concern would be does it have any of the anti-nutritional factors that are found in soy (i.e. phytates, tannins, trypsin inhibitors and oligosaccharides)? These can all be problematic with carnivorous fish, leading to inflamed GI tract epithelia, and in some cases diarrhea (in the fish).
  - Alex Tsappis, Alltech Answer: Canola meal or Rapeseed meal mostly known in the EU has been used in aqua diets (but primarily in livestock). I will fall back to my PP and comments on the panel: There is not going to be a magic bullet in alternative ingredients. Any ingredient that we choose to use, we have to take into account the 4P's (Palatability, Performance, Pollution and Planet) which will allow us to decide in the end if we will use them in our lineup of top quality ingredients.
  
2. Is anyone aware of emerging certification standards in Europe that are aimed at ensuring no animal, including insects, are grown with the intent of being feed for another animal? Would you lose less protein if you take DDGS and convert it to a concentrate to feed to fish rather than feeding DDGS to insects that are then fed to fish?
  - Ewen McLean, Aqua Cognoscenti Answer: The only standards that I am aware of are those relating to safety issues. Over 2 billion people worldwide eat insects in various forms on a regular basis. The use of DDGS in aquafeeds is reliant on a number of factors, not least its nutritional composition, which varies with grain type and fermentation and drying methods employed. There may also be a need for supplementations with Lys/Met. Different aquaspecies also respond differentially with respect to inclusion levels. There may be an advantage with DDGS in that it has been reported to augment the immune system. Regardless of this, the cost of insect meals is currently so horrendous that it is likely that,

economically speaking, it would be more reasonable to use DDGS concentrates in aquafeeds rather than to employ as an insect feedstock.

- Neil Sims, Ocean Era Answer: I am not aware of any such initiatives, but ... animal welfare standards, even in the EU, would probably not extend to insect larvae such as BSF. And the question of protein efficiency would depend on the process of “conversion”. If this was a microbial fermentation, then it would probably be more protein efficient, but the advantage (as I understand it) of the BSF larvae is that they are highly digestible. Would the fermented DDGS be readily digested by carnivorous fish? It should certainly be tested.
- Alex Tsappis, Alltech Answer: I am not aware of any Certification Standards for this. What I would say though is that DDGS in their current form are not the greatest options in carnivorous aquatic diets. In my opinion, feeding them to insects though would definitely provide a better alternative to standardize the insect diet which will allow for the residue to be fed to livestock and thus reduce the cost of the initial insect larvae to aquaculture.
- Boyd Way, Dainichi Answer: No, I am unaware of any such emerging standard or regulation. I would find that rather unfortunate. Our company has taken the stance of using salmon oil, tuna meal, shrimp meal, and squid extract as key raw materials for our feed. These items are all taken from processing plants and cannery mills. We are using the “waste” from facilities that manufacture food for humans NOT other animals. I am not a scientist but regarding DDGS concentrate, I believe the key would depend on (a) the bioavailability of the ingredient to the fish and (b) the ingredients landed cost. Which comes down to the economic FCR of the fish using that diet.

### **Paul Wills/Marty Riche**

1. How advanced is the technology of recirculating systems in the States now?
  - Paul Wills and Marty Riche, Florida Atlantic University Answer: Recirculating Aquaculture System (RAS) technology is well advanced in the US today with regard to development and is building in its application. Development includes “traditional” RAS system technology and next generation integrated systems such as Recirculating Land-Based Integrated Multi-Trophic Aquaculture (IMTA) and Aquaponics. However, application is still limited for all types of RAS. There are farms using RAS for production of tilapia directed toward the live markets in Asian communities, salmon culture (e.g., Atlantic Sapphire), and pilot scale marine aquaculture (e.g., Florida Pompano at Aquaco LLC).

### **Alex Tsappis**

1. You mentioned LCA - why do you think we should measure this for feed ingredients and what are some of the parameters that you have used for the LCA assessment?
  - Alex Tsappis, Alltech Answer: The LCA(Life Cycle Assessment) looks at the impact of the specific ingredient in question: Material input, Energy input, Emissions, Land use, Co-products, Waste - which will allow us to add our environmental score which will then help customers make a more informed

decision. Alltech also offers an in-house solution to all our customers with our Alltech ECO2 which I hope will become available to Aquaculture soon.

<https://www.alltech-e-co2.com/>

- Neil Sims, Ocean Era Answer: Here is a link to some LCA work that we did on feed ingredients, a few years ago:

<https://pubs.acs.org/doi/10.1021/acs.est.7b05468>

2. Can you shed some light on your work with algae as an alternative feed ingredient?

- Alex Tsappis, Alltech Answer: Algae holds a very special spot in my heart. I believe that it is a key ingredient for all aquaculture species, especially carnivorous fish. It is the solution to replace all our fish oil needs due to the great levels of Omega 3 DHA & EPA fatty acids.

### **Boyd Way**

1. Do you think that Japanese consumers are willing to pay a premium for fish approved by ASC or MEL in terms of SDGs?

- Boyd Way, Dainichi Answer: I believe that any consumer, regardless of the product, is willing to pay a premium if the product is marketed and presented correctly. ASC or MEL in terms of SDGs is a marketing tool and needs to be used as one to change attitudes toward the consumption of seafood.

The major issue I see to get the (Japanese / aka any) consumer to pay a premium is consumer education. The story must be clearly and simply told. What exactly does this sticker on my seafood mean? Unfortunately, at my local supermarket I have yet to see posters explaining what ASC or MEL mean in terms of SDGs.

As more producers achieve ASC or MEL this will become a requirement to do business by the retailer and expected by the end-user. In this case, the consumer will expect this to be a necessary part of the product. At this level achieving a premium will be difficult.