GOED Technical Committee - Minutes

Date: September 28, 2023

PRESENT (please let us know if you were present, but not listed below)

Jenna Ritter (*chair* – Nature's Way of Canada)
Rafa Gracia (Solutex)
Ingjerd Lystad (Pharma Marine)
Tina Vestland (Golden Omega)
Lina Cekaite (Aker Biomarine)
Helen Albans (Croda)
Henriette Meiser-Zessner (KD Pharma)
Frank Möllering (Nutriswiss)
Erik Fuglseth (Orivo)
Juergen Gierke (BASF)
Guy Ben-Zvi (Omega-3 Galil)
Christine Bousses (Fermentalg)
Johannes Kraft (Evonik)
Geir Frode Olsen (Epax Norway/Pelagia)
Magdalena Sobieska-Pietrzak (GC Rieber)
Heike Meyer (Imperial Oel)
Gunnar Herstad (Aker Biomarine)
Ida Aspmodal (KD Pharma)
Vibeke Bløndal (BASF)
Bas Arntz (Novosana)
Davide Mazza (Sochim)

GOED Staff:
Gerard Bannenberg (GOED)
Elana Natker (GOED)

Guests:
Linda Ren (Thai Union)
Kim Thorup (Arctic Bioscience)
Arne-Magne Johansen (Vesteraalens)
Wilco Nieuwenhuize (Bioriginal)

Absented:
Chloé Lhomme (Fermentalg)
Udaya Wanasundara (Algarithm)
Huw Watkins (Eurocaps)
Chris Gearheart (GOED)
Tony Bimbo (International Fisheries)
Tim Johanek (Carlson Laboratories)
Sonia Casanova (Copeinca)
Gerhard Kohn (Vesteraalens)
Anthony Bible (Wiley Companies/Organic Technologies)
Mike Roberts (HuveNutra)
Dagmar Behmer (Bruker Optics)
Craig Mallon (DSM)

Invitees for this call: -

<u>Approval of Agenda and Minutes (Jenna Ritter - committee chair)</u>

- Any comments on the minutes of the last meeting?
  - *No comments.* The minutes of the last meeting were approved.
- The agenda and meeting documentation were sent out on September 26th, 2023. Any additions or changes?

- The agenda was approved.

New Technical Committee Members (Jenna Ritter)

- **New members of the Technical Committee**
  - **Alessandro Zerbi (SFI Health)** – *not present*
- **Members who have left the committee:**
  - **Francesca Nembri (SFI Health)**

Monograph/Pharmacopeia Updates (Gerard Bannenberg - GOED)

- **Technical report on Conversion Factors for Polar Lipid Oils (PLOCF WG) (Gerard)**
  - **Gerard –** We like to return to the technical report on Conversion Factors for Polar Lipid Oils, on which we have worked a good part of this year. What happened in the past months is that one member, Aker Biomarine, asked for clarification on the scope of this document and specifically when conversion factors be used when GOED's recommendation is that members always first express EPA, DHA and Total Omega-3 content as free fatty acid equivalents. We asked GOED's Regulatory Affairs Committee to discuss the report and provide feedback since that member's regulatory representatives are a member in that committee, and also to evaluate any broader, perhaps regulatory, implications of this report on conversion factors. A more clear and general introductory statement was suggested to be included at the beginning of the report while remaining to state that conversion factors are needed for the various oil types that GOED members manage, including for polar lipid oils. The new paragraph reads as follow *"GOED recommends that members express the content of EPA, DHA and Total Omega-3 ~~content~~ in free fatty acid equivalents. This permits comparison between products produced by different manufacturers and by different production technologies. This is particularly important with regards to certificates of analysis and the labelling of final products. In addition to the use of free fatty acid equivalents, GOED members can optionally express EPA and DHA content of their product according to the chemical form in which the fatty acids are present in the oil. To interconvert the omega-3 content of various lipid forms and free fatty acid equivalents, conversion factors are needed. While these are available for members producing and marketing triglyceride- and ethyl ester-based oils (see the GOED Guidance Documents), information on conversion factors for*

polar lipid oils had not been compiled until now." Furthermore, the Regulatory Affairs Committee did not have any comments on the actual content of the report.
So, hereby we would like to ask the Technical Committee if we can now adopt this report today. Does anyone have any last comment or question?

- **Heike Meyer (Imperial Oel)** – I think it is a great document. Just one question. Since there are so many labs that use different methods, I remember you mentioned you wanted to share contact regarding which labs are suitable for measuring EPA and DHA, so that it can be used for direct labelling?
- **Gerard** – Making a summary of methods that are suitable for EPA and DHA quantification in polar lipid oils is on our list of things to do. That will probably be part of a new type of guidance documents for polar lipid oils accompanying a new monographic structure for these oils. This may include information on specific method for polar lipid oils, but also method adaptations for recommended methods for triglyceride and ethyl ester oil, for example replacing iso-octane with chloroform to dissolve the sample (when polar lipid content is relatively high). That was not really within the scope of this technical report focusing on conversion factors. On the other hand, we will also launch GOED's Special Achievement or mention for highly accurate 3rd-party laboratories for EPA and DHA quantification (scheduled for Q1 2024), although that will not focus on polar lipid oils specifically.
- **Heike** – OK, thanks
- **Guy Ben-Zvi (Omega-3 Galil)** – In solving how to designate the amount of EPA and DHA in many different products, do we have any idea about their bioavailability? I know there were arguments that if polar lipids are present, or EPA/DHA is incorporated in phospholipids like phosphatidylcholine, are they absorbed as such, or are they decomposed into free fatty acids, like what happens with triglycerides and ethyl esters? Is there any information about that? It is the most important question in the end of the day.
- **Gerard** – Polar lipids can vary tremendously in chemical structure, and encompass glycolipids, phospholipids, lyso-phospholipids and other. You can find a list of the most relevant ones in this technical report on conversion factors for polar lipid oils.
- **Lina Cekaite (Aker Biomarine)** – For krill oil we have some studies showing a better bioavailability of omega-3 fatty acids than from triglycerides, but similar to some other phospholipid-containing algae oils.
- **Guy** – These are very large molecules, with molecular weights of hundreds of Daltons. They don't pass the gut membrane. Normal fat is decomposed by the digestive lipase enzymes into free fatty acids, absorbed and restructured into triglycerides, after passing the gut and before going into lipoproteins. For me the main question is how this works for phospholipids and these complex molecules? Are they readily absorbed as they are, which does not make a lot of sense from a physiological or biological point of view, or are they also decomposed into free fatty acid and then restructured into triglycerides? I know it is not the main topic here, but I like to know
- **Lina** – Good question.

- **Gerard** – This is a good question for the Science Committee. I will let Kaitlin (Roke) know. In recent years the MFSD2A transporter was discovered and characterized, but I don't know if it is active in the gut to transport the corresponding lyso-phospholipids. That would imply you need hydrolysis of at least one fatty acids before the lipid containing EPA/DHA can be absorbed.
- **Lina** – That can be covered by a speaker on LPC transport in the brain perhaps. But it is a little different than LPC levels in krill oil.
- **Guy** – Is krill oil only phospholipid or a combination of triglycerides and phospholipid?
- **Lina** – A combination.
- **Guy** – So it is difficult to tell what raises the Omega-3 Index.
- **Lina** – It does, compared to fish oil. You have a control.
- **Guy** – OK, thanks
- **Gerard** – We will let everybody know if and when this will be discussed in the Science Committee
  Let me return to asking for approval of the technical report on conversion factors for polar lipid oils. Are there any objections?
  No objections or further comments received.
  OK, then we hereby approve of this document. GOED will turn this into a good-looking document and upload it on the technical section of our GOED website. As always, if there are any changes needed in the future, we can revise and update it. It will be interesting to see how different members using polar lipid oils will use it.

- **Action Item**: Upload the Technical Report on Conversion Factors for Polar Lipid Oils on the technical section of the GOED website (**Gerard**)

Legislative Updates (Gerard Bannenberg)

- **EFSA Scientific Opinion on MOH (Gerard)**

  - **Gerard** – recently, on September 13, 2023, EFSA published its finalized Scientific Opinion *"Update of the risk assessment of mineral oil hydrocarbons in food "* (officially adopted on July 12, 2023) – link. In the documentation sent with the agenda you can find a document with links to this EFSA publication. We have discussed this in the past but basically EFSA is saying that there is no health risk for all age classes from consuming MOSH present in food, whereas 3- or ring MOAH are mutagenic and carcinogenic and do pose a health risk, especially for the young population. A plain language can be found here – link. Between the draft (published in March 2023 – link) and the final opinion, a number of small changes have been made – if you are interested in seeing those, feel free to reach out to GOED. I think EFSA recognizes that more research is still needed to better understand the toxicity

associated with exposure from the 3- or more ring MOAH, and also further characterize the risk from MOSH, which may have been underestimated.
This is an important foundation for understanding the risks of exposure to MOH through food. The question is what the European Commission (EC) will do now. It is likely, but we don't know for sure and the timeline, that maximum limits may be set for MOAH.
Lina – We were contacted by the Norwegian food safety authorities. They informed us that discussions have already started. It is still in an initial phase.
Gerard – That is very interesting as it is the first direct contact about this topic we know of between a member and the authorities. Please keep us updated.
Lina – I think it would be interesting to compare the methods and their performance, to see how to obtain reliable data and when it could be questionable.
Gerard – We all know that regarding method performance we are still in a bit confusing situation today. The action limit that the EU member states have agreed upon is very close to the limits of quantification, and there is large method variability, which gives producers and brands very little space to make reliable measurements in MOH levels, or to determine the effect of changes in production methods to mitigate MOH levels.
Ingjerd – Lina and I have talked with the Norwegian food safety authorities together. They contacted us so that we started to work and tell them that the analytical method was confusing and not good enough. It might be that if other European countries contact their food safety authorities, it might help to at least delay.
Gerard – If anyone needs any information from GOED, also on method performance, just ask us.

- **Summary brominated flame retardants occurrence data (Gerard)**

  - **Gerard** – I would like to show you a first summary of the occurrence data we have collected from technical Committee members on brominated flame retardants. Brominated flame retardants are under discussion in EFSA, so it is a good idea to have an idea what the levels of these contaminants are in your oils. We have received data to date from three members (*show summary on screen*). The preliminary conclusion is that from still limited occurrence data received from three producers, it appears that most batches do not contain measurable levels of brominated flame retardants. Observations range from continued measurements of the past 20 years for 6 brominated diphenyl ethers (BDEs), a set of 17 batches for the sum of 7 BDEs, and a set of three batches with results for 24 individual BDEs. When brominated flame retardants are measurable only very low levels have been found, with congener BDE-47 as the most abundant congener at also low levels (highest value observed to date is 0.56 ng/g).

We will keep collecting data and when we have more test results from more members it will be possible to display the results in graphical format in a future Technical Committee meeting.

- **Action Item**: Members to measure brominated flame retardants in their oils, and send results to Gerard to update report (**Technical Committee**)

<u>All Other Business (Jenna & Gerard)</u>

- **Technical publications notification (Gerard)**

  - **Gerard –** You have all received and can see here (*on screen*) the list of technical publications for our sector for the last month (*also included with the agenda*). Among these, there are quite a few interesting new publications about microalgal oils and different formulations, as well as a document from the German BfR (German Federal Institute for Risk Assessment) called "*Questions and answers on mineral oil hydrocarbons in food* ". Have a look.

- **Action Item**: If you see an interesting technical publication, please send to Jenna or Gerard (**Technical Committee**)

- **Fukushima wastewater release dossier (Gerard)**

  - **Gerard –** As you all know, Japan recently initiated the controlled discharge of accumulated radioactive wastewater from the Fukushima Daichii power plant that was damaged in 2011. We have collected technical information on this topic over the past few weeks and created a short summary, a copy of which was sent to you with the agenda (*shown on screen*). Thank you to the 16 members who contributed to this.
    The wastewater has been treated and all radionuclides have been removed, except for tritium which cannot be removed since it incorporates in the molecular structure of water. There are strict guidelines for the release of the wastewater, and the first testing recently showed no levels in seawater above the guideline. The wastewater release does appear to generate important political reactions - China has blocked seafood import from Japan, whereas the position of the EU and United Nations is more lenient on the situation. Maintaining the monitoring of the legacy isotopes from the 2011 nuclear accident, so ^{134}Cs, ^{137}Cs and ^{131}I, appears to be still important to some of our members. Some members have reported that their clients also request monitoring of a whole range of additional radionuclides. And now the new monitoring of tritium is becoming relevant. We have included a reference with information about tritium, its chemistry and biochemistry, and its adverse effects. Its effects

are intimately linked with water, and its incorporation into organic substances through metabolism, what is referred to as “organically-bound tritium”. Toxicity is of course related to the dose and length of exposure, with the dose in the marine environment being very low. Whether the tritium release will have relevant effects remains to be seen, but monitoring is of course important.

There is a limited number of laboratories that can measure tritium. In the document you can find labs where the legacy isotopes can be analyzed in fish/seafood and in water. For tritium we have only found two possible locations. Please check in the document and with these laboratories, if you are interested. If people have information specifically on other labs in Asia, please let us know.

As far as we have received feedback from five members, no measurable levels of ^{134}Cs, ^{137}Cs and ^{131}I have been found for any tested samples since 2011 (all data < 10 Bq/kg). No results for tritium are known – please share with us if you collect any during the upcoming year.

Some regulations can also be found in the document, and a list of references if given with some relevant literature on the waste water treatment and release, ocean currents and distribution of radioactivity in the Pacific Ocean and Bering Sea, and on tritium.

- **Linda Ren (Thai Union)** – Yes, last week at VitaFoods Asia (*Bangkok*) I contacted Ashley Becnel (GOED Business Development Director) to discuss this subject. I think that in the fish oil industry we do have the knowledge what is really the risk. We are receiving many requests from customers, who are not necessarily familiar with our industry. So, it would be helpful to develop an easy-to-understand infographic. Just to pass the knowledge that this is not a real concern. Otherwise, I think I am not alone here, we will be asked for more test and monitoring data, and it is unnecessary and costs a lot to do this. But if the customers know that there is no real risk, the concern will be addressed.
- **Heike** – We received some customer questions, but they were happy with the information we shared. But let’s see if additional customers will come with further questions. It is very helpful to have this document available, so that we can also answer in more detail with the available information.
- **Gerard** – Feel free to take information from the document and share that with your clients. We are planning to develop an infographic also, that members can share with their customers.
- **Gerard** - I think there is also fishing of squid in waters close to Japan, for the production of squid/calamari oils. Is that a specific case and concern in this context? Do any members produce oils from squid caught in that area?
- **Ingjerd** – We have a squid oil from Asia. We have been following with analysis since 2011, and everything has been below the detection limit. But we have not started to track for tritium.
- **Gerard** – Thanks, that is good to know.

- **Action Item**: GOED is planning to develop an infographic for members explaining the Fukushima wastewater discharge and risk for contamination of omega-3 oils and supplements (**GOED staff**)

<u>Presentation</u>: **Linda Ren (Thai Union)** – *"Tuna Fishing and Tuna Oil Production"*

A copy of the recorded presentation will be distributed to the committee with the minutes.

Q&A

- **Gerard –** For infant formula, is refined tuna oil derived from both black and white tuna oil used?
- **Linda** – Yes, both can be used. Through processing both can achieve the required quality standard.
- **Gerard** – Are there any other or specific uses of black versus white tuna oils?
- **Linda** – In terms of applications, both can be used in exactly the same applications. The key differences are in the refining process, as I just mentioned – you generate less waste and you use less chemicals and energy. Some users are able to remove FFA by distillation instead of chemical neutralization. When it comes to contaminant levels, the white oil, even before refining, has a much lower level of, for example, mineral oil hydrocarbons. So, some refineries would choose to use the white oil. Generally speaking, after sufficient processing one can actually achieve the required quality standard.
- **Heike** – How high are the production losses when you winterize the tuna oil?
- **Linda** – That is a little hard to say – we have not done a full winterization. There will roughly be about thirty percent loss. It depends on what the customer wants to achieve. If he wants the product to be clear at room temperature, or completely clear even when storing it in the fridge.
- **Heike** – That is then independent also on whether the oil is originated from a black or white oil? Or it depends on the customer requirements?
- **Linda** – Yes. The difference is mainly the process, the oxidation levels, and color differences. The white oil contains a much higher level of DHA, because the DHA concentration is highest around the eye area. So, when the raw materials are from mixed body parts, the DHA gets diluted. But if you only take the oil from the eye area, like, take the fish head, you achieve the crude oil with the highest DHA level. That can be a difference of 15 to 20% difference. For example, 24-25% versus 28-29%.
- **Guy** – What is the EPA content, and what is the ratio of EPA to DHA? Is that something you can control?

- **Linda** – Tuna oil is a DHA-dominant oil. Customers use tuna oils mainly for the DHA. The EPA levels is naturally from 4.5-7.5%. In the process we don't control it. It is just natural. Typically, in our experience, we end up with 5-5.5% EPA.
- **Guy** – Regarding oxidative status, in your presentation you mentioned only Anisidine Value. Do you try to comply with GOED's specifications for Anisidine Value, Peroxide Value and Totox?
- **Linda** – Yes, we are fully compliant with GOED's standard when it concerns refined oil. The crude oil is not a finished product. But some of the parameters even at the crude stage can meet the requirements, but not fully.
- **Lina** – I have a question regarding heavy metals and contamination in white versus black tuna oil, and how is the reduction in their levels, particular in the final refined oil? Do you see a reduction in their levels, especially in mercury?
- **Linda** – According to our experience, mercury is not an issue even in the crude tuna oil, without any refining. If you measure the mercury, it is already very low – less than 0.01 mg/kg. The main heavy metal in the tuna oil is arsenic. That is a natural content in tuna. So, cadmium, mercury and lead are not an issue. Arsenic is mainly in the form of organic arsenic instead of inorganic arsenic. After bleaching, the arsenic can be effectively reduced to below the European standard.
- **Lina** – Thank you very much.
- **Geir Frode Olsen (Epax Norway)** – Will you share this presentation?
- **Gerard** – Yes, after the meeting, together with the minutes, and in our presentations folder (GOED Presentations (goedomega3.com). And I will work with Linda to get the discussion reflected in the minutes.

End of meeting.

Summary of Action Items

- **Action Item**: Upload the Technical Report on Conversion Factors for Polar Lipid Oils on the technical section of the GOED website (**Gerard**)
- **Action Item**: Members to measure brominated flame retardants in their oils, and send results to Gerard to update report (**Technical Committee**)
- **Action Item**: If you see an interesting technical publication, please send to Jenna or Gerard (**Technical Committee**)

Date of next meeting

- The next Technical Committee meeting will be scheduled for Tuesday, November 7th, 2023.

USEFUL LINKS:

- Useful documents that the committee has discussed can be found in the Technical Committee folder. You can upload any material there yourself as well: https://drive.google.com/drive/folders/0B-5CurmVIvvETm1Wd29xemU5YVU

- Past minutes can be found here:
  2023 - https://drive.google.com/drive/folders/1Q_aJTzxZL106KkZJUkgrkLT2MdgDiEXh?usp=share_link
  2022 - https://drive.google.com/drive/folders/1Pt8CJafBCjIYaLZF0ZJ08csPqlzW5XaC?usp=sharing
  2021 - https://drive.google.com/drive/folders/1VGy-t4TuWtDUB30jU98unIxWYzpnZuNj?usp=sharing
  2020 - https://drive.google.com/open?id=1olF0Ab9UeGO_VaQpSshICS3xn0V8IiLK
  2019 - https://drive.google.com/drive/folders/0B0usR2nagMSpSU1aaTR6Ty0yTE0
  2018 - https://drive.google.com/open?id=1lXXmBgN3F9XwZnXKxqq0hwC-oLZl9rc_
  2017 - https://drive.google.com/drive/folders/0B6uJWj5y9FY9NDRRS2lVdUQ1ZWs
  2016 - https://drive.google.com/drive/folders/0B6uJWj5y9FY9UVZpU3NLejBIMEk

- GOED Presentations - GOED Presentations (goedomega3.com)

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