ADVISORY COMMITTEE ON NOVEL FOODS AND PROCESSES

OPINION ON SUBSTANTIAL EQUIVALENCE OF DHA RICH OIL FROM THE MICROALGAE *SCHIZOCHYTRIUM* CONSIDERED UNDER ARTICLE 3(4) OF THE NOVEL FOODS REGULATION 258/97

Applicant	**DAESANG Corp.** **26, Cheonho-daero** **Dongdaemun-gu** **Seoul 130-706** **South Korea**
Responsible person	**Stoffer Loman**

Introduction

1. In March 2015 a request was submitted by Daesang Corp. to the UK Competent Authority for an opinion on the equivalence of DHA rich oil from the microalgae *Schizochytrium*, compared with the DHA rich oil marketed in the EU by Martek Biosciences Corp.

2. There have been a number of applications made under the novel foods regulation (EC) 258/97 for algal oils that are rich in DHA (docosahexaenoic acid). Of particular relevance to the current request are the oils produced from microalgae of the genus *Schizochytrium* and the Committee first considered an application for the authorisation of DHA oil from this source in 2001-2002. Following its authorisation in 2003[1], the applicant company Martek Biosciences Corp (*formerly* Omega–Tech) successfully sought an extension of use which was authorised in 2009.[2]

[1] Commission Decision of 5 June 2003 authorising the placing on the market of oil rich in DHA (docosahexaenoic acid) from the microlagae *Schizochytrium sp.* as a novel food ingredient under Regulation (EC) No 258/97 of the European Parliament and of the Council (2003/427/EC)

[2] Commission Decision of 22 October 2009 concerning the extension of uses of algal oil from the micro-algae *Schizochytrium sp*. as a novel food ingredient under Regulation (EC) No 258/97 of the European Parliament and of the Council (2009/778/EC)

3. Regulation (EC) 258/97 makes provision for novel foods or ingredients that are substantially equivalent to an existing product to be placed on the market once the applicant has notified the Commission. In all cases to date, the Commission has required that the applicant first obtain an opinion from a Member State confirming that equivalence has been demonstrated. Daesang Corp. is requesting such an opinion from the UK Competent Authority.

4. According to Article 3(4) of the Regulation, the notification procedures applies to "foods or food ingredients…which on the basis of the scientific evidence available and generally recognised or on the basis of an opinion delivered by one of the competent bodies…are substantially equivalent to existing foods or food ingredients as regards to their:

   - Composition
   - Nutritional value
   - Metabolism
   - Intended use, and
   - Level of undesirable substances contained therein".

5. Daesang Corp. has provided data which in their view demonstrates that their DHA oil is equivalent to the DHA oil marketed by Martek Biosciences Corp. This view is substantiated by a comparison of the composition of key constituents in the oils, evidence that their oil does not differ in terms of the presence of undesirable substances and metabolism, and an acknowledgement that their oil will be used at levels no greater than those currently authorised for Martek's oil. Daesang Corp.'s application dossier is attached at **Annex 1**.

6. A non-confidential version of the application dossier was placed on the Agency's website for a 21-day public consultation to allow the public to contribute to the assessment. No comments were received on the consultation of this application dossier.

Evaluation

a) Composition

7. The applicant cultivates the algae (*Schizochytrium* sp.RT100) using a heterotrophic fermentation process, carried out in the absence of light under axenic conditions, which, in their view, is broadly the same as the production process employed by Martek. The fermentation process controls a number of operating parameters (temperature, aeration, pH, etc) to ensure maximal biomass production and the harvested biomass is dried prior to oil extraction using the EU permitted extraction solvent (hexane), the extraction solvent used by Martek.

8. Once the crude oil is extracted from the biomass, it undergoes a number of refining processes that are common to the edible oil industry. Specific details of the extraction and refining process can be found in Appendix B of Annex 1. EU permitted antioxidants are added to the refined oil to ensure stability and the oil is packaged in airtight containers prior to sale.

9. The applicant has assessed compositional equivalence in two ways: by evaluating the similarity of the two strains from a taxonomic perspective and by comparing relative quantities of key components in each of the oils.

10. The taxonomic evaluation was carried out to provide reassurance that the production strain sp. RT100, was sufficiently closely related to *Schizochytrium* to enable a request for an opinion on equivalence to be considered. This evaluation concluded that, based on morphological, biochemical and ribosomal DNA analysis, strain sp.RT100 is correctly classified within the genus *Schizochytrium*. This evaluation is explored with Figure 3, 4 & 5, together with Table 1& 2 of Annex 1, in addition to Appendix A of Annex 1. The strain used by Daesang Corp can be described as being closely related to the organism used in the production of Martek's oil.

11. In terms of composition the applicant regards the specification of their oil (summarised below) to be well within the specification for Martek's (Table 5 of Annex 1 and Annex 2 Appendix A)

    The applicant also refers to a proximate analysis (compared Table 6 of Annex 1 and Annex 2 Appendix C) summarised below, noting that the oil does not contain protein and carbohydrate, (limit of detection 0.1%). Although this may overstate the absence of protein, the detection limit is consistent with that used for Martek's oil.

Specification for DHA-rich oil produced by *Schizochytrium* sp.RT100

Test Items	Specification
Appearance	Yellowish liquid
Odor and taste	Characteristic
Docosahexaenoic Acid (mg/g)	NLT 400
Docosahexaenoic Acid (GC)	NLT 43% of TFA
Acid Value (mg KOH/g)	NMT 0.5
Peroxide Value (meq/kg)	NMT 5.0
Residual Solvent (ppm as Hexane)	Not Detected
Arsenic (ppm)	NMT 0.1
Cadmium (ppm)	NMT 0.1
Lead (ppm)	NMT 0.1
Mercury (ppm)	NMT 0.04

Proximate Analysis of DHA rich oil from Schizochytrium sp ONC-T18

Test	Unit	Daesang			DSM/Martek
		NMF2-2701140A1	NMF2-2003140A1	NMF2-0111130A1	VY00081803
Fat	%	100	100	100	100
Saturated fatty acids	%	24.8	23.6	22.1	30.1
Protein	%	< 0.1	< 0.1	< 0.1	< 0.1
Ash	%	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	%	< 0.005	< 0.005	< 0.005	< 0.005
Carbohydrates	%	< 0.1	< 0.1	< 0.1	< 0.1
Energy	kJ/100g	3.700	3.699	3.699	3.699
Energy	kcal/100g	899.9	899.9	899.9	899.8

12. A specification for Martek's oil was published in the original 2003 Decision (reproduced in Table 4, p16 of Annex 1). The applicant's oil meets this specification but, as it includes only a limited number of fatty acids, the applicant has provided a detailed lipid profile, drawing comparison between the oils in order to give additional reassurance that they are equivalent. This analysis, detailed below, was carried out on three independent batches and includes a side-by-side analysis of Martek's oil. To complete the comparison the applicant also includes the data set that was submitted in the original application (OmegaTech - final column). The applicant concludes that the results of this analysis indicate a relatively high degree of similarity with Martek's oil.

Discussion: *The committee considered whether the fatty acid profile of the DHA-rich oil manufactured by Daesang Corporation could be considered substantially equivalent to DHA- rich oil already on the market. The Committee in review of the fatty acid profile data considered that the three samples from Daesang and the five samples from OmegaTech (Martek) are insufficient to provide definitive evidence of substantial equivalence. It was discussed whether the evidence was also insufficient to demonstrate that the DHA- rich oil was different. It was*

discussed whether differences observed between the two sets of analytical results could be due to the different circumstances in which they were collected or produced. The Committee was content that the DHA-rich oil manufactured by Daesang Corporation met the specification for DHA-rich oil under the authorisation. The Committee was satisfied that differences observed between the DHA-rich oil would probably be due to slight differences in production methods. It was agreed that all the compositional data, taken together , was sufficient to conclude that the DHA-rich oil manufactured by Daesang and the comparator's DHA-rich oil have an equivalent composition. The committee noted that some minor differences in the DHA-rich oil by Daesang may have potential benefits to the consumer.

Fatty Acid Composition

Fatty acid	Unit	Specification according to CD 2003/	Daesang			DSM/Martek	OmegaTech Application (ATCC 20888)
			NMF2-2701140A1	NMF2-2003140A1	NMF2-0111130A1	VY00081803	
C12:0 (Lauric acid)	%		-	-	-	0,2	0,4
C14:0 (Myristic acid)	%		1.2	1.1	0.9	6.3	10.11
C16:0 (Palmitic acid)	%		16.4	15.5	14.2	17.3	23.68
C16:1 (Palmitoleic acid and isomers)	%		0.4	0.3	0.2	0.2	1.76
C17:0 (Heptadecanoic acid)	%		0.8	0.8	0.7	0.9	-
C18:0 (Stearic acid)	%		0.8	0.7	0.6	0.9	0.45
C18:1 (Oleic acid and isomers)	%		0.8	0.6	0.4	13.9	13.8
C18:2 (Linoleic acid and isomers)	%		0.2	0.1	0.1	1.2	1.2
C18:3n3 (*α*-Linolenic acid and isomers)	%		0.4	0.3	0.2	0.1	
C18:3n6 (*γ*-Linolenic acid)	%		0.3	0.3	0.3	0.2	
C20:0 (Arachidic acid)	%		0.1	0.2	0.1	0.1	
C20:1 (Eicosanoic acid and isomers)	%		0.1	0.1	-	-	
C20:3 (Eicosatrienoic acid and isomers)	%		0.7	0.7	0.8	0.4	0.87
C20:4n6 (Arachidonic acid)	%		1.1	0.9	0.8	0.8	0.94
C20:5n3 (Eicosapentaenoic acid)	%		3.0	2.4	2.2	1.0	2.63
C22:0 (Behenic acid)	%		-	-	-	0.2	
C22:5n3 (Docosapentaenoic acid)	%		1.9	1.9	2.0	0.5	
C22:5n6 (Docosapentaenoic acid)	%		21.5	23.0	24.5	16.9	13.5
C22:6n3 (Docosahexaenoic acid)	%	NLT 32.0	49.1	50.1	50.4	39.4	35.0
C24:0 (Lignoceric acid)	%		0.1	-	0.2	0.2	
C18:1 trans	%	NMT 1.0	< 0.01	< 0.01	< 0.01	< 0.01	Max 2.0%
C18:2 trans (Sum of isomers)	%		< 0.01	< 0.01	< 0.01	< 0.01	
C18:3 trans (Sum of isomers)	%		0.06	0.05	< 0.01	< 0.01	

b), c) Nutritional Value and Metabolism

13. The applicant is of the view that as their oil has an identical proximate analysis, and a similar lipid profile, there will be negligible difference in terms of nutritional value and metabolism compared with Martek's oil.

Discussion: *The Committee was content with information provided on the nutritional value of the DHA- rich oil compared with the existing products.*

d) Intended Use

The applicant intends to market their oil in accordance with the authorised uses summarised below and in Table 8, pg. 22 of Annex 1. These uses and use-levels are consistent with the authorisations that are specified in Commission Decision 2003/427/EC and 2014/463/EU.

AUTHORIZED USES OF OIL FROM THE MICRO-ALGAE *SCHIZOCHYTRIUM* SP.

Food category	Maximum use level of DHA
Dairy products except milk-based drinks	200 mg/100 g or for cheese products 600 mg/100 g
Dairy analogues except drinks	200 mg/100 g or for analogues to cheese products600 mg/100 g
Spreadable fat and dressings	600 mg/100 g
Breakfast cereals	500 mg/100 g
Food supplements	250 mg DHA per day as recommended by the manufacturer for normal population 450 mg DHA per day as recommended by the manufacturer for pregnant and lactating women
Foods intended for use in energy-restricted diets for weight reduction as defined in Directive 96/8/EC	250 mg per meal replacement
Other foods for particular nutritional uses as defined in Directive 2009/39/EC excluding infant and follow on formulae	200 mg/100 g
Dietary foods for special medical purposes	In accordance with the particular nutritional requirements of the persons for whom the products are intended
Bakery products (breads and rolls), sweet biscuits	200 mg/100 g
Cereal bars	500 mg/100 g
Cooking fats	360 mg/100 g
Non-alcoholic beverages (including dairy analogue and milk-based drinks)	80 mg/100 g

Discussion: *The Committee was content that the intended uses of the DHA- rich oil is consistent with those permitted for the existing products.*

e) Levels of Undesirable Substances

14. The applicant's oil is routinely tested to ensure compliance with the specification and they have provided results of heavy metals analysis for three separate batches of their DHA oil which include limits for arsenic, copper, iron, mercury, lead and trans-fatty acids. These results, which are comparable to those obtained by Martek Biosciences Corp., are detailed in the specification (Table 10 of Annex 1).

15. The applicant notes that the fermentation, extraction and refining processes minimise the risk of microbial contamination, and that tests to check for the presence of contamination, including pathogenic organisms, are carried out as part of the quality control regime. The applicant presented microbiological data for the analyses of three separate batches of its DHA oil and compared these to relevant data for authorised DHA oil. Data relating to yeasts and moulds, *E.coli*, *Salmonella*, coagulase positive Staphylococci, *Bacillus cereus,* Coliforms and Enterobacteriaceae were presented. No concerns were identified and the results are comparable with those obtained by Martek Biosciences Corp.

16. The applicant has also considered the possibility of toxin production, noting that there are no reports of toxin production in the genus *Thraustochytriaceae*. Nevertheless, the applicant has analysed three samples of both the oil and the algal biomass for a wide range of algal toxins. The analysis shows that none of the toxins tested were present in any of the test batches (Table 13 of Annex 1)

Discussion *The Committee agreed that the applicant's DHA-rich oil is comparable to the comparator's DHA-rich oil in relation to levels of undesirable substances (chemical contaminants and microorganisms) and no concerns were raised.*

The Committee agreed that the DHA-rich oil in this application could be considered equivalent to one already on the market.

Secretariat

Draft for Committee Discussion by consultation- May 2016

Annexes attached:

Annex A - Application Dossier

Annex B - Certificates of analysis