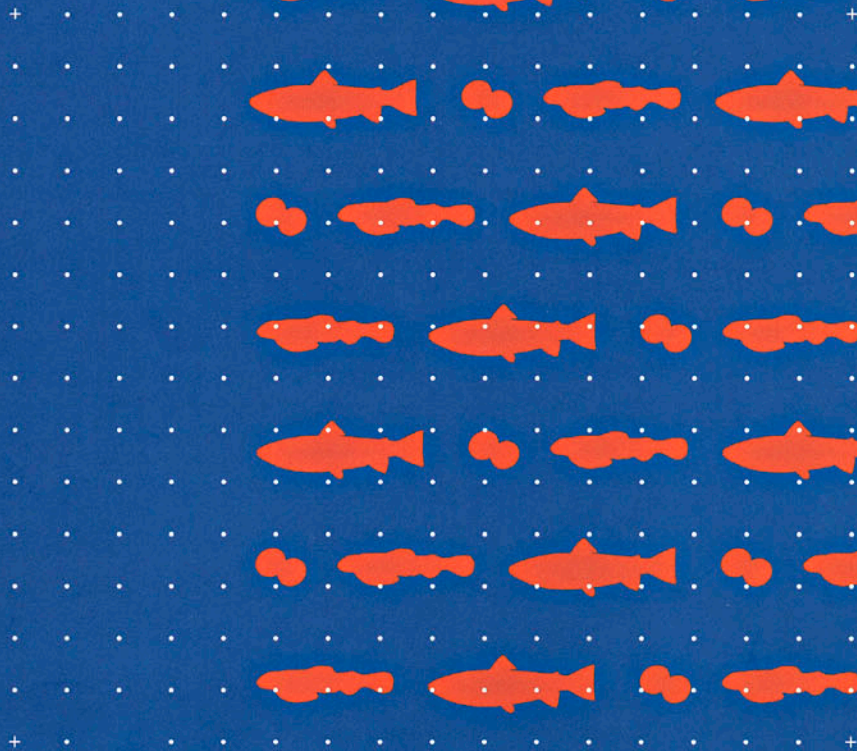


CAROPHYLL® Pink 10% CWS

Astaxanthin for aquaculture

a **DSM** Product



DSM Nutritional Products

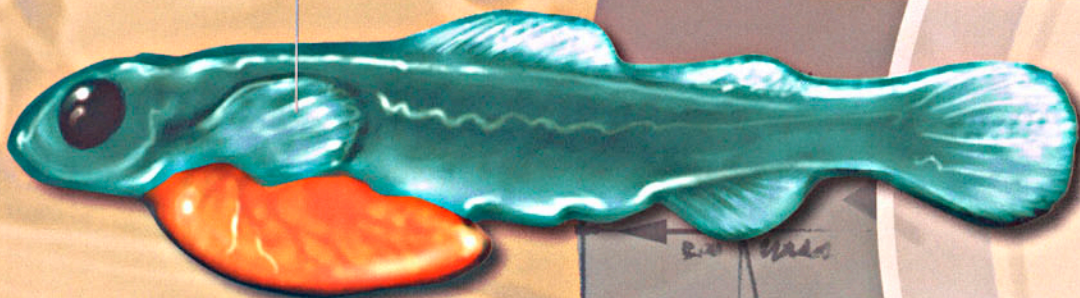
Unlimited. **DSM**

CAROPHYLL® Pink 10% CWS



- Astaxanthin has been shown to benefit larval fish growth and survival.

- Astaxanthin is naturally present in wild salmon and trout eggs.
- Astaxanthin has important physiological functions.



- Astaxanthin is THE carotenoid found in the flesh of wild salmonids. It imparts the characteristic red colour to the flesh of these fish.
- A corrent dietary supply of CAROPHYLL® Pink ensures farmed salmon and trout have the red feeds characteristic of these fish.



Problems

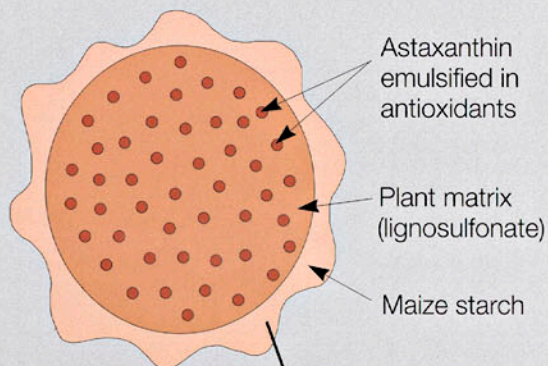
- Astaxanthin is very unstable
- Variable bioavailability of other astaxanthin sources
- Poor handling properties of many astaxanthin products
- Some astaxanthin products have variable activity
- Many astaxanthin products have limited application characteristics

Product Benefits

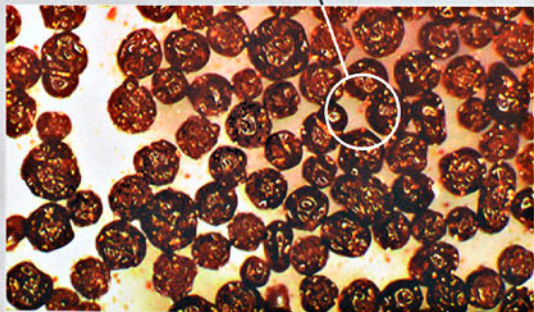
- CAROPHYLL® Pink is stable due to its unique beadlet structure
- Guaranteed minimum of 10% astaxanthin activity
- Optimised for flexible use
- THE proven industry standard with over 20 years of successful use
- CAROPHYLL® Pink has superior handling properties due to beadlet technology

CAROPHYLL® Pink 10% CWS

Structure and composition of a CAROPHYLL® Pink CWS beadlet



CAROPHYLL® Pink 10% CWS – beadlet appearance



- It is an innovative product with a plant-based beadlet structure.
- It is a convenient, cold-water soluble (CWS) product form, designed for ease of use for post-extrusion.
- Its innovative design allows for use in both – pre- and post-extrusion applications – it is a truly flexible product form

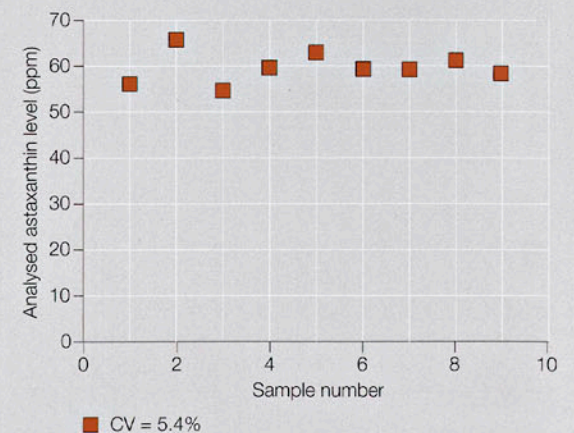
Handling

CAROPHYLL® Pink 10% CWS has been specially formulated to contain plant-based materials. The formulation results in quick and easy dissolution in water. The formulation disperses well at 1:10 to 1:20 concentrations of water at temperatures ranging from 4°C to 25°C.



CAROPHYLL® Pink 10% CWS dispersing in tap water

Homogeneity test results of CAROPHYLL® Pink 10% CWS sprayed on extruded fish feed



CAROPHYLL® Pink 10% CWS

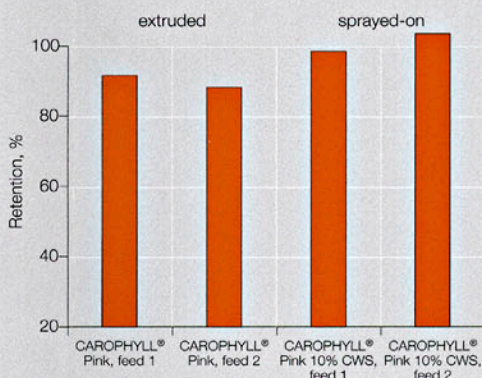
CAROPHYLL® Pink 10% CWS performance in post-extrusion application results in increased flexibility for the feed manufacturer and improved astaxanthin recovery. CAROPHYLL® Pink 10% CWS maintains the proven pigmenting efficacy of the CAROPHYLL® family.

Stability

Added pre-extrusion, CAROPHYLL® Pink 10% CWS performs equally to CAROPHYLL® Pink 8%, the current industry standard.

Using CAROPHYLL® Pink 10% CWS for post-extrusion application has been shown to improve the initial recovery of astaxanthin in the finished feed.

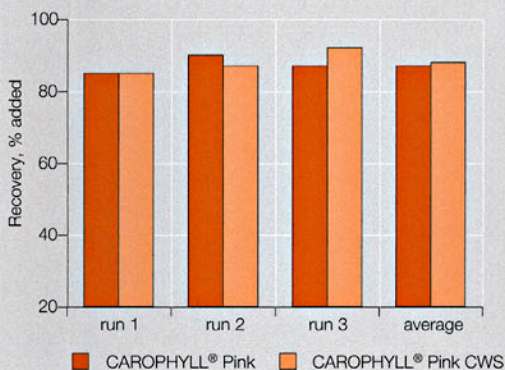
Recovery of CAROPHYLL® Pink 10% CWS added post-extrusion compared to traditional CAROPHYLL® Pink 8% added pre-extrusion.



Flexibility

Provides greater flexibility to the feed manufacturer. CAROPHYLL® Pink 10% CWS may be used for pre- or post-extrusion applications.

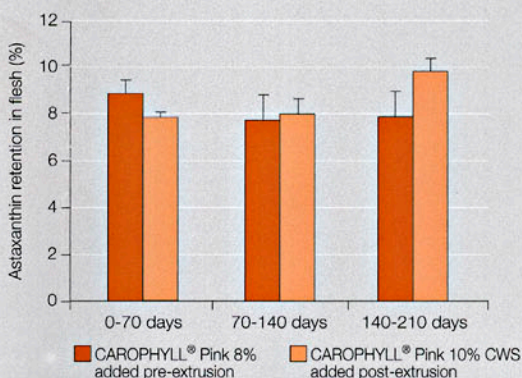
Initial recovery of CAROPHYLL® Pink 10% CWS added pre-extrusion compared to traditional CAROPHYLL® Pink 8% added pre-extrusion.



Bioavailability

CAROPHYLL® Pink 10% CWS has been shown to perform equally as well as CAROPHYLL® Pink 8% in pigmentation trials.

The retention of astaxanthin in Atlantic salmon fed CAROPHYLL® Pink 8% added pre-extrusion or CAROPHYLL® Pink 10% CWS added post-extrusion (n = 10 fish per treatment per sampling period.)



Technical characteristics of CAROPHYLL® Pink 10% CWS

Content	min. 10% astaxanthin
Chemical name	3,3'-dihydroxy-β,β-carotene-4,4'-dione
Chemical formula	C ₄₀ H ₅₃ O ₄
Molecular weight	596.85
Colour	Violet-brown – violet-red
Bulk/tapped density	0.68/0.79 kg/litre
Flow	ca. 5 sec per 100 g
Particle size	100% < 850 µm 90% < 425 µm 30% < 150 µm
Smell	No detectable odour
Particle number	ca. 180000/g
Solubility	Excellent dissolution in coldwater
Shelf life	The shelf life is 36 months from the date of manufacture when stored in the unopened original packaging at a temperature below 15°C

CAROPHYLL® Pink 10% CWS is a product made by DSM Nutritional Products Ltd. and has been certified by AFAQ (1993/1015) under the standard ISO 9001–2000 14001–1996.

For more detailed information about the use of CAROPHYLL® products, please contact your local DSM office.

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