

The Editor of the Farmers Guardian

Dear Editor

Given the recent discussions on omega-3 fatty acids and their sources, we the undersigned plant scientists working in the field of lipids wish to provide an explanation of the omega-3 fatty acid nomenclature and classifications so that your readers have the correct information and can make their own informed judgment on this topic.

Current plant sources of omega-3 PUFAs such as flax seeds do not produce eicosapentaenoic acid (EPA) and docosahexanoic acid (DHA), both of which are classified as very long chain omega-3 polyunsaturated fatty acids. Plants naturally produce omega-3 fatty acids such as alpha-linolenic acid (ALA). Similarly, in some rare examples, seeds of plants such as Ahiflower™ (*Buglossoides arvensis*) and Echium accumulate stearidonic acid (SDA), a related omega-3 fatty acid. However, neither SDA nor ALA confers the health-beneficial properties associated with EPA and DHA, despite also both being omega-3 fatty acids. Not all omega-3 fatty acids are equivalent.

Below are some key facts about omega-3 fatty acids.

Vegetable oils contain polyunsaturated fatty acids (PUFA). Some of these fatty acids are members of the omega-3 group.

Omega-3 is a shorthand description that defines the position of the last double bond in the fatty acid carbon chain.

Omega-3 fatty acids can be medium, long or very long-chain.

Oilseed crops like flax, linseed and hemp naturally make alpha-linolenic acid (ALA). ALA is an 18-carbon (C18) chain fatty acid and has three double bonds. Echium and Ahiflower accumulate SDA, which has an 18-carbon chain and four double bonds. Both ALA and SDA are C18 omega-3 PUFAs.

Eicosapentaenoic acid (EPA; 20-carbon chain – C20) and docosahexaenoic acid (DHA; 22-carbon chain – C22) are longer chain omega-3 PUFAs which are beneficial for human health. EPA and DHA are greater in the length of their carbon chains compared with ALA or SDA, and they also contain more double bonds (more unsaturated). **They are chemically and biologically quite distinct from the C18 forms such as ALA and SDA.**

Vegetable oils do not contain EPA and DHA. Vegetable oils do contain omega-3 fatty acids, but these are in the form of ALA (or occasionally SDA).

Neither ALA nor SDA have the same health-beneficial properties as EPA and DHA. This is because they are inefficiently converted to EPA, and especially DHA, by animals. Thus, fish oils rich in EPA and DHA are recommended components of our diets, since those specific fatty acids deliver the health benefits.

Neither can ALA nor SDA be converted into EPA or DHA to any significant extent by marine fish. Therefore farmed marine fish need EPA and DHA in their feed to remain healthy but also in order to deliver these health promoting fatty acids to humans through the consumption of these farmed marine fish.

It is incorrect to suggest that ALA and SDA are in some way equivalent to EPA and DHA, even if all four fatty acids are classified as omega-3.

Signed

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