**QUESTIONS AND ANSWERS ABOUT FERMENTED COD LIVER OIL (FCLO)**

**The following questions and answers were prepared by Sally Fallon Morell, President of the Weston A. Price Foundation (WAPF), in response to inquiries from Foundation members and others following the recent circulation of a report by Kaayla Daniel, PhD, CNN, which raises issues about the safety and quality of FCLO [http://drkaayladaniel.com/hook-line-and-stinker-opt-in/]. Dr. Daniel is a board member of WAPF, but her report was not authorized by the Foundation’s board, nor did the board see it before it was circulated. Dr.Daniel raised the concerns about FCLO contained in her report to the WAPF board last year, at which time the board investigated and concluded her concerns, with only Dr. Daniel dissenting, were unfounded [http://www.westonaprice.org/uncategorized/concerns-about-fermented-cod-liver-oil/].**

**What is your own use of Green Pasture products?**

I was introduced to the Green Pasture butter oil when it first came out in about 2003. At that time, I was concerned that I was developing arthritis—this runs in my family, and when I woke up in the morning, my hands would be very achy and stiff. One week on the butter oil and this condition completely disappeared. Naturally I was thrilled and happy to recommend this product to our membership. Green Pasture soon began selling a cod liver oil from Norway, which I began to take also. I felt good on it but it did not clear up the night vision problems I was having—I was afraid I would no longer be able to drive at night. When Green Pasture came out with the fermented cod liver oil, I switched to that and my night vision problems also cleared up completely. Also, I found I could adjust to bright light much easier. These two conditions are important indicators of vitamin A status, so for me, the vitamin A in the fermented cod liver oil has worked better than the vitamin A in other cod liver oils.

I take both products every day, without fail (mixed in warm water). My husband takes the fermented skate liver oil, my daughter and daughter-in-law took fermented cod liver oil during pregnancy, and my grandsons get it every day. The proof is in the pudding, in the wonderful health of these three boys.

We also use the cod liver oil lick tubs for the cows on our farm and they love it! They are very healthy and have good reproductive health.

**Do you personally or the WAPF receive any compensation from Green Pastures for an endorsement or sale of product?**

WAPF received $20,000from Green Pasture in 2014 in sponsorship fees for exhibiting at our conferences, plus $360 for an ad and $250 for a membership, for a total of $20,610, about 1.1 percent of our yearly budget.

This income from Green Pasture has nothing to do with our endorsement of its products, and WAPF clearly does not need the company’s money. We endorsed these products before Green Pasture became a sponsoring exhibitor. Our rule is that we do not allow anyone to exhibit unless they have a product we approve of. (By the same token, we do not allow any of our exhibitors to criticize another approved product. If they have concerns, they need to bring them to us to look into. They should sell their products by emphasizing their good features. Exhibitors who market their products by criticizing competing products will be asked to leave and will not be invited back.)

I do not receive any compensation from Green Pasture. My husband and I do sell its FCLO and other products in our farm store (pabowenfarmstead.com), along with other healthy products that we believe in. Gross profit from sales of Green Pasture products probably does not exceed $1,000 per year. All the Green Pasture products for my personal use and farm store sales are purchased directly from Green Pastures; my only discount is for buying by the case.

**Why do you recommend what the report calls a“stinky” product?**

Of all the accusations against fermented cod liver oil, this one is the most difficult to comprehend. Anyone who takes a whiff of fermented cod liver oil knows that it is not stinky. I keep my fermented cod liver oil at room temperature, and even when I get to the end of the bottle, after it has been opened several weeks, it still smells just slightly fishy. This smell comes from residual fish proteins in the oil, not the oil itself. All cod liver oil smells like this. If it had gone rancid, it would have a varnish-like smell.

**Why did you send the fermented cod liver oil to the UK to be tested last year?**

When Dr. Daniel first emailed me about her concerns, I immediately contacted Nina Teicholtz, author *of The Big Fat Surprise*. This book has a chapter on rancidity in vegetable oils (which we reprinted in *Wise Traditions*, the link is here: <http://www.westonaprice.org/health-topics/the-big-fat-surprise-toxic-heated-oils/>.) Since Ms. Teicholz had written on this subject so recently, I figured she would be the best person to know who is the leader in this field. She recommended Dr. Martin Grootveld, BSc, PhD, FIBMS, CBiol, FSB, FRSC, Leicester School of Pharmacy, Faculty of Health and Life Sciences, De Montfort University, Leicester, UK. His credentials are very impressive and include Fellow of the Royal Statistical Society,Professor of Bioanalytical Chemistry and Chemical Pathology, Chair of the Faculty of Health and Life Sciences Research Ethics Committee, Head of Medicinal Chemistry Group, Director of Bioanalysis, Pharmaceuticals and Health Doctoral Training Programme (DTP), and Member of the Editorial Boards of *Bio Analytical Techniques* and *International Journal of Medical and Clinical Research.*

Because of the urgency of this issue, I over-nighted an unopened bottle of fermented cod liver oil that had been in my cupboard; the results are posted here: <http://www.westonaprice.org/wp-content/uploads/13GrootveldReport.pdf>. Dr. Grootveld found no rancidity in the fermented cod liver oil.

One thing I discovered during the conversations I had at that time was that there is disagreement in the scientific field on how to test for rancidity in oils. The industry tests for peroxides such as PV, PA and TBARS. But Dr. Grootveld and others held that these were not good tests for rancidity; instead they test for aldehydes. For one thing, the peroxide markers rise over time and then fall, so you have to test many days in a row to get any kind of idea what’s going on. Obviously, we have a lot more to learn about all this. Dr. Daniel wanted the Foundation to spend a lot of money sending cod liver oil samples to labs that tested for these things, but the Board felt that the funds were better spent on vitamin testing, and anyway, Green Pasture had already provided certified lab reports showing that the peroxide markers were low. Obviously we are now going to do more testing, but we want to make sure that we are testing for the right things. We are currently looking for a U.S. lab to do this.

This is Dr. Grootveld’s opinion on the TBARS test, which he described as “analytical garbage.”

”It should be noted that the TBARS test commonly employed for determinations of lipid oxidation product (LOP) aldehydes in foods, and culinary or health-promoting oil products (and accordingly not just MDA), are completely unreliable and serve little or no value for the estimation of these species. Indeed, we are, of course, already aware of the induction of the lipid peroxidation process at standard frying temperatures, and since this test requires the heating of biofluids or tissue sample extracts with TBA for periods of ca. 15 min., this is more than sufficient to induce the peroxidation of PUFAs therein, and hence all results derivable from this heat-dependent test system represent nothing more than artifactual data. Indeed, our H1 NMR experiments have clearly proven the thermally-induced oxidation of PUFAs in commercial oil formulations to CHPDs and aldehydic LOPs at Pasteurisation temperature (72oC), in addition to 95oC, the latter for only a 15 minute period.  If, however, this method involves a prolonged equilibration at ambient temperature (or 25oC), and the TBA-MDA (and other) chromophores are then allowed to develop slowly (perhaps for 72 hr. or more), then this test system does have the potential to monitor aldehydic LOPs, but not exclusively MDA since a wide range of aldehydes (including á,â-unsaturated ones) react with TBA to generate the same chromophores, or similar interfering adducts. Moreover, further caution should always be employed since it is known that a series of further biomolecules, especially reducing sugars (if present in food matrices for analysis), also react with TBA to form chromophores which also absorb at 532 nm.”.

**But why do some people say that fermented cod liver oil is rancid?**

As Chris Masterjohn, PhD, an Assistant Professor of Health and Nutrition Sciences at Brooklyn College, City University of New York, and a frequent contributor to *Wise Traditions*has pointed out, a lot of the discussion on rancidity is a question of semantics. "Chemical changes of several types contribute to what is known by the generic term rancidity. In its broadest meaning, rancidity denotes a deterioration of flavour and odour of fat or the fatty portions of foods. Such deterioration can be due to hydrolysis, oxidation, or to microbial action. The term rancidity is used in the dairy field to indicate hydrolytic deterioration; in other fields it denotes microbial deterioration, and to the fat chemist it means autoxidation." -- Ralph Holman, Autoxidation of Fats and Related Substances, 1954

According to Dr. Masterjohn, “An entire section of Dr. Daniel’s report deals with the practically meaningless semantic precision around the word ‘fermentation,’ yet she does not even allude to the very practically important and very different meanings of the word ‘rancidity.’

“To a food scientist whose aim is a palatable product, the FCLO is ‘rancid.’ To a lipid chemist, it is not. Which matters? To someone who doesn't mind the taste and wants to be healthy, only the lipid chemist's meaning is important; just because something doesn’t taste good doesn’t mean it’s going to harm you. It is the autoxidation that produces toxic substances,and just because something is fermented does not mean it contains autoxidation products.”

Another point by Dr. Masterjohn: “If the polyunsaturated fatty acids had peroxidized and fragmented, they wouldn't still be in the oil. Yet the total EPA and DHA in the oil seems normal for cod liver oil at about 1 g/tsp. That these are present and not destroyed is evidence against a history of lipid peroxidation within the oil.”

**What about free fatty acids? Dr. Daniel claims that high levels of free fatty acids mean that fermented cod liver oil is rancid.**

Dr. Daniel is expressing a view put forth by a number of companies in the cod liver oil industry. The process used by most companies in the industry removes all the free fatty acids from an oil in the refining process and then claims that the absence of free fatty acids is a sign that the oil is not rancid. But two lipid scientists (Dr. Fred Kummerow and Dr. Martin Grootveld) assured me that free fatty acids are not a sign of rancidity.

Most or even all unprocessed oils contain free fatty acids, which are just fat molecules not attached to a triglyceride. When we digest our food, we break down the triglycerides into free fatty acids, so they can’t be bad for us! Because fermentation is a kind of pre-digestion, one would expect a lot of free fatty acids in fermented cod liver oil. Green Pasture has been very open about the high levels of free fatty acids in fermented cod liver oil. If an oil has no or low levels of free fatty acids, it is a sign that it has been processed.

**What about the accusation that fermented cod liver oil isn’t even made from cod, but pollock?**

Alaskan Pollock IS a species of cod, considered very close to the Atlantic cod. Lots of cod liver oil processers use Alaskan pollock. Green Pasture uses mostly Pacific cod but also some Alaskan pollock, taken from Alaskan waters, depending on availability. It is standard practice for cod liver oil manufacturers to use many different varieties of cod and even other fish. They are not required to list the individual varieties on the label.

“One member of the genus *[Gadus](https://en.wikipedia.org/wiki/Gadus" \o "Gadus)* [cod family] is also commonly referred to as pollock. This is the [Alaska pollock](https://en.wikipedia.org/wiki/Alaska_pollock) or walleye pollock (*Theragrachalcogramma*) including the form known as the [Norwegian pollock](https://en.wikipedia.org/wiki/Norwegian_pollock). . . . The Alaska pollock is a significant part of the commercial fishery in the Gulf of Alaska”[(C.Michael Hogan. 2011.](https://en.wikipedia.org/wiki/Pollock" \l "cite_note-2)[*[Gulf of Alaska](https://en.wikipedia.org/wiki/Pollock" \l "cite_note-2)*[. Topic ed. P.Saundry. Ed.-in-chief C.J.Cleveland. Encyclopedia of Earth. National council for Science and the Environment](https://en.wikipedia.org/wiki/Pollock" \l "cite_note-2)](http://www.eoearth.org/article/Gulf_of_Alaska?topic=49523)). Alaskan Pollock has recently been renamed *gaduschalcogrammus*.

**What about claims that there can be no such thing as a fermented oil, or that you cannot ferment livers?**

The oil is not fermented but it is a product of fermenting the livers. You can indeed ferment livers—fermentation experts will tell you this. The glycogen stores in the liver are what ferments—and there is plenty of glycogen in liver. The oil from this is called fermented cod liver oil because it comes from fermented cod livers. Regular cod liver oil is oil from unfermented cod livers.

**Why does Green Pasture claim that there is vitamin D2 in fermented cod liver oil? Everybody knows that there is only D3 in cod liver oil.**

This is the industry view. Most industrial (refined) cod liver oil today has vitamin D3 added because refining takes most of the natural vitamin D out.

When David Wetzel, the owner of Green Pasture, first began making the fermented cod liver oil, he sent it to NDI laboratories in Canada ([http://www.nutrasource.ca](http://www.nutrasource.ca/)) (associated with Guelph University) for vitamin D testing. He was surprised when these tests came back showing vitamin D2, with very little or no D3. Mr. Wetzel immediately communicated this to us. He then sent the oil to the University of Wisconsin for a rat assay test to see whether the oil had vitamin D activity—and the answer came back yes. Mr. Wetzel has shared all this on his website [http://www.greenpasture.org/utility/showArticle/?ObjectID=8819&find=vitamin%20d%20in%20cod%20liver%20oil&happ=siteAdministrator]. The rat assay is considered the gold standard of vitamin D testing. The University of Wisconsinthen recommended UBE Laboratories in Fullerton, California for further testing, and these labs found mostly vitamin D2 as well.

The prevailing view at that time—one that we repeated at WAPF—was that vitamin D2 is ineffective and possibly toxic. Of course, these discoveries led us to reconsider this view—after all, cod liver oil cures rickets. This is something we are looking into further and will be sharing with our members in *Wise Traditions*. There are hundreds of vitamin D metabolites, so the probable explanation is that the natural D2 metabolites in cod liver oil have different effects from the synthetic D2 added to vegetarian foods, used in vitamin drops, etc. We encourage product manufacturers like Mr, Wetzel to share information like this to help advance knowledge about nutrition.

By the way, Dr. Masterjohn is of the opinion that the forms of D in cod liver oil are not D2, but other metabolites. We hope to solve this mystery with further research.

**Why doesn’t fermented cod liver oil raise the vitamin D levels in the blood?**

Some people have reported this, but the physician Roseann Volmart, DO, reports that small doses of fermented cod liver oil have very effectively raised vitamin D levels in many of her patients. Obviously the product does not have the same effect on all people. Again, this is an interesting question and one that we hope to look into. Remember that all vitamins need co-factors to be effective, and one explanation is that the people for whomfermented cod liver oil is not raising serum D levels may be missing certain co-factors. Also, the current thinking is that serum levels should be in the range of 30-40; higher levels may not be healthy.

**Dr. Daniel reports that all vitamin levels in cod liver oil are low.**

The first thing people have to understand about vitamin testing is that it is not an exact science, especially when the vitamins are naturally occurring. Using the same tests, different labs can get different results, and even two different technicians in the same lab can get different results. And testing for fat-soluble vitamins is even more complicated because these vitamins are mostly attached to proteins or other compounds. If the lab does not go through processes to release the vitamins, then the results will be low. UBE Labs says that they do a very thorough job of releasing or extracting the vitamin D, and that is why they get high results. Unfortunately, they will not share their methodology with us, so we (WAPF) have not published any of their results in our journal. What we are planning to do is provide funding so that Chris Masterjohn can do this testing in his laboratory at Brooklyn College, so we can study this question thoroughly.

The question of how much vitamin D is in our food is an important one. The conventional dogma is that “you can’t get vitamin D from food.” I believe that USDA is using tests that give deliberately low results, so people will not realize the health value of foods like butter, egg yolks and lard.

For example, USDA claims there is 100 IU vitamin D in 100 grams of lard. But Mary Enig, PhD was in contact with someone from USDA years ago who found 2800 IU vitamin D in lard.

At my own expense (not funded by WAPF) I sent some samples to UBE labs and received thesestartling results:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Vitamin D IU per 100 grams | Current USDA Values | Old USDA Values | UBE Lab Confinement Raised | UBE Lab Pasture Raised |
| Egg Yolks | 129 | 148 | 9240 | 70,000 |
| Lard | 100 | 2800 | 6040 | 75,000 |
| Butter | 64 | 56 | 1880 | 6,560 |

The Foundation has not published these results because we don’t know the methods UBE is using. We expect to have publishable results from Dr. Masterjohn’s studies.

For other fat-soluble vitamins like A and K, the situation is similar. We are not going to send products to labs that don’t do a thorough extraction process before testing.

**What about all those lab reports in Dr. Daniel’s report?**

To be a valid legal document, or to constitute substantiation for a nutrition claim on a food or supplement label, or to be sufficiently credible for WAPF to publish it, a lab report must show the name and address of the lab, the name and contact information of the person requesting the analysis, the date, the name of the product, the type of test used and the name of the person responsible for the test. None of this information is disclosed in the reports that Dr. Daniel has relied on in her report. Therefore, we have no way of evaluating the reliability or relevance of those reports.

**Should everyone take Green Pasture fermented cod liver oil?**

Of course not! There is no one product for everybody. If someone doesn’t like the fermented cod liver oil, there are other recommended brands they can choose cod liver oil products endorsed by WAPF(http://www.westonaprice.org/health-topics/cod-liver-oil-basics-and-recommendations/).

**Should every one take cod liver oil?**

Again the answer is no. Some people are very sensitive to the polyunsaturated fatty acids in cod liver oil; others are allergic to all fish products, or sensitive to iodine or to fermented foods. These individuals will need to get their fat-soluble vitamins from other foods.

**Is it OK to take cod liver oil while eating a standard American Diet?**

Certainly not in large amounts.  The unsaturated omega-3 fatty acids in cod liver oil need to be balanced by saturated fats and especially omega-6 arachidonic acid in animal fats.  The diet needs sources of easily absorbed calcium and plentiful magnesium.  Above all, the A and D in cod liver oil need to be balanced by vitamin K2, found in aged cheeses, duck and goose fat, butter, butter oil and other animal fats.

According to Dr. Masterjohn: “If someone's weakness is a propensity to oxidative stress, cod liver oil might be an oxidative liability and harmful. If someone's weakness is a deficiency of one of the cooperative nutrients, it could cause an imbalance. But for many, their weakness may be that they need more A and D, and they might benefit. That might explain why it was usually associated with positive outcomes in clinical trials even though the background diets were likely subpar.”

**What about claims that taking fermented cod liver oil caused someone to have heart failure?**

An individual took 1-2 tablespoons per day of another brand of cod liver oil from 1979 to 2006 and 1-3 tablespoons daily of fermented cod liver oil from 2006 to 2012. This is 3-9 times the recommended dose over many years. If this in fact contributed to his heart failure, it is just as likely that his extended over-consumption of cod liver oil in general, rather than fermented cod liver oil in particular, was the contributing factor.

**Doesn’t WAPF recommend high doses of cod liver oil?**

The WAPF recommendation is 1 teaspoon per day high vitamin cod liver oil for a maintenance dose; 2 teaspoons per day for pregnant and lactating women; and higher doses for a short time during periods of stress (http://www.westonaprice.org/health-topics/cod-liver-oil-basics-and-recommendations/). We have also reported on a South African study in which women with endometriosis had a 92 percent cure rate when given high doses (up to 90,000 IU) of vitamin A daily (D M Lithgow and W M Politzer, “Vitamin A in the Treatment of Menorrhagia,” South African Medical Journal, February 12, 1997, Pages 191-193).. WAPF board member Kim Schuette, CN, reports great success with 1 tablespoon 2-3 times daily for 30-60 days in cases of endometriosis. (But after 60 days, they go back to one-half to a full teaspoon.)

Personally I take 1 teaspoon per day and a second teaspoon in the afternoon when I have a lot of stress or during the pollen season (for me FCLO works like nothing else to alleviate pollen allergies.) I have never taken cod liver oil in tablespoons. I do often tell people that increasing the cod liver oil temporarily can help with stress.

**What about Dr. Daniel’s claim that the X Factor is not vitamin K2?**

Here is Dr. Masterjohn’s article on this subject; readers will have to decide for themselves: <http://www.westonaprice.org/health-topics/abcs-of-nutrition/on-the-trail-of-the-elusive-x-factor-a-sixty-two-year-old-mystery-finally-solved/>.

**Green Pasture has a monopoly and this is not good.**

Green Pasture has been successful because they produce a good product. But there are plenty of customers for other brands. The role of WAPF is to explain why people should take cod liver oil and point people to products that are natural and clean.

We will need many more companies producing a natural and/or fermented cod liver oil to meet the coming demand. Presumably Green Pasture is not going to share its proprietary processing techniques, but it would be easy to figure out how to do this. One good possibility is natural processing of the fresh water cod livers from the Great Lakes.

**Dr. Daniel accuses Green Pasture of getting its fish livers from Alaska and its butter oil from Argentina without disclosing this fact.**

Green Pasture has not advertised the source of its products but has not hidden it either. It is a business and may not want to jeopardize its sources of supply. The company says it has obtained its livers from Alaskan waters since the beginning. When the company could not get enough butter for butter oil domestically, it set up a supply from a dedicated grass-fed herd in Argentina, where there is plenty of good pasture.

**Who paid for all the lab tests relied on in Dr. Daniel’s report?**

In her report she acknowledges “Dr. Ron Schmid. . .  and several other loyal members of the Weston A. Price Foundation [who] helped fund my laboratory testing.”I do note that the language in her report often expresses the view of the conventional (refined) cod liver oil industry.

**Why would companies that make refined cod liver oil attack fermented cod liver oil?**

David Wetzel has reported that when he went to Norway years ago he made a shocking discovery—that essentially all the modern processed cod liver oil today has had most of the vitamins removed by the molecular distillation process and synthetic vitamins are added back. He made this information public, which cannot have helped the industry, and went on to develop a traditional fermented cod liver oil. It is not heat processed and contains natural vitamins, which is why WAPF has endorsed it.

Comparing processed cod liver oil to fermented or unrefined cod liver oil is like comparing pasteurized milk to raw milk—they are completely different products. The dairy industry has spread some terrible misinformation about raw milk, and it may be that this is what the cod liver oil processing industry is doing to fermented cod liver oil. To be fair, based on their training, these companies may honestly believe that because an oil is brown, it has to be putrid and rancid. People trained 20-30 years ago may know nothing about fermentation.

**Why are you claiming that Weston Price used fermented cod liver oil?**

We did not make that claim. Dr. Price probably used cod liver oil processed by steam extraction, which was the method in use at the time. He described the cod liver oil he used as “high vitamin,” and he probably determined vitamin levels in his own laboratory using methods available at the time. All the tests we have seen indicate that fermented cod liver oil is higher in vitamins than other brands so it seems to us appropriate to recommend it.

**What is your testing process for a product to garner endorsement?**

We have never tested products for endorsement, only looked at the ingredient list to see whether they fit into our guidelines. However, for the important product of cod liver oil, because of this controversy, I will now be recommending to the board that we develop a protocol for testing all brands for vitamin levels and markers of rancidity before we approve them.  
  
**Do you stand by Dr. Daniel's other writings for the WAPF? What about *The Whole Soy Story* and *Nourishing Broth*?**  
Dr. Daniel did great work on these books and her articles—more thorough than the cod liver oil report.

**What is your greatest concern about Dr. Daniel’s report?**

My biggest concern is that the report is clearly aimed at putting Green Pasture out of business and taking this wonderful product away from the thousands of people who have benefitted from it, including myself and members of my own family. This would be a terrible thing to happen.

Link to this report here:

http://www.westonaprice.org/uncategorized/concerns-about-fermented-cod-liver-oil/

Wise Traditions 2016, the nation’s foremost nutrition conference

November 13-16, Anaheim, California [link]