



Feeding Better Foods

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Introduction

Over the last decade, there has been a steady decline in the amount of Omega-3 fatty acids, which have many health benefits, consumed by Americans. The goal of my experience was to create beef products that had a higher amount of Omega-3 fatty acids by altering their diet as well as improving consumer perceptions of beef and beef production systems. Better Fed Foods is a program that is designed to provide traceability to individual producers and to improve soil health, crop yields, and animal performance. Wise



Figure 1 : Omega-3 milk from Oregon Dairy that is on sale at Hethwood Market

Up is a program that drives engagement and education to consumers. By using QR codes, consumers can gain information that matters to them about their fresh food. By feeding a specialized diet consisting of GO+ lick tubs and pasture fertilized with microalgae, we were able to create beef products containing more Omega-3 than other commercial and grass-fed products. My experience at Hethwood Market and SES Agricultural Enterprises is the initial retail model for BetterFedFoods featuring Omega-3 milk (114mg/serving), Eco-Eggs (225mg omega-3/egg), and beef enriched with omega-3.

What is so special about this diet?

Performance Lick Tub

Ingredients: Molasses Products, Flaxseed, Processed Grain By-Products, Marine Micro-Algae, Monocalcium Phosphate, Urea, Calcium Carbonate, Vegetable Oil, Magnesium Oxide, Vitamin A Supplement, Manganese Sulfate, Zinc Sulfate, Aluminum Silicate, Copper Sulfate, Sodium Selenite, Ferrous Sulfate, Vitamin E Supplement, Calcium Propionate, Ethoxyquin, Vitamin D3 Supplement, Ethylenediamine, Dihydroiodide and Cobalt Carbonate.

Figure 2 : Ingredient list from the lick tub supplement

This group of cattle was fed a diet consisting of grain, hay, and GreatOPlus(GO+) feed tubs. The feed tubs contained a mixture of molasses, flaxseed, and Nannochloropsis oculata (a strain of marine micro-algae). This strain of micro-algae is high in essential omega-3 PUFAs. Traditional rumen diets are high in Omega-6 and Omega-9 fats that lead to inflammation and health stress. In most cases, the rumen changes the structure of the incoming fatty acid through a process called biohydrogenation, which turns these fatty acids into saturated fats. The flaxseed in these feed tubs have been encapsulated so it can remain a source of PUFAs with exceptional bypass of the rumen. This allows the cattle to convert LCFAs available at more than double the level of other feeds. Research has also shown that with the addition of hay as well as flaxseed and algae in ruminant diets, they are able to maintain higher levels of omega-3 when compared to hay alone or flaxseed alone.

How Does This Benefit the Cattle?

Not only does the increase in omega-3 benefit the consumer, it also benefits the cattle as well. Some of these benefits include...

- Reduced inflammation
- Reduced heat stress
- Better nutrient absorption
 - The ruminant capillary activity is improved which allows for better nutrient absorption. This leads to better hoof health, marbling in the meat, ability to handle feedlot stress and improved average daily gain.
- Improved reproductive health
- Reduced methane emissions
- Better immune system
- GO+ is high in beta-glucans that bind toxins and stimulate the immune system

Research is also being done at Kansas State University with the use of GO+ to reduce the frequency of High Mountain Disease (HMD) which is a disease in which there is heart failure due to hypoxic pulmonary hypertension in cattle.



Figure 5 : Sample QR code to view a NY strip from Ribbonwire Ranch

How does this Benefit the Consumer?

The increased amount of omega-3 present in the products offers many health benefits to consumers such as....

- Lower risk of heart disease
- Reduced inflammation caused by rheumatoid arthritis
- Decreased prevalence of age-related memory loss
- Regrowth of the myelin sheath and restore nerve function
- Brain and eye development in utero up until early childhood
- Lower risk for developing Alzheimer's Disease
- Low levels of n-3 fatty acids have also been associated with depression
- Reduce symptoms of ADHD in children
- Alleviate menstrual pain
- Improve sleep

With the help of Wise Up, consumers are also able to scan a QR code where they can see what farm the product came from, and where that farm is located. They are also able to see how that animal was raised, what it had been fed, and if there were any antibiotics or hormones used on the animal. (An example QR code can be found in the bottom left corner)



Figure 3 : Feed tubs on the farm before given to the herd



Figure 4 : Herd of 50 cows still fed tubs on the farm

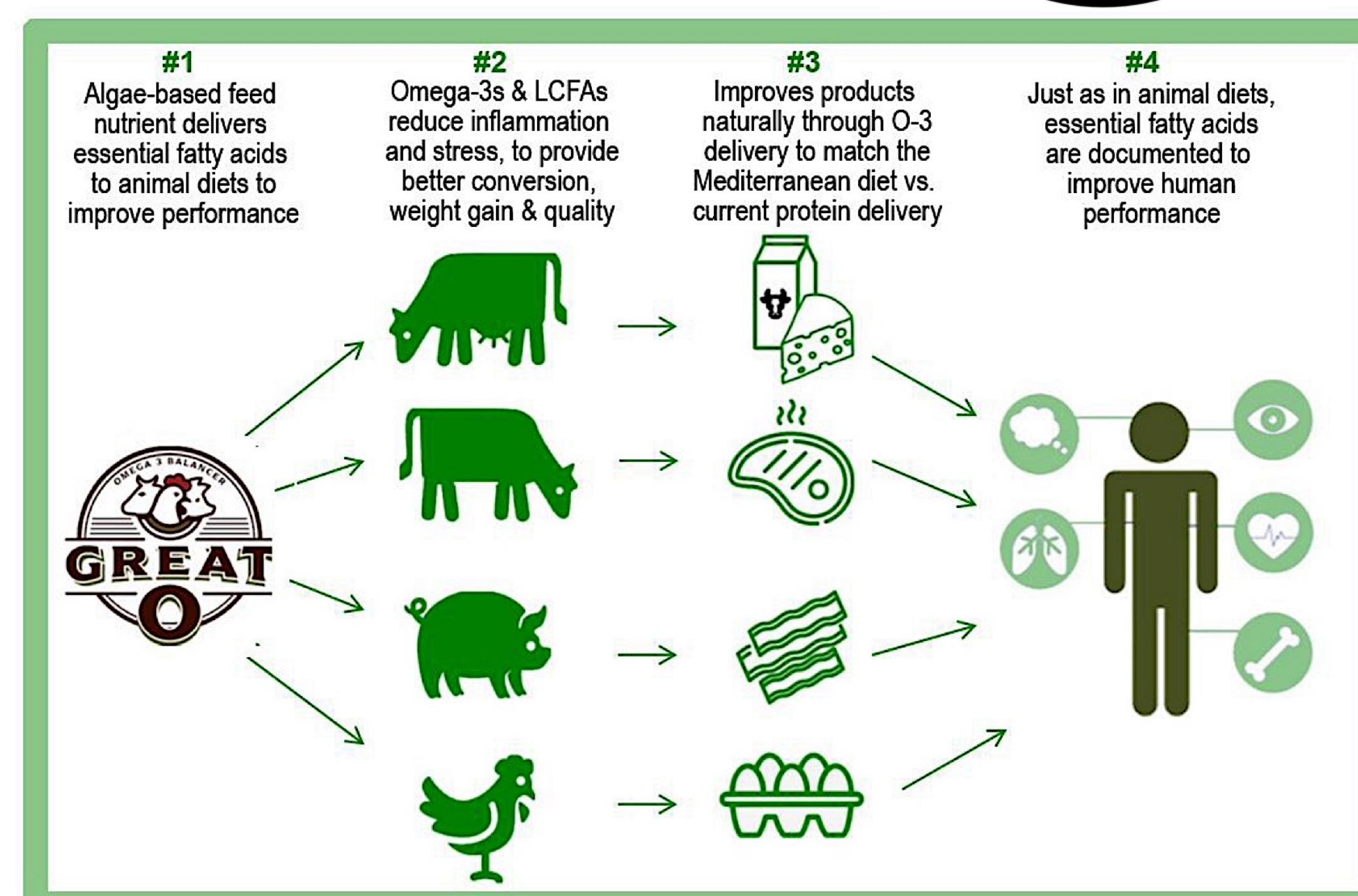


Figure 6 : Diagram showing the overall process of BetterFedFoods

Retail & Marketing

Marketing for these items included hanging papers on the door of Hethwood Market advertising these products and explaining their benefits/importance of them. Inside the store, a sign was placed next to the coolers storing these products further emphasizing them and explaining how the idea for "better" products came about. Milk sales have increased in the store and consumers have shown a greater preference for whole milk since Wise Up Food's engagement campaign using QR codes. Consumers also prefer the ground beef that has gone through this program which resulted in a 15% increase in omega-3. Consumers felt that the QR code from wise up played a role when deciding which products to purchase

The fertilizer

A fertilizer consisting of green microalgae was applied to the pasture where the cattle grazed. Microalgae produce compounds that promote the growth of plants more efficiently than typical NPK-based fertilizers. The algae have a positive effect on the soil microbiome and the soil around the roots is equivalent to the biome and microorganisms living there are critical to the plant. Bacteria are in a symbiotic relationship with the plants where fix the nitrogen in the soil in exchange for sugars from the plants. Plants aren't able to fix nitrogen themselves, that is the function of bacteria. This leads to a higher concentration of oxygen related to algal photosynthesis, improving the water-holding capacity of soil and providing nutrients to the plants. The application of this fertilizer resulted in a 40% gain in protein and 18% gain in yield.

The Science – Microalgae as a Bio-Stimulant

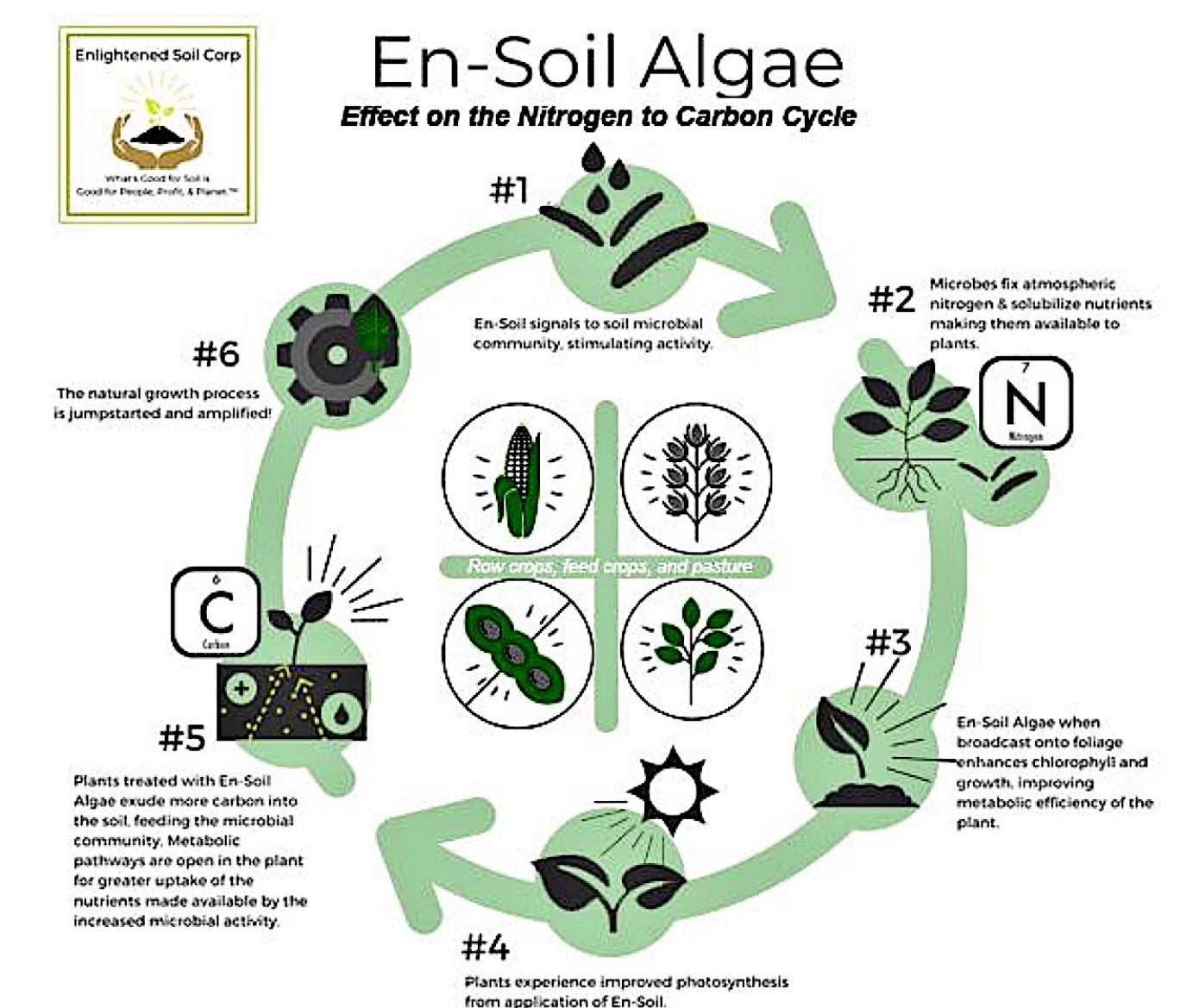


Figure 8 : Diagram showing how microalgae affects the nitrogen to carbon cycle

What Did I Do?

My responsibilities during this experience and within my project included...

- Feeding cattle the tubs from GreatOPlus
- Monitoring growth and behavioral changes
- Taking soil samples to determine the effects of the microalgae fertilizer
- Collecting data from BetterFedFoods on control groups and previous herds to compare with the herd from my experience
- Produced marketing ideas for selling the products at Hethwood Market and Virginia-Maryland College of Veterinary Medicine
 - These ideas included advertisement of the products at the store that explain the ideology and process and a poster that will be at the Vet School cafeteria in the Hethwood Market Café to introduce these products to the next generation of ag.

Results

A group of 20 cows from my experience was recently processed and compared to a control on the same feedlot. This is the first group that has been involved in this process since before birth. The omega 6: omega 3 ratios were compared in ground beef.

	ADG	Feed: Gain	Mortality	Hot Carcass Weight	Carcass Value	Herd Value	Per Head value	Omega 6 : Omega 3
Control	3.93	5.85	4	902.8	\$2,058.63	\$712,285.98	\$2,035.10	10:1
GreatOPlus	4.08	5.9	1	932.0	\$2,122.29	\$740,679.21	\$2,116.23	4:1

Questions?

If you have any further questions about my experience, please contact me at oliviagm19@vt.edu

Sources

- Alvarado-Gilis, C., Aperce, C., Miller, K. A., Van Bibber-Krueger, C., Klamfoth, D., & Drouillard, J. (2015). *Effects of flaxseed encapsulation on biohydrogenation of polyunsaturated fatty acids by ruminal microorganisms: Feedlot performance, carcass quality, and tissue fatty acid composition.* 93, 4368–4376. <https://doi.org/10.2527/jas2015-9171>
- Figures 6 and 8 were provided to me by Paul Rosenberger with BetterFedFoods in the program overview



Figure 7 : Ribeye steak after processing