

Centre for Innovation in Nutrition Health Disease. IRSHA.BVDU. Pune.

Preamble:

Since the inception IRSHA, Interactive Research School for Health Affairs, in Bharati Vidyapeeth (deemed to be) University, one of the main focus area of research and development activities has been on “how to reduce the rising non-communicable disease burden on the nation”. One major factor responsible for this horrifying health condition of our people is: “omega 3 fatty acid deficiency in modern diet and excessive consumption of omega-6 fatty acid through edible oil”. Therefore, BVDU.IRSHA Centre for Innovation in Nutrition Health Disease focused research

Goal: Bring Back Omega-3 Fatty acid into food Chain

Mission: Omega-3 Nutritional Security in the country

Vision: Healthy Wealthy and Wise India.

In order to achieve above objective we developed unique innovative “Flax Bio-Village Concept” (FBC)

The first product developed through DBT’s “EGG for Health” was “ALVEL omega-3 egg. BVDU developed a enriched poultry feed mix resourcing omega 3 from flaxseed (linseed). This innovation received DST. Lockheed Martin Gold medal and Rs one lakh award. It is being marketed through “Real World Nutrition Laboratory Foundation” (RWNLf), a non-profit company instituted within Bharati Vidyapeeth.

FBC further got a boost by World Bank assisted two major Indian Council of Agricultural Research (ICAR), National Agriculture Innovation project (NAIP) projects: (2007-2014) for seven years working with more than thousand linseed growing farmers in Vidharbha:

1. Sustainable Rural Livelihood Security for Backward Districts (Gadchiroli, Chandrapur Yewatmal) of Maharashtra.
2. Linseed Value Addition for profitability

We were able to demonstrate that FBC can effectively increase the income of linseed growing farmers by providing high yielding high omega-3 PKV.NL260 variety, but also can add value to linseed by developing several omega-3 enriched food products.

The input outcome and impact of the work of BVDU was highly acclaimed by ICAR. In recognition of this BVDU was awarded a ICAR Linseed Value addition Centre under its All India Coordinated Research Program (AICRP)

In order continue BVDU's effort to support the linseed growing farmers, the BVDU.ICAR. flax oil extraction unit at Sangamner, was transferred to BVDU Pune and a non profit "Real World Nutrition Laboratory Foundation" a non-profit company was established.

Since then, with the help of ICAR. Linseed Value Addition Centre, CINHD.IRSHA has been carrying out research and development activities with additional grants from DST and private agencies.

Some products already being produced and marketed by RWNLF and some, that are in the offing, some that can be taken up by entrepreneurs for startups, are listed in "[Enclosure 1](#)".

A short note on how BVDU's effort for attaining "omega-3 Nutritional Security in the country can have a major impact on the health of our people and economy of the country is described in "[Enclosure II](#)".

A list of patents applied for the developed technologies in "[Enclosure III](#)"

"[Enclosure IV](#)" lists the products already being test marketed by RWNLF.

Enclosure I. Real World Nutrition Laboratory Foundation

Website: www.rwnlf.in

RWNLF is a “Not for profit “registered company under section 8 company act 2013 constituted to test the innovations developed at CINHD for its commercial potential. At RWNLF we have scaled up the operation with the aim to take these innovative products to society. RWNLF has now obtained ISO 9000 certificate.

There are three categories of products developed:

Category I ALVEL registered brand (B to C) “Ennexure IV: brocure”

1. Flax seed Oil.
2. Flaxseed oil soft gel
3. Omega-3 rich Flaxseed oil emulsion
4. Alvel omega-3 egg
5. Alvel omega-3 chocolate
6. Alvel omega-3 Flour mix (low GI)
7. Alvel omega-3 poultry enriched feed mix (EFM)

Category II. New products in the offering: (B to B)

1. Vegan flax milk
2. Edible oil blend
3. Edible oil super blend
4. Low GI atta mix
5. Omega-3 milk fortifier
6. SDG (Secoisolaricinol diglucoside)

Category iii. For start-up- incubation at RWNLF

- 1, omega3 -egg mayonnaise
 2. Veg omega-3 mayonnaise
 3. Omega-3 ghee
 4. Omega-3 butter
 5. Omega 3 cheese
 6. Omega-3 chocolate
 7. Omega-3 flavored milk
- (any products can be fortified with our Omega -3 universal fortifier emulsion)

Enclosure II

BVDU's Pioneering innovative initiative:

Addressing Nations' scorching health problems

MISSION: OMEGA-3 NUTRITIONAL SECURITY IN THE COUNTRY

I. PROBLEM STATEMENT AND ITS CAUSE and its health implications

1. STARTLING GLOBAL HUNGER INDEX (GHI),

After 74 years of independence, it is unbecoming for a country, aspiring to become 5 trillion economy in another five years, to rank 102nd out of 117 countries in GLOBAL HUNGER INDEX (GHI), when our neighboring countries have done better than us. India ranks below Pakistan (94), and Bangladesh (88). It is particularly alarming, because GHI is based on malnutrition, child stunting, child wasting, child mortality. Of course, this state of affairs is also due to poor nutrition of would be mother, during pregnancy and lactation. Obviously. the future of our children is bleak and the measures taken to rectify the situation is definitely not adequate.

Note: Our food is precariously low in omega-3 fatty acid and omega-3 fatty acids play key role in mother and child health. Bring Back omega-3 Fatty acids into food chain is the solution

2. EPIDEMIC OF NON-COMMUNICABLE DISEASE (NCD)

NCDs (NCDs include Diabetes, heart disease, cancer, respiratory diseases mental illness, pregnancy complications etc.) are the biggest cause of premature deaths in India. NCDs account for 63% of all deaths. We have program for treating the patients "AYUSHMAN BHARAT". More importantly we have to have program making people healthy "AYUSHWANT BHARAT".

Note: Omega-3 fatty acids are anti-inflammatory. One of the major factors that is responsible for the rise in NCD is that there is dominance of inflammation in our population because we consume very high amount of inflammatory omega-6 fatty acid and very little of omega-3 fatty acid. National Health mission is about providing

health care. BVDU has developed technologies to balance omega-6 to omega-3 ratio in edible oil.

3. COVID 19 PANDEMIC AND IMMUNITY

Coronavirus positive cases in India, continue to rise on a daily basis despite implementation of social distancing measures and extension of nationwide lockdown.

Note: Immune system protects us from virus and diseases. Good Nutrition is fundamental for improving immunity. GOOD FOOD, NO COVID, NO DISEASE. Complete nutrition (all vitamins, minerals) is a necessity (man is crippled evolution). As the modern food is precariously low in omega-3 fatty acid and therefore **Omega-3 fatty acids are crucial for human health today.**

4. SEVERE OMEGA-6: OMEGA -3 IMBALANCE

Man, as hunter-gatherer, *Homo sapien* has consumed equal amount of omega-6 and omega-3 fatty acid for nearly 10 lakh years. His genes have been conditioned to that life style. Comparatively very recently, 10 thousand years ago, he has adopted to agriculture. Further sudden changes in his life style has also taken place because of industrial revolution in last 150 years. Genes don't change so suddenly. Omega 6 fatty acids are inflammatory and omega-3 fatty acids are anti-inflammatory. The level of omega-6: omega-3 in our population is 20: 1 and in Delhi industrial belt 36:1. Therefore, there is dominance of inflammation in our population, a primary cause of rise in NCD and also lower immunity.

Note: There is terrible edible oil crisis in the country. 65% of our need is met by importing edible oil worth INR. 70 thousand crores. The irony is that good cooking oil is not a healthy oil and good healthy oil is not a good cooking oil. To make the things worst most of the oilseed grown in the country is dangerously high in omega-6 fatty acid. While reframing the policy for National Mission for edible oil, we need to take into account the fatty acid composition of the edible oil being domestically produced and also the edible oil being imported and its impact on the health of our people.

5. LACK OF CONVERGENCE OF AGRICULTURE AND NUTRITION

No doubt our policy of FARMER FIRST is commendable, however without proper planning neither the farmer nor the people are happy. Farmer is committing suicide as he is not getting adequate return for his produce and the people are dying because what is produced by farmer is not balanced in bulk food (carbohydrates, good protein and essential fat) and nutra-ingredients (vitamins and minerals). In our anxiety to feed our population, we have focused our agriculture on wheat and rice, dangerously rich in carbohydrate. Our food is also low in good protein. Recently, however some government measures have improved the situation with respect to protein. However, Fat is completely neglected with dire consequence to our health.

Note: So we need to urgently draw a road map to attain the convergence of agriculture with nutrition.

6. FLAXSEED (LINSEED) A NEGLECTED CROP

According to ICAR and IIOR, nine annual oilseeds, which include seven oilseeds viz groundnut, rapeseed-mustard, soybean, sunflower, sesame, safflower, niger, are considered edible and castor and **LINSEED as non-edible**. Linseed is only the oilseed that has very high amount of omega-3 fatty acid. **Therefore, classifying linseed as nonedible and neglecting it as minor oilseed, is very unfortunate and detrimental for the health of our people.** In 1980s Linseed was grown in 20 lakh ha and today it occupies less than 3 lakh Ha.

Note: Last 15 years. realizing that omega-3 fatty acids are endangered nutrient, we at Bharati Vidyapeeth Deemed University (BVDU), Pune, in order to BRING BACK OMEGA-3 FATTYA ACID INTO FOOD CHAIN, pioneered, innovative “FLAX BIOVILLAGE CONCEPT” developed technologies to resource alpha-linolenic acid (the essential vegetarian omega-3 fatty acid) from linseed and enrich common food egg, chicken meat, milk, ghee, chocolate and other milk products. Good part of the research and development activities were carried out during 2007-

2014 ICAR.NAIP. world Bank assisted projects. We have continued our support to farmers by forming Linseed farmer's association for producing PKV.NL. 260, high omega, disease resistant variety and distributing to the farmers and establishing forward linkage with market (value addition by producing number of omega-3 enriched linseed derived products) at Real World Nutrition Laboratory Foundation, not for profit section 8, startup company in BVDU. In recognition of the much needed linseed value addition pioneering work ICAR has awarded ICAR.AICRP.Linseed value addition center. This needs to be strengthened and its scope widened to the whole country to fulfil its dream: HEALTHY WEALTHY WISE INDIA. Omega-3 fatty acid is brain food, regarded as hardware of the brain.

CONCLUSION: Linseed is a cash crop with the potential of boosting poultry, bakery, dairy, confectionary, edible oil industries. Creating millions of job and entrepreneurship. Producing linen and composite fiber, linseed straw would double the income of the farmer. Most importantly Mission: "Omega-3 Nutritional Security", if implemented on a large scale, will reduce disease burden and health care expenses.

Enclosure III.

Details of patents application filled by Prof. Mahabaleshwar V. Hegde

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Sr. No.	Title of the patent	Application Number	Date of filling	Inventors
01	Omega-3 Fatty acid compositions with honey	World Patent, PCT/IN05/00163	24-05-2005	Mahabaleshwar. Hegde, Ulhas Wagh and Shahida Khan
02	Composition for chicken feed for production of Omega-3 Chicken and method thereof	1971/MUM/2012	09-07-2012	Mahabaleshwar Hegde, Surekha Bhalerao, Shivajirao Kadam
03	Nutritional and rejuvenative food supplement capable of fortifying any food products	1717/MUM/2012	Publication date (U/S 11A)- 14/02/2014	Mahabaleshwar. Hegde, Ulhas Wagh
04	Fortified omega-3 ghee and process for preparation thereof	3719/MUM/2013	27-11-2013	Mahabaleshwar Hegde, Anand Zanwar, Yogesh Badhe, Subhash Bodhankar, Tejas Gosavi
05	Coatings and methods for infection-resistant medical devices	International Full patent application no:PCT/US17/31969	10-05-2017	Indian Inventors: Mahabaleshwar Hegde, Anand Zanwar, Santoshkumar Dongre, Shivajirao S. Kadam

		USPTO Sr. No. 62/333,9085		US Inventors: Shanta Modak, Arnab Kumar Ghosh, Chathuranga C. De Silva
06	Omega-3 supplement feed composition for omega -3 eggs production	2193/MUM/2014	7-07-2014	Mahabaleshwar Hegde, Surekha Bhalerao
07	Polymer films with antimicrobial agents	International Patent Application No. PCT/US18/44247	27-07-2018	Modak SM, De Silva CC, Ghosh AK, Zanwar AA, Hegde M.
08	Formulation of edible oil	Provisional Indian Patent Application No. 201921006187	16/02/2019	Zanwar AA, Hegde M.

Enclosure IV: RWNLF. Products with FSAAI license.



The brochure cover features the RWNLF logo at the top right, which consists of a stylized flame icon and the text 'rwnlf FOUNDATION PRODUCT BROCHURE'. Below the logo are several blue flowers. The central part of the cover contains a diamond-shaped graphic with the text 'Science For Society' at the top. Inside this diamond is a circular flow diagram with three gears: a blue gear labeled 'Idea Innovation', a green gear labeled 'Validation', and a yellow gear labeled 'Commercialization'. To the left of the diagram is the text 'Goal: Bring Back omega-3 Fatty acid into food chain'. To the right is 'Vision: Healthy Wealthy and Wise India'. Below the diagram is 'Mission: Omega-3 Nutritional Security in the country'. The cover is decorated with images of flaxseeds in a wooden bowl, a glass of flaxseed oil, and a glass pitcher of flaxseed oil.

RWNLF is not for profit company formed to validate and market the innovative products developed by Center for Innovation in Nutrition Health Disease, Bharati Vidyapeeth (Deemed to be University) for commercial exploitation. For backward integration with farmers throughout India, BVDU has ICAR-Flaxseed Value Addition Center

Flaxseed Oil



Product Description

ALVEL, vegetarian, virgin, omega-3 oil, is cold press extracted (from high omega, PKV.NL. 260 variety) and sealed under nitrogen ensure very high purity, is free from pesticides and also from naturally present anti nutrients, in flax seed (antivitamin B₆, lignan, cyanogen glycoside etc.). Natural vitamin E, is added for its stability and better utilization in human body and contains no preservative. Flaxseed oil contains 55-57% primary essential omega-3 fatty acid, alpha linolenic acid (ALA).

तुळ्यात उच्चतरात

Brand Name: ALVEL
Quantity: 100 ml
Food Source: Vegetarian
FSSAI No: **11513035008126**

Product Code: FO101
Type: Dietary Supplement
Shelf life: 18 months

Unique features:

ALA is the only form of omega-3 fatty acid available from vegetarian source. ALA is the essential fatty acid that can't be made in, human body and from ALA, more physiologically potent forms Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA), can be made in human body. ALA has the unique power of lowering the inflammatory action of linoleic acid (LA) by competing with LA. Therefore, ALA is more likely to be more effective in balancing the present skewed omega 6: omega-3 ratio, responsible for rise in diabetes, heart and lung disease, cancer, by lowering the dominance of highly inflammatory pathway in man today.

Application:

ALVEL Omega 3 oil can be used for Salad Dressings, Chapattis, Dal, Rice, Mayonnaise, Sauce, Curds, and Milkshakes etc. Not to be used for cooking /frying purpose.

Nutritional Facts

ALVEL Flax seed oil has 55-57% omega-3 fatty acid almost double than of fish oil. Further, it has 3-4 times higher levels of omega-3 than omega-6 fatty acid and therefore endowed with better ability to balance skewed omega-6 -omega-3, to lower inflammation and prevent chronic degenerative diseases.

Flax Seed Oil Soft-gel

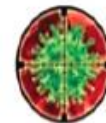


Product Description:



VELMEGA Softgel is easy to consume, easy to carry flax oil in soft gel form, and it has all the goodness of a vegetarian omega-3 oil. With vitamin E, it is protected from oxidation within the soft gel and also ensures better utility in human body. 2 capsules per day, provides over 1 g of alpha-linolenic acid (ALA).

Unique Features:



Fights Inflammation



Improves Bone and Joint Health



Promotes Brain Health during Pregnancy

Product Specifications:

Brand Name: VELMEGA
Quantity: 30 x 1000 mg
Food Source: Vegetarian
FSSAI No: **GA/505**

Product Code: FC101
Type: Dietary Supplement
Shelf life: 24 months

Application/Dosage Guidelines:

1 to 2 capsules per day.

Nutritional fact:

Modern human diet, is very deficient in the essential omega-3 fatty acid. The two capsules of VELMEGA soft gel is must for all vegetarians to remain in good health and reap the health benefits of omega-3 fatty acid

Omega-3 Rich Flaxseed Oil Emulsion



Product Description



ALVEL omega-3 rich flaxseed oil emulsion is a versatile, innovative, and proprietary, customized, **vegetarian omega-3 fortifier** that is fully miscible with water and can enrich any food product with omega-3 fatty acid (ALA). Available in Customized bulk pack for **B to B** to any food industry for omega-3 fortification and also **B to C** for enriching milk and other food products like ice-cream curd, yoghurt at home (available in different flavors).

Product Specifications:

Brand Name: ALVEL

Quantity: 100 ml

Food Source: Vegetarian

FSSAI No: **11516035000506**

Product Code: FO101

Type: Dietary Supplement

Shelf life: 12 months

Omega-3 Content: **150 mg/ml**

Unique features:

Well researched stabilized, tailor made, omega-3 fatty acid emulsion that can be used in fortification of other food products besides chocolates, sweets, jam, bakery products and dairy products like milk, curd, yoghurt, ice-cream etc. The product is ideal for fortifying milk with excellent palatability and still retaining vegetarian characteristic. The product can be customized to contain other essential and phyto-nutrients to meet specific health condition.

Unlike soft gel, wherein gelatin obtained from animal source is used for encapsulation, omega-3 in emulsion form is directly palatable and truly **VEGETARIAN**.

Nutritional Facts:

Omega-3 fatty acid, is resourced from special flax seed (high omega, pesticide free, and gluten free, PKV. NL. 260 variety). Flax oil used is cold press extracted under nitrogen and is stabilized in emulsion along with vitamin E. Emulsion can be customized to contain both water soluble and fat soluble vitamins, essential minerals and herbal medicines.

ALVEL Omega-3 Eggs



Product Description:

Layer chicks fed on **ALVEL omega-3 enriched feed mix (EFM)** lay eggs with over 250 mg of omega-3 (ALA+DHA) per egg, they retain all the goodness of regular egg, high amount of good protein and vitamins and are healthier because they have lower amounts cholesterol, triglycerides and omega-6 fatty acids along

with very high amount of omega-3 fatty acid.

Product Specifications:

Brand Name: ALVEL
Quantity: 6 eggs/tray
Food Source: Non-Vegetarian
FSSAI No: **11513035010364**

Product Code: OE101
Type: Dietary Supplement
Shelf life: 21 days

Health Benefits:

High amount of omega-3 in Omega-3 egg transforms fat in egg yolk into a healthy fat and vitamin E in the egg gets doubled. The cholesterol in the egg is significantly reduced. Most importantly high amount of omega-3 fatty acids in the yolk has the power of reducing both cholesterol and triglyceride. Omega-6: omega-3 ratio gets significantly reduced and high omega-3 fatty acid that lowers inflammatory pathway, is known to lower the risk of diabetes, heart disease, cancer, blood pressure, pregnancy complications, mental illness etc.

Unique features

Egg is not cheap but not costly either. With lowered cholesterol, triglycerides and saturated fat. Besides omega-3 worth the price of the egg, egg is not costly. With no eggy smell it tastes better.

Nutritional facts:

With over 250 mg omega-3 fatty acids and increased Vitamin E, with lowered saturated fat, triglycerides and cholesterol, egg is truly healthy

ALVEL Omega-3 Chocolates



Product Descriptions:

Alvel Omega-3 chocolate is enriched with vegetarian omega-3 fatty acids and is tasty delicious alternative to pills and joy for the children and adult alike for memory and brain health

Product Specifications:

Brand Name: ALVEL

Quantity: 21 chocolates/pack

Food Source: Vegetarian

FSSAI No: **11517035001239**

Product Code: OC101

Type: Dietary Supplement

Shelf life: 12 months

Omega-3 Health Benefits:

Supports heart health;

Regulates blood glucose;

Maintains healthy triglyceride, cholesterol;

Beneficial for bone and joint health;

Improves immunity;

Important for eye health and normal vision;

Brain food which control s mood;

A must for mother and child health; protects and maintains healthy skin

Nutritional Facts:

Each 10g bite provides 200 mg omega-3 fatty acid

ALVEL Flax Omega 3 Flour Pre mix



Product Description:

ALVEL Flax Omega 3 Pre mix has very low carbohydrate, very high both soluble and insoluble fibers, and good amount of good protein as well as omega-3 fatty acid. Hence 10% mixing of ALVEL Flax Omega 3 flour Pre mix with wheat flour / Atta will make it healthier. We have also observed that the food

products (such as roti, chapatti, and bread) made by fortified premix are equally tasty.

Product Specifications:

Brand Name: ALVEL

Quantity: 1000 gm

Food Source: Vegetarian

FSSAI No: **11513035010364**

Product Code: FS 501

Type: Dietary Supplement

Shelf life: 6 Months

Health Benefits of the flour after mixing

Increase in Fiber Content for better digestibility and lowered cholesterol absorption; Known to reduce the risk of developing heart disease, diabetes. Helps to prevent constipation; Substantial decrease in carbohydrate lowered calorie intake; Increase in good quality protein and good fat; Enrichment with Omega 3 fatty acid

Application:

By just 10% mixing of ALVEL Flax Omega 3 Pre mix with regular wheat flour (which is high in carbohydrate, very low in fiber and protein) can be transform into low carbohydrate, high fiber, high protein, Healthy ATTA along with very vital omega-3 fat.

ALVEL Enriched Feed Mix (EFM)



Product Description:

ALVEL EFM is for the production of Omega 3 enriched eggs. When layer birds' regular feed is supplemented with our proprietary ALVEL EFM, & dispensed as per our protocol then birds lay Omega 3 enriched eggs. 5part of EFM to be mixed with 95 parts of regular poultry feed and the mixture to be fed to layer birds. After 15days (approx.), the eggs so produced will have minimum 250 mg of Omega 3 fatty acids per egg. The proprietary ALVEL EFM is formulated using the Linseed and Linseed cake (after cold press extraction of Linseed oil) and other health supplements which helps to produce best quality Omega 3 enriched eggs.

Product Specifications:

Brand Name: ALVEL

Quantity: 40 kg

Food Source: Vegetarian

Product Code: EF 101

Type: Poultry Feed Mix

Shelf life: 3 Months

Unique features:

The technology is created to bring back Omega 3 fatty acids into food chain. The technology is a step towards Omega 3 nutritional security in the country. It can be an instrumental for poverty alleviation in rural setting. Omega3 eggs would boost consumer health. It will be instrumental to "Bring Back omega-3 Fatty acids" into food chain.

ALVEL EFM makes the egg healthier and heart friendly in addition it improves health of layer birds and reduces morbidity and mortality adding profit to poultry owner. Thus use of ALVEL EFM for production of omega 3 eggs , is a profitable and commercially viable proposition. Its' commercial viability, will boost poultry industry, and can generate lots of employment and revive Linseed agriculture.

Nutritional Facts:

The technology provides over 250 mg of omega 3 per egg (ALA+DHA). Omega 3 in these eggs is more bio-available and more affordable as it comes along with high bio-value protein, vitamins, and minerals.