

A Premium, Ultra-Sustainable & Highly Nutritious
Ocean-based Super-Protein Ingredient



Technology Presentation

A Perfect Protein (APP[®]) from Advance International Inc.

A Perfect Protein (APP[®]): Overview

Protected by U.S. and International Patents

General Description:

FDA-approved odorless and tasteless **Fish Protein Powder** from sustainable resources with > 90% of protein content plus naturally occurring minerals, vitamins and collagen.

Applications:

Food and Beverage: Dietary Supplement in baby food, baking, dressings, snacks and others; Functional Foods; Functional Beverages; Therapeutic Foods for medical conditions or malnutrition, Meat Substitute / Alternative Protein Ingredients; Athletes' Nutrition; Military Nutrition.

Animal / Pet Nutrition

Ingredient for Cosmetics

Business Opportunities:

A Perfect Protein[®] (APP[®]), A Perfect Omega[®] (APO[®]) and Blue H2O[®] Commercialized; Seavior[®] Extraction Process available for Licensing.

Purchase Specifications:

Sold in 20kg or 725kg bags

Production Capacities:

200 tons per month

Best Possible Price Per Pound:

\$7.17

Website:

<https://advanceprotein.com/>



Technology: A Perfect Protein[®] (APP)

Overview

Advance International developed a disruptive closed-loop extraction process (Seavior[®]) leading to the production of a **premium high quality, sustainable ocean-based protein powder** (APP[®]) along with other by-products, an omega-rich triglyceride oil (A Perfect Omega[®]) and a purified water (Blue H2O[®]), also commercialized.

Main Characteristics

The recently **FDA-approved** fish protein powder, developed by Advance International, derives from a **sustainable protein source** and a **sustainable extraction method**. In fact, it is more sustainable than any other protein source including plant-based proteins. It possesses a **high nutritional content**, a Protein Digestibility-Corrected Amino Acid Score (PDCAAS) score of 0.95. In addition, it has demonstrated many **proven health benefits** making it a dietary supplement of choice. The protein powder not only has a great potential on the food supplement market but also a fortiori on the pet/animal market and on the cosmetic industry notably due to the naturally present collagen.

Main Characteristics (Summary)

1. >91% Protein Isolate, Natural Minerals & Collagen
2. Full & Complete Amino Acid Profile
3. Non-hydrolyzed protein – Made using NEW extraction process
4. Highly Digestible - 99.40% Pepsin Test & Perfect PDCAAS score of 1.0
5. Extended Shelf Life: 2 years + (room temperature)
6. Gluten-free, Dairy-free, Lactose-free, Soy-free
7. Growth hormone-free
8. Trans-Fat-free
9. Ketogenic, Paleo, and Pescatarian Diet Friendly
10. Low Glycemic Index
11. Excellent Natural Mineral Content
12. Non-Hygroscopic
13. No Additives or Preservatives
14. Low Carb, Fat and Cholesterol

Main Competitive Advantages

- ① High nutritional content
- ② Health benefits supported by published studies
- ③ The most Sustainable Protein Source & Sustainable Extraction Method
- ④ Sustainable Marine Resource, Product Traceability, Natural Ingredients
- ⑤ Versatile Product with various application possibilities
- ⑥ Clean Label
- ⑦ Patented Ingredients

Technology: A Perfect Protein® (APP)

Location of production plant:

California, USA. The Plant was designed to be scalable and modular.

Applications:

(1) Food and Beverage including dietary supplement in baby food, baking (non-hygroscopic), dressings, snacks and others; functional foods; functional beverages; therapeutic foods for medical conditions or malnutrition, meat substitute/alternative protein ingredients; athletes' nutrition; military nutrition. (2) Animal/Pet Nutrition. (3) Ingredient for Cosmetics.

Development Stage:

APP® -A Perfect Protein-, APO® -A Perfect Omega- and BlueH₂O® -Nutrient rich oceanic water-, Advance Int. 3 core products, are approved by the FDA (FDA export certificate available). Since February 2019, they are produced at owned and operated state-of-the-art California based company, in the first of its kind extraction facility. Advance Int. is starting sales to major food ingredient distributors and food and supplement CPG manufacturers, in addition to newly formulated superior Ocean-Based & Plant-Based Alternative Protein / Meat products.

Intellectual Property:

Strong IP portfolio that includes 5 granted patents and 5 filed patents covering Systems and Methods for recovering a high-quality protein, and Protein Formulations.

Innovator:

Advance International is a California-based company dedicated to the production and commercialization of the world's most sustainable and nutritionally superior marine proteins, ultra pure food grade omega oil and other sustainable wild ocean fish products. The company consists of entrepreneurs, humanitarians, food scientists, materials scientists, process engineers, and more.

Main Competitive Advantage (1)

1. High Nutritional Content

Because proteins support many critical functions in the body, the protein intake must satisfy the metabolic demand. APP® is a fish protein powder (FPP) that, like all FPPs, has a protein content higher than in the original fish flesh. FPPs are usually ranked according to the percent of protein and fat present in the powder. The highest grade FPP contains a maximum of 0.75% of fat and a protein content exceeding 80% (protein concentrate) or 90% (protein isolate). APP® contains above 90% of protein and about 0.1% of fat, one of the highest protein content and lowest fat content among the examples shown in the table below. These values reflect a HIGH quality FPP.

Comparison of the nutritional profile of APP® with proteins from different sources and brands:

	APP®	B.R Pea Protein Concentrate	A.V Whey Protein Concentrate	HM 94 Whey Protein Isolate
Protein (%)	91.1	83	80	92
Moisture (%)	2.9	8.0	4.0	4.3
Carbohydrates (%)	0.50	NI	5.0	NI
Lactose (%)	NA	NA	5.0	0.2
Fat (%)	0.1	6.0	6.3	0.6
Cholesterol (%)	0.0	0.0	0.2	10.0

NI: Not Indicated; NA: Not Applicable.

The nutritional quality of a protein source can be determined based on the amino acid profile and the protein to fat ratio. The ability of humans to digest the proteins and turn them into productive nutrients is another factor to take into account. This parameter is calculated using the Protein Digestibility-Corrected Amino Acid Score PDCAAS. APP® contains all nine essential amino acids in addition to several minerals and demonstrates a perfect PDCAAS score of 1 (results of 99.40% for Pepsin test) which ranks the product among the best source of proteins across all categories.

TYPICAL AMINO ACID PROFILE (AOAC 982.30 mod.)		g/100g
Alanine		6.50
Arginine		7.01
Aspartic Acid		11.45
Cysteine		1.13
Glutamic Acid		17.98
Glycine		4.02
Histidine*		2.31
Isoleucine*		5.33
Leucine*		9.03
Lysine*		11.10
Methionine*		3.88
Phenylalanine		4.23
Proline/Hydroxyproline		3.45
Serine		4.63
Taurine		0.02
Threonine*		4.95
Tryptophan*		1.27
Tyrosine		3.86
Valine*		5.50
*Essential Amino Acid		

TYPICAL ANALYSIS		g/100g
Protein (AOAC 990.03-992.15)		≥ 90
Collagen (AOAC 982.30 mod.)		0.56
Fat		0.13
Cholesterol		0 mg
Ash (AOAC 942.05)		10
Moisture (AOAC 942.05)		≥ 3.0
Pepsin* (AOAC 971.09) †(Digestibility test)		99.40 %
MINERAL PROFILE (ICP-MS)		mg/100g
Calcium		<2400
Chromium		.09
Copper		.20
Iron		<15
Magnesium		200
Potassium		<2000
Selenium		.10
Sodium		<500
Zinc		.20

MICROBIOLOGICAL ANALYSIS,		cfu/g
TPC (CMMEF Chapter 6)		< 5,000
Coliform (AOAC 991.14)		< 10
E. Coli (AOAC 991.16)		< 10
Salmonella (AOAC 2003.09)		Negative
HEAVY METALS (ICP-MS)		ppm
Lead**		< 0.5
Arsenic**		< 0.5
Cadmium**		< 0.5
Mercury**		< 0.5

**Results below 0.5 ppm testing threshold.

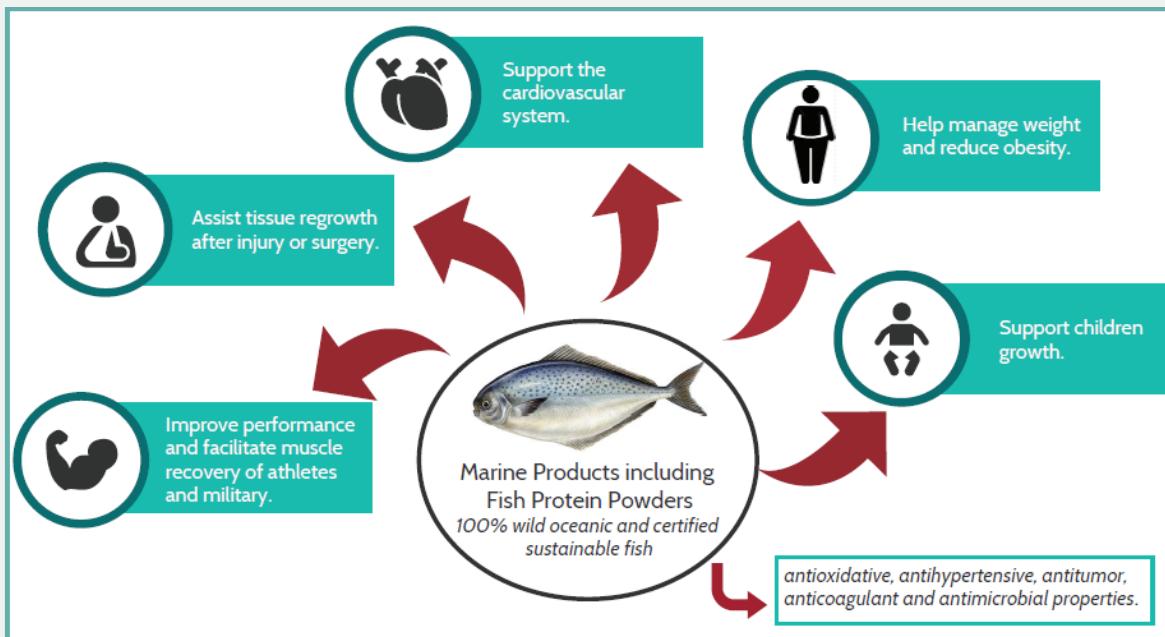
Determined after multiple rounds of analysis by Eurofins Scientific Inc.

Main Competitive Advantage (2)

2. Health Benefits supported by Published Studies

Due to the important roles of proteins in the body, high quality fish-derived products meet the definition of **functional food**, that is a type of food that has limited amount of deleterious components and significant amounts of substances that support well-being and general health.¹ APP® is no exception. Indeed, the multiple inherent properties of fish proteins contribute to provide various health benefits.

Some proven health benefits of marine products:



The Oregon State University independently conducted a study evaluating the overall health and growth of mice-fed rodent diet containing APP® as a protein source.² The results demonstrated the efficacy of APP® as a supplement to safely promote normal growth, and development in a mice model.



Moreover, APP® has the potential to **reduce severe-to-moderate malnutrition**. Indeed, APP® can easily be incorporated into local dishes of children suffering from malnutrition in order to enhance the protein content of their diet. A pilot study with malnourished Indian children suggests **positive effects on their growth** when APP® was part of their diet.

In fact, Advance International is **committed to distribute a ready-to-eat food sachet (RUSF) for every kilogram of APP® sold** as part of the Protein-4-Kids program. Companies purchasing APP® are granted permission to display the program logo on their own products or websites to help raise awareness while promoting the social commitment of their own corporation.

¹Atef, M.; Ojagh, S. M. J. Funct. Food. **2017**, 35, 673-681. Lordan, S.; Ross, R. P.; Stanton, C. Marine Drugs **2011**, 9, 1056-1100.

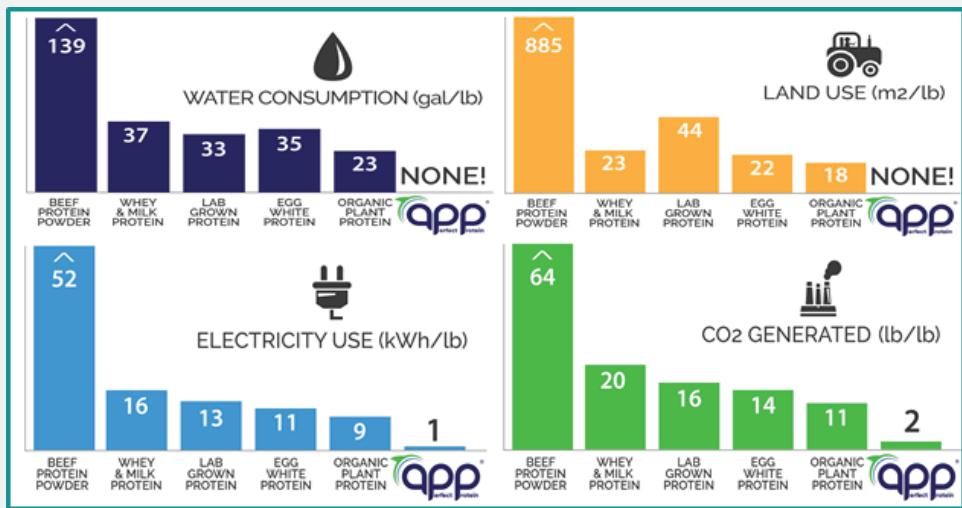
²Wong, C. P.; Bray, T. M.; Khanna, S. K., Ecol. Food Nutr. **2019**, 58, 80-92.

Main Competitive Advantage (3)

3. Sustainable Protein Source & Sustainable Extraction

While ruminants possess the most drastic impact of all sources of proteins (they increase pressure on land and water and emit significant amount of greenhouse gases), wild-caught fish stand among the proteins possessing the lowest environmental footprint.¹ In fact, their greenhouse gases emissions per gram of protein are comparable to that of plant-based proteins. However, unlike peas, wheat or corn, they do not rely on land use and water consumption. APP® is based on fish proteins and thus it is NOT resource-intensive unlike terrestrial agriculture and livestock that are largely responsible for deforestation, freshwater scarcity and all the resulting consequences.

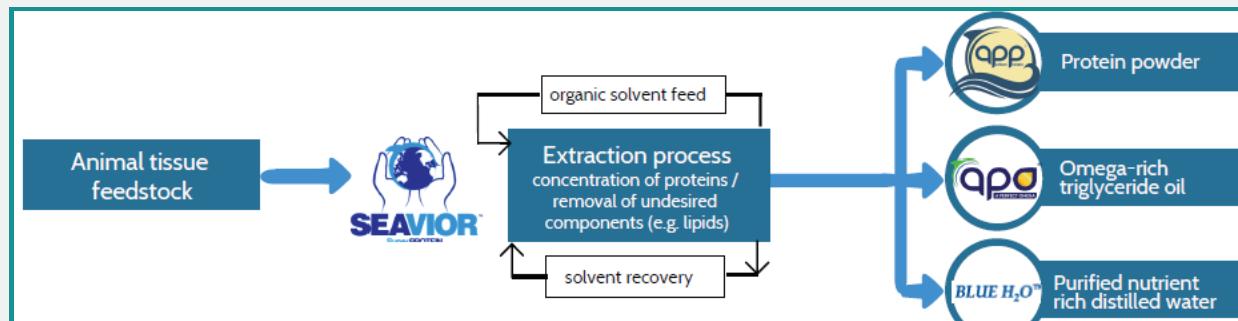
APP® sustainability comparison: global protein sources:



*Resources Consumed in Manufacturing Protein, per pound of finished protein powder

Concerning the production of the fish protein powder, enzymatic processes and solvent-based processes potentially account for the environmentally-friendly methods. Advance International relies on a patented food grade safe solvent-based extraction that functions in a closed-loop fashion. The patented system Seavior™ does not consume water (unlike enzymatic processes) and it does not require excessive energy. In fact, the system produces nearly ZERO waste and generates a carbon footprint that ranges from 6 times to 32 times SMALLER than all other commercial protein categories. The solvent employed, isopropanol, is minimally toxic and the residues in APP® surpass the FDA regulations thanks to an efficient end-of-process solvent removal step. Interestingly, as part of the process, Seavior™ also produces an omega-rich triglyceride oil (A perfect Omega®) and purified water (Blue H₂O®).

Seavior™ extraction method:



¹Henchion, M.; Hayes, M.; Mullen, A. M.; Fenelon, M.; Foods 2017, 6, 53

Main Competitive Advantage (4)

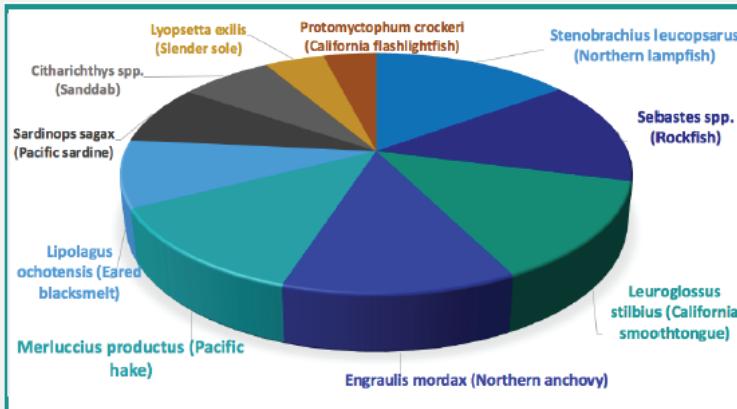
4. Sustainable Marine Resource, Product Traceability, Natural Ingredients

Some fishing practices can endanger vulnerable fish species and affect local marine ecosystems. Yet, the ocean constitutes an incredible resource when responsibly harvested in a way that fosters marine biodiversity.¹ Advance International utilizes fisheries that are granted the Marine Stewardship Council (MSC) certification. It is granted by accredited independent certifiers and guarantees the sustainability and the responsible management of fisheries. Several parameters are taken into account: (i) the fish stock must ensure a continuously renewing healthy fish population, (ii) the environmental impact of the fishing activity must preserve the ecosystem, and (iii) the management of the fishery must strictly comply with the latest laws in force.

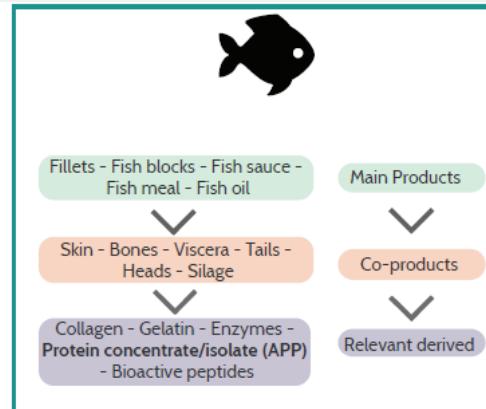


Because 50% of food-grade raw seafood is commonly discarded during commercial processing, Advance International has seized the opportunity to develop value-added products from fish by-products. APP[®] derives from the Merluccius productus fish species that is underexploited or discarded and that has been rated as one of the most abundant fish population. The company's fish suppliers catch the fish in the Pacific Northwest, at a reasonable distance from the manufacture in order to ensure a minimal environmental footprint of the fishing activity.

Relative proportion of the most abundant fish species in the Californian Coast ²:



Fish protein recovery as a by-product:



Finally, the raw material that constitute APP[®] is derived from wild oceanic resources, thus, APP[®] is free from harmful pesticides,



antibiotics, synthetic hormones and it is also non genetically modified (GMO). In addition, nutrients present in APP[®] such as vitamins and minerals are naturally occurring nutrients in fish; APP[®] does NOT contain additional ingredients or artificial additives.

¹ <https://oceana.org/>

² Wells, K. B.; Brodeur, R. D.; et. al, CCIEA Phase III report 2013

Main Competitive Advantage (5)

5. Versatile Product with Various Application Possibilities

A Perfect Protein® for human consumption:

The PATENTED ingredient, APP® can give you the competitive edge you've been looking for! Sensory attributes such as taste and flavor remain crucial factors for consumers; however, a virtually tasteless and odorless powder such as APP® that could **conveniently be combined to any food or beverage** is undoubtedly interesting as a food fortifier. The Oregon State University Food Innovation Center demonstrated the versatility of APP® during a culinary event: more than 50 products were developed using APP® as an ingredient including burgers, noodles/ramen/pasta cereal bars, fish sauces, cookies, chips, gummies, energy bars etc.

Nutrition facts of some recipes using APP® as an ingredient:

Recipe																																																																																																																																																																				
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Oats, honey, dried cherries, dried cranberries, butter, APP®, flax seed meal, vanilla extract, kosher salt.	Calrose rice, APP®, shrimp flavor, yeast extract, kosher salt, grapeseed oil.	Barley, brown rice, mozzarella, beets, Crimini mushrooms, APP®, cheddar, lemon juice, kosher salt, garlic, soy sauce powder, lemon peel.																																																																																																																																																																		
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Incorporating APP® to a healthy diet can contribute to having tonic new muscle mass, increasing energy, agility and endurance, balancing body weight, having healthy skin, strong bones, joints and cartilage. Therefore, APP® has also a great potential in the food supplement market.

Main Competitive Advantage (5) cont

Processing Characteristics

1. Designed for applications where a low water-hold and low viscosity protein is needed.
2. Recommended ingredient for extruded food products.
3. Designed for applications in slightly acidic liquid foods.
4. Very Heat Stable, and will not 'gum up' or stick to machines, excellent option for baking.
5. 50+ product applications tested by University-led expert panels.



A Perfect Protein® for Animal/Pet Nutrition:

The high food grade of APP® makes it a **product of choice for animal consumption**, a market where it is becoming a trend to use **human grade ingredients**. In addition, the notable Characteristics of APP® such as its high digestibility, its odorless and tasteless nature, its very long shelf-life, its high purity and the absence of preservatives are real assets for applications on the animal food market. The protein powder could be used as a spiker / enricher ingredient in pet foods, pet treats or pet shaker to be directly sprinkled on foods



A Perfect Protein® for cosmetics:

The **beneficial effects of protein-rich cosmetics** for topical applications are well-known.¹ For Instance, protein-rich products have long been used to promote hair gloss and softness and prevent hair damage. The presence of collagen in protein-rich formulations makes those products of great interest for skin care as well. In fact, collagen is the major structural protein of connective tissues. Although the collagen contained in lotions cannot be absorbed by the skin due to its high molecular weight, **it creates a protective layer** that is anti-aging and anti-wrinkling and keep the skin moisturized. The cosmetic industry is constantly looking for innovative, sustainable and high quality raw materials. **Marine proteins are promising ingredients for many formulations and they are a good alternative to collagen from land animals** that has posed threat to its utilization in the past due to various diseases outbreaks.²

¹ Secchi, G. Clin. Dermatol. 2008, 26, 321-325.

² Felician, F. F.; Xia, C.; Qi, W.; Xu, H. Chem. Biodivers. 2018, 15, e1700557.

Patent Portfolio:

High Quality Protein Compositions Systems and Methods for Recovering the High Quality Protein Compositions

Standard Systems

Earliest Priority:
10/5/07

Automated Systems

Earliest Priority:
3/15/13

Continuous Conveyance Systems

Earliest Priority:
6/04/15

Protein Formulations

Filed 07/23/18

US Pat. No.
8,663,725

Methods for recovering and storing protein, oil and water from ground fish

US Pat. No.
9,826,757

Methods for recovering protein and a mixture of oil and water from animal tissue using a unitary filter-drier-reaction

US App. No.
15/173,448

Systems and methods for recovering protein from animal tissue using a continuous conveyance filtration system

US Prov. App. No.
62/702,091

Protein based therapeutic nutritional products

US Pat. No.
9,706,787

Systems for recovering and storing protein, oil and water from milled raw material using a blending system

US Pat. No.
10,039,299

Systems with a filter-drier-reaction tank for recovering protein from an animal tissue

Also pending in Europe, Australia, Brazil, Canada, China, India, Japan, Korea, Mexico, and Peru.

US Pat. App. No.
15/651,755

Non-hygroscopic protein powder composition having all essential amino acids and an extended shelf life for human consumption

EP Pat. No.
2999350

Systems and methods for recovering protein, oil, and water from animal tissue using a unitary filter-drier-reaction tank

Pending in US (continuation), EP (divisional), Canada, China, and Mexico

Issued

Pending