FEEDING THE GROWTH IN AQUACULTURE TO 2015
The Scope for Novel Nutritional Products

A Brochure Describing a Multi-Client Study
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Aquaculture is becoming an increasingly sophisticated and valuable agribusiness. It is now a major force in the global supply of seafood, especially that of high value species. Rapid growth in farmed fish output (averaging 9% per annum recently) is set to continue, as wild stocks are fully utilised, or overexploited, while consumer demand for seafood expands steadily. The growing reliance upon aquaculture, notably intensive aquaculture, to meet the extra demand for seafood presents exciting opportunities for suppliers to this industry.

The interest of suppliers is focused above all on higher value species, especially those enjoying rapid market growth and critical mass in economic terms, and on their feed requirements. For these species that are reared intensively on protein-rich feeds, feed demand dominates production economics, with both fishmeal and fish oil underpinning development of the industry, especially in the key salmonid and crustacean segments.

This dependence on rendered fishmeal and fish oil products must change in future. Aquaculture already uses a substantial proportion of global fishmeal output and, more critically, the majority of world fish oil supplies. For the mid-term to long-term, the predicted growth in aquaculture production can occur only with substantial substitution of both fishmeal and fish oil. As a result, the need for alternative sources of protein and lipid feeds, as well as for specialty feed ingredients, is expected to grow rapidly.

Against this background, there is an urgent need for an assessment of the nature, extent and timing of the market opportunities for feed ingredient suppliers.

LMC’S NEW STUDY

The new multi-client study, *Feeding the Growth in Aquaculture to 2015: The Scope for Novel Nutritional Products*, meets this need. Undertaken by LMC International in association with Napfisheries, the study defines the future scope of these opportunities in vegetable meal and oil substitution and in several classes of novel feed additives. It provides the detailed assessment of opportunities in this rapidly changing market that is required in order to make strategic decisions about investments in feeds and feed ingredients for high value fish species. The study includes:

**Analysis and Forecasts to 2015 of:**

- **Key production parameters** and international *trade flows* of high value farmed species, together with key economic factors, including *production costs*
- Growth in per capita *supply and demand* of major fish groups in different regions and countries, and projections of the production of *key species groups*
- Growth in *supply and demand of fishmeal and fish oil* as aquaculture feed ingredients
- Opportunities for *fishmeal substitutes* (focusing on vegetable protein alternatives), and *fish oil substitutes* (including vegetable and animal lipids), as well as for specialised feed ingredients, such as amino acids, feed attractants, enzymes and lipid derivatives, that the use of these substitutes will require
- Opportunities for other *speciality feed additives*, including immune stimulants, colourants, vitamins and others, that are required for farmed species

**With strategic conclusions for existing and potential industry participants**
LMC INTERNATIONAL

LMC is exceptionally well qualified to assess the opportunities for suppliers of feed for the aquaculture industry. For over 20 years it has undertaken research and consultancy on global markets for agricultural products, including feed. It has unrivalled skills in identifying, assessing and forecasting agricultural commodity and food markets, including evaluating the prospects for novel foods and ingredients.

This study has benefited greatly from the key role played by Nigel Peacock, of Napfisheries, in the study’s research and analysis. He has been a highly informed analyst of the global aquaculture sector for 25 years, carrying out research in all significant segments of the sector, and working in every major global arena. He has particular expertise in modelling the economics of aquaculture industries and forecasting growth.

WHO WILL BENEFIT FROM THE STUDY?

This study details the specific opportunities for producers of protein and lipid feed substitutes and specialised feed additives that either have been, or could be, adapted to aquaculture. In the study, such opportunities have been quantified, with forecasts of growth, to help potential suppliers assess investment opportunities and plan their research and development programmes and marketing plans. Accordingly, the study is designed to appeal to the major players in the following areas:

- Animal feeds
- Vegetable protein feeds
- Vegetable oils
- Lipid derivatives
- Amino acids
- Feed attractants
- Animal health
- Speciality feed additives, including enzymes and vitamins
- Feed binders
- Colourants and carotenoids

The study offers assistance to planners responsible for directing the sector’s development, as well as organisations interested in financing aquaculture ventures. More broadly, the study provides critical market information for:

- Fishmeal and fish oil producers
- Financial institutions
- Policymakers and planners
- Seafood suppliers, traders and processors
Scope and Coverage of the Study


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Each volume is described briefly in the following pages, which also provide a detailed Table of Contents and a list of the tables and diagrams that appear in the study.

**EXECUTIVE SUMMARY**

This volume provides a synopsis of the key findings of the study in 26 pages, including the most significant tables and diagrams from the Main Report. It serves as an excellent introduction and guide to the rest of the study.

**MAIN REPORT**

**CHAPTER 1: THE NATURE OF THE AQUACULTURE INDUSTRY — THE BROAD TECHNICAL PARAMETERS**

The study begins by introducing the key sectors in the aquaculture industry, including those that were instrumental in its establishment, such as salmon, shrimp and catfish; those representing the new wave of market players, for example, tilapia; as well as the novel species now occupying a niche role, but whose output is expected to grow significantly. Table 1 provides a list of the species covered in this study and their major regions of production; aquaculture is now well represented in all major regions except Africa, the Middle East and Oceania.

This chapter describes the emergence within the industry of large blocks of producers who increasingly control both feed inputs and processing in two major sectors, pointing toward vertical integration following the model of the poultry industry.
Trends in costs of production are examined for each species. Together with trends in the growth of output, they allow an assessment to be made of the future competitiveness of species in specific markets. As an example, Atlantic salmon production has grown impressively since 1980, while its production costs have declined and real prices have fallen sharply. By expanding supply and cutting costs, it has been able to move out of the luxury market into the mainstream market.

The chapter also describes the evolution of carp production in China toward the 80:20 model, whereby 80% of the farmed carp are high value species that are fed formulated feeds, while the remaining 20% are filter feeders that serve to cleanse the pond and are therefore a “bonus” crop. This shift from extensive production of carp to intensive farming has strong positive implications for feed demand in China.

A new category of bulk whitefish, tilapia and catfish, is emerging as a substitute for wild catch whitefish and becoming competitive in the export market. Novel species that are new to aquaculture are also discussed with a view toward their future position in either the exclusive, high value market, or in the bulk whitefish market. The implications of the emergence of these groups are explored in depth in Chapters 2 and 3.

### Table 1: Key Species and Countries Covered in the Study

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<th>Species Type</th>
<th>Europe</th>
<th>East Asia</th>
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CHAPTER 2: THE EVOLUTION OF PRODUCTION AND TRADE

The second chapter presents the historical production and growth rates for each species group by region until 2003. This provides the background upon which the production forecasts of Chapter 4 are built, and upon which the feed and feed ingredients forecasts in Chapter 6 are structured.

Key differences are highlighted between intensive and extensive production in species such as shrimp, tilapia and others; as well as between aquaculture and fisheries production.

Because international trade is the key driver of growth in the intensively produced sectors that require feed, this chapter also presents the relative importance of trade to each species. Diagram 1 compares the rates of growth in salmon and shrimp exports to the high income markets that are members of the OECD. The growing importance of international trade in new bulk whitefish species, such as tilapia and catfish, is also explored in detail.

This chapter also addresses some important specific questions concerning the high-value industry segments, for example, whether prime protein feeders such as snakehead (*Channa*) or catfish (*Clarias, Pangasius*), will generate major new markets for feeds in freshwater culture in the wealthier tropical areas, especially in South East Asia. It also answers the question of whether Japan will diversify from its pioneering fish culture in yellowtail and eel, and move toward less demanding species.

CHAPTER 3: PRODUCTION ECONOMICS – UNIT COSTS AND PRICES

The economic status of each aquaculture sector is presented in this chapter. Both the price history (using real, inflation-adjusted, and nominal prices) and the production costs of each key species are compared.
Rapidly falling real prices have been a feature of the culture of each species as it becomes established. Diagram 2 compares real production costs and selling prices for Atlantic salmon. Cost reductions driven by technical improvements have helped to maintain margins, and the study determines the scope for future price reductions through further technical improvements.

This chapter also defines the major structural revolution occurring within the aquaculture industry, highlighting the emergence of intensive aquaculture as a commodity agribusiness. It also describes the two-tier quality and pricing structure that is operating in this new market model, between prime seafood and bulk whitefish, which will influence a fundamental change throughout the industry.

![Diagram 2: Farmed Atlantic Salmon – Real Production Costs and Selling Prices](image)

**CHAPTER 4: CONSUMPTION AND PRODUCTION – TREND ANALYSIS AND FORECASTS**

In this chapter, the study examines the outlook for the supply and demand for fish and crustaceans to 2005, 2010 and 2015. The forecasts are based upon econometric analysis of production trends, qualified by an understanding of fundamental change occurring within the industry, using modelling techniques developed by LMC for a wide range of food and feed sectors, and designed to relate projections of income growth to the rates of increase in luxury seafood demand.

Chapter 4 provides projections of per capita fish demand in the major consuming countries, together with forecasts of national and global demand for each major type of fish (demonstrated in Diagram 3). The growth in per capita demand for fish is driven by population growth and rising per capita calorie consumption, translating into a total fish and crustacean requirement of 129 million tonnes by 2015, of which China will consume two-fifths by 2015. The chapter concludes with forecasts of growth in output of each of the major farmed species that are the focus of the study, and these in turn
form the basis of the projections of demand for feed, fishmeal, fish oil and novel feed ingredients in Chapter 6.

Changing trends in the worldwide composition of fish consumption are discussed at length, illustrating the shifts toward freshwater species away from the major marine species, and revealing that the burden of keeping pace with rising demand will fall upon the intensive production of farmed freshwater fish and crustaceans.

**Diagram 3: Total Demand for Fish in Leading National Markets, 1980-2015**

**CHAPTER 5: THE KEY INPUTS – AVAILABILITY OF FISHMEAL AND FISH OIL**

Chapter 5 addresses the single most important issue in the aquaculture industry today: how to sustain its rapid rates of growth when the output of fishmeal and fish oil, its main sources of protein and lipids, is stagnant or declining.

A detailed historical review of the global supply and demand situation of fishmeal and fish oil, together with projections to 2005, 2010 and 2015, is presented, along with comparisons of their output and price to those of their vegetable oilseed counterparts, shown in Diagrams 4 and 5.

This chapter describes the influence that the major producing countries (especially Peru) and consuming countries exert on prices and potential availability. It also details how the growing competition among aquaculture and other end-users serves as the market's means of rationing these increasingly scarce resources. Price-sensitive end-uses of both fishmeal and fish oil are giving way to aquaculture, for which both these products are difficult to replace in many feed formulations.
CHAPTER 6: THE OUTLOOK FOR THE SUPPLY OF NOVEL NUTRITIONAL PRODUCTS

Chapter 6 focuses on those feed components that offer the greatest opportunity for the substitution by vegetable meals and oils for fishmeal and fish oil in the diets of intensively farmed fish. It also examines the opportunities for a number of feed additives that are essential for aquafeeds. A detailed list of these novel feed ingredients is provided in Table 2.

Furthermore, it describes trends in the aquaculture feed industry and their potential influence on the adoption of fishmeal and fish oil substitutes, and provides details of feed demand on a species level and on a regional basis. Current fishmeal and fish oil demand are also disaggregated on a species level, along with forecasts to 2005, 2010 and 2015.

The analysis points to the urgency in identifying vegetable meal and oil substitutes, since the majority of both fishmeal and fish oil will be required by aquaculture by 2015. Diagram 6 reveals the particularly critical position of fish oil, for which 80% of the global supply will be required in aquaculture feed by 2015. There is currently no cost effective alternative source of Ω-3 fatty acids, putting the growth in output of the carnivorous fish species and crustaceans at some risk without rapid adoption of new technology for production of these Ω-3 fatty acids.

The requirements for fishmeal, together with opportunities for its substitution by 17 vegetable protein concentrates and meals, are discussed in depth and demand for fishmeal substitutes is forecast to 2005, 2010 and 2015. The analysis takes into account their individual suitability for carnivore, omnivore and crustacean diets vis-à-vis their amino acid profile, price, availability and absence of anti-nutritional factors.

The advances in technology that are needed for improving the quality of vegetable meals and for reducing the price of vegetable protein concentrates are discussed in detail. A number of opportunities exist for supplementing these vegetable proteins with novel feed additives to enhance their feed performance; among these products are amino acids, enzymes and feed attractants.

The scope for substitution by ten vegetable oils and animal fats is also quantified for each species and species group, highlighting those species in which substitutions are possible, as well as those for which fish oil is still an absolutely essential ingredient, such as crustaceans. The most appropriate lipid substitutes are identified and ranked in terms of their suitability according to fatty acid profile and price, and their demand is projected to 2005, 2010 and 2015. As with fishmeal, certain additives are or may be required when vegetable oil substitutions are made, including choline, cholesterol and lecithin.

Other feed additives that are required, whether or not fishmeal and fish oil are substituted, include vitamins, colourants, animal health products such as immune stimulants, antioxidants and binders. These products are discussed in detail for each species group, together with the scope for their expansion in the aquafeed uses.

For each of these novel feed additives, the current market value and volume are calculated, together with forecasts of their market volumes to 2005, 2010 and 2015. Opportunities for value-added products in each of these feed ingredient areas are explored in detail, in the light of the formulation challenges that the aqueous environment presents for many of these products.
CHAPTER 7: STRATEGIC CONCLUSIONS

This final chapter draws conclusions from the foregoing analyses to provide a comprehensive view of the future for the aquaculture sector. Traditionally, aquaculture has been segmented by species. LMC’s expectation is that, with aquaculture coming of age, the meaningful distinction now will be based on differences in approach to culture, with increasing commonality between sectors that were formerly regarded as disparate, e.g., salmonids, shrimp, tilapia and catfish. As a result, the industry will mature into a large, integrated, global high-value agribusiness (incorporating a number of major “agribusinesses” during the coming decade), and will increasingly become both the supplier of choice to wealthy high-end seafood markets and a major contributor to bulk whitefish supplies.

The more exciting and challenging areas of investment in aquaculture, and indeed the most critical for its future growth, are in the application of present technology and the development of new technology to solve the impending oil and protein shortfall. This is particularly critical for fish oil, and only slightly less so for fishmeal. This study addresses future opportunities in both of these important areas.
The final chapter examines other strategic conclusions that are essential for industry participants in both the aquaculture industry and in those sectors that supply its feed requirements. The critical questions to which it provides answers include:

- What is the outlook for each of the intensively produced species; which will be the winners and which ones will fall behind?
- How will the evolving two-tier structure of the prime seafood and the bulk whitefish markets influence the supply and demand, as well as prices, for fish and crustaceans within each of these categories?
- How will changes in output of fish and crustacean groups influence the demand for fishmeal and fish oil, and what impact will that have on demand for novel feed ingredients?
- Which vegetable meals and concentrates have the greatest opportunities to substitute for fishmeal, and what technology advances will be required to improve their quality and lower their cost?
- Which vegetable oils and animal fats will offer the most cost-effective service as substitutes for fish oil?
- What are the opportunities for novel feed ingredients that specifically compensate for deficiencies in the vegetable protein and vegetable oil substitutes used in aquafeeds?
- What are the most lucrative opportunities within the novel feed additives, in terms of present demand as well as in terms of adding value to existing products?
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Other Ingredients:
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and the same 2 tables for each:
- Antioxidants
- Amino Acids, both as Protein Supplements and Feed Attractants/Growth Promoters
- Organic Acids
- Enzymes
- Immune Stimulants
- Yeast-Derived Immune Stimulants
- Vitamins, including for Carnivorous Species, Omnivorous Species and Crustaceans
- Binders

Table 6.59: Binders Used in Aquaculture Feeds

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Amino Acids
- Aspartic Acid
- Betaine
- Carnitine
- Glutamic Acid
- Glycine
- Lysine
- Methionine
- Threonine
- Tryptophan
- Other (Alanine, Arginine, Taurine, Valine, etc)

Lipids Derivatives
- Cholesterol
- Choline
- Phospholipids and Lecithin
- Organic Acids (Citric, Formic, Lactic, Propionic, etc)
- Vitamins
- Astaxanthin
- Canthaxanthin
- Vitamin A
- Vitamin B family:

Antioxidants
- Biotin
- Cyanocobalamin (B12)
- Folic Acid
- Inositol
- Niacin (B3)

Binders (Cellulose, Hydrocolloid, Lecithin, Protein, Synthetic)
- Pantothenic Acid
- Pyridoxine (B6)
- Riboflavin (B2)
- Thiamine (B1)

Enzymes
- Non-Starch Polysaccharide Hydrolysing Enzymes

Immune Stimulants
- Vitamin C
- Vitamin D
- Vitamin E

Probiotics

Other (Citric Acid, Lecithin, Vitamin C, Vitamin E)
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• Farmed Trout
• Seabass
• Seabream
• Yellowtail
• Asian Eel
• European Eel
• Silver Bream
• Channel Catfish
• Asian (Pangasius) Catfish
• African (Clarias) Catfish
• Tilapia
• Tilapia, using intensive culture
• Common Carp
• Common Carp, using intensive culture
• Shrimp
• Shrimp, using intensive culture
• Silver Bream
• Channel Catfish
• Asian (Pangasius) Catfish
• African (Clarias) Catfish
• Tilapia
• Tilapia, using intensive culture
• Common Carp
• Common Carp, using intensive culture
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Diag 4.6: Growth in World Meat, Fish and Total Calorie Intake, 1961-2001
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Diag 4.8: Composition of World Protein Demand, 1961-2001
Diag 4.9: Forecasts of Composition of World Protein Demand, 1961-2015
Diag 4.10: Comparisons of National Per Capita Demand for Meat, 1961-2015
Diag 4.11: Comparisons of Non-EU Per Capita Demand for Meat, 1961-2015
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Diag 4.16: Trends in the Composition of World Fish Supply, 1961-2015
and same 2 diagrams for each: Major Marine (Pelagic and Demersal), Crustacean, Other Fish Species, Total for All Fish Species
Diag 4.28: World Production of Farmed and Wild Freshwater Fish, 1995-2015
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Appendix 1 to Chapter 4: The Derivation of Consumption Forecasts for Major National Markets Outside the EU
Diag A4.1: Composition of Chinese Protein Demand, 1961-2001
Diag A4.2: Forecasts of Composition of Chinese Protein Demand, 1961-2015
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Diag A4.6: Chinese Per Capita Real GDP and Demand for Fish, 1961-2001
Diag A4.7: Growth in Chinese Meat, Fish and Total Calorie Intake, 1961-2001
Diag A4.8: Forecasts of Chinese Meat, Fish and Total Calorie Intake, 1961-2015

And same set of 10 diagrams for each: Japan and USA
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Within the EU

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Diag A4.32: Forecasts of Composition of French Protein Demand, 1961-2015
Diag A4.34: Forecasts of French Protein and Calorie Intake, 1961-2015
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Diag 6.5: Shares of Global Feed Production by Region, 2003
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Regional Feed Demand:
Diag 6.12: Regional Demand for Aquaculture Feed for Marine Carnivorous Species, 2000-2015
and the same diagram for each: Freshwater Carnivorous Species, Omnivorous Species and Crustaceans
Diag 6.13: Regional Demand for Aquaculture Feed, 2000
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**Protein Demand:**
Diag 6.23: Total Dietary Protein Demand for Major Species, 2000-2015
Diag 6.25: Vegetable Meal Share of Protein Demand for Major Species, 2000-2015
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and the same diagram for each: Freshwater Carnivorous Species, Freshwater Omnivorous Species and Crustaceans

**Lipid/Oil Demand:**
Diag 6.30: Total Lipid Demand for Major Aquaculture Species, 2000-2015
Diag 6.31: Total Fish Oil Demand for Major Aquaculture Species, 2000-2015
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**Demand for Feed Ingredients:**
8 Diags: Total Demand, 2000-2015, for each of the following ingredients:
- Organic Acids
- Enzymes
- Immune Stimulants
- Vitamins
- Astaxanthin
- Canthaxanthin
- Amino Acids as Protein Supplements
- Amino Acids as Feed Attractants & Growth Promoters

5 Diags: Demand by Species Group, for each of the following ingredients:
- Lipid Derivatives
- Antioxidants
- Immune Stimulants
- Amino Acids as Protein Supplements
- Amino Acids as Feed Attractants & Growth Promoters

Diag: Demand for Binders by Species, 2000-2015
Availability, Fee and Deliverables

AVAILABILITY

The study, *Feeding the Growth in Aquaculture to 2015: The Scope for Novel Nutritional Products*, is available immediately.

FEE

The fee for the study is €22,500.¹

DELIVERABLES

Subscribers to the study will receive:

- Two copies of the study;
- Four copies of the study's Executive Summary; and
- A CD-ROM providing an electronic copy of the study

During the six months after receipt of the study, subscribers will also be entitled to:

- Up to one full day of consulting by senior LMC staff to assist clients in the interpretation of the study's findings and to discuss other matters concerning the study. If these meetings are held elsewhere than at LMC's Oxford office, LMC will expect to be reimbursed for travel and subsistence costs.
- Reasonable telephone and email access to LMC staff for clarification or general discussion of the study.

ADDITIONAL SERVICES

Subscribers will also be entitled to commission special additional research, built on the analysis in the study, tailored to their specific commercial needs and undertaken by LMC on a strictly confidential basis. LMC has extensive experience in undertaking such consulting assignments and will be pleased to prepare a proposal and fee quote for work commissioned to meet a subscriber's requirements.

CONFIDENTIALITY

The study and any additional services are offered by LMC for subscription on the strict understanding that the subscriber agrees to the following conditions: that the content of the study and related materials provided shall remain confidential within the subscribing organisation, and shall not be disclosed in whole or in part, in any manner, to any third party without the prior written consent of LMC International Ltd.

¹ Please note: Subscriptions from clients in New York State are subject to sales tax, which is not included in these fees.
The Project Team’s Capabilities and Experience

THE PROJECT TEAM

To carry out the proposed study, LMC International joined forces with aquaculture expert Mr Nigel Peacock, of the Napfisheries consultancy, to form a project team with unique breadth and depth of experience, as outlined below.

NIGEL PEACOCK, NAPFISHERIES

Nigel Peacock is a leading expert on aquaculture, with some 25 years of experience of the global industry. He has advised clients in the private and public sector on end-markets and their prospects, on marketing, on competitive conditions, on investment and on development strategies.

He has managed specific studies on salmonids, shrimp, seabass and seabream, tilapia, carp, shellfish and novel species. Devising models to analyse costs and to underpin forecasts of growth has been one of his particular strengths. He also has extensive practical and market experience in the sector, having developed and supervised aquaculture projects, as well as undertaking numerous surveys of the seafood market.

Nigel Peacock’s knowledge of the sector comes from a career that began with work overseas implementing fisheries and aquaculture projects. He subsequently joined the UK consultancy LML to develop a fisheries and aquaculture capacity, and the firm went on to become a leading practitioner in this field. This involved managing and conducting over 40 aquatic resource studies, with the fast expanding aquaculture sector a key focus. Alongside this, he directed major fisheries and aquaculture development projects worldwide – working in Africa, Latin America, South East Asia, South Asia, the Middle East, the Former Soviet Union and the Pacific, as well as most OECD countries involved in aquaculture.

Working independently as Napfisheries for the last three years, he continues to direct aquatic development projects, in Southern Africa and Ukraine, but has focussed specifically on strategic and technical aquatic resource studies, including:

- Nigeria: shrimp farming strategy study
- Global: overview of the international market for canned fish
- EU: study of the socio-economics of fisheries
- South Africa: study for a post-apartheid fisheries company
- Iran: shrimp farming feasibility study

LMC INTERNATIONAL

LMC is an independent economic and business consultancy serving a range of industries related to agricultural commodities, foods, raw materials and their end-markets. Founded in 1980, it provides economic, marketing and planning services for industry participants around the world. Its headquarters are in Oxford, England, while its office in New York serves the USA, Canada and Mexico.

LMC has teams of economists that focus on particular industry sectors, helping participants in the sectors to operate with improved market knowledge, efficiency and competitiveness. With this focus and almost 25 years of experience throughout the world, LMC combines unrivalled understanding of each industry – its markets,
technology, participants and challenges – with analysis and advice of the highest standard.

Its expertise and experience make LMC exceptionally well qualified to assist industry participants to respond to the threats and opportunities facing them. The company serves all segments of each industry, including growers, traders, processors and manufacturers, end-users, financial institutions, trade associations, governments and international organisations. A representative list of the company’s clients is presented at the end of this document.

Capabilities

LMC’s particular capabilities include:

- Market Research, Analysis and Forecasting
- Analysis of Cost Competitiveness, Technical Performance and Profitability
- Pricing and Marketing Studies
- Advice on Product and Production Strategies
- Feasibility and Investment Studies
- Analysis and Advice on International Trade Issues and National Policy

Services

The company's services, described in the following pages, include:

- Single client studies – consultancy for individual clients
- Multi-client studies – on key market issues
- Regular service – monthly

LMC SINGLE CLIENT STUDIES

LMC undertakes consultancy assignments tailored to the specific needs of individual clients. The scope of such work is diverse, and projects carried out have covered a very wide range of production, marketing, purchasing, planning and policy issues. Titles of a few such studies are presented below.

Market Research, Analysis and Forecasting

- The World Market for Fishmeal
- Changes in European Oilseeds Proteins and Cereal Markets
- Markets for Soy Isoflavones
- The Oilseeds, Oils and Meal Proteins Economy

Analysis of Cost Competitiveness, Technical Performance and Profitability

- The Competitiveness of Soybean Meal and Soybean Oil
- Oilseeds, Pulses and Cereals — Costs of Production in Selected EU Countries
- The Competitiveness of the North and South American Oilseed Industries

Pricing and Marketing Studies

- The Pricing of Oilseeds and Oilseed Products
- Edible Oils: How Will Consumer Concerns About Diet Affect Demand?
- Development of a Marketing Strategy for a Novel Food Ingredient
- The Promotion of Soymeal Exports
Advice on Product and Production Strategies

- Long Term Planting Strategies in Indonesia
- Analysis of Strategic Options for a Food Ingredients Company
- Prospects for Palm Oil in Indonesia

Feasibility and Investment Studies

- Feasibility Study for an Oilseed Processing Complex
- Opportunities for an Investment in a Soybean Crushing Plant in Brazil

Analysis and Advice on International Trade Issues and National Policy

- The Impact of EU Oilseeds Policy on the Spanish Crushing Industry
- The Impact of Mercosur on the Pricing of Sugar and Maize in Argentina

LMC MULTI-CLIENT STUDIES

The multi-client approach enables clients to obtain the results of ambitious research projects at a fraction of the overall costs of undertaking such studies. On this basis, LMC has carried out unique and innovative research on a wide range of industry issues. LMC multi-client studies include:

- Oilseeds and Oilseed Products to 2015: A Strategic Assessment for Producers, Processors and Investors
- The Outlook for Oleochemicals to 2015: The Scope for Adding Value to Vegetable Oil Production
- The LMC Worldwide Survey of Oilseeds and Oils Production Costs
- Genetically Modified Oilseeds: The Implications of Customised Oilseeds for Seed Companies, Oilseed Producers and Processors

Brochures describing these multi-client studies are available on request.

LMC REGULAR SERVICE

Drawing on its continuing research undertaken in the oilseeds, oils and meals sectors, LMC offers this monthly service, available in hard copy and online:

- Oilseeds, Oils & Meals Analysis

Each issue provides:

- An authoritative evaluation of the current state of the market, in a concise and easily understood format. Production, consumption, the world supply/demand balance, stocks, trade and prices are assessed for seeds, oils and meals.

- A major article analysing a key market topic in depth. Together, the articles provide a resource for market awareness and planning. Each article is of direct commercial relevance to industry participants and draws on the results of LMC’s global research. Subjects covered have included, for example: the global market for oil meals (reviewed annually), the price drivers for vegetable oils and meals, recent trends in vegetable oil refining and fat modification, biodiesel and biosolvents, Indonesia’s palm oil sector, soy protein, palm oil in Malaysia, technological change in the vegetable oils market, the Chinese oilseeds sector, and the impact of GMOs on the global oilseeds industry.
LMC Client List

LMC has an exceptionally wide range of clients, including private and public sector bodies throughout the world. Among those for whom LMC has undertaken research projects or who have subscribed to LMC’s regular services are:

Aarhus Oliefabrik A/S ....................................................................................................................... Denmark
African Products Pty Ltd .................................................................................................................. South Africa
Agriculture and Agri-Food Canada ................................................................................................. Canada
Agriculture and Livestock Industries Corp................................................................................... Japan
Ajinomoto Co, Inc.......................................................... Japan
Aicorp SAA ......................................................................................................................... Mexico
Almidones Mexicanos SA ....................................................................... Mexico
AmerigoEurope NV ................................................................. Belgium
API Grain Processors .............................................................................................................. Canada
Archer Daniels Midland Co ........................................................................................................... USA
Asian Agri Group ..................................................................................................................... Indonesia
Asian Development Bank ........................................................................................................... Philippines
Asian Development Bhd ................................................................................................................ Malaysia
Associação Brasileira das Indústrias de Oleos Vegetais ... Brazil
Association des Amidonneries de Céréales de l’UE ........................................................................... Belgium
Avebe bv ............................................................................................................................... Netherlands
Banco do Brasil ...................................................................................................................... Brazil
BASF AG ............................................................................................................................... Germany
Bolsa de Mercadorias e Futuros .................................................................................................. Brazil
Bunge Ltd ........................................................................................................................................ USA
Canadian Oilseed Processors Association ................................................................................... Canada
Canola Council of Canada ........................................................................................................ Canada
Cargill, Inc........................................................................................................................................ USA
Cereol SA ...................................................................................................................................... France
Chicago Board of Trade ............................................................................................................. USA
CJ Corp ................................................................................................................................. South Korea
Common Fund for Commodities ................................................................................................. USA
ConAgra Foods, Inc ..................................................................................................................... USA
Corn Products International, Inc .................................................................................................. USA
Cosun ......................................................................................................................................... Netherlands
Daesang Corp ........................................................................................................................... South Korea
Degussa AG ................................................................................................................................... Germany
Department for Environment, Food & Rural Affairs ...................................................................... UK
The Dow Chemical Co ................................................................................................................ USA
DSM Nutritional Products ........................................................................................................ Switzerland
E I du Pont de Nemours & Co ..................................................................................................... USA
European Commission .................................................................................................................. Belgium
Ex-Seed Genetics, LLC ................................................................................................................ USA
Fedepalma .................................................................................................................................. Colombia
Fediol ......................................................................................................................................... Belgium
Felda Marketing Services Sdn Bhd ................................................................................................. Malaysia
FMC Corp ...................................................................................................................................... USA
Food and Agriculture Organization of the UN ........................................................................ Italy
Fuji Oil Co Ltd ............................................................................................................................. Japan
Genencor International, Inc ...................................................................................................... USA
Godrej International Ltd ........................................................................................................... India
Golden Hope Plantations Bhd .................................................................................................... Malaysia
Grain Pool of Western Australia .................................................................................................. Australia
Hap Seng Consolidated Bhd ......................................................................................................... Malaysia
Healy Food Ingredients Ltd ........................................................................................................ UK
Home Grown Cereals Authority ................................................................................................... UK
Institute of Agricultural and Food Economics ................................................................................ Poland
International Finance Corp ......................................................................................................... USA
Itochu Corp ..................................................................................................................................... Japan
Japan Corn Starch Co ................................................................................................................... Japan
Jungbunzlauer AG ....................................................................................................................... Switzerland
Kamani Oil Industries .................................................................................................................. India
Marico Industries Ltd ......................................................................................................................................... India
Lesaffre International R & D .......................................................................................................................... France
Les Huileries de Meknès ............................................................................................................................. Morocco
Kumpulan Guthrie Sdn Bhd ....................................................................................................................... Malaysia
Kuok Oils & Grains Pte Ltd .......................................................................................................................... Singapore
Les Huileries de Meknès ............................................................................................................................. Morocco
Lloreda Grasas SA ......................................................................................................................................... Spain
Loders Croklaan BV ................................................................................................................................. Netherlands
Louis Dreyfus Corp ..................................................................................................................................... USA
Malaysian Palm Oil Board ........................................................................................................................... Malaysia
Manildra Milling Corp. ................................................................................................................................ USA
Marico Industries Ltd .................................................................................................................................... India
Marubeni Corp .............................................................................................................................................. Japan
Meadow Lea Foods .................................................................................................................................... Australia
Midwest Grain Products Inc. ......................................................................................................................... USA
Mitsubishi Corp ............................................................................................................................................ Japan
Mitsui & Co Ltd........................................................................................................................................ Japan
Molinos Rio de la Plata SA ......................................................................................................................... Argentina
Monsanto Co .............................................................................................................................................. USA
National Oilseed Processors Association .................................................................................................... USA
National Starch & Chemical Co ................................................................................................................... USA
Nestlé .......................................................................................................................................................... Switzerland
Novozymes AS ........................................................................................................................................... Denmark
NSW Grains Board ..................................................................................................................................... Australia
ONIDOL .......................................................................................................................................................... France
Ontario Ministry of Agriculture, Food and Rural Affairs ............................................................................ Canada
Ontario Soybean Growers ......................................................................................................................... Canada
Penford Corp .............................................................................................................................................. USA
Pioneer Hi-Bred International, Inc ................................................................................................................ USA
The Procter & Gamble Co ............................................................................................................................... USA
Product Board for Margarine, Fats & Oils ................................................................................................. Netherlands
Productos de Maiz SA ................................................................................................................................ Argentina
PTPP London Sumatra Indonesia ................................................................................................................ Indonesia
Rabobank International ............................................................................................................................... Netherlands
Raisio Group plc ......................................................................................................................................... Finland
Renessen LLC ........................................................................................................................................... USA
Research-Works Pte Ltd ............................................................................................................................... China
Rhodia ........................................................................................................................................................ France
Roquette Frères ......................................................................................................................................... France
S&S Industries & Enterprises Ltd ................................................................................................................ India
Samyang Corp ........................................................................................................................................ South Korea
The Savola Co ......................................................................................................................................... Saudi Arabia
Sensus ........................................................................................................................................................ Netherlands
Sime Darby Bhd ........................................................................................................................................ Malaysia
Solea LLC ................................................................................................................................................. USA
Staley-Tate & Lyle ..................................................................................................................................... USA
Syral SA ..................................................................................................................................................... France
Tomen Corp ............................................................................................................................................... Japan
UNIDO ...................................................................................................................................................... Austria
Unilever NV ................................................................................................................................................ Netherlands
United Coconut Associations of the Philippines, Inc ....................................................................................... Philippines
United Plantations Bhd ................................................................................................................................ Malaysia
United Soybean Board ............................................................................................................................... USA
Univanich Palm Oil Public Company Ltd .................................................................................................. Thailand
US Department of Agriculture .................................................................................................................... USA
Vopak Terminal Vlaardingen BV ................................................................................................................ Netherlands
Walter Rau Neusser Öl und Fett AG ........................................................................................................ Germany
The World Bank ........................................................................................................................................ USA

and many others....