



The Pacific Basin Economic Council is an association of business leaders from throughout the Pacific that promotes the expansion of trade and investment through open markets. Founded in 1967, PBEC serves as a forum through which regional business leaders create new business relationships and address emerging issues in the Pacific and global economies. PBEC assists in economic growth in the region through programs to increase understanding and by encouraging networking and business relationships among its members. PBEC supports open markets, advocates the reduction of trade and investment barriers, and encourages economic cooperation based upon the shared interests of its members.

PBEC's multinational membership includes more than 1,200 corporate members in twenty economies including Australia; Canada; Chile; People's Republic of China; Colombia; Ecuador; Fiji; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Mexico; New Zealand; Peru; the Philippines; Russia; Chinese Taipei; Thailand; and the United States. These member committees conduct a wide range of programs, including conferences, seminars, training programs, and regular meetings with senior government officials.

THE PACIFIC BASIN ECONOMIC COUNCIL

Dr. Helmut Sohmen, Chairman

Chairman, World-Wide Shipping Agency, Ltd., Hong Kong, China

Gary L. Tooker, Chairman Emeritus

Chairman, Motorola, Inc.

Robert Lees

Secretary General

International Secretariat

900 Fort Street, Suite 1080

Honolulu, HI 96813

Tel: (808) 521-9044 ** Fax: (808) 521-8530

World Wide Web: <http://www.pbec.org>

Working Committee on Food Products

Raymond M. Cesca, Chairman

Managing Director, World Trade, McDonald's Corporation

The Independent Voice of Business in the Pacific

2nd printing, including all changes made by the PBEC Working Committee on Food Products at its Working Committee Meeting May 15, 1999 in Hong Kong, China.

THE VALUE CHAIN FOR POULTRY

Pacific Basin Economic Council Working Committee on Food Products

March 1999

Final Report

Contributing Authors

Isamu Dobashi, GM, Sec. to President, Nichimen Corp., Japan

John Fallon, Bowlands, New Zealand

F. C. Eizmendi, Jr., President, San Miguel Food Group, Phillipines

M. Loureiro, Research Assistant, Washington State University, USA

Kenneth Matchett, Chief Executive Officer, XCAN Grain Pool Ltd., Canada

Rob Parrish, Int'l Bus. Consultant, BDP International, USA

Bonnie Raquet, VP, Wash. Corp. Relations, Cargill, Inc., Raquet. , USA

Editor

G. Erikson, Research Assistant, Washington State University, USA

Project Coordinator

Thomas I. Wahl, Director APEC Study Center for Food Systems, Washington State University, USA

Project Director

Ray Cesca, Managing Director, McDonald=s World Trade, USA

“This study is available for use without restriction or further permission, provided PBEC is acknowledged as its source.”

FOREWORD

Expanded, efficient poultry production in the Asia Pacific and increased supplies at lower costs for consumers offer the promise of improved nutrition and more varied diet. In order to facilitate improvements in the production, distribution, and overall supply of poultry, the PBEC Working Committee on Food Products has undertaken this review and study of the value chain for poultry. The goal is to identify best practices along the value chain to improve efficiency and lower costs.

At our final conference (Manila, March 1999) to conclude this study, Committee members developed a series of policy and program recommendations for consideration and implementation by governments and the private sector as a means to achieving the goals of improved efficiency and lower costs for consumers.

This study included active participation and contributions by members of the PBEC Working Committee on Food Products drawn from 12 member economies around the Pacific Rim. Individual sections of the report were authored by PBEC members, as listed on the title page. Integration and editing of the final report was carried out by Dr. Thomas Wahl, APEC Study Center for Food Systems, Washington State University, with financial support of the PBEC Special Fund.

I would like to thank the Asia Institute for Management in Manila, the PBEC International Secretariat in Honolulu, and all of our co-authors and collaborators in this project, which I hope will serve as a model for other sectoral studies aimed at strengthening growth and development and increased efficiency in food promotion throughout the Asia Pacific region.

Ray Cesca, Chairman, PBEC Working Committee on Food Products
Managing Director, McDonald's World Trade, IL U.S.A.
PBEC US Member Committee Tel: (202) 293-5730, FAX: (202) 289-1940

TABLE OF CONTENTS

	Page
FOREWORD	i
LIST OF TABLES	iv
LIST OF FIGURES	iv
EXECUTIVE SUMMARY	v
SUMMARY OF RECOMMENDATIONS	vi
INTRODUCTION.....	1
RECOMMENDATIONS.....	3
Logistics	3
Non-Integrated Markets	3
Semi-Integrated Markets	3
Integrated Markets	3
Financing.....	4
Non-Integrated Markets	4
Semi-Integrated Markets	4
Integrated Markets	4
Trade	4
Production and Processing	4
Food Safety	4
Feed Grain Production, Poultry Transportation, and Distribution	5
DISCUSSION.....	5
Poultry Market Integration and Development	5
Key Attributes Affecting Industry Development.....	5
Poultry Industry Organization	6
Forces Toward Integration.....	9
Recent Development in Integration Issues	11
Logistics	11
Forces on Logistical Issues	11
Recommendations for Logistic Improvement and Investment	14
Financing.....	15
Principles of Financing.....	15
Taxation.....	17
Independent Contractors.....	17
Recommendations	18
Trade	18
Tariffs	18
Non-Tariff Barriers	21
Summary of Recommendations	22

	Page
Production and Processing	22
Costs of Production in Different Countries	22
Economies of Scale in Production.....	24
Processing Costs.....	25
Economies of Scale in Processing	25
Non-Cost-Related Sources of Competitive Advantage.....	26
Summary of Production and Processing Recommendations.....	28
Food Safety	28
Proposed System for Poultry Food Safety.....	28
Overview of Worldwide Food-Borne Disease.....	29
International Trade and Food-Borne Diseases.....	30
Recommendations	30
Grain Distribution, Poultry Transportation, and Distribution.....	30
Poultry Distribution.....	30
Feed Grain Distribution.....	31
Chicken Products Warehousing, Refrigeration and Distribution	31
Recommendations	33
CASE STUDIES.....	34
INTRODUCTION.....	35
THE NEW ZEALAND POULTRY INDUSTRY	35
The Poultry Meat Industry.....	35
The Egg Industry	36
THE PHILIPPINE CHICKEN INDUSTRY	36
Feedmilling.....	36
Broilers	39
Breeder Operations.....	39
Hatchery Operations.....	40
Broiler Growing	41
Contractor Toll Arrangements.....	42
Layers	43
Breeder Operations.....	43
Pullet Growing.....	43
Layer Operations.....	45
Animal Health.....	46
Processing.....	46
Philippine Industry Problems	49
THE INDONESIAN CHICKEN INDUSTRY.....	49
Feedmilling.....	49
Broilers	50
Layers	52
FOOD SAFETY IN THE UNITED STATES	53
Overview of the Current Situation	54
HACCP Guidelines	54
Critical Points in the Poultry Processing Industry	55
Other Possible Food Safety Recommendations.....	56
APPENDIX A. POULTRY MARKETS INDIVIDUAL APEC ECONOMIES	58
APPENDIX B. TARRIFF RATES FOR SELECTED COUNTRIES	67

LIST OF TABLES

Table	Page
1 Summary (see also Appendix A) of tariff ranges for poultry feed grain, poultry and poultry products	19
2 Poultry cost of production in selected countries	23
3 Efficient poultry processing sizes in the U.S. for selected years	26
4 Contacting or tolling arrangements in the Philippines.....	44
5 Summary of chicken diseases in the Philippines.....	47
6 Estimated medical costs and productivity losses for selected human pathogens, 1993.....	55

LIST OF FIGURES

Figure	Page
1 World Poultry Production and Imports, 1964-98.....	1
2 APEC Poultry Production, 1998.....	2
3 APEC Poultry Exports, 1998	2
4 APEC Poultry Imports, 1998	2
5 Per capita income and per capita poultry meat consumption for selected countries	6
6 Model of 'Non-Integrated' poultry industries	7
7 Model of 'Semi-Integrated' poultry industries.....	8
8 Model of 'Integrated' poultry industry	8
9 Capital Requirements for a one million bird/week broiler complex in the U.S., 1985	10
10 Poultry industry return on invested capital and broiler production, 1990-97.....	16
11 Steps in the integration process and distribution of costs in the integration process	17
12 Typical product throughput in the poultry industry	25
13 Sogo-Shosha integrated chicken product operation	32
14 Japanese feed grain distribution system.....	32
15 Temperature control in warehousing, refrigeration, and distribution	32
16 Critical points in the poultry processing.....	56

THE VALUE CHAIN FOR POULTRY

EXECUTIVE SUMMARY

The objective of the Asia-Pacific Economic Cooperation (APEC) Food System is to ensure the long term availability of food, at affordable prices, to all consumers. The food sector can then contribute to sustainable growth and development in the region. The poultry industry is an important food sector that has become increasingly sophisticated as the level of economic development has increased. The purpose of this study is to suggest ways to improve the efficiencies of the poultry value chain and to build sustainable competitive poultry industry. The recommendations contained in this report are based on best-management practices and are identified from reviews of the poultry industry from industry participants in several economies. This study examines six of the poultry value chain's constituent links: logistics, finance, tariff and non-tariff barriers, production and processing, food safety, feed grain distribution and poultry transportation and distribution. Recommendations are given for best management practices for each of the examined links.

Tariff and non-tariff barriers issues are the main focus of APEC leaders, who announced their commitment to achieve free and open trade and investment in the Asia Pacific region by year 2020. Although this study does not analyze the domestic agricultural policies that motivate tariff and non-tariff barriers, it reveals that with the exception of Australia and Hong Kong, all PBEC economies employ one or more tariffs on poultry, poultry feedstuffs or poultry products. In addition, several economies employ various non-tariff measures to protect their markets. The year 2020 objective is for all barriers to trade to be eliminated. A variety of problems have been afflicting the world economy since the outbreak of the Asian currency crisis, causing protectionist pressures mount. This trend towards protectionism could aggravate the present world economic order. PBEC expresses its concern on any protectionism trend against the liberalization of the world economy.

While the long-term objective is for barriers to be eliminated (both tariff and non-tariff), it is NOT recommended that governments discard their sanitary and phytosanitary requirements that are implemented to protect the general health of consumers. These sanitary standards, however, should be based on science and agreement of international experts. Adoption of science-based sanitary requirements will provide assurance to consumers and governments that food products are subject to the best monitoring systems. Additionally, borders should be legally enforceable (so that contracts and intellectual rights can be enforced) and transparent (so that customs etc., are as efficient as possible).

In order to reach the 'zero' tariff objective, it is important that each economy identifies its potential weaknesses and strengths in all areas of the poultry value chain. Once trade barriers are reduced, each economy can take advantage of other economies comparative strengths and strengthen its own position in areas where it identifies itself as potentially competitive. Given a timetable appropriate for each level of development, open trade benefits all economies.

Less developed economies should concentrate their efforts on developing their capital markets and transportation infrastructure, which are needed for their poultry industry and their economy to grow. Also needed are standards to quantify profitability, which will allow the industry to identify its weaknesses and strengths. Economies should concentrate on better organizing their poultry industry across production and processing units, and standardizing their production at each stage of the production process. Special attention should be given to feed grain, which is the most significant cost in poultry production.

SUMMARY OF RECOMMENDATIONS

Because the poultry industry is more developed in some economies than in others, some of the following recommendations are more applicable to less developed poultry industries, while others are more applicable to developing or developed poultry industries. Other recommendations are applicable to all markets regardless of their level of development. Finally, some of the recommendations are best implemented by industry, while others are best implemented by government.

Six areas of the poultry value chain were evaluated for potential inefficiencies and resulted in the following recommendations.

Logistics

- Improve/maintain transportation and communication infrastructure.
- Encourage privatization and globalization of transportation and communication sectors.
- Promote the use of logistics firms' products and services.

Financing

- Measure and control investments' profitability.
- Improve capital market and credit access.
- Invest in businesses which enhance the common organization of the poultry value chain and the standardization of its production.

Trade

- Develop policy to reach the "zero" tariff objective for PBEC economies by year 2020.
- Eliminate unreasonable, non-scientific based sanitary and phytosanitary regulations WHILE maintaining the vigilance over food products to maintain consumers health and welfare.
- Develop legally transparent and enforceable borders.

Production and Processing

- Facilitate the availability of high nutritional value and low cost feed.
- Encourage reliable sources of poultry housing and housing equipment coupled with good after sales service.
- Identify and propose solution to environmental concerns.

Food Safety

- Encourage collection of reliable information on food safety issues.
- Set industrial and home food safety standards.
- Promote and monitor the adoption of food safety standards.

Feed Grain Distribution, Poultry Transportation, and Distribution

- Promote best combination of imported and domestic feed to produce most appropriate compounded feed.
- Adopt warehousing and refrigeration standards to maintain quality and freshness of poultry products.
- Streamline quarantines, customs and clearance systems.

THE VALUE CHAIN FOR POULTRY

INTRODUCTION

APEC leaders have recognized the importance of the food sector in ensuring the sustainability of the region's economic prosperity.¹ The poultry industry is an important component of the food sector in most APEC economies, and in the World.

World poultry production has increased rapidly at a relatively rapid, constant rate since the mid 1960s, resulting in a 10-fold increase in the level of world poultry production (Figure 1). World poultry imports have also dramatically increased since the mid 1960s.

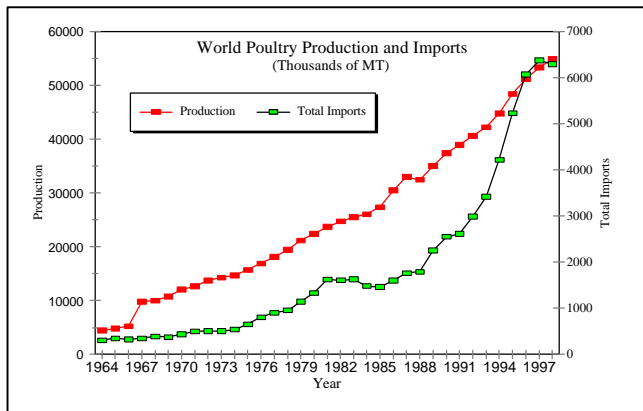


Figure 1. World Poultry Production. (Source: U.S. Department of Agriculture, Economic Research Service. Production, Supply and Distribution Database. Washington, DC, 1998.)

In the Pacific Basin, the U.S. and China are among the leading producers, and account for more than 75% of the APEC poultry production (Figure 2). Among APEC economies, the U.S. also provides the majority of poultry exports (Figure 3). Hong Kong,

China and Thailand are other leading exporters. Leading poultry importers in the APEC countries are Russia, China, Japan and Hong Kong (Figure 4). (See appendix B for poultry consumption, production, imports and exports, for individual APEC economies.)

The large increases in world production and trade suggest that efficiency improvements in the poultry value chain have had large effects on both regional and national economies. Continuing to improve efficiency in the poultry value chain will help importing and exporting countries regardless of their level of economic development by lowering costs of poultry products and inputs for all. The improved efficiency in the poultry value chain will benefit all conditional upon the existence of free market.

APEC leaders have agreed on the goal of free and open trade and investment in the APEC region by 2010/20². There remains significant impediments to trade in food products in the APEC region. All APEC economies, except Hong Kong and Australia, employ tariffs to limit trade in poultry products and inputs. In addition, several economies employ various non-tariff measures to protect their poultry markets. The existence of these impediments arises from natural, social and historical conditions in each economy, and were established to achieve food security as well as to enable agriculture to play multiple other roles in each economy. Although those were valid policies, it

¹ 1995 meeting in Osaka.

² 1994 meeting in Bogor.

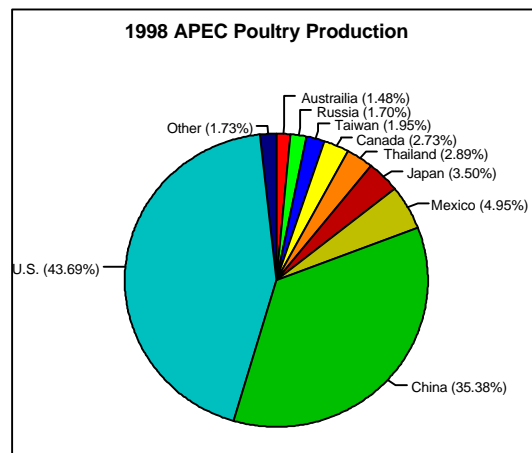


Figure 2. APEC Poultry Production, 1998.
Source: USDA ERS Production, Supply and Distribution Database.

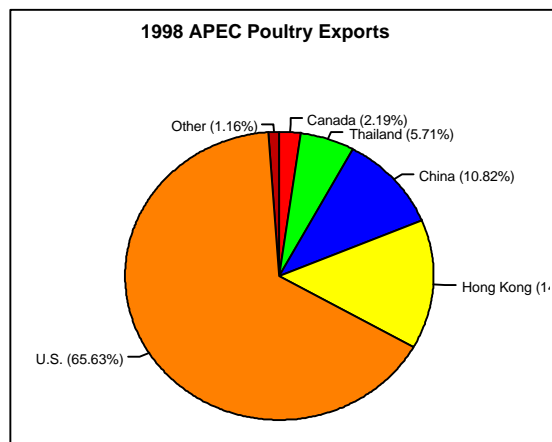


Figure 3. APEC Poultry Exports, 1998.
Source: USDA ERS Production, Supply and Distribution Database.

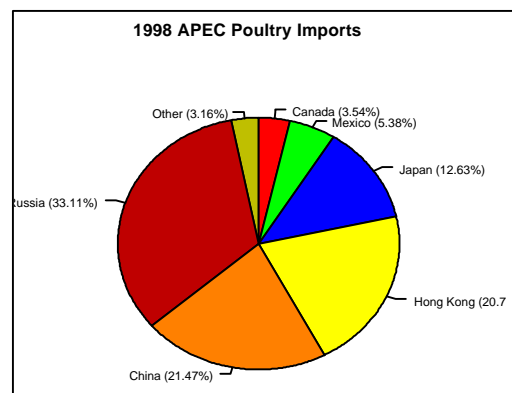


Figure 4. APEC Poultry Imports, 1998.
Source: USDA ERS Production, Supply and Distribution Data Base.

is in view of the fragility of the current food system in the region that an APEC food system was Proposed.³ The APEC Food System promotes greater level of trade in food products and efficient food production patterns reflecting resource endowments and competitive advantages. Food needs can then be met at the lowest possible price, while preserving the region's scarce resources. With the objective of an APEC food system in mind, this study evaluates the efficiency of the poultry value chain in the Pacific Basin.

There are six areas of the poultry value chain evaluated in this report for potential inefficiencies. The six areas of the poultry value chain are:

- 1) logistics;
- 2) financing;
- 3) trade;
- 4) production and processing;
- 5) food safety issues;
- 6) feed grain distribution, and poultry transportation and distribution.

The following section addresses the goals of the report by presenting recommendations to overcome inefficiencies that were found in each of the six areas of the poultry value chain. The next section presents the background material used to find poultry value chain inefficiencies and corresponding recommendations. The final section provides case studies that illustrate strengths and weaknesses of the poultry value chain in selected countries throughout the Pacific Basin. The appendices contain poultry production, consumption, imports and exports for individual APEC economies and, tariffs on poultry, and poultry products.

³ A Proposal from the APEC Business Advisory Council, An APEC Food System, September 1998.

RECOMMENDATIONS

Since, in the Pacific Basin, the poultry industry in some economies is more developed than in others, some of the recommendations will be presented for each of three levels of industry development (nonintegrated, semi-integrated, and integrated). Other recommendations are more applicable to all markets and are not segmented by level of development. Some of these recommendations are best implemented by industry, others by governments. Again, the purpose of these recommendations is to suggest solutions to inefficiencies in the poultry value chain.

Logistics

Non-Integrated Markets

- Improve surface, air and sea transport infrastructure.
- Improve communication infrastructure.
- Develop logistics and transportation sub-contractors.

Semi-Integrated Markets

- Privatize key transportation and communication sectors.
- Continue to invest in transportation infrastructure and in transportation and logistics service providers.
- Develop employment and educational initiatives in logistics professions and logistics education.

Integrated Markets

- Support the globalization of the key logistics inputs to the poultry industry – ocean shipping, air transport, and logistics service providers.
- Encourage privatization initiatives in port and airport management.
- Continue to invest in transportation, logistics service and communications infrastructures.

- Continue to support professional and educational institutions that promote and educate logistics professionals.
- Use and develop logistics firms to consolidate and coordinate transportation and logistics subcontractors into single customer facing entities.
- Invest in point of purchase inventory management software and communications.
- Continue to improve logistics process coordination between retail outlets and poultry producers.
- Continue to improve the internal logistics processes of the poultry producers as they apply throughout the supply chain of the fully integrated firm.

Financing

Non-Integrated Markets

- Improve capital market and credit access policy in order to decrease the costs of capital for producers.
- Develop standards to quantify profitability.
- Invest in retail and processing businesses.

Semi-Integrated markets

- Continue to progress toward capital and currency liberalization
- Invest in mass mechanizing of food products.
- Invest in firms whose business models expand from simple poultry processing to full scale integrated poultry supply companies.
- Support private sector firms that facilitate distribution of credit to processed poultry suppliers, transportation service suppliers, and mass market food retailers.

Integrated Markets

- Invest in the consolidation of the retail and poultry supply industries.
- Facilitate financing of industry consolidation.

- Carefully control working and investment capital.

Trade

- Progressively reduce tariffs in PBEC economies in order to achieve a “zero” tariff policy as already committed to by the APEC leaders.
- Eliminate unreasonable, non-scientific based sanitary and phytosanitary regulations while maintaining the vigilance over food products to maintain consumers health and welfare.
 - Imposed regulations should be based science-based data and technology and subject to agreement and review by an international body of experts in this field.
 - It should be clearly understood that it is NOT recommended that governments abandon any concern or responsibility over the general health and welfare of its citizens.
- Develop effective legal regimes
 - Create enforceable intellectual property rights.
 - Create mechanisms for contract enforcement.

Production and Processing

- Facilitate the availability of low cost feed ingredients.
- Upgrade the nutritional value of raw feed materials.
- Support measures to mitigate high financing rates.
- Encourage reliable sources of poultry housing and housing equipment coupled with good after sales service.
- Help resolve environmental concerns.

Food Safety

- Encourage collection of reliable information about food safety issues.

- Set performance standards in poultry products for food borne diseases such as *Salmonella*, and *E. coli*.
 - Standards similar to those suggested by HACCP (Hazard Analysis Critical Control Points Programs) could be implemented.
 - Standards should allow industry to place different priorities on price of the product, quality and health aspects of the product in response to consumer demand.
- Modernize production processes.
- Develop more rigorous product labeling guidelines that follow international standards.
- Provide consumers with better information about food safety issues in the home.

Feed Grain Distribution, Poultry Transportation, and Distribution

- Set policies and do research to encourage the supply of feeds that are:
 - Easy to use, uniform in nutrition levels, and consistent in quality and grain size.
 - Tasty, satisfying and easily digestible for poultry.
 - Made from safe feed ingredients (not contaminated by salmonella or agricultural chemicals).
 - Inexpensive, based on, for example, increased investment in deep-water ports.
- Distribute poultry and poultry products in such a way that maintains freshness and quality.
 - Make distribution channels as simple as possible
 - Invest in cold storage transportation infrastructure.
 - Streamline quarantines, customs, and clearance systems.

DISCUSSION

For each of the six areas of the poultry value chain, there are issues that are important in determining how to increase efficiencies in the value chain. Some of these issues are specific to the area of the value chain that is being examined, while others are important to more than one (or all) area of the value chain.

One issue of importance to several (if not all) aspects of the value chain is the degree of integration of the industry. The following subsection addresses the issue of poultry industry integration. Following the discussion of integration, each area of the value chain will be examined in more detail.

Poultry Market Integration and Development

The degree of integration in the poultry industry, to a large extent, determines which issues are important to improve efficiency in the value chain. This section discusses integration in the poultry industry by examining factors that affect the development of the poultry industry, the organization of the poultry industry, other forces that encourage integration, and recent developments in integration issues.

Key Attributes Affecting Industry Development

In considering the regional poultry industry, it is necessary to examine the general levels of poultry industry development as they occur across the Pacific Basin. Below are five factors that determine the development and maturity level of regional or national poultry industries.

- 1) Demand conditions (e.g., income, market size, cultural tastes, retail development).

- 2) Production conditions/economic inputs (e.g., labor, technology, inputs costs, climate).
- 3) Government policy, regulation, and investment (e.g., health and safety regulations, tariffs, subsidies, infrastructure development).
- 4) Development of supporting/related industries (e.g., feed grain industry, transportation, finance, biotech and veterinary medicine).
- 5) Corporate (enterprise) strategy and market structure (e.g., size and number of competitors).

Each of the above five factors is a significant contributor to the overall development of the poultry industry on a regional and national level.

Regional or national poultry industries can be segmented into three general levels of micro-economic development -- less developed, developing and developed. Each of the three levels of development identified can potentially exist simultaneously in a given economy.

Consumption has grown for poultry meat in almost all countries throughout the world. Within each country, the development of the industry will follow different time lines and the development will be determined by the above key attributes. In general terms, industry development and the development of

marketing infrastructure tends to be closely linked to GDP growth. That is, there is a positive relationship between consumption and per capita income. Countries with low GDP levels tend to have low poultry consumption while countries with higher GDP levels have higher poultry consumption.

As per capita income and consumption rise, poultry industries develop to satisfy emerging demand. Firms make use of the environmental conditions that often exist concurrently with rising standards of living (relaxed government oversight, legal transparency and more highly developed business and economic infrastructures) to improve operational efficiencies and profitability. Figure 5 shows the relationship between per capita income and per capita poultry consumption for several countries. The development of industry tends to follow a similar pattern as it moves from underdeveloped to advanced.

Poultry Industry Organization

The level of poultry industry development manifests itself primarily in the vertical integration of firms. Vertical integration refers to the common organization of the industry across an increasing

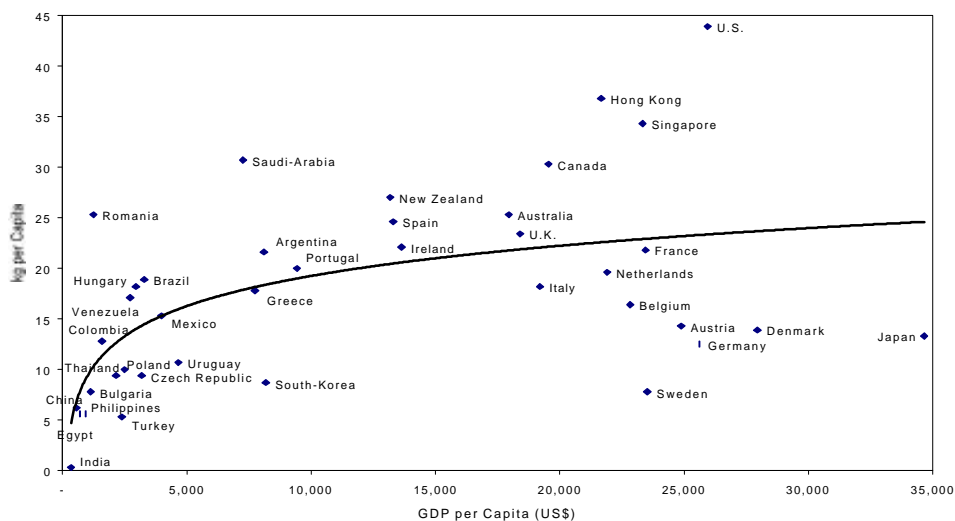


Figure 5. Per capita income and per capita poultry meat consumption for selected countries. (Source: Rabobank)

number of components of the value chain and to the increase standardization of production at each stage of the production process. Vertical integration does not necessarily imply a financial consolidation of the different components of the value chain or an increase in the production scale of each business unit. As consumption increases and firms are forced to become more efficient, a general integration of the poultry value chain occurs. In that step-by-step process, maturing firms seek to control more of the individual components of the poultry production process.

Different levels of market maturation roughly correspond to the three levels of economic development discussed above. The three levels of market development are 'Non-Integrated', 'Semi-Integrated' and 'Integrated'.

'Non-Integrated' poultry industries generally exist in conjunction with less developed economic conditions. In this configuration, the poultry industry tend to be operated as distinct business units. A non-integrated poultry industry has the following characteristics (see also Figure 6):

- 1) The value chain components operate as distinct business units.
- 2) *Parent stock* (breeder farming) production is non-existent or very small on local farms.
- 3) Consumers perform *hatchery* operations on small local farms, or individually.
- 4) The broiler *grow out* phase of the value chain is performed either by the consumer or in small, highly localized operations.
- 5) *Processing* is generally performed either by the consumer or in small, highly localized operations.
- 6) *Distribution and retail* operations are non-existent or highly underdeveloped.
- 7) *Feed milling* is the most developed industry in the value chain and has the highest concentration ratio of any of various industry participants; may have an inordinate share of profitability in the value

chain and in some cases may even act as an integrator.

- 8) Note: Parent stock, hatchery, grow-out and processing may all, in the least developed cases, be under the control of the same small farmer or highly localized operation.

'Semi-Integrated' poultry industries often emerge in conjunction with developing economies.

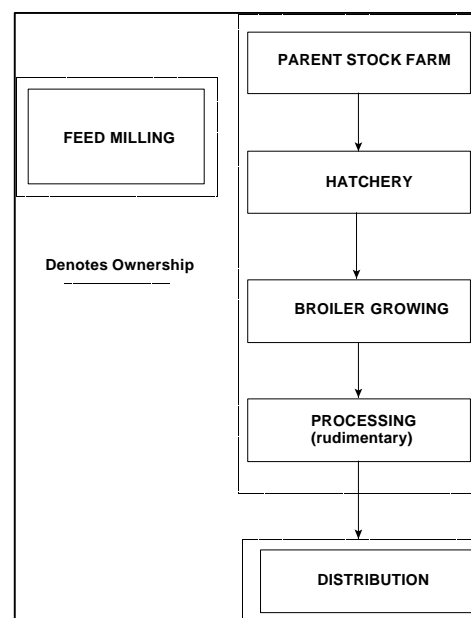


Figure 6. Model of 'Non-Integrated' poultry industries.

Under these conditions, the processing component of the value chain is often the catalyst for integration as it strives to control inputs and stimulate demand. Characteristics of a semi-integrated industry are as follows (see Figure 7):

- 1) Value chain components begin integrating (often as a result of processing business units' efforts to control inputs and demand).
- 2) *Parent stock* production is controlled by the processors in their effort to control the quality and quantity of product inputs into the production process.
- 3) *Hatchery* operations are bought and managed by the processors for similar reasons.
- 4) The *grow out* phase of the value chain may continue to operate as a separate business group well into the semi-integrated phase as

processors subcontract this portion of the value chain.

- 5) *Processing* is in relatively larger business units with measurable capital investment. Processors emerge as lead integrators in value chain consolidation. Processing is the main driver for efficiency and integration.
- 6) *Distribution* and retail normally are not integrated into the poultry value chain, though during the semi-integrated phase, processors in some cases invest in retail outlets to bolster demand for their products.
- 7) *Feed milling* is owned and operated as a stand-alone industry and acts as a vendor to breeder and broiler growing operations; influence in the value chain reduced.

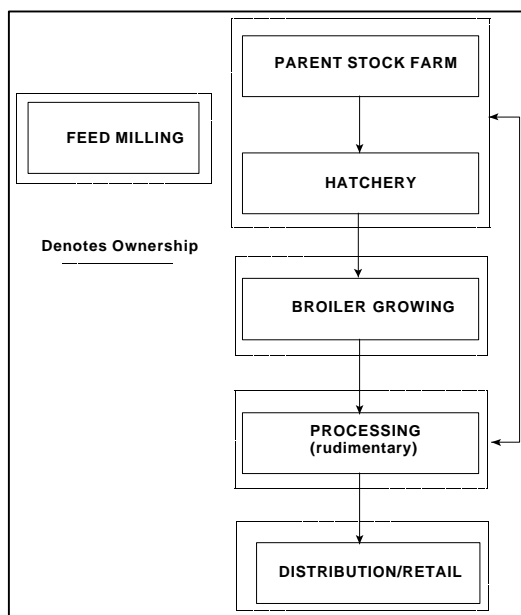


Figure 7. Model of ‘Semi-Integrated’ poultry industries.

In developed economic environments, ‘Integrated’ poultry industries exist where large corporate entities control (manage) all levels of the value chain from feed milling to delivery at the retail outlet. In an integrated poultry industry model (see Figure 8), the processing and retail sectors are the dominant participants in the value chain. Processors complete the integration of the value chain up to the point of delivery to a mature retail sector. Consumer

demand and cost constraints force poultry production enterprises to consistently provide large quantities of high quality products at competitive prices. Large, integrated multi-national corporations emerge to satisfy the business requirement for economies of scale. Other characteristics of an integrated poultry industry are:

- 1) *Breeder farming* is controlled by the value chain integrator (processor) in order to assure quality and reduce unit costs.
- 2) *Hatching operations* are owned and operated by the integrator for the same reason.
- 3) The *grow out* phase of operations is brought in-house and performed by the integrator or under contract with the integrator.
- 4) *Processing* is operated as part of the integrated unit and produces a vast array of value added products.
- 5) Consequently, the lead integrator (processor) is forced to also take on the distribution step in the value chain to assure

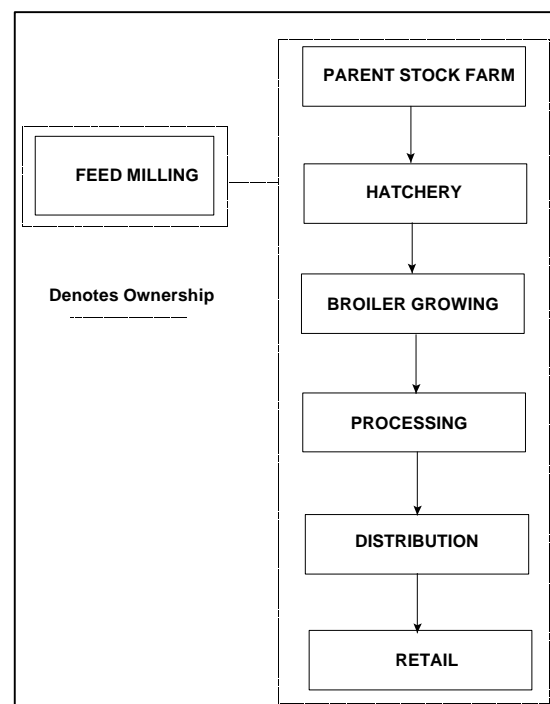


Figure 8. Model of ‘Integrated’ poultry industry.

that the quality improvements achieved through integration are not lost in the

movement of products to the retail customer. *Retail* tends not to be part of the integrated value chain but is highly demanding and is operationally integrated into the process.

- 6) The integrator takes on *feed milling* in order to meet internal quality standards at a competitive cost.

Forces Toward Integration

In addition to the overall development of an economy, there are generally three primary forces pushing integration: (1) market ownership and margin control, (2) biosecurity and total quality management control, and (3) economies of scale and optimization of capital resources.

Market Ownership and Margin Control

The nature of the poultry meat industry is such that product pricing is a major weapon in companies' competitive arsenal. This in turn leads to pressure to lower production costs. Coupled with this is the need for significant volumes of consistent product to supply large customers that emerge as retail and wholesale networks develop. To compete effectively on price, and to minimize production costs, most industry operators prefer to control the range of technical inputs in the business at all levels. Inability to control the process completely or having to provide excess margin to an independent operator within the process can lead to an inability to compete and, therefore, subsequent loss of volume and profit. Marketing benefits such as branding and consistency of product quality are important features of process control through integration.

Biosecurity

Biosecurity (protection of poultry from pathogens) is important within poultry meat operations and good biosecurity is a significant benefit of well-run integrated operations. A majority

of economically significant diseases are transmitted vertically (pathogens that are present in chicks are also likely to be present as the chicks mature) and so a consistent policy of hygiene control at all levels of integration is very important. International suppliers of genetic material invariably supply stock that meets high standards of health and are free from the major poultry diseases, and there is real economic benefit in maintaining those health standards as much as possible within the integration. Control of bacterial human public health contaminants such as *Salmonella*, *Campylobacter*, and *E. coli* is also a significant benefit of an integrated system, although more progress is needed to control these contaminants effectively.

Many companies are now moving to progressive total quality management systems to ensure the status of their products and services. This includes modern Hazard Analysis Critical Control Points (HACCP) programs and defined, documented processes and systems at all stages to protect the consumer.

The key to ongoing growth and success of the poultry meat industry for the future, especially in integrated markets, will be related to health and product quality. Product wholesomeness is critical in determining consumer perceptions and in this regard it is important to limit harmful additives (especially hormones) in the product. Modern management principles (such as HACCP) will provide 'traceability' tools that will be required to earn consumers confidence in the product.

Economies of Scale

Thresholds in production units tend to set a minimum efficient size for an integrated poultry operation compared with a simple localized family operation. Most important is the size of a modern

slaughter plant where a typical single line operation has a 7,000 - 9,000 birds / hour capacity. This equates to a single-shift capacity of 16 million birds per year. Smaller-size plants are available, but have higher production costs. Unit sizes of other facilities within the integration are smaller so that expansion into other activities is based on multiples of facilities such as breeder and broiler sheds, setters, and hatchers.

As a consequence, the barriers to significant entry into the poultry industry in a well-developed market are relatively high. The cost of establishing a 1 million birds-per-week integrated operation in the southern United States was estimated by Barton (1995) at \$75 million in 1985 (see Figure 9). Recent expansion by major integrators suggests that, overall, this figure is still valid in part because of technology gains which have lowered real investment costs.

While this is considered a large scale for a number of countries, the principles are valid and the proportions of capital required have validity in smaller sized modules. It is possible in some countries to enter the processing sector on a partly

integrated basis by forming an association with a major integrator who may supply day-old broiler chicks or live birds for slaughter to a relatively small processor.

There is little pressure to integrate at the highly complex levels, such as genetic development or in pharmaceutical and chemical inputs. Likewise at the base commodity input levels, where markets are well organized, prices are visible, and input costs of competitors (such as grain and proteins for feed) can be readily assessed, there is little pressure to integrate.

The poultry meat industry has shown a tendency to form relatively large integrated structures in most developed countries and the same holds true in developing countries. It is interesting to compare the aggregating tendency in the poultry meat industry to the structure of the egg-producing industry because the two industries developed from a common base.

The egg-producing industry, in most developed countries, has a number of large operators who may have an integrated feed mill and sometimes a

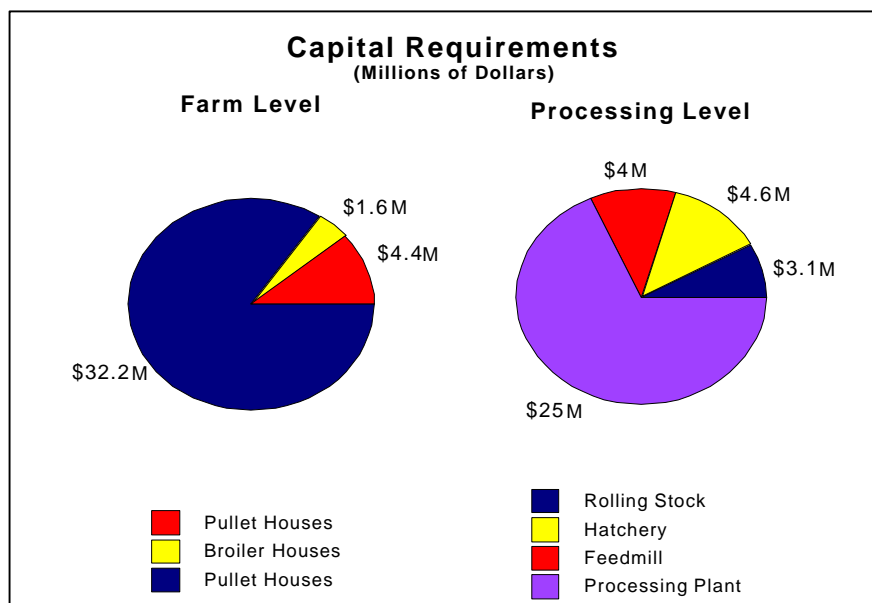


Figure 9. Capital Requirements for a one million bird/ week broiler complex in the U.S., 1985. (Source: Barton, 1985.)

hatchery operation, but the industry still has a significant number of small independent operators who purchase day-old chicks or pullets at point of lay, buy feed, and sell their own eggs. Sometimes the eggs are sold on a cooperative basis and sometimes industry-wide production controls prevent surplus eggs from disrupting markets. Because egg industry products can go directly from farm to retail without going through a significant processing transformation, barriers to entry are relatively low. The industry is therefore susceptible to low pricing led by marginal producers on a seasonal basis. Lower entry barriers, coupled with the fact that the egg industry has a relatively lower technology base, allow the egg industry structure to be less concentrated than the poultry meat industry.

The worldwide poultry meat industry has a tendency to concentrate in relatively large integrated businesses using up-to-date, readily transferable technology and modern business practices. The pressure for concentration comes from the cost advantage of large production units and more consistent quality of product. As markets become more sophisticated, the industry changes to react to the pressure.

There is no consistent pattern to the number of poultry meat companies that operate in any individual market, although in countries where the industry is relatively developed, one company tends to emerge as the largest in the industry, and is generally twice as large as the second largest company. Examples exist in the region; in Australia- Inghams, New Zealand-Tegel, Thailand-Charoen Pokphand, and USA-Tyson.

Recent Developments in Integration Issues

An interesting recent development in the USA is the de-verticalization of the industry. Companies such as Sara Lee are looking to reduce their asset

investment, improve their return on total assets, and improve productivity by concentrating on marketing and sales. They are potentially selling off almost all parts of the production process and acquiring product from contract suppliers.

Conversely, a senior executive from Perdue Farms has suggested that the poultry industry may be well served by backward integration into grain farming to ensure the right specification from a feed formulation perspective.

Logistics

This section points out forces that play a part in the logistical issues for each level of integration and gives corresponding recommendations. Logistics of the poultry industry develop with the development of the poultry market. As demand grows and the poultry market advances, logistics expenditures are forced to expand also. As with general industry development, it is the combined force of environmental (external) forces and enterprise (internal) forces on logistical conditions that drive industry logistics development.

The discussion of the forces on industry's logistical configurations below will help identify industry logistical issues that can be improved in order to make poultry production operations more efficient and competitive.

Forces on Logistical Issues

Forces that affect logistical issues are presented below for each of the three levels of integration. Although this section specifically relates to logistical issues, notice that many of the other aspects of the value chain are discussed. This illustrates not only how the level of integration affects logistical issues (and other facets of the value chain), but also the

degree of interrelation among different aspects of the value chain.

In this section, there will be no effort to break the forces that affect the logistic value chain into ones that only affect the logistical issues. Instead the forces will be presented with an emphasis on logistical issues, and various other aspects of the value chain will be presented as they relate to logistics. The next section, which gives recommendations, will indicate which recommendations affect different areas of the value chain.

Non-Integrated Industry Forces

In a non-integrated industry, industry logistics are underdeveloped and add significant costs to the value chain and the industry cost structure. These added costs reduce the availability of product and contribute to low consumption levels. Some forces that affect the logistical issues in non-integrated markets are below.

- 1) Underdeveloped capital markets and limited sources of credit reduce enterprises' ability to purchase the capital equipment to move product efficiently through the enterprise supply chain.
- 2) Underdeveloped transportation infrastructure restricts enterprises' ability to move product between business units, or the ability of vendors and buyers to bring product efficiently to market.
- 3) Onerous government regulation prohibits free flow of goods across international or regional borders, limits access to competitive supplies or transport services and causes distortion in local prices.
- 4) Tariff and non-tariff barriers restrict free flow of goods and raise costs of product through the supply pipeline.
- 5) Underdeveloped communications and data processing infrastructure adds costs to external and internal logistics processes.

- 6) Atomized value chain adds to total logistics costs. There is little coordination or synergy in the operation of the supply chain.
- 7) There is no dominant participant in the value chain to coordinate and drive out costs.
- 8) Enterprise logistics skills are underdeveloped.
- 9) Terms of sale (normally on a delivered basis) limit scale economies in distribution activity.
- 10) Concentrated control of logistics at the upstream end of the value chain (feed milling, small breeders/growers) limits cost control benefits.

Semi-Integrated Industry Forces

In a semi-integrated industry, a processing industry emerges that begins to control the logistics inputs between the various business units in the value chain. Control of inputs includes coordinating logistics related information and managing logistics and transportation subcontractors. Concurrently, regional or national economic development progresses, facilitating other aspects of purchasing and material management. Forces on logistical issues in semi-integrated markets are as follows:

- 1) Capital markets and sources of credit mature. The environment offers firms the ability to integrate the value chain (by purchasing business units) and to buy and finance capital equipment for logistics process management.
- 2) Government oversight/intervention in the private sector is reduced and capital investment from outside the economy is available for enterprise logistics investment.
- 3) Public sector investment in transportation and logistics infrastructure increases and road, sea port, and airport development facilitates movement of material into the region/nation.
- 4) Customs, taxation and inspection processes are more reliable and consistent.
- 5) Tariff and non-tariff barriers are reduced and movement of goods into regional/national economy facilitated.

- | | |
|---|---|
| <p>6) Privatization of communications and data communications service sectors results in reduced costs related to logistics management costs.</p> <p>7) Processing businesses emerge as lead integrators and begin activity of managing down logistical input costs.</p> <p>8) Feed milling costs are controlled through the increased purchasing power of consolidating breeder and grower sectors.</p> <p>9) Logistics costs are reduced by the consolidation of all value chain sectors and more concentrated movements of goods into fewer, high volume operations which allows participants to buy on an free-on-board (FOB) basis, making transportation costs more transparent.</p> <p>10) Emerging transportation and logistics service sector allows firms to out-source logistic activities and concentrate on core competencies.</p> <p>11) Firms begin to coordinate delivery of goods with required needs which reduces inventory carrying costs and drives costs out of the supply chain.</p> <p>12) A mature retail sector emerges and begins to have influence in the value chain and value added products require a higher quality product. More time sensitive delivery into the retail environment results.</p> <p>13) Growing use of technology, both in information management and in transportation and processing.</p> | <p>2) Government investment in transportation is high. Systems are in place to respond effectively to infrastructure growth. Areas are targeted for investment where bottlenecks are anticipated.</p> <p>3) Political conditions prevail that encourage transparency, open markets, the rule of law, consistent enforcement of contracts, and reductions in tariff and non-tariff barriers. The free flow of goods over regional/national borders is well developed and poultry industry supplies and logistical inputs are competitive on a global basis.</p> <p>4) Communications and data processing hardware and software industries are globally competitive.</p> <p>5) The logistics profession has a vibrant support structure and logistics professional education is available.</p> <p>6) Multi-national processing firms emerge, integrate the industry value chain, coordinate and control logistical inputs across the supply chain.</p> <p>7) Economies of scale in logistics service purchasing are key ingredients to enterprise success.</p> <p>8) Poultry processors/suppliers use sophisticated networks of transportation and logistics subcontractors to drive costs out of the supply chain and free up funds within their capital structures.</p> <p>9) Terms of sale between processors/suppliers and retail outlets are on a delivered Just-In-Time (JIT) basis. Fresh and value added product is delivered for immediate consumption. Value added packaging and preparation add to profitability of suppliers.</p> <p>10) Processors/suppliers distribute on an international basis, concentrating production in advantageous geographic locations, managing global transportation networks, and using value added transportation services of transportation and logistics service vendors.</p> <p>11) Sophisticated logistics communications and data management practices facilitate the timely delivery of product to market.</p> |
|---|---|

Integrated Industry Forces

Price pressure forces processors to squeeze the maximum amount of cost out of the supply chain. Coordination of the supply chain is facilitated between the business units owned and operated by the lead integrator. Many of the logistics management functions are out-sourced to a variety of transportation and logistics vendors or performed by experts in-house. Forces that drive logistical issues in integrated markets are below.

- 1) Capital markets are competitive on a global basis and credit is also available in a competitive environment. Public sector

Recommendations for Logistic Improvement and Investment

The previous section presented forces that impact the logistical issues for different levels of integration. These forces suggest inefficiencies in the poultry value chain. This section presents recommendations for logistic improvement and investment for different levels of integration. Since the different facets of the poultry value chain are interrelated, some of the recommendations are clearly related to logistical issues while others relate to logistics through other facets of the poultry value chain. The related areas of the value chain are presented under separate headings in the “Recommendations” section above.

Non-Integrated Industry Recommendations

In a non-integrated industry, development initiatives are most effective in the areas of broad public policies that stimulate demand through economic growth and increasing investment in basic logistics infrastructure. Specific areas of interest are:

- 1) Currency and economic liberalization in support of free trade and open markets.
- 2) Capital market and credit access policy improvement.
- 3) Tariff and non-tariff barrier liberalization.
- 4) Roads and surface freight transport infrastructure improvement.
- 5) Airport and seaport transport infrastructure improvement.
- 6) Reliance on the rule of law, including mechanisms for contract enforcement.
- 7) Transparency.
- 8) Retail business investment.
- 9) Processing business unit investment.
- 10) Logistics and transportation sub-contractor development.

Semi-Integrated Industry Recommendations

In a semi-integrated industry, development initiatives can be targeted evenly toward public policy initiatives and private sector investment. Specific considerations are:

- 1) Continued progress toward capital, currency and tariff liberalization, and transparency in border systems.
- 2) Privatization of key transportation and communications sectors.
- 3) Continued investment in transportation infrastructure.
- 4) Investment in mass mechanizing of food product production.
- 5) Investment in firms whose business models expand from simple poultry processing to full scale integrated poultry supply companies.
- 6) Investment in transportation and logistics service providers who operate on a regional or national basis.
- 7) Employment and educational initiatives in logistics professions and logistics education.
- 8) Support for private sector firms that facilitate distribution of credit to processed poultry suppliers, transportation service suppliers, and mass market food retailers.
- 9) Investment in technology and enforcement of intellectual property rights.

Integrated Industry Recommendations

For an integrated industry, development considerations are most effectively targeted at allowing private sector investment to flow to the areas of highest return. Specific considerations are as follows:

- 1) Policy initiatives that provide international leadership in free trade and the reduction of tariff and non-tariff barriers globally.
- 2) Policy initiatives that support the globalization of the key logistics inputs to the poultry industry – ocean shipping, air transport, and logistics service providers.
- 3) Privatization initiatives in port and airport management.

- 4) Continued investment in transportation, logistics service and communications infrastructures.
- 5) Continued support for professional and educational institutions that promote and educate logistics professionals.
- 6) Investment in the consolidation of the retail and poultry supply industries.
- 7) Use of and development of logistics firms to consolidate and coordinate transportation and logistics subcontractors into single customer facing entities; movement toward logistics "utilities" who wean extraneous costs from logistics and deliver savings back to poultry producers and ultimately to the consumer.
- 8) Investment in bulk shipping transportation (rail) in order to lower feed grain component costs.
- 9) Investment in point of purchase inventory management software and communications in order to reduce inventory-carrying costs.
- 10) Continued improvement in logistics process coordination between retail outlets and poultry producers.
- 11) Continued improvement in the internal logistics processes of the poultry producers as they apply throughout the supply chain of the fully integrated firm.

Financing

This section discusses principles of financing, taxation, contractors and presents recommendations concerning financing issues. Note that some of the justification for those recommendations comes from other sections (in particular the logistics section).

Principles of Financing

In considering the financing of a poultry enterprise or industry, it is important to establish criteria for financial goals to ensure long term commercial success and viability of the industry and the enterprise within it. The commodity nature of the production and marketing of poultry meat and eggs means that the industries tend to be low margin

where high volume is often important. Thus, sound financing and high asset utilization are important. Given the often private ownership nature of the industry, accurate information is difficult to obtain. Reference has been made to publicly available information where possible to relate industry practice to the desirable situation. For this purpose, U.S. public companies, Tyson and Pilgrims Pride, have been used as examples for some important financial measures.

Return on Total Assets

For the enterprise every dollar invested should earn an adequate return. Typical returns on total assets should be in excess of passive returns (e.g. bank interest) by a factor that recognizes the stage of development of the market and the situation of the economy. Companies would normally look for in excess of a 10% after tax return.

Debt/Equity Ratio

This ratio should also be set to reflect the risk inherent in the market but for successful long term financial performance it should be 1 to 1. Both US companies are close to this ratio with the weighted average at 1.07 to 1.0 at the end of fiscal year 1997 (FY97).

Shareholders Fund/Total Assets

The minimum ratio for sound financing would be 30% with figures higher than this desirable. Tyson Foods were 37% and Pilgrims Pride 32% at the end of FY97.

Return on Sales

Often this measure considers the relationship of operating income before tax and interest to sales. Ratios for Tyson and Pilgrim in FY97 were 6.3% and 5.0% respectively. There are generally considered to

be good returns for the industry and again demonstrate the need for financial prudence in managing the enterprises as small movements in price or cost can have a very significant impact on bottom line performance.

Return on Invested Capital

Invested capital is defined as fixed assets plus net working capital. A ratio of net profit after tax to invested capital in excess of local bank interest rates is essential. This ratio would be expected to improve as the industry becomes less dependent on commodity style products and moves to more added value products. This expectation is however not always achieved as the U.S. performance shown in Figure 10 shows. The figure shows that during the 1990s in the U.S. return on invested capital as a percentage has declined whilst production has continually increased.

Working Capital Management

The poultry industry, both egg and meat, is a high consumer of working capital as the production

pipeline is a lengthy one. Figure 11 shows integration time lines and costs and illustrates the need for financial prudence, given the fact that grandparent breeding stock is acquired up to 2 1/2 years prior to finished products being sold and money received from customers. Thus careful planning and sound criteria are essential.

EBIT Cover of Interest

The earnings before interest and tax (EBIT) should cover the interest charge at least twice to ensure a soundly financed business. For FY97 Tyson and Pilgrim achieved a ratio well in excess of this criteria.

Capital Expenditure

The poultry meat industry in particular is a heavy consumer of capital both for growth and efficiency (new technology) factors. In an ongoing environment most operations invest a long term average of approximately 1.5 times annual depreciation as a minimum to maintain efficiency and competitiveness. In periods of major expansion this guideline may be exceeded but cash planning

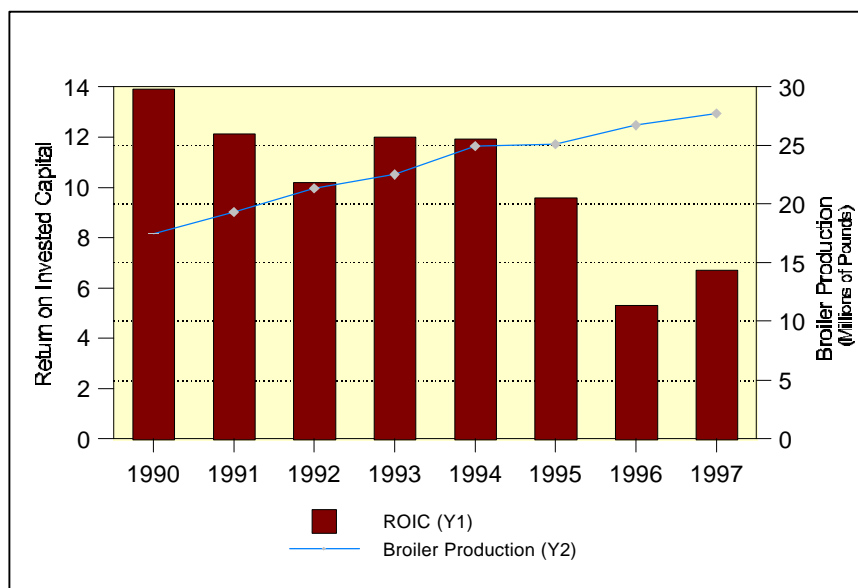


Figure 10. Poultry industry return on invested capital and broiler production, 1990-97.

needs to be very prudent given this appetite for capital.

Productivity of Assets: Sales/Total Assets

Given the capital intensive nature of the poultry industry, it is important to ensure that the assets are operating productively. One measure that demonstrates this is relating sales to total assets. Figures vary but a ratio in excess of 1:1 is considered important. For Tyson in FY97 this figure was 1.44 whilst Pilgrims Pride was more productive at 2.21. The U.S. model typically excludes company ownership of parent stock breeding and broiler growing facilities, which are contracted out to independent farmers. Adding these assets into the organization which some entities favor, requires additional capital and consequential higher interest costs. Using the information referred to in Figure 11 an entity that owned all the parts of the integration would double their investment and interest cost.

Taxation

Taxation strategy varies by country but is a real cost to the individual business. To consider the performance of various operations requires the normalization of tax in the widest sense so that there is equality of treatment to enable comparison. Any comparison across economies or countries should take into account any incentives, either direct or indirect, and consider both direct and indirect taxation at all levels of the enterprise's cost structure.

Independent Contractors

In most integrated companies in the more developed markets, a number of activities are undertaken by independent operators who are contracted to the enterprise. This is especially

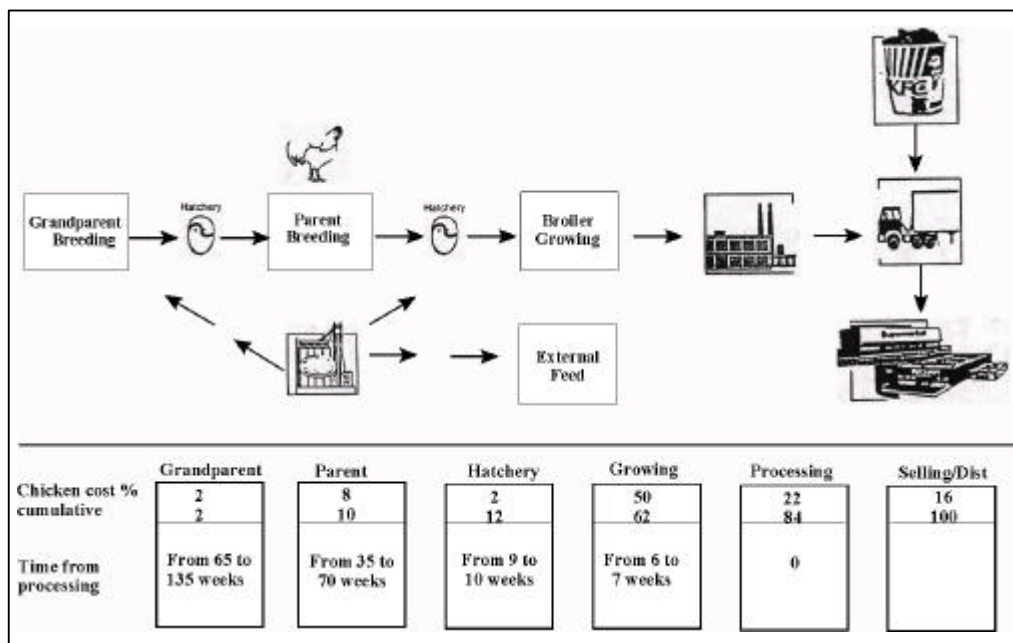


Figure 11. Steps in the integration process and distribution of costs in the integration process.