VIABILITY AND PROFITABILITY OF THE CHILEAN DEER INDUSTRY

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ABSTRACT

Chile is located in the south-west corner of South America, with climates that vary from hot and dry in the north to mild cold in the south. This large range of climates enables Chile to produce a variety of animal and plant products. The Chilean economy is strongly based on the exports of agricultural products. Even though the economy was negatively affected by the Asian economic crisis in 1997/98, the economic sector is through a recovery process. Diversification is one important factor in the recovery process of the economy. The Chilean economy needs to diversify (products and markets), to spread the risk involved in the trade sector. Agriculture is one of the most important sectors in the Chilean economy. This sector is composed of fruit, crops, and livestock production. Within the latter sector, the main activities are beef cattle and dairy production. In the last few years, diversification of the current productive systems in Chile has been through the introduction of new animal species, such as ostriches and deer. These activities are considered to be very new, and consequently are unknown to a vast number of people. In addition to this, and in particular with regards to the deer industry in Chile, structure is almost non-existent, and its marketing channels and quality controls are unorganised. Deer farming is an opportunity to diversify the agricultural sector in Chile. As a new activity it must be developed either by domestic private or public institutions and/or by foreign investors. As any other business, this industry works within certain conditions, determined by the country's economy and situation of its sector, in this case agriculture. Deer have a highly efficient conversion rate from grass to protein when compared to other farmed animals. Deer products are commonly in demand in European and Asian countries. The farmed deer industry is a world-wide business, with New Zealand as the leader. In 1999 the New Zealand deer industry exported venison, velvet antler and co-products with a value of about NZ$210 million. For the year 2002 is forecasted that New Zealand deer exports will reach about NZ$270 million. The main markets for New Zealand deer products are Europe, USA and Asian countries.

The deer industry in Chile is in an embryonic stage, and is a growing activity. However, it still needs further development in areas such as processes, transport, management practices, etc. This industry does not present a fixed structure, and deer

products have to be marketed through traditional beef marketing channels. Regulations are almost non-existent, with the exception of minimal import, farming and slaughter regulations. Total farm gross margins results for deer farms in Chile suggest that deer farming in Chile is profitable (US$20,982 for Farm A and US$10,578 for Farm B). However, compared to New Zealand, the gross margins from Chilean farms are low. On a total farm and per hectare gross margin basis, New Zealand has higher gross margins compared to Chilean farms. However, on a stock units basis, Chilean farms have higher gross margins. This may be due to the fact that Chilean farms have a lower stocking rate than New Zealand.

Even though gross margin results suggest that Chilean deer farms are profitable, this activity shows important issues that need to be addressed. These issues are related to infrastructure and regulations for deer production, and marketing and promotion of deer products. Probable reasons for New Zealand's higher profitability in the deer industry compared to Chilean deer farms are management practices and know-how of deer farming. The threat of new entrants in the Chilean deer industry is weak. The bargaining power of suppliers and buyers also is weak, because production and demand in the domestic market are very low. Rivalry within the industry is between deer farms and hunting operations, and is related to quality issues. In Chile, substitute products for deer products are mainly other protein sources for venison, and other herbal tonics for velvet. Strengths of the Chilean deer industry are represented by geographical and physical factors, and include the fact there are no presence of natural deer predators in Chile. The main weaknesses are related to the size of Chilean deer farms, low production levels and lack of a complete legislation. Land availability, increasing meat and healthier product consumption trends in Chile, are the main opportunities for the Chilean deer industry. The main threat to the industry in Chile is the variability of venison quality and lack of quality controls in the marketing process.

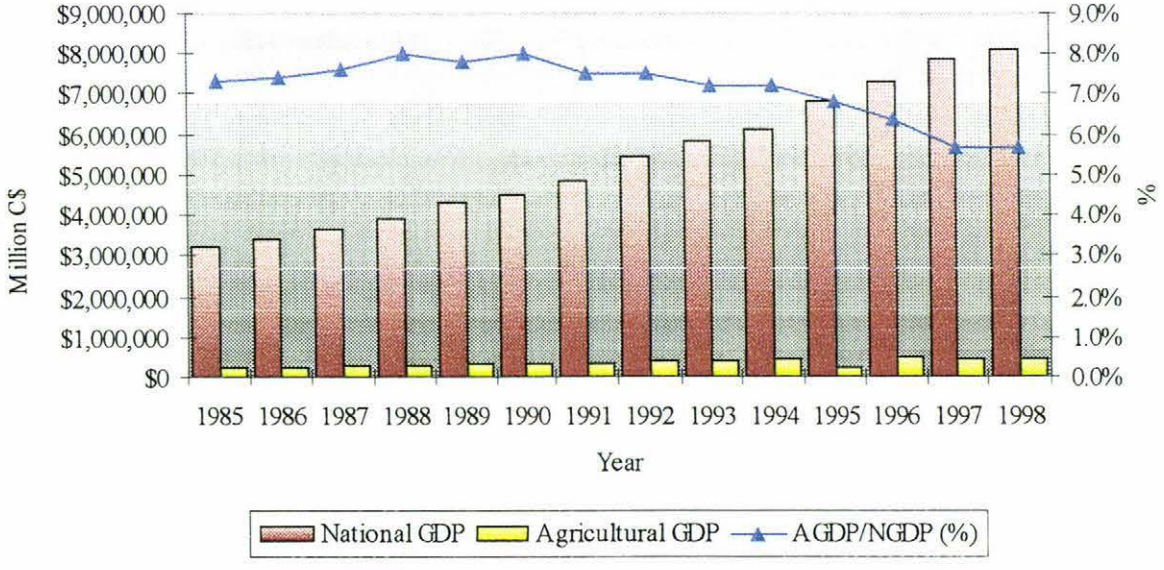
CHAPTER 1: INTRODUCTION

1 INTRODUCTION

1.1 PROBLEM STATEMENT

Agriculture is a very important activity in Chile. The Agricultural Gross Domestic Product (AGDP) and the National Gross Domestic Product have been increasing steadily since 1985. However, the participation percentage has been decreasing from 7.9% in 1990 to 5.7% in 1998 (see Figure 1.1)

Figure 1.1: Participation of Agriculture in the National Gross Domestic Product (AGDP), National Gross Domestic Product and Agricultural Gross Domestic Product in Chile, 1985 - 1998.



Source: Central Bank of Chile and ODEPA.

It is important for Chilean agriculture to participate in the growing economic environment of the country. Chilean agriculture's participation in the National Gross Domestic Product (NGDP) over recent years shows the need to improve and diversify the productive base of Chilean agriculture. Diversification is very important, not only to Chilean agriculture, but also for any economic sector, as it can spread the risk involved in the trade sector, and offers a larger range of markets and products. One way to diversify agriculture in Chile is by introducing new farming alternatives into the traditional agricultural system (crops, fruit trees, forestry, sheep, beef and dairy cattle). Chilean farmers can no longer rely solely on traditional agriculture, as markets and consumers are demanding more sophisticated products. For instance, deer farming is a new alternative for Chilean farmers who are looking for diversification of their current production system and a new source of income. Deer have been introduced onto Chilean farms with a sporting/hunting purpose and currently some farmers are trying to establish a new industry with these animals.

In many developed countries, traditional agricultural production systems (beef, dairy cattle, sheep, etc) are near to being in a mature or low growth stage in their life cycle [1]. This has resulted in the search for diversification of agricultural systems and an alternative supply of raw materials. The most important requirements for the development of a new agricultural production system are that there must be a market for the products produced, and that the systems are economically viable (profitable).

Deer farming represents an alternative for Chilean farmers to diversify their systems. Venison production levels can be compared with those achieved by sheep and beef farms in similar pasture conditions[1]. In addition, deer farmers have an extra income apart from venison and co-products, as deer velvet antler can be sold annually. The diversification of agriculture in Chile should not be limited to the domesticated native animals in the national territory, such as beef and dairy cattle, sheep, pigs, etc. It is necessary to look for new alternatives, such as deer farming.

[1]Russel, J.F. 1996: Sistemas Alternativos de Producción Animal y su Rol Potencial en Mercados Internacionales.

1.2 HYPOTHESES

The purpose of this research is to determine if deer farming in Chile is profitable, and to inform farmers, investors (domestic and foreign), and any person who may be interested in starting or further develop a deer operation in Chile. As mentioned before, in Chile there are some farmers who have deer on their properties. But deer operations are in an embryonic stage, compared to other agricultural activities, therefore the profitability of it is uncertain. Moreover, as deer farming is not the main activity of these Chilean farms, costs and incomes are generally mixed with the main activities of the farms. Determination of the profitability of deer farming for Chilean farms could be the turning point for those people who are uncertain about this activity. The hypotheses for this research are:

(a) "Deer farming is viable in the Chilean environment (physical and economic)"

(b) "Deer farming in Chile is profitable"

In order to test these hypotheses, it first needs to be determined if Chilean farmers can physically farm deer on their properties. If so, then it must be determined if these farmers can do it in a profitable way.

1.3 RESEARCH OBJECTIVES

The objectives of this research are presented as General and Specific Objectives.

1.3.1 GENERAL OBJECTIVES

The general objectives of the project are:

1. To determine if Chile has the required physical, environmental and economic factors needed to establish a deer industry.
   - Main productive sectors in Chile,
   - Overview of the Chilean economic and agricultural situation, and
   - Overview of the current situation of Chilean deer farms.
     - History,
     - Regulations,
     - Imports and exports.

2. To give an overview of deer as a farmed animal.
   - Types of deer,
   - Diseases affecting deer,
   - Farmed deer.
   - Deer products

3. To give an overview of the New Zealand Deer Industry.
   - Products,
   - Markets,
   - Exports volumes and values.

4. To investigate the profitability of Chilean deer farms.
   - Collect cost and income data from Chilean deer farms,
   - Analyse data using Gross Margin Analysis.

5. To perform a Five Forces, External Macro-environment and SWOT analysis of the Chilean deer industry.

6. To produce a reference for those Chilean farmers and investors (domestic and foreign) who are interested in deer farming.

1.3.2 SPECIFIC OBJECTIVES

The Specific Objectives of the project are:

1. Determine the total farm, per hectare and per stock unit (S.U) gross margins for Chilean deer farms and a New Zealand model deer farm.
2. Compare results from gross margin analysis with those from New Zealand model deer farm.

1.4 METHODOLOGY

The first step in carrying out this research was based on reviewing the literature available on industry structure and SWOT analysis; searching the Internet for data from Chile and on deer in general. The Internet search was based on Chilean institutions, such as the Central Bank of Chile, the National Statistics Institute (INE), Ministry of Agriculture and its services (SAG), the Office of Agricultural Policies Studies in Chile (ODEPA), etc. This information was used to build up the background of the study. The second step was to gather information on the New Zealand deer industry, where a research report made by the researcher in a postgraduate Diploma at Massey University in New Zealand was used. In addition to this, vital information was obtained through contacts in the New Zealand Game Industry Board and amongst New Zealand deer farmers. The next step was to obtain the financial data from the Chilean deer farms. In order to obtain these data a questionnaire was sent by email to

different 'deer farms' in Chile. These questionnaires included a general or descriptive section, and a production section. All the questions were formulated in order to track information about the history of these deer farmers, type of farm (e.g. number and type of animals, etc). The cost and income spreadsheet was based on the one used to describe New Zealand farms in the Farm Monitoring Report from the New Zealand Ministry of Agriculture and Forestry (MAF), in 1999, for the North Region. After obtaining the data from the Chilean farms, a Gross Margin Analysis was performed using the financial data from the farms. After performing the gross margin analysis, the data collected from Chile, its agricultural sector, and deer farming in Chile (Chapters 3, 4 and 7 respectively), were used to perform an industry analysis, which included Porter's Five Forces, External Macro-environment, and a SWOT analysis for the Chilean Deer Industry.

1.5 LIMITATIONS OF THE STUDY

As deer farming in Chile is a new activity, information regarding income and costs from these farms is very difficult to obtain. The first limitation was to find those Chilean farmers who are currently farming deer. Once these farmers were found, the next limitation was to obtain the data required to perform the analysis. The information flow in this kind of research is slow as it takes time for the farmer to sort the financial data and then send it to the researcher. On the other hand, some farmers did not want to share their information, as deer farming is a new and growing activity in Chile, and this data is confidential. Alternative and faster ways of performing this research such as travel to the study area, would have involved a high level of funding, which was not available to the researcher,. This factor did not allow the researcher to have personal contact with the Chilean deer farmers, or visit their properties in order to have an idea of the kind of farm on which the research was based. All the information was obtained via email, as this was found to be the best way to deal with the data collection, and the farmers.

In terms of information availability, the limitations were found to be high. As a new activity, deer farming is unknown to many people, including government

institutions, in Chile. Information regarding regulations, the number of deer farmers in Chile, sanitary requirements, production of deer farms in Chile, availability of deer meat (venison) in the domestic market, imports and exports of deer and deer products to and from Chile, was found to be difficult to collect. The difficulty was related to the fact that deer farming is a poorly regulated and controlled activity in Chile.

Finally, Chilean deer farmers' willingness to help with the research was found to be a limitation. The two farmers who answered the questionnaire sent detailed information in a very comprehensive way and this allowed the researcher to compile the data and test the hypotheses. However, it must be recognised that the sample size from which the conclusions are drawn was very small ($n = 2$).

1.6 ASSUMPTIONS

The assumptions involved in this study are related to the farm information, as it is very difficult to obtain full detailed data from farmers. The only specific assumption made in the study is due to the fact that the specific number and type of deer in Farm A in Chile could not be determined from the data provided by the farmer. The number used to determine the stock units for Farm A in Chile was the one that appears in the official list (Appendix 13) of deer farms in Chile, provided by the Livestock and Agricultural Service of Chile, SAG, in 1996. This list shows the number of deer farms in Chile, and for each, its name, contact, location, property type (deer farm or hunting operation), number of animals, etc. The number used was 225 deer, assuming that Farm A in Chile has maintained this number of animals since 1996. In order to convert this number into stock units, an average stock unit conversion rate was applied (refer to Appendix 15, Gross Margin Analyses, Farm A). The final stock unit number that was used in the cost and income spreadsheet and in the gross margin analysis was 400.5 stock units.

1.7 THESIS OUTLINE

The present study is based on eight Chapters, which are: Introduction, Literature Review, Chilean Background, The Agricultural Sector in Chile, Deer Background, The New Zealand Deer Industry, The Chilean Deer Industry, and Conclusions. In order to study the profitability of the Chilean deer farms and to determine if Chile has the required productive and economic environment to establish this industry, a description of Chile, its agricultural sector and deer in general was necessary.

1.7.1 CHAPTER 2: LITERATURE REVIEW

This chapter gives an overview of the literature available on industry structure, its external macro-environment and SWOT analysis. The main reason for including a chapter explaining industry structure, the external macro-environment and SWOT analysis was that the Chilean deer industry is very new and developing and lacks structure analysis. The data included in this chapter were used to analyse the Chilean deer industry, by applying what the literature establishes with the data found in the research.

1.7.2 CHAPTER 3: CHILEAN BACKGROUND

This chapter was included in the research because the deer industry in Chile needs to be developed by domestic and/or foreign investors, and therefore it is important to give an overview of the general situation in Chile. This overview includes geography, economy, etc., in order to establish a solid base for future investors for further development of any industry in the country, especially deer. The importance of this chapter is that it gives the reader an overview of the relevant points, which should be considered when starting an industry or a new agricultural activity in Chile.

1.7.3 CHAPTER 4: THE AGRICULTURAL SECTOR IN CHILE

Just as it is important to consider the effects of an industry on the country's economy, it is important to consider the sector where the new industry will be established, in this case the agricultural sector in Chile. In order to determine if a new animal industry could be established in this sector, it was important to give a general description of the sector (land use, Agricultural Gross Domestic Product (AGDP), labour force, the sector's structure and production, etc.). It was important to study and review also the agricultural trade and policies, and to determine the phyto-sanitary situation of the country, for matters concerning imports and exports.

1.7.4 CHAPTER 5: DEER BACKGROUND

Many people in Chile, including farmers, have a limited knowledge of deer as a wild animal, and an even more limited knowledge about deer as a farmed animal. Consequently, it is necessary to give a brief description of deer and deer farming. This description includes types of deer, reproductive cycle, deer diseases, farming of deer, deer products, etc. This would help farmers and investors realise not only the feasibility of the activity, but also the different options that deer farming offers from a production viewpoint. This chapter also increases the amount of information on deer as a farmed animal, which one needs to acquire before starting a deer operation.

1.7.5 CHAPTER 6: THE NEW ZEALAND DEER INDUSTRY

From a market point of view, it was important to give an overview of the world leader in deer trade, the New Zealand Deer Industry. This overview discusses the products that can be obtained from farmed deer, and the markets and competitors for these products, as well as New Zealand deer production and prices. This chapter is

important, as before producing any product, it is necessary to know what to produce, also where and to whom to sell the products.

1.7.6 CHAPTER 7: THE CHILEAN DEER INDUSTRY

The study of the Chilean deer industry was based on the historic management of deer in Chile, and the results of a Gross Margin analysis of two farms in the south of Chile. This Chapter also provides the reader with an Industry Structure (Porter's Five Forces), External Macro-environment and a SWOT analysis for the Chilean deer industry.

1.7.7 CHAPTER 8: CONCLUSIONS

This chapter presents the conclusions of the research after collecting and analysing the data required to test the hypotheses. It points out the main issues concerning the viability and profitability of the Chilean deer farms.

1.8 IMPORTANCE OF THE RESEARCH

The importance of this research is that in the future, this material may constitute a reference for farmers and investors interested in developing this activity in Chile. This research has been carried out because deer farming is a new activity in Chile, with no established industry. By developing deer farming, the participation of agriculture in the national economy may increase. Information has been presented related to the country's environment (physical and economic), describing deer and overviewing the leader of the industry (New Zealand) was necessary before discussing profitability.

The research provides information on a new production alternative product for pastoral systems in the south of Chile. It also shows that a non-traditional farming activity may be a profitable alternative for farmers looking for new activities and diversification of their farms.

CHAPTER 2: LITARATURE REVIEW

2. LITERATURE REVIEW

Agriculture has an industry structure, a feature common to every industry independent of its activity. However, every industry is unique and has its own unique structure. Industry is defined as a group of competitors producing products or services that compete directly with each other[2]. Various authors have studied Industry Structure. For instance, Allio (1988) noted in his book, The Practical Strategist, that an industry is part of an input/output system. The inputs of the system are all those raw materials provided by the suppliers. The industry transforms those inputs into products or services that constitute the output to the market.

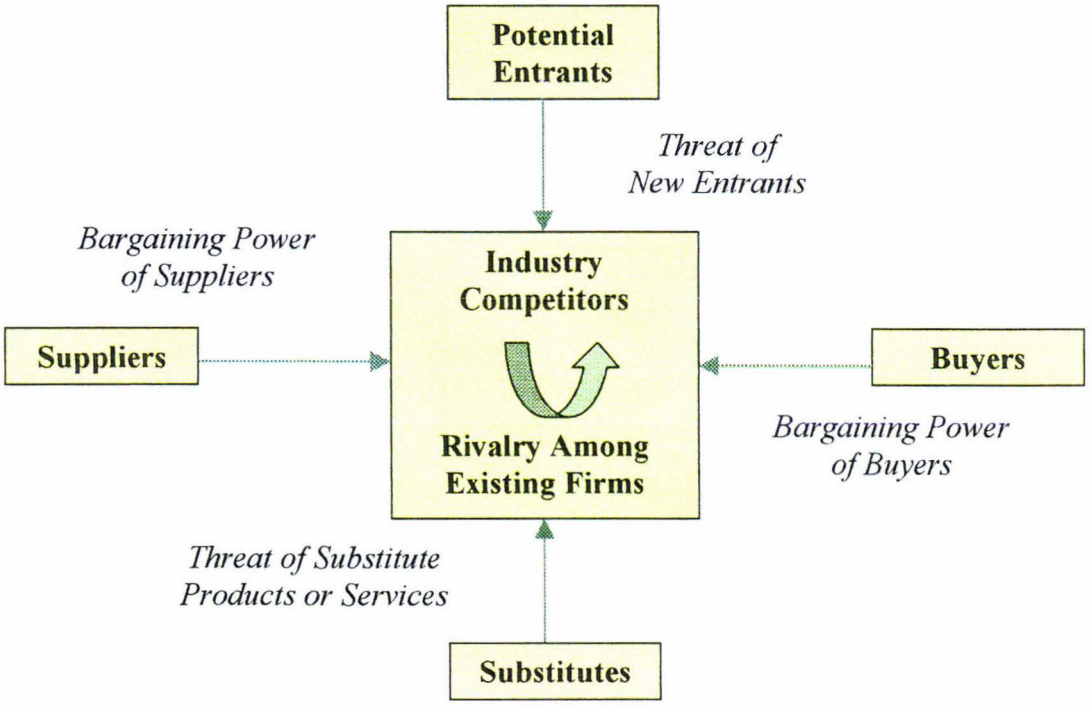
2.1 FIVE COMPETITIVE FORCES OF THE INDUSTRY

The most commonly accepted tool used to explain industry structure is Porter's Diamond, or Five Competitive Forces model, which includes the industry components and their interactions. This diamond is shown in Figure 2.1. As seen in this Figure, the rules of competition are represented by the five competitive forces:

1. The entry of new competitors,
2. The threats of substitutes,
3. The bargaining power of buyers,
4. The bargaining power of suppliers and,
5. Rivalry among the existing competitors.

[2] Porter, M.E.1990: The Competitive Advantage of Nations.

Figure 2.1: Porter's Five Forces Driving the Industry.



Source: Porter, M.E, 1980: Competitive Advantage.

The five competitive forces described in Figure 2.1 determine the intensity of competition and profitability in an industry as they influence the costs, prices and required investment of firms in an industry (Porter 1980). However, it is not the product (looks, high technology, etc.) which is the main factor to determine profitability of an industry it is, rather, the structure of the industry. If the industry as a whole is strong relative to suppliers or customers, it tends to be profitable (provided that new competition does not have easy access to the market, or the customer does not have numerous acceptable substitutes (Allio 1988)). The strength of the five forces varies from industry to industry as the industry evolves. The changes in the industry structure can shift the overall and relative strength of competitive forces, and this can influence (positively or negatively) the profitability of an industry.

The extreme of competition intensity is when there is a perfectly competitive industry, where entry is free, there is no bargaining power between participants, and there is no rivalry among customers and suppliers, as firms and products are alike.

The structure of an industry will be related to the strength of the forces that affect competition and profitability (Porter 1980).

In order to understand more about the industry structure it is necessary to explain how the different components (forces) of the diamond affect the industry.

2.1.1 BARGAINING POWER OF SUPPLIERS

The role of suppliers is very important within an industry, as they provide the raw materials that are needed to produce what the market demands. The bargaining power of suppliers will determine the cost of raw material and other inputs. Suppliers can apply their bargaining power over buyers by threatening to raise prices or reduce the quality of goods and services. Thus, powerful suppliers are able to squeeze profitability of an industry, which is incapable of recovering the cost increase in its own prices. For instance, in the New Zealand Deer Industry, venison suppliers such as Duncan (North and South Island) and PPCS (South Island) have more power compared to other suppliers, being more competitive than other suppliers.

The supply cost of raw materials and other inputs will influence the performance of competitors in any industry. Suppliers tend to be in a powerful position in the following circumstances:

(a) Few suppliers: This occurs when buyers are fragmented, in relation to suppliers, and the buyers represent a small fraction of the supplier's sales. In this case, suppliers have a high bargaining power, as buyers have few choices as to where to buy the raw materials.
(b) Differentiated supplier: In this case, suppliers are highly specialised, and their switching costs are high. This means that there are few choices of suppliers, so there is a disadvantage for buyers.
(c) Forward integration: The integration of suppliers means that they can become a new source of competition in the industry that they supply.
(d) The industry is not an important customer of the supplier: If suppliers are selling their raw materials in an industry that does not represent a significant fraction of their total income, generally, suppliers are more inclined to exert their power.

(e) The supplier's product is an important input to the buyer's business: As the product represents an important input for buyers, suppliers' power rises.

2.1.2 BARGAINING POWER OF BUYERS

In any industry, buyers try to force prices to go down, demand higher quality products or more services. All this pressure is applied at the expense of industry profitability. In certain conditions, buyers have a stronger position or are powerful in the industry. Such is the case with New Zealand deer velvet in the USA market, where the market segment (natural products) is very sophisticated, and consumers have power over suppliers. The pressure or power of consumers is in terms of animal welfare and scientific proof for deer velvet efficiency and safety. The conditions, which give consumers a powerful position in the industry, are:

(a) Few customers: Few customers characterise the market. This kind of industry is not attractive to new suppliers, as it does not offer suppliers a great opportunity to establish an advantage.
(b) Undifferentiated products or services: When products are uniform in the market, buyers have different choices to satisfy their needs. In this case, buyers have bargaining power against suppliers, as the switching cost is very low. Similar power levels for buyers can be found when the product offered is not important in the customer's value chain.
(c) Backward integration: Those buyers that can integrate backward (become their own suppliers) can stop suppliers from increasing prices. Buyers' power can be partially neutralised when firms in the industry offer a threat of forward integration into buyers' industry (Porter 1980).
(d) The product purchased from the industry represents a significant fraction of buyers' costs or purchases: In this case, buyers can spend, as many resources are required to shop for an attractive price and to purchase selectively. When the product purchase represents a small fraction of buyers' cost, buyers are usually less price sensitive.

(e) Buyers have full information: If buyers have full information about demand, market prices, and supplier costs, this leads to a bargaining dominance compared to when information is scarce. Buyers with full information are in a position to guarantee the best prices and quality.

2.1.3 RIVALRY WITHIN THE INDUSTRY

Rivalry in an industry can be detected when tactics such as price competition, advertising battles, product introductions, and increased customer services are found. For instance, the New Zealand Game Industry Board (NZGIB), introduced venison in the USA by using the Cervena trademark, and is trying to do the same with deer velvet under other branded names. According to Porter (1980), rivalry starts when one or more competitors either feel pressure, or see the opportunity to improve the actual position in the industry. The phenomenon of mutual dependency between firms is explained as any move from a firm in the industry that will provoke the competition to make an effort to counter back that initial move. This mutual dependency can leave the firms involved in a better, or in a worse off, situation than before. High competition and intense rivalry can be found in industries when the following situations are present:

(a) Numerous or equally balanced competitors: If an industry has numerous firms, it is often thought that some firms' moves will not affect others. Even if there are few players in a balanced industry, instability is created, as firms will fight with each other in order to get an advantage (better position in the industry, lower costs, etc.). In the other extreme, if the entire industry consists of only one or few firms, then the leader has total control over the others by imposing discipline and by playing a coordinative role with price leadership.
(b) Slow industry growth: For those firms that are seeking expansion, a slow industry growth turns competition into a market share game (Porter 1980). This situation is much more volatile than when the industry has a rapid growth situation where firms improve their position only by keeping up with the industry.

(c) High fixed costs or storage costs: When the fixed costs of a firm are high in relation to the variable costs, firms are under high pressure to use more capacity. This leads to price-cutting when excess capacity is present. A common situation related to high fixed costs is when a product, once produced, is very difficult or costly to store (Porter 1980).

(d) Undifferentiated products: In general, for commodity products or services, price is usually the deciding factor for the purchase (Allio 1988). If there is no difference between suppliers' prices, the industry becomes uniform, which means there is high rivalry among competitors. This explains why the NZGIB launched the Cervena programme in the USA, and the new deer velvet marketing strategies for western markets.

(e) High exit barriers: In order to leave an industry, there are several with which firms have to deal. Exit barriers can be economic, strategic, and emotional factors that keep firms in the industry, even though earnings are low or even in some cases a negative return on the investment. Some of the sources of exit barriers, according to Porter (1980) are:

- Specialised costs: Those assets that are highly specialised have low liquidation values, or high conversion costs.
- Fixed costs of exit: This exit barrier includes costs such as labour agreements, maintaining capabilities for spare parts, etc.
- Strategic interrelationships: Interrelationships between the business unit and others in the company in terms of image, marketing ability, access to financial markets, shared facilities, etc. These interrelationships cause the firm to attach high strategic importance to being in the business.
- Emotional barriers: When a firm has a high identification with a certain business, or high level of loyalty towards the employees, fear for the decision maker's career (owner), and pride, high exit barriers are founded.
- Government and Social Restrictions: These exit barriers involve government pressure to denial or discouragement from exiting an industry, giving reasons such as regional job losses, regional economic effect, etc.

Rivalry within the industry is summarised in Figure 2.2.

Figure 2.2: Rivalry Among Industry Participants.

Source: Pressley, M, 1999: Strategic Management. Hill Jones.

2.1.4 THREAT OF NEW ENTRANTS

The threat of new entrants to the industry is based on the barriers of entry to an industry. If barriers are high and/or the newcomer finds the entry to the industry difficult (due to competitors' actions), then the threat of entry is low. "Barriers to entry are often thought to reflect permanent disadvantages that new entrants face, but may also be thought of as a kind of adjustment that entrant must over come"[3]. According to Porter (1980) there are six major sources of barriers to entry. (All of these entry barriers can be found in the Deer Industry).

(a) Capital requirement: The need to invest large amounts of money in order to compete creates a barrier to entry. In cases of large investments such as plant or equipment, a large amount of capital is needed. This represents the first filter to entry into an industry, so small firms cannot enter, as the entry costs are too high for them. This barrier to entry is particularly high if the capital is required for high risk or unrecoverable up-front advertising or research and development.

(b) Economies of scale: Economies of scale are often assumed to be applied to manufacturing activities, but they can be found in any functional area or activity. For instance, this factor can be found in the firm's advertising, and research and

[3] Geroski *et al*, 1990: Barriers to Entry and Strategic Competition.

development areas. Economies of scale prevent new entrants from becoming involved in the industry, as they are forced to enter into the industry on a large scale and they risk a strong reaction from existing firms. If newcomers enter the industry on a small scale, they will have to accept a cost disadvantage. "A type of economies of scale entry barrier occurs when there are economies to vertical integration, that is, operating in successive stages of production distribution"(Porter 1980). In the case described by Porter, the newcomer has either to enter already integrated or accept a cost disadvantage.

(c) Product differentiation: Product differentiation means that customers in the industry are loyal to branded products, which is a result of past advertising, customer service, product differentiation, or simply of having been first in the industry. In an industry where products are differentiated or branded, customers must be convinced to switch to new products or brands. This factor creates a barrier to entry by forcing entrants to spend heavily to overcome existing customers' loyalties. The cost that this effort implies represents a high barrier to entry into an industry for new competitors.

(d) Distribution channels: As economies of scale, distribution channels represent a great advantage for firms. These represent a major obstacle to entry, particularly in mature industries. New firms have to persuade the channels to accept their products through price break, which are likely to reduce profit. Some industries, such as tobacco, drugs and food products, show this entry barrier.

(e) Switching costs: Switching costs are the costs involved in the change of suppliers. These costs may include employee retraining costs, cost and time involved in testing, the need for technical help and product redesign. If an industry exhibits high switching costs, then new entrants must offer a major improvement in cost or performance.

(f) Cost disadvantage independent of scale: Some of the participants in the industry may have costs advantages that cannot be imitated by new entrants, no matter what their size and economy of scale level is. The cost advantage of a firm can be related to cheap labour, capital or raw material, favourable location, patented or proprietary technology, favourable access to raw materials, learning experience curve and government subsidies.

2.1.5 PRESSURE FROM SUBSTITUTE PRODUCTS

Companies in an industry not only compete against each other, but they also compete against industries producing substitute products. "Substitutes limit the potential returns of an industry by placing a ceiling on the prices firms in the industry can profitably charge"[4]. Customers are constantly looking for cheaper prices and high quality products or services. If customers identify a product or service (substitute) that can offer the same function as the one offered in the industry, then that product or service represents a substitute to the industry product. According to Porter (1980), there are two substitute products that deserve attention:

(a) Those that are subject to trends improving their price performance trade-off with the industry products, and
(b) Those that are produced by industry, earning high profit.

In the deer industry, products such as venison and velvet are unique, and it is very difficult to emulate them. However, in the venison area, the substituted products are other protein sources in restaurants' menus, such as white and red meats, seafood, and other choices, which include emu, ostrich, bison and even springbok (which is often misrepresented as venison). In terms of velvet, substitutes could be other herbs, brews and tonics.

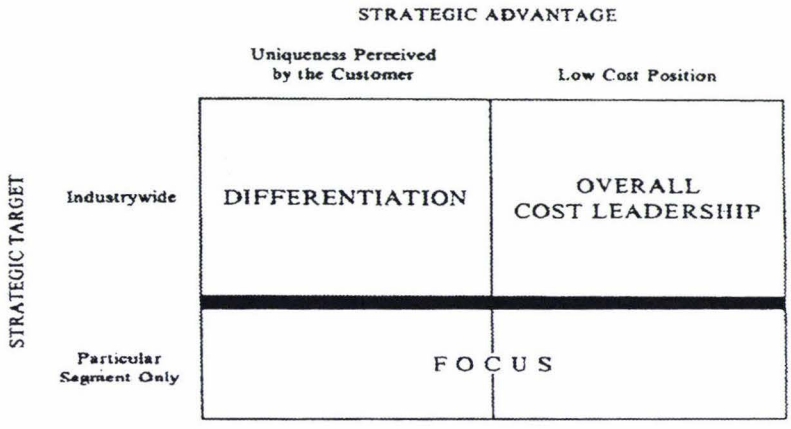
2.2 GENERIC COMPETITIVE STRATEGIES

In order to be successful in an industry it is important for every firm to think about the position the firm wants to be in within the industry. By defining the Generic Competitive Strategies, the firm can know what is the best way to compete in the industry. For instance, the New Zealand Deer Industry has try to market its products as different or special, and has been focusing on a unique market segment, different for the different products. Such is the case of venison in the USA, where the NZGIB

[4] Porter, M.E, 1980: Competitive Strategy, Techniques for Analysing Industries and Competitors.

has tried to change the perception of venison as a seasonal product, and focus on a larger market segment. On the contrary, for deer velvet products, those Asian housewives with high income make up the main market segment. According to Porter (1980), there are three potentially successful generic approaches. A firm can determine their generic strategies by defining their competitive advantage. Figure 2.3, shows Porter's (1980) three Generic Competitive Strategies.

Figure 2.3: Porter's Generic Competitive Strategies.



Source: Porter M.E, 1980: Competitive Strategy: Techniques for Analysing Industries and Competitors.

2.2.1 OVERALL COST LEADERSHIP

When a firm is situated in the overall cost leadership quadrant, the firm has broad scope and serves many industry segments. In order to achieve a cost leadership position in the industry, it requires an aggressive construction of efficient-scale facilities, reduced costs based on experience, to avoid marginal customers' accounts, and to seek cost minimisation in areas such as research and development, service, sales forces, advertising, etc. The source of the cost leadership may vary within the industry structure where the firm operates. Firms with cost leadership have an advantaged position in relation to other firms in the industry, despite the level of competition, giving these firms protection against rivalry from competitors. When buyers do not perceive a product as acceptable, a cost leader firm will be forced to

reduce the price in order to be competitive in the industry. However, other firms that cannot reduce the price will have to increase the quality in order to be able to demand a premium for their products, putting them in a disadvantaged situation.

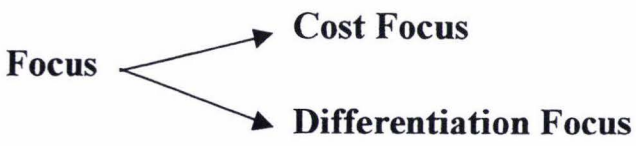
2.2.2 DIFFERENTIATION

The main aim of differentiation is to be perceived as unique industrywide. This differentiation can be gained by selecting one or more attributes that buyers perceive as important, and trying to position the firm, or firm's in such a way that it is perceived by the customer to be different from the rest of the industry's products. Some of the most common attributes that buyers perceive as different are the delivery service and the marketing approach of a firm (Porter 1985). "A firm that can achieve and sustain differentiation will be an above average performer in its industry if its price premium exceeds the extra costs incurred in being unique" (Porter 1985). The differentiation strategy can be approached in many forms, such as: design or brand image (e.g. Cervena and the Nongyong logo in the New Zealand Deer Industry for venison and velvet, respectively), technology, features, customers' services, and dealer networks. Differentiated firms perceive a low level of competition and rivalry, as customers have a low sensitivity to price due to brand loyalty.

2.2.3 FOCUS

The focus approach is based on choosing a market segment or group of segments in the industry, by product line, or geographic market. Once the market segment is chosen, the firm's efforts should be focused to serve that segment to the exclusion of others. The focus approach can achieve low cost or differentiation, but not for the whole market. The focus strategy is shown in Figure 2.4.

Figure 2.4: Focus Approach, as Generic Strategy.



Source: Porter M.E, 1980: Competitive Strategy: Techniques for Analysing Industries and Competitors.

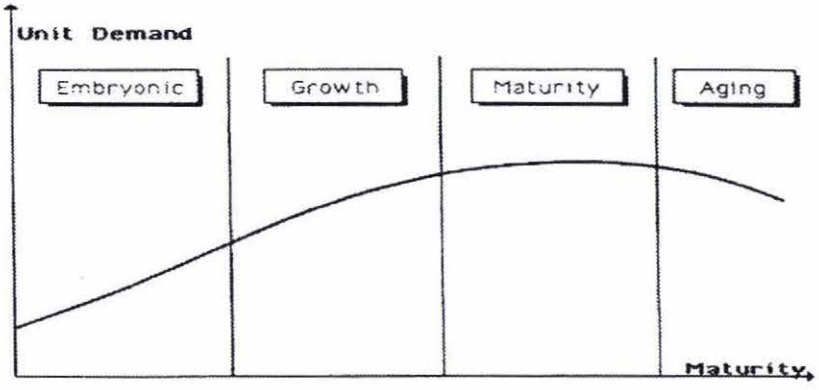
2.3 INDUSTRY LIFE CYCLE

Analysing the industry life cycle provides industry participants with the additional dimension necessary to understand the dynamics of industry structure. An industry is a dynamic structure that evolves through time, and has a life cycle. As seen in Figure 2.5 an industry, within its life cycle, goes through different stages or transformations. There is no time limit for the life cycle of an industry, it can take months, or years.

2.3.1 LIFE CYCLE STAGES

There are four stages in the industry life cycle (ILC) different from those of a firm or business. However, Baker *et al.* (1998) defines the product life cycle (PLC) in the same way as Allio (1988) defines the industry life cycle. In Baker's work, the PLC has four stages: introduction, growth, maturity and decline. Allio (1988) defines industry as a group of firms that produce products or services and compete in order to sell them in the market. According to this definition, the product should not have a different life cycle from that of the industry. However, different products, in different stages of their life cycles, can be seen in an industry. The length of each stage will depend on the industry. The four stages can be seen in Figure 2.5.

Figure 2.5: Industry Life Cycle.



Source: Allio, R.J, 1988: The Practical Strategist.

2.3.1.1 EMBRYONIC STAGE

When a new product or service is introduced to a market, an industry begins to emerge, and demand may grow rapidly (Allio 1988). In this stage, the growth rate is rapid and erratic, although unit sales may be quite small (Allio 1988). As new products come in to the market, customers needs begin a changing process. The number of industry participants is hard to define; however, it is easy to enter the industry. According to Allio (1988), investment at this stage is low, but variable costs are high. An example of an industry in the embryonic stage is the Chilean deer industry.

2.3.1.2 GROWTH STAGE

As new customers or buyers are discovering the new product being offered, growth increases rapidly. However, by the end of this stage, growth declines. As growth is high, there is a high perception of profits in the industry and competition increases to a maximum number. As competitors accumulate market franchises and secure market shares, new participants find it hard to enter the industry (Allio 1988). At this stage, the number of companies that can control a large fraction of the industry sales is not high. The product lines start to grow rapidly, and technology is an important factor in industry competition.

2.3.1.3 MATURE STAGE

When an industry reaches the maturity stage, the growth rate is similar to the growth rate of the economy. The potential for growth is well defined in this stage, and the industry has predictable behaviour. A competition within the industry is very stable, the number of participants is maintained, and market's shares change very slowly. A specialisation of production can be perceived in this stage, as firms try to satisfy specialised market requirements, finding a niche by differentiation. In terms of entry to the industry, it is very difficult to enter, as some firms within the industry have developed economies of scale. Customers are stable and the buying patterns are well established.

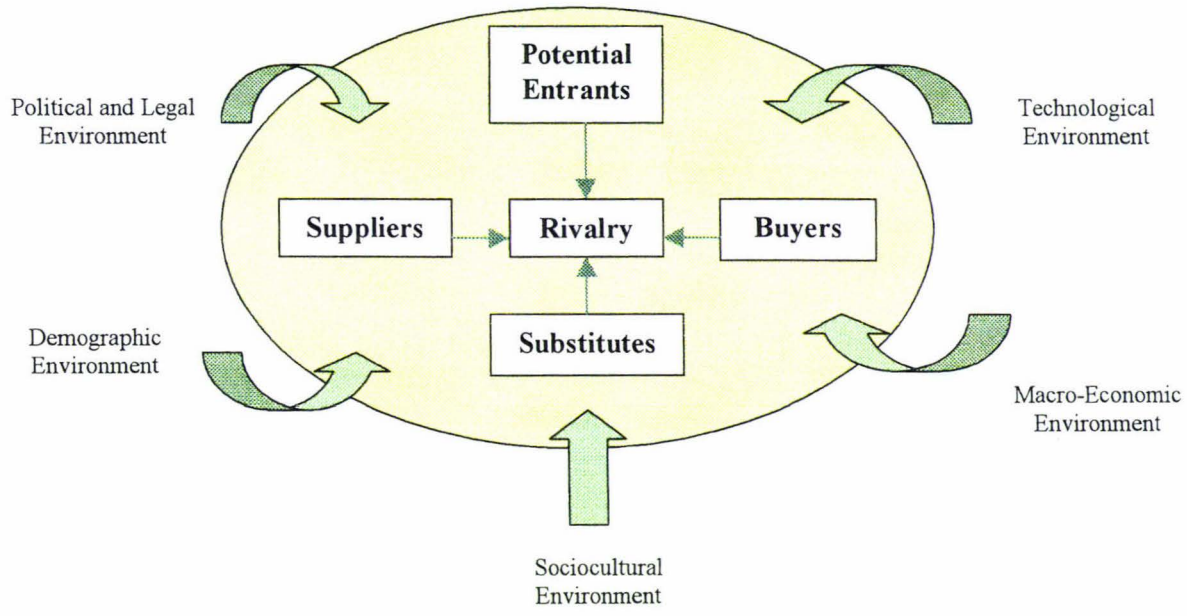
2.3.1.4 AGING STAGE

This stage is characterised by the decline of demand for products and/or services, and it is the when the industry can no longer satisfy the needs of the market. Some companies start to leave unprofitable markets and eliminate marginal products. The number of participants in the industry declines, and share distribution becomes more fragmented. Those firms that remain in the industry compete by securing a specific market or product niche. The stable and long relationships between customers and suppliers are the basis for competition in the industry. Entry barriers to an industry at this stage can be low, and entry is often by firm acquisition. New competitors are rarely attracted, with the exception of those who seek a source of cash flow (Allio 1988). Investments in technology are usually minimal, although innovation may renew the industry. Even though the profit margins for the industry overall are declining, the surviving businesses may be extremely profitable (Allio 1988).

2.4 THE EXTERNAL MACRO-ENVIRONMENT

Every industry firm operates within a macro-environment that generally cannot be controlled. This external environment produce influences in the industry, which are called macro-environmental forces or environments. Changes in any of these forces can provoke a change in other forces and in industry participants. The macro-environmental forces can be seen in Figure 2.6.

Figure 2.6: External Macro-environment of an Industry.



Source: Adapted from Pressley, M. 1998: Strategic Management.

These forces or environments are interrelated and are dynamic. They are subject to change, and are partially uncontrollable by firms within the industry. However, the macro-environmental forces are not completely uncontrollable, and firms in the industry may be able to influence the external forces to some extent by understanding the different forces.

Many authors have studied the industry macro-environment, identifying the different forces. The number of forces identified varies among authors, with four to

eight forces being identified. The difference in the number of forces identified is due to the fact that some authors include two forces in one, whereas others try to explain each force individually. For instance, Rose (1995) identifies eight categories (cultural, social, demographic, economic, political, legal, technological and competition). In contrast, Hunger *et al.* (1998) identifies four forces (economic, technological, political-legal and socio-cultural). As stated, Rose (1995) analyses cultural, social, political and legal forces separately, while Hunger *et al.* (1998), groups these forces in two categories; socio-cultural and political-legal. In addition, from those forces presented Figure 2.6, natural, institutional and global forces are considered by some authors to be significant in the macro-environment (Hitt *et al.* 1999; Ennew 1993; Kotler *et al.* 1996; Christopher *et al.* 1980.). The industry macro-environment will be analysed considering a five environments scheme as shown in Figure 2.6, adding the extra environments analysed by other authors.

2.4.1 DEMOGRAPHIC ENVIRONMENT

Demography is the statistical study of human population and its distribution (Stanton *et al.* 1994). This study is concerned with size, density, location, age, gender, race, occupation, and other statistics. This force is of special interest for industry participants, as it involves people, and people make up the markets (Kotler *et al.* 1996). The potential market for any product in any industry is affected, not only by the product characteristics, but also by the number of individuals within the population, the age structure, and the regional distribution of the population (Ennew 1993). Trends in population growth, such as births, deaths and migration, exert great pressure on the future plans of firms within the industry and influence the future approach to the market (Christopher *et al.* 1980).

2.4.2 MACRO-ECONOMIC ENVIRONMENT

The macro-economic environment refers to the nature and direction of the economy within which the industry operates, or may operate (Hitt *et al.* 1999). This

factor covers aspects such as interest rates, inflation, free trade, Gross Domestic Product (GDP), unemployment, exchange rates, trade deficits or surpluses, and personal and/or business savings rates. The different impacts of this force in the industry can vary across sectors of the economy (Ennew 1993). As markets are made up of people (as mentioned in the Demographic environment), these people need money to be able to purchase products or services in the market. Firms in the industry should pay close attention to major trends in consumer spending patterns (Kotler *et al.* 1996).

2.4.3 POLITICAL AND LEGAL ENVIRONMENTS

The macro-environment of an industry includes also legal and political facets. Political and legal environments affect every firm within an industry, as they write the set of laws under which it operates and sets the policies, which determine the trading environment (Rose 1995). According to Kotler *et al.*, (1996) these forces consist of laws, government agencies, and pressure groups that influence and limit various organisations and individuals in a given society. Similarly, Hitt *et al.*, (1999), established that this environment represents how organisations try to influence government and how government entities influence them. Changes in these environments will change the political/legal situation of an industry, and therefore, will bring either new threats or new opportunities to the participants in the industry, influencing the nature of competition. Stanton *et al.*, (1994), group the political and legal environments into five categories:

1. Monetary and fiscal policies,
2. Social legislation and regulation,
3. Governmental relationships with industries,
4. Legislation related specifically to marketing, and
5. Source of information and buyers of products.

As shown, these categories go from the most general area to the most detailed one, and in each of them the impact will come from both legislation and policies established by many governmental agencies.

These environments can be found in the deer industry, where these kinds of forces restrict the marketing of some products. Such is the case of deer velvet products in Europe, where velveting is not allowed, and hence the marketing of velvet products is not allowed in European markets.

2.4.4 SOCIO-CULTURAL ENVIRONMENT

In order to be successful in an industry it is essential to understand the consumer's needs, as "every society has a structure"[5]. This force is concerned with societies' social attitudes and cultural values. Some of these values include life-style and social beliefs, whereas Rose (1995) describes culture as the set of rules that governs the way society operates. All the rules in society are changing constantly, and they are changing much more quickly than they used to (Rose 1995 and Stanton *et al.* 1994), and firms in the industry should be prepared for that change. As this environment is directly influencing customers, it can often drive demographic, economic, political/legal and technological changes (Hitt *et al.* 1999).

2.4.5 TECHNOLOGICAL ENVIRONMENT

Nowadays, *technology* is a word commonly used by every participant in an industry. This term covers: mechanics, electrics, electronics, physics, chemistry and biology (Rose 1995). Technology has a great influence over consumers' buying patterns and economic well being. The technological force "includes institutions and activities involved with creating new knowledge and translating that knowledge into outputs, products, processes and materials"[6]. In any industry there is a massive technological change, and rapid obsolescence of products due to changing technology,

[5] Rose, P. 1995: Basic Marketing.
[6] Hitt, M. *et al.* 1999: Strategic Management, Competitiveness and Globalisation.

which are the rule rather than the exception in modern industry (Rose 1995, and Christopher *et al.* 1980). As change becomes faster and faster, the product life cycle in an industry has been shortened. Technology is a very important force as it affects product availability, the way people organise their lives and the ways which goods and services are marketed.

2.4.6 NATURAL ENVIRONMENT

Only Ennew (1993) and Kotler *et al.*, (1996) include the Natural environment in the external macro-environment of an industry. This means that every industry operates within a natural environment. This environment deals with factors such as the geography and climate of a particular industry. In past years, environmental concerns have increased and have become highly relevant for firms. This environment plays an important role in relation to agricultural activities, such as deer farming. The importance of this force is due to the fact that agricultural activities may have a negative impact upon the environment. Such is the case with introduced deer in Chile, where the government is very careful about the environmental and the phyto-sanitary situation of the country. Some aspects of which firms in an industry should be aware regarding the natural environment are:

1. Availability of raw materials,
2. Cost of raw materials,
3. Increased pollution, and
4. Government intervention in natural resource management.

It is clear that these aspects of the natural environment will vary from industry to industry, and that they will depend on the particular situation of a firm (Ennew 1993). As previously stated, political and legal decisions or government interventions can influence this force. In the same way, there are interactions between the sociocultural force and the natural force as the values and beliefs of society may be affected by the use of the natural environment.

2.4.7 COMPETITION ENVIRONMENT

Only Stanton *et al.,* (1994) identifies competition in their analysis of industry macro-environments. The competition environment of an industry will affect any firm's products, pricing, distribution systems, and promotional programmes within that industry. Stanton *et al.,* (1994) identifies three types of competition: brand competition, substitute products and every other company in the industry. In Table 2.1 show elements of some of the macro-environment forces recently mentioned.

Table 2.1: Macro-environments and elements.

Environment	Elements
Demographic	• Population size
	• Age structure
	• Geographic distribution
	• Ethnic mix
	• Income distribution
Economic	• Inflation rates
	• Interest rates
	• Trade deficits or surpluses
	• Budget deficits or surpluses
	• Gross Domestic product
Political and Legal	• Antitrust laws
	• Taxation laws
	• Deregulation philosophies
	• Labour training laws
	• Educational philosophies and policies
Sociocultural	• Women in the workforce
	• Workforce diversity
	• Environment concerns
Technological	• Product innovation
	• Process innovation
	• Application of knowledge
	• New communication technologies

Source: Adapted from Hitt *et al.,* 1999: Strategic Management, Competitiveness and Globalisation.

2.5 SWOT ANALYSIS

The letters of SWOT analysis stands for:

Strengths
Weaknesses
Opportunities
Threats

A SWOT analysis is part of strategic planning and it is often called a situation analysis as it analyses a firm's actual situation and how this situation can change in the future. The final purpose of the SWOT analysis is to isolate key issues to facilitate a strategic approach. This kind of analysis can be made at a company level, or at an industry level. However, the literature refers mostly to SWOT analyses of firms. The macro-environmental forces can be evaluated by performing a SWOT analysis of a particular firm within the industry.

A SWOT analysis consists of evaluating a firm's internal strengths and weaknesses and its external opportunities and threats. Strengths (positive aspects) and Weaknesses (negative aspects) are always found inside the firm, as they are internal factors whereas Opportunities (positive aspects) and Threats (negative aspects) are often originated outside the firm. Definitions[7] and typical examples of the SWOT components are as follows:

- **Strength**: Something a company is doing correctly or which it does well. It may be a skill, a competence, or a competitive advantage that the firm has over rivals in the industry. Also, it is defined by Pedler *et al.*, (1991), as any internal asset, which will help the firm to meet demands, and to fight off threats. Some of the typical examples are: well-trained manpower, technology and know-how.

- **Weakness**: Something a company lacks or does poorly compare to rivals in the industry, or a condition that puts it in a disadvantaged position. Weakness is also

[7]Definitions quoted from: Blade Consulting Corporation, 1998 in http://www.blade-consulting.com/swot.html; and Pedler *et al.* in http://www.snafu.de/~h.nauheimer/an_01.htm

defined as an internal deficit hindering the organisation in meeting demands. The typical examples of a firm's weakness are lack of motivation, lack of transport facilities, distribution problems, and low reputation.

- **Opportunity**: A realistic way for future growth and where a company has the most potential to develop a competitive advantage. Opportunity examples are new technologies, increasing purchase power and development of new markets for high quality products.

- **Threat**: An external environmental factor which can lead to a decline in a firm's future performance. It is any external circumstance or trend, which unfavourably influences demand for a firm's competence. Examples of threats are establishment of strong competitors, lack of cash, governmental regulations, and unfavourable demographic shifting and political changes.

In an industry, different firms will have different strengths, opportunities, weaknesses and threats. Once the SWOT analysis is completed, a firm can determine which is the best strategy to use, as "SWOT can be used also to generate a number of possible alternative strategies"[8].

2.6 GROSS MARGINS ANALYSIS

Gross margins analysis is generally used as a guide to the general profitability or financial outcome, of a wide range of livestock operated on farms. The gross margins analysis reflects general levels of inputs and outputs and is one of the most common tools used by farmers to help them plan. Gross margins are used as a management tool to help farmers choose between different strategies. This may mean choosing between two different enterprises, or choosing between different production methods for the same enterprise. Gross margins of an enterprise is the difference

[8] Hunger *et al.*, 1998: Strategic Management. Sixth Edition.

between the gross income earned by the enterprise and the variable or direct costs associated with it. The time period used is normally either 12 months or a cropping season. Figure 2.7 shows the formula used to calculate gross margins.

Figure 2.7: Gross Margins Formula.

Gross Margin = Gross income – Variable costs

Variable costs are the costs directly linked to the enterprise. They are called variable because they vary with the size of the enterprise. For instance, the greater the number of deer run by a deer farmer, the greater will be the cost of drenches, vaccines, velveting, etc., to the deer enterprise. Hence these costs are the deer farmer's variable costs. This is in contrast with fixed or overhead costs. These costs are those that are incurred regardless of whether or not production takes place. These costs do not vary as the size of an enterprise change unless a very large change takes place. Overhead costs common to all enterprises such as rates, interest and principal payments, labour, repairs and maintenance, are excluded from the Gross Margin Analysis. Variable costs are enterprise specific, whereas fixed costs are associated with the whole farm.

CHAPTER 3: CHILEAN BACKGROUND

3. CHILEAN BACKGROUND

3.1 CHILEAN GEOGRAPHY

Chile is placed in the south-western corner of South America (see Figure 3.1). It shows extraordinary geographical features. The country constitutes a narrows strip of land whose length stretches over 4,200 km, with a width that goes from a maximum of 375 km to a minimum of only 90 km. Chile is the seventh largest nation in South America. Its mainland covers 756,626 square km. All the territory is sheltered by two great mountain ranges, the Andes Mountains (Cordillera de los Andes) and the Coast Mountains (Cordillera de la Costa). The geographical effect caused by these two mountain ranges is called the intermediate depression, and it varies from region to region in Chile.

To the east, the high tops of the Andes Mountains (around 7,000 m) constitute a natural boundary with Argentina and Bolivia. Meanwhile, to the west the Coast Mountains' height is lower, with a maximum of 3,000 m in the North, and decreases gradually to the south. In the regions called Little North and Central Zone there exist the transversal valleys, which go down from the Andes to the Coast Mountains. These valleys make flat lands, which are scarce as compared to the total area of the country that is approximately 29% out of the total area. To the South is Antarctica and to the North the Atacama Desert.

Figure 3.1: Location of Chile in America.

Source: http://www.worldatlas.com/aatlas/samerica/maps/chile.htm

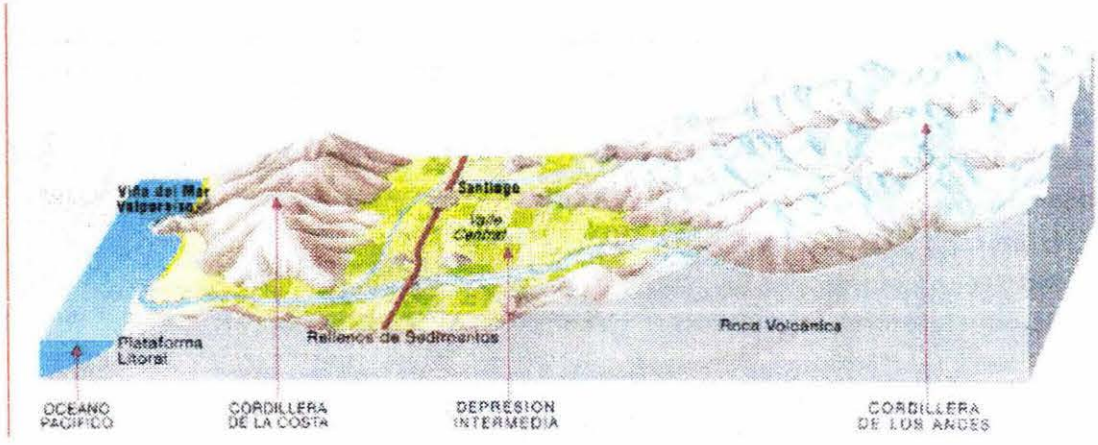
3.1.1 THE NORTH OF CHILE

The North of Chile is well known for its prodigious fisheries and mineral wealth (copper, nitrate, silver and salt). It comprises approximately one-third of the Chilean mainland, including the Atacama Desert where the annual rainfall is zero. Further south, in the Little North, the first valleys begin to appear. The climate, temperate and mild, is perfect for growing plants, vegetables and fruits, such as grapes (table and wine grapes).

3.1.2 THE CENTRAL VALLEY IN CHILE

The Central Valley is bounded by the Aconcagua and Bio-Bio rivers. With hot summers, temperate autumns, rainy winters and sunny springs, the region's fertile valleys are the core of Chilean agriculture (see Figure 3.2).

Figure 3.2: Central Valley Geographical Composition.



Source: Guia Turistica de Chile, TURISTEL, 1999.

The most important agricultural activities are vineyards, orchards, fields of vegetables and cereal crops. The majority of the Chilean population live in this region, as this is the place for main cities, industrial, commercial and financial activities. Santiago, the capital, stands in the centre of the country, as is the home of most of the farming and industrial activities. Further south lie the city of Concepcion and the port of Talcahuano, which together comprise the third largest urban area in the country after Santiago. The region is rich in agricultural products, livestock and, above all, forestry resources.

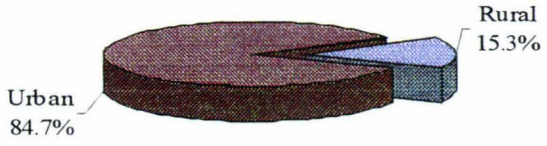
3.1.3 THE SOUTH OF CHILE

The South is a world-famous tourist destination, known for its lakes, volcanoes, islets and glaciers. Forestry and agriculture represent the most important sources of revenue for the rural population, as well as for the urban. In this part of

Chile, the land breaks up into hundreds of islands, channels, fjords and glaciers. The climate is cold and rainy.

Chile has a total population of 14,418,800 people. From this total, 84.7% is urban and 15.3% is rural, as seen in Figure 3.3. Santiago has the highest concentration of the population, with 4.2 million.

Figure 3.3: Chilean Urban and Rural population.



Source: National Institute of Statistics (INE), Chile.

3.1.4 CLIMATES

As a result of the length of the country, in addition to other features such as natural barriers formed by the mountain ranges and the subtropical ocean currents in the north as well as the polar ones from the south, there is a great diversity of climates along the territory. The country's climates vary from the desertic climates in the north, with average rainfalls lower than 1 mm per year, to the mildly cold rainy ones in the south end, in which the average rainfalls exceed 5.000 mm per year. This makes possible the existence of a great variety of animal and vegetable lifeforms, that constitute the basis of a diversified agricultural and forestry development of the nation.

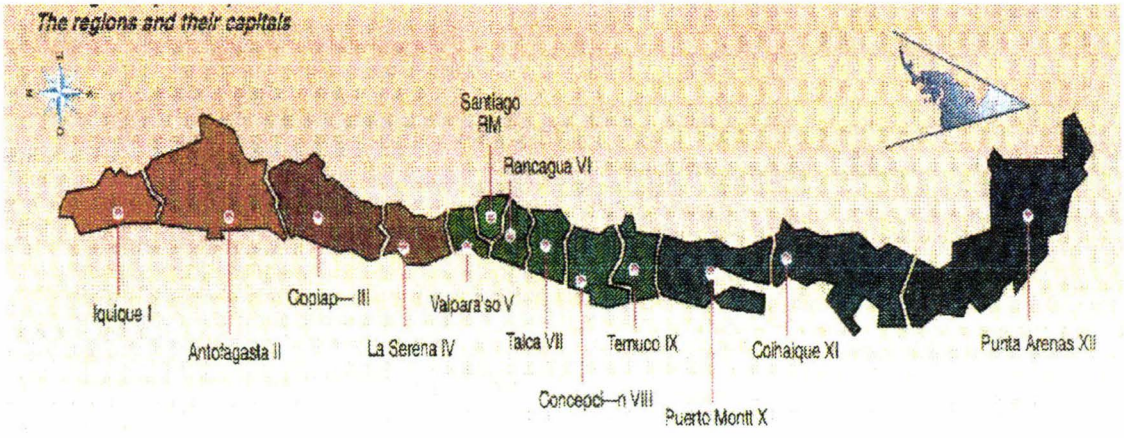
The climate in the most populated areas is generally mild. In the far north, summers are warm and winters extremely mild; in the south, it is colder and wetter. Summer (December-March) in Santiago is long and dry with temperatures reaching a

low of 10°C and a high of 30°C. The rainy season is from May to August, with an average temperature of 12°C.

3.2 ADMINISTRATIVE DIVISION OF CHILE

The state management is carried out through a division of the territory into regions enumerated from north to south (see Figure 3.4). In an effort to decentralise the administration, Chile has been divided into 12 regions and a Metropolitan area, which includes the capital, Santiago and its vicinity. Santiago is the commercial centre of Chile, other major cities include Concepcion, Valparaiso (the principal seaport), Vina del Mar, Temuco, Antofagasta, Punta Arenas, Iquique, Coquimbo and La Serena.

Figure 3.4: Chilean regions and their capitals.



Source: ODEPA: Chilean Agriculture Overview 1997, Chile.

From an agricultural and forestry production point of view, it is possible to identify 7 macro regions in Chile. These macro regions stand out as they have a certain unity of climate and geography (see Table 3.1).

Table 3.1: Principal Agricultural Activities of the Macro-Regions in Chile.

Macro – Region	Principal Agricultural Activity
Great North	Horticulture, Camelid raising.
Little North	Horticulture, Pisco Production, Goat raising.
Centre	Horticulture, Viticulture and viniculture, Annual crops.
Central South	Annual crops, Viticulture and viniculture, Forestry.
South Frontier	Cereals, Livestock raising and fattening, Forestry.
South: The Lakes Zone	Cattle, Milk production, Forestry.
Extreme South	Lamb and Cattle, Forestry.

Source: ODEPA: Chilean Agriculture Overview, 1997.

3.3 AGRICULTURAL LAND IN CHILE

From the 75.6 million hectares of continental Chile, approximately only one-third, are suitable for agriculture and forestry activities. This area is divided as follows:

- 8.5 million hectares suitable for livestock raising,
- 13.5 million hectares with forestry potential,
- 5.1 million hectares of arable soil,
  - 1.8 million ha of irrigated soil,
  - 1.3 million ha of soil with irrigation potential,
  - 2.0 million ha of dry land.

3.4 CHILEAN ECONOMY

3.4.1 INTRODUCTION

In terms of new businesses or the introduction of new activities to the productive system of a country, it is necessary to analyse and understand some factors that can influence these new businesses. Nowadays, investors are confronted with a wide and varied menu of investment choices. In these conditions, when considering a new investment, the investor will have regard to factors such as kind of investment

(area of the investment, e.g. agriculture, share markets, etc.), location of investment (domestic or overseas), and economic criteria (inflation, exchange rates, etc.).

In the case of the Deer Industry in Chile, all the factors that will be analysed in this chapter are relevant, as they will determine the opportunities of both new entrants into and leavers from the industry. Moreover, these factors should be taken into account when trying to start a new activity in the country.

Chile has an open and stable economy, which promotes trade and investment. Some of the most important figures of the Chilean economy in the 1992 – 1997 period are presented in Table 3.2.

Table 3.2: Relevant Figures of Chilean Economy, 1992 - 1997.

	1992	1993	1994	1995	1996	1997
GDP (US$ billion)	41.9	44.5	50.9	65.2	69.2	76.4
GDP Per Capita (US$)	3,143	3,305	3,719	4,015	4,841	5,350
GDP Growth Rate (%)	11.0	6.3	4.2	8.5	7.2	6.5
Unemployment rate (%)	6.2	6.4	7.8	6.6	6.5	6.1
Consumer Price Index (%)	12.7	12.2	8.9	8.2	6.6	6.0
Exports (FOB) (US$ million)	10,007	9,199	11,604	16,024	15,405	16,923
Imports (CIF) (US$ million)	9,285	10,181	10,872	14,655	16,500	18,218
Trade Balance (US$ million)	722	(990.0)	732	1,369	(1,095)	(1,295)
Foreign Debt (US$ million)	18,242	19,186	21,478	21,736	22,979	26,775
Population (million)	13.5	13.8	14.0	14.1	14.4	14.6

Source: Central Bank of Chile.

Chile has a low country risk rating (A-), according to Standard & Poor's rating services (refer to Appendix 1), Duff & Phelps (1999), and is ranked *Baa1* by Moody's. These ratings offer attractive conditions, which make Chile one of the most competitive market places in Latin America. Furthermore, Chile is ranked by the World Economic Forum as the 21st most competitive country on a worldwide basis in the 1999 competitive index. Competitiveness is defined as "the ability of a country to achieve sustained high rates growth in GDP per capita"[9]. The index is "designed to assess which country has the best prospects for economic growth over the next five to ten years"[9] The Chilean performance for 1999 and the previous three years in this ranking is shown in Table 3.3.

[9] The World Economic Forum 1999 report.

Table 3.3: Competitive Index, 1999.

	Competitive Index 99	Rank 1996	Rank 1997	Rank 1998	Rank 1999
Chile	0.57	18th	13th	18th	21st

Source: World Economic Forum, Global Competitiveness Report, 1999.

As seen in Table 3.3, Chile shows a step backwards from 1998 (rank 18th) to 1999 (rank 21st). The ranking is based on statistical data from business leaders, and allows determination of the country's capacity to increase the level of participation of its products and services in international markets. At the same time it determines the life quality of the country's population. Even though Chile is currently in 21st place its economy is the best-evaluated in Latin America[10].

The competitive index considers 8 factors: openness, government, finance, infrastructure, technology, business capacity, labour force, and institutional behaviour. In addition, Chile is ranked in 1st place in the equilibrium ranking between public income and expenditure.

Some of the weaknesses found in the Chilean competitiveness index were in the Internet development and electronic commerce. It is important to notice that the latter not only implies the buying or selling of products, but also it is included in the exchange of documents and other transactions.

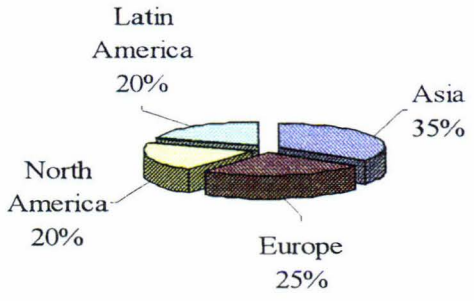
3.4.2 EFFECTS OF THE ASIAN ECONOMIC CRISIS ON THE CHILEAN ECONOMY

Among the most important effects of the Asian economic crisis on the Chilean economy were its negative effects on the external commerce and the national income. The low growth level of activity in the world economy, especially in Asia, generated a low demand for the principal Chilean export products. This situation led to a decrease in product prices, and therefore a decrease in export income. Chilean exports have a diversified market, exporting more than 3,500 products to 180 different countries. As

[10] Jorge Leiva, Ministry of Economy in Chile, 1999.

seen in Figure 3.5, from the total of Chilean exports, 25% goes to Europe, 20% to North America, 20% to Latin America, and 35% to Asia.

Figure 3.5: Chilean Export Destination, by volume, 1997.



Source: Central Bank of Chile.

As can be seen, the Asian market is very important to Chilean international commerce. The most important market for Chilean products in Asia is Japan, a country which has experienced a low growth level after the economic crisis. Other important markets are Thailand, Indonesia, the Philippines and Korea. According to Carlos Massad Abud[11], the export prices in 1998 were partially compensated by a lower external inflation and a decrease in the crude oil price.

Some of the strengths of the Chilean economy, according to the Central Bank of Chile, are:

1. Solid financial structure and macroeconomic stability,
2. Low and decreasing inflation rate (Table 3.4), and
3. A non-significant short-term external debt, (Table 3.4).

These strengths are the basis for the present and future growth of the country. Even though the growth rate has decreased, the country is still growing but at a slower rate.

[11] President of the Central Bank of Chile.

Table 3.4: Chilean Inflation Rate and External Debt, 1990 – 1998.

Year	Inflation Rate (%)	External Debt (TM US$)
1990	27.3	17,425
1991	18.7	16,364
1992	12.7	18,242
1993	12.2	19,186
1994	8.9	21,478
1995	8.2	21,736
1996	6.6	22,979
1997	6.0	26,775
1998	4.7	31,546

Source: Central Bank of Chile and El Mercurio Newspaper, Santiago Chile, 1999.

Table 3.4 shows how the inflation rates have been decreasing since 1990, from 27.3% to 4.7% in 1998. In contrast, the external debt has been increasing. However, the short-term external debt represents only 1.5% of the National GDP[12].

3.4.3 CHILEAN ECONOMIC INDICATORS

Economic indicators are important to a country and to investors, due to the fact that they show the current economic situation of the country (in this case Chile). Some of the most important economic indicators that will be discussed are Gross Domestic Product (GDP), investment, Exchange rates, Trade balance (export-imports) and Employment.

3.4.3.1 GROSS DOMESTIC PRODUCT

Chile has shown a maintained rise in its National GDP for the last 14 years, which on an average basis, accounts for more than seven percent (7%) per year. The increasing development plus the low birth rate of the country has resulted in an

[12] Carlos Massad Abud, President of the Central Bank of Chile.

increase in the GDP per capita from US$2,321 in 1990 to US$5,350 in 1997 (Table 3.5).

Table 3.5: Chilean Total Gross Domestic Product and per capita Gross Domestic Product, 1990 – 1997.

Year	Total National GDP (TM US$)	Variation (%)	GDP per capita (US$)
1990	30,402	3.7	2,321
1991	34,412	8.0	2,584
1992	42,749	12.3	3,143
1993	45,658	7.0	3,305
1994	50,919	5.7	3,719
1995	65,216	10.6	4,015
1996	69,217	7.4	4,841
1997	77,083	7.6	5,350

Source: Central Bank of Chile and Agricultural Studies and Policies Office (ODEPA).

In 1997, the Chilean GDP was US$77 billion, increasing 7.6% from 1996. The growth in GDP can be explained by increases in sectors such as transport and communications (10.5%), electricity (10%), mining (8.1%), construction (7.7%) and commerce (7.3%). As seen in Table 3.5, National GDP has been constantly increasing from a US$30 billion level in 1990 to almost US$80 billion in 1997.

Different regions of the country have different production specialities, and therefore the level, or extent of participation in the National GDP is different from region to region. As seen in Table 3.6, in 1997, the Metropolitan Region had the highest level of participation in the National GDP, with $3,074,407 million Chilean peso (C$). On the contrary, XI Region has the lowest level of participation, with $32,582 million Chilean pesos. The reason for this is that, as Chile's territory goes from the Atacama Desert to the Antarctica, the climates and topography change, giving the different regions different productive advantages.

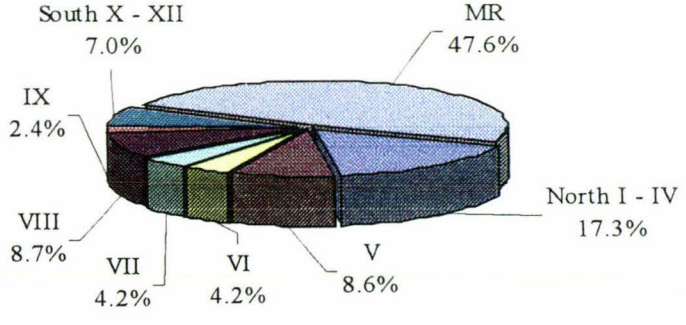
Table 3.6: Chilean Gross Domestic Product by Region 1990 – 1997, in million Chilean pesos.

Region	1990	1991	1992	1993	1994	1995	1996	1997
I	129,475	137,199	155,991	155,667	181,269	205,325	218,582	255,060
II	274,953	311,288	316,527	328,599	360,110	381,255	471,377	540,601
III	69,146	81,853	92,902	102,720	117,375	134,000	153,177	162,847
IV	106,716	114,003	128,413	126,567	138,713	149,185	155,081	159,195
V	382,164	396,184	426,711	458,806	489,960	531,397	547,785	553,995
MR	1,736,608	1,904,349	2,174,295	2,352,444	2,422,839	2,685,215	2,865,621	3,074,407
VI	201,481	208,428	231,712	243,652	266,211	273,769	284,927	291,136
VII	160,862	178,408	206,944	212,791	238,899	260,624	261,809	271,785
VIII	414,716	429,616	460,894	476,670	485,207	518,864	535,868	562,044
IX	97,655	100,906	115,176	126,346	128,690	142,729	146,651	155,552
X	162,368	164,276	180,081	190,693	203,155	224,316	243,278	267,643
XI	19,521	19,735	20,961	22,519	25,228	25,629	28,775	32,582
XII	117,551	122,315	122,652	123,661	119,073	122,847	126,070	134,110
Others	610,855	672,887	802,622	894,511	970,881	1,145,797	1,266,140	1,397,524
Total	4,484,071	4,841,447	5,435,881	5,815,646	6,147,610	6,800,952	7,305,141	7,858,481

Source: Central Bank of Chile.

The regional participation in the National GDP is presented in Figure 3.6. The participation percentage does not include Value Added Tax (IVA[13]), import rights, and external services of public management sector.

Figure 3.6: Regional Participation in the National Gross Domestic Product, in percentage (1997).



Source: Central Bank of Chile.

[13] The IVA is 18%, and it is equivalent to the Goods and Services Tax (GST) in New Zealand.

As mentioned before, the most important activities in Chile are mining, agriculture and fishing, which comprise the main economic sectors. However, there are various other activities that are significant in the structure of the National GDP (see Table 3.7).

Table 3.7: Chilean Gross Domestic Product Composition by Economic Activity, 1990 – 1998 (million Chilean pesos).

Activity	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agriculture*	360,183	364,667	405,666	416,615	441,515	464,295	470,393	450,830	464,211
Fishing	54,685	60,275	70,281	74,195	86,316	100,040	109,771	119,239	123,056
Mining	400,882	450,532	444,040	443,323	482,754	527,800	610,991	670,603	698,016
Manufacture	784,161	826,013	920,293	987,062	1,027,352	1,104,750	1,140,257	1,202,348	1,183,786
Electricity**	85,995	109,182	139,295	146,047	155,111	166,945	160,678	177,604	186,188
Construction	237,010	233,382	265,228	327,508	324,038	356,179	386,859	416,881	415,334
Commerce	683,138	748,841	880,336	944,208	992,606	1,133,117	1,241,044	1,359,306	1,431,731
Trans. & Comm.	318,672	345,487	405,359	428,874	451,964	518,310	571,042	650,603	723,403
Financial Serv.	569,942	653,965	727,876	778,204	833,577	915,060	977,703	1,050,945	1,088,182
Public Mgt.	149,159	151,646	156,052	158,949	160,676	162,933	165,172	167,421	169,741
Others	549,648	568,081	401,500	616,918	639,052	659,011	691,021	715,239	738,301
Sub Total	4,193,475	4,512,071	5,010,726	5,321,903	5,594,961	6,108,440	6,524,931	6,981,019	7,221,950
Others***	290,596	329,376	425,155	493,743	552,649	692,512	780,210	877,462	904,556
Total	4,484,071	4,841,447	5,435,881	5,815,646	6,147,610	6,800,952	7,305,141	7,858,481	8,126,506

* Include Forestry; ** Include Gas and Water; *** GST and Import rights.
Source: National Institute of Statistics (INE), Chile.

As seen in Table 3.7, both, agriculture and manufacturing show a decrease in their GDP participation (from 1997 to 1998), due to the economic crisis that affected the Asian countries. It is interesting to notice that commerce accounts for 17.6% of the total GDP in 1998. This activity includes hotels and restaurants. Even though fishing represents an important activity, the increase in its level of participation during 1998 was only 1.5% of the total GDP. Other activities such as Financial Services, and Transport and Communications are important participants in the national GDP (13.3% and 8.9% respectively).

3.4.3.2 EMPLOYMENT

Employment is a very important factor to be considered when analysing the economic indicators of a country. There is no doubt that in the last 10 years, Chile has

experienced an impressive economic development. The employment level has shown great variations among different productive sectors of the country, (see Table 3.8).

Table 3.8: Employment by Economic Activity (1997, 1998, and 1999).

Sector	Participation (%)	1997 (% average)	1998 (% average)	1999 January (%)	1999 February (%)
Agriculture*	15.4	-4.9	0.6	0.2	-1.2
Mining	1.8	-1.5	-5.8	-6.0	-7.7
Industry	16.4	1.9	-1.6	-8.1	-9.0
Electricity	0.7	-1.7	-10.9	21.9	15.0
Construction	7.9	9.7	8.3	-13.5	-16.8
Commerce	17.9	3.1	3.0	4.5	4.7
Transport & Comm.	7.5	4.5	4.3	10.1	7.1
Financial Services	6.7	4.8	5.6	6.8	5.5
Commercial Services	25.7	2.7	0.9	2.5	4.6
Total	**100.0**	**2.1**	**1.8**	**0.2**	**-0.3**

Note: Growth rates in 12 months %
*Includes Fishing and Hunting.
Source: IME-UC. 1999.

In the last twelve months, the number of unemployed people increased by more than 172 thousand, according to the average unemployment rate of 8.2% from January to March 1999. The total number of unemployed people in Chile at the months mentioned before was 472,830 people[14]. In the same period in 1998, the average unemployment rate was 5.3%. The lowest unemployment rate registered in Chile was between December 1997 and February 1998, at 5.1%. In contrast, during the period between November - September 1994, the average unemployment rate was 8.4%. In Table 3.9, the annual labour market growth rates (%) can be seen, which include the growth in the total labour force and the growth of unemployment.

Table 3.9: Annual indicator of Labour market, 1991 – 1999. (Growth rate in %)

	1991	1992	1993	1994	1995	1996	1997	1998	1999[e]
Labour Force	1.9	2.7	5.6	2.6	0.7	0.4	1.8	1.8	1.0
Unemployment Rate	8.2	6.7	6.5	7.8	7.4	6.5	6.1	6.2	7.9

e: estimate figures.
Source: IME-UC. 1999.

[14] National Institute of Statistics (INE), Chile.

The unemployment rate between April/June 1998/99 increased in twelve of the thirteen regions in Chile. From a regional point of view, the V Region is the one that shows the highest unemployment level, with 13.9%. On the contrary, the XI Region shows the lowest unemployment rate with only 5.1%. In the Metropolitan Region, the unemployment level grew from 6.5% in April/June 1998 to 11.5% during the same period in 1999 (see Table 3.10).

The constant increase in the unemployment level has been observed since the last three months of 1998, with unequal levels in different regions. At the same time, job opportunities have decreased, due to constraints in the economy following the Asian economic crisis. For instance, in January/March 1999 the number of people that entered into the labour force was 108,230, and the number of jobs available in the market decreased by 63,970.

Table 3.10: Total Unemployment Rate (%) and by region, April/June 1998 – 1999.

		Regions												
Period	National	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	MR
1998														
Apr/Jun	6.1	5.6	3.9	6.9	5.7	7.5	5.0	3.9	7.4	5.1	4.5	3.4	4.7	6.5
May/Jul	6.4	5.9	4.0	7.7	5.1	7.7	5.4	4.6	7.7	5.1	4.5	4.2	6.3	6.9
Jun/Aug	6.8	5.6	3.7	6.1	5.0	8.5	5.1	5.5	8.1	5.6	4.8	4.1	8.0	7.3
Jul/Sept	6.8	5.3	3.5	6.1	4.8	9.1	5.2	6.6	7.9	5.9	4.4	4.3	8.7	7.1
Aug/Oct	6.9	5.5	4.0	6.4	5.1	9.2	4.6	6.7	7.9	6.9	4.9	3.5	8.8	7.2
Sept/Nov	7.1	5.4	4.8	6.9	5.5	9.2	4.4	6.2	7.5	8.0	4.6	2.9	8.3	7.7
Oct/Dec	7.2	5.9	5.0	7.6	5.6	9.6	3.2	5.5	8.1	7.7	4.6	2.6	7.6	7.8
1999														
Nov/Jan	7.5	5.7	4.8	8.0	5.9	11.0	2.7	5.7	8.4	7.3	4.5	3.3	7.0	8.1
Dec/Feb	7.5	5.8	5.2	6.9	6.6	11.4	2.2	5.8	8.9	7.1	4.6	3.4	6.8	8.0
Jan/Mar	8.2	6.3	5.9	6.1	6.9	12.0	2.9	6.1	9.1	8.1	5.0	3.6	7.0	9.0
Feb/Apr	8.7	7.7	5.9	7.7	7.8	11.6	4.4	6.3	8.9	9.5	5.6	3.5	6.5	9.7
Mar/May	9.8	10.0	5.7	10.3	10.5	13.4	6.8	8.5	9.7	9.8	5.9	3.8	6.3	10.5
Apr/Jun	10.8	10.8	5.6	11.4	12.4	13.9	9.9	10.5	10.2	10.5	6.2	5.1	7.8	11.5

Source: Central Bank of Chile.

The total labour force accounts for 5,790,510 persons, showing an increase of 1.9% in comparison with the same period in 1998. However, the number of people

who are currently employed is 5,317,690, with a decrease (variation) of 1.2% compared to 1998. The sectors where employment decreased were construction, manufacture, mining, agriculture, and those in which employment increased were electricity, financial services, commerce and transport and communications (see Table 3.11).

Table 3.11: Employment decreases and increases by sector (number of people), April 1999.

Sector	Employment variation
Decrease Effect	
Construction	-88,250
Manufacture	-114,200
Mining	-8,370
Agriculture	-2,250
Increase Effect	
Electricity	3,460
Financial Services	23,090
Commerce	48,880
Transport & Communication	13,530

Source: El Mercurio Newspaper, April 28th, Santiago, Chile. 1999.

The increase in 7 points in the unemployment rate can be explained by three factors[15]:

1. The retarded constraint effect in the economic activity,
2. The pressure of the labour force, and
3. The seasonal increase in unemployment in some periods of the year (fourth trimester).

According to Molina[15], unemployment can be corrected only with the reactivation of both economic activity, and the private sector, which is responsible for 85% of the total employment of the country.

[15] German Molina, Labour Ministry, Santiago, Chile.

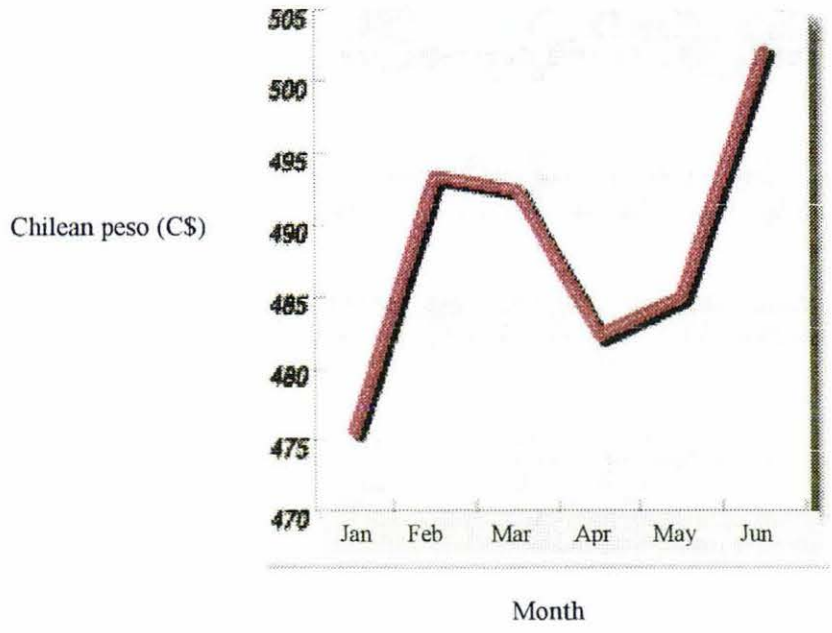
3.4.3.3 EXCHANGE RATES

The Chilean international exchange regulations allow the free setting of the exchange rate for all transactions in both the formal and the informal exchange market. The US dollar is the main currency, and it is used as the rule. Nowadays in Chile there are three exchange rates for the US dollar:

1. Formal exchange rate (observed): Banks and financial institutions use it. The Central Bank of Chile publishes daily the average exchange rate observed in the transactions in the formal market. This is the official exchange rate, and it is used for taxation and customs rights.
2. Informal exchange rate: This exchange rate is set in the share market in Santiago.
3. Agreed exchange rate: This exchange rate is set by the Central Bank of Chile, and is used for a limited number of institutional transactions.

In the first semester of 1999, the dollar value increased 6.8%, and as seen in Figure 3.7, the value of the US dollar was increasing (due to more devaluation of the Chilean peso (C$)), in this period. In February 1999, the value of the US dollar showed a decrease until April, where the value was between C$480 and C$485. However, from January to June 1999, the value of the US dollar in relation to the Chilean peso increased from approximately C$475 to over C$500.

Figure 3.7: Chilean Exchange Rate, First Six Months 1999. (Chilean pesos, in relation to US dollar).

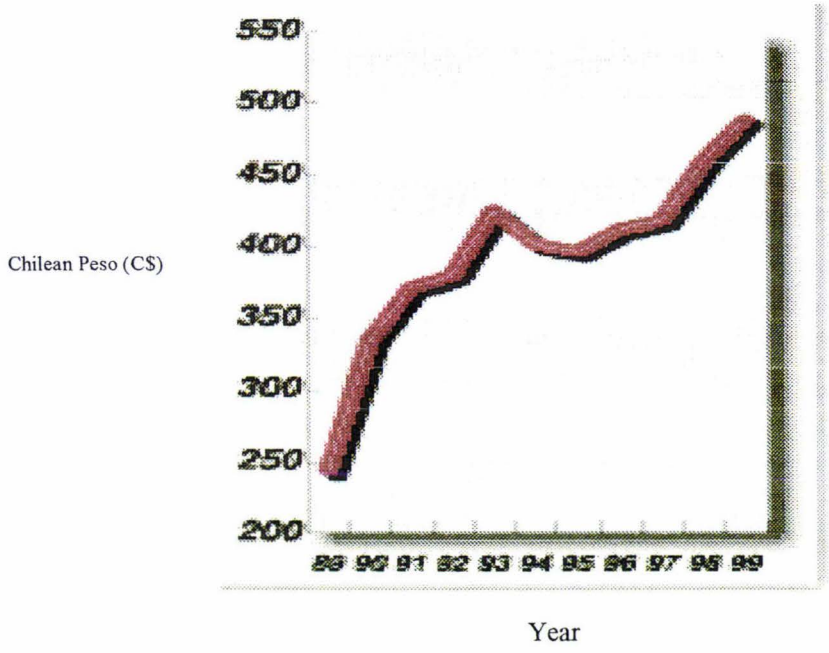


Source: El Mercurio, Newspaper, Santiago, Chile. August 1999.

According to Erik Haindl[16], the conditions of the internal expenditure allow the US dollar to increase without influencing the inflation target. In addition to this, Haindl mentions that the rise in the US dollar value is compensated for by the decrease in import prices of 4.0%. As seen in Figure 3.8, the exchange rate for the US dollar has been increasing steadily from about C$250 in 1989 to almost C$500 in 1999, and this is a process that will continue in the future. The government can control the increasing exchange rate by applying different macroeconomics policies in order to make the increase in the exchange rate more moderate within the country's economy.

[16] Director of the Study Department of Gabriela Mistral University, Santiago Chile.

Figure 3.8: Exchange Rate for Chilean Peso (CH$ v US$), 1989 – 1999.



Source: El Mercurio, Newspaper, Santiago, Chile. August 1999.

The increase in the exchange rate might influence the country's exports, as a higher value of the US dollar in relation to the Chilean peso means that for each US dollar the exporter receives, he/she will receive more Chilean pesos. However, there are several factors that influence, and that can motivate or constrain, the exports, such as market demand, legal requirements, etc.

3.4.3.4 GOVERNMENT'S ROLE IN THE ECONOMY

In Chile, businesses are generally owned by private entities. Prices are set freely, except those of regulated utilities. Even though Chile has gone through a privatisation process in the last 12 years, the state retains holdings in several industries. For instance, the most important public corporation is CODELCO, the world's largest copper company. In the case of major highway projects, seaports and airports infrastructures are being built under a concession programme.

The public budget is approximately 12.5% of the GDP. The main sources of income are: 18% Value Added Tax (IVA or GST), personal income taxes, corporate taxes, and import tariffs.

3.4.3.5 INFRASTRUCTURE

As mentioned before, the highway network is a private sector investment. The main highway is called the Pan-American Highway and is the major route from south to north. The highway that connects Chile (Valparaiso and Santiago) with Argentina (Mendoza) is called Trasandina, and has an important role in Chile/Argentina trade.

Several international airlines operate from Santiago's international airport, linking Chile with the rest of the world. A number (32 domestic and 3 international) of complete airports are located throughout the country. Air traffic has increased 17% in the last 5 years.

Chile's long coastline provides the country with major ports (47) in the Pacific Ocean. The principal port is Valparaiso (V Region), which is about 210 km from Santiago, and it has the ability to move more than 10 million tonnes each year. Other ports are Arica, Iquique, Antofagasta, San Antonio, Talcahuano and Punta Arenas. National and foreign shipping lines cover the international traffic to and from Chile. The coastal traffic is handled by several national companies, of which one is state-owned. As Chilean trade has been increasing, the port facilities have to be restructured in order to satisfy the country's needs. The government is awarding service and management concessions of the ports to private entities. The investment to improve the service and performance of the Chilean ports can be seen in Table 3.12.

Table 3.12: Projected Investment in Chilean Seaports (millions of US$).

Port	Million US$
Arica	181.9
Iquique	112.6
Antofagasta	104.5
Coquimbo	20.9
Valparaiso	428.1
San Antonio	308.9
S. Vicente Talcahuano	167.5
Puerto Montt	18.3
Chacabuco	27.0
Punta Arenas	22.0
Total Investment	**1,391.7**

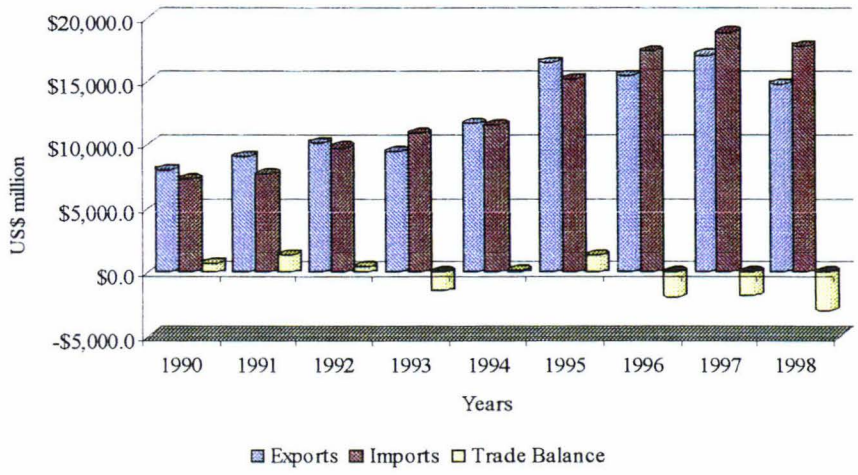
Source: Economic Report from the United States, 1998.

Chilean telecommunications are considered to be excellent, and the Chilean network is one of the best in the Southern Hemisphere. The telephone system is all digital, and cable, fax, telephone and Internet services rival those found anywhere in the world. In addition, the Chilean railroad system is the fourth largest rail network in Latin America (8,870 km), of which about 3,000 km is for cargo transport only. However, the railroad system needs to be upgraded and expanded. The Chilean government owns the railroads. As with the rest of the country's infrastructure, the government is giving private concessions for the passenger service. On the other hand, the government emphasises cargo transportation by train, which in 1997 moved more than 17 million tonnes.

3.4.3.6 CHILEAN TRADE

Chile has all the economic resources to overcome the negative effects of the Asian economic crisis of 1997/98. The Chilean economy is highly dependent on international trade. The trade balance (export Free On Board (FOB) minus imports Cost Insurance and Freight (CIF)) showed a deficit of US$ 3,028 million in 1998. Chile registered a deficit in the trade account only three times before 1998, in 1993, 1996 and 1997 (see Figure 3.9).

Figure 3.9: Chilean Foreign Trade History 1990 - 1998.



Source: Prochile – Central Bank of Chile.

The performance of Chilean exports, imports and trade balance from 1990 to 1998 is presented in Figure 3.9. During 1997 Chilean foreign trade reached US$35.1 billion. Exports of goods represented US$16.9 billion, increasing by 10% from the previous year. The exports decreased 13.3% in value from 1997, as a result of the declining price received for Chilean main export products, especially copper. Imports decreased 5.8% from 1997, with a total loss of US$17,785 million. The decline in imports was the result of a lower growth in the GDP. However, Chilean exports are estimated to exceed US$22 billion by the year 2000[17].

The main Chilean export product is copper, which represents over 40% of total exports. The industrial sector is the second in importance, followed by forestry and fishing. The main Chilean export products in 1997 are presented in Table 3.13.

[17] Prochile, 1998.

Table 3.13: Main Chilean Export products in 1997.

Product	US$ Million	%
Copper cathodes	4,400.0	25.9
Copper minerals and concentrates	1,938.7	11.4
Cellulose	677.7	4.0
Fresh Grapes	623.0	3.7
Fishmeal	549.7	3.2
Blister Copper	368.0	2.2
Raw Gold	330.8	2.0
Serrated Pine Boards	288.3	1.7
Bottled Wine	268.3	1.6
Refined Copper	256.4	1.5
Subtotal	**9,700.9**	**57.1**

Source: Prochile, 1998.

The growth rate for Chilean exports (non-copper) has been decreasing since 1994. Even though the growth is still there in various sectors, it is a cause of concern, as it is not leading the economic growth of the country. This can be clearly seen in Table 3.14.

Table 3.14: Growth Rates of Exports (volume), 1994 – 1997. (%).

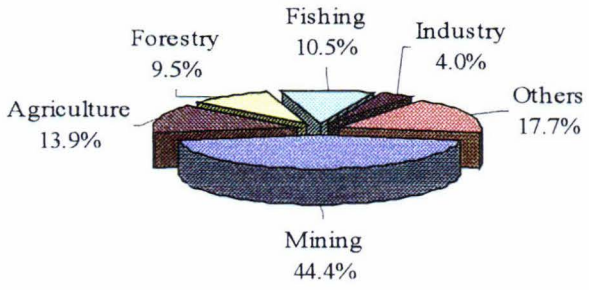
Sector	1994	1995	1996	1997
Mining	6.5	14.9	19.6	17.6
Agriculture	9.8	6.2	6.4	-6.1
Industrial	12.5	8.3	7.7	7.2
Total	**9.6**	**11.0**	**13.4**	**10.8**
GDP	5.1	9.2	6.8	7.1

Source: Central Bank of Chile, Economic and financial reports, 1998.

The slow down in the growth of the non-copper sectors is closely related with the exchange rate performance, which in turn, is related to the entrance of capital to the Chilean economy.

Historically, Chilean exports have been based on natural resources. For instance, in 1998 only mining represented 44.4% of total exports. The agricultural and fishing exports combined represented 24.4%. Figure 3.10 show the trade structure of Chilean exports.

Figure 3.10: Trade Structure of Chilean Exports, by sector, 1998.



Source: Prochile & Central Bank of Chile.

Chile, since 1991, has signed and integrated several trade agreements with countries from North, Central and South America, Europe and the Asia-Pacific region. The countries which have a trade agreement with Chile, are Mexico, Bolivia, Colombia, Venezuela, Ecuador, MERCOSUR (Argentina, Brazil, Uruguay, Paraguay), Canada and Peru (see Table 3.15).

Table 3.15: Chilean Standing Trade Agreements

Latin America			Multilateral	
Argentina	ECA	(Oct. 1996)	APEC	Full Membership
Bolivia	ECA	(Jun. 1993)	MERCOSUR	Associate
Brazil	ECA	(Oct. 1996)	OMC	Membership
Canada	FTA	(Dec. 1996)	WTO	Full Membership
Ecuador	ECA	(Jan. 1995)	EEC	Talks Underway
Mexico	ECA	(Jan. 1992)		
Paraguay	ECA	(Oct. 1996)		
Peru	PA	(May. 1983)		
Uruguay	ECA	(Oct. 1996)		

Source: Prochile

Chile entered into an economic association agreement with the Southern Cone Economic Community (MERCOSUR) in June 1997. This agreement is based on a 10 year deadline for the lifting of import duties on 90% of all goods traded. The agreement included also the physical integration of Southern Cone nations. Bioceanic corridors (overland, air, river and railway facilities) connect Chile with the Atlantic

counterparts. MERCOSUR represents 11.1% of the total Chilean exports in 1998, with Brazil being the most important market with 47%.

Chile joined APEC in 1994, and has full membership. This membership commits industrialised APEC members to free regional trade by the year 2010, with a 2020 deadline for less developed members.

These agreements include the progressive reduction of tariffs and the ban of all non-tariff trade barriers. It has been projected that for the next decade, more than 83% of Chilean agricultural products will be able to get into the countries involved tariff free[18]. At the moment, there are negotiations with the European Union, Panama and Cuba. The trade agreements signed by Chile, whose geography allows the closeness of productive areas to the ports, constitute an advantage for those export companies established in Chile. The projected impact of the trade agreement in the agricultural sector by the year 2005 can be seen in Table 3.16.

Table 3.16: Impact of Trade Agreements in the Chilean Agricultural Sector, 2005.

Chilean Exports	Agricultural Exports 1997 (Thousands US$)	Tariff Reduction 1997 (%)	Proportional Reduction 2005 (%)
Mexico	68,585	91.8	99.6
Venezuela	80,376	96.4	98.8
Colombia	108,526	93.0	98.6
Canada	57,905	9.0	99.9
Equator	46,943	73.0	96.5
Peru	85,274	10.0	67.7
MERCOSUR	407,614	30.0	75.8
Total	**855,222**	**46.8**	**83.4**

Source: Prochile.

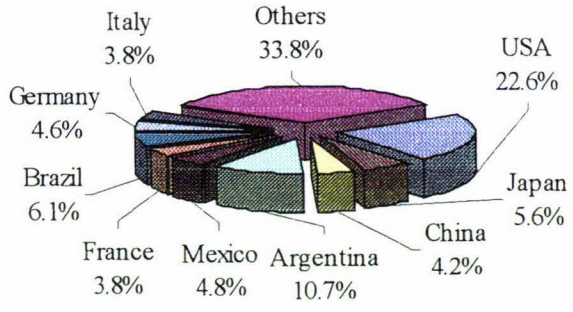
Starting from July 1, 2001, Chile and MERCOSUR partners can begin separate negotiations with the European Economic Community (EEC). These negotiations are aimed at lowering their import and export tariff rates. In 1998, Chile exported a total of US$4,148.3 million to the EEC (28.1% of total exports). The most important markets in Europe for Chilean exports are the United Kingdom (7.9%), Italy (4.5%) and Germany (3.6%).

[18] Fundacion Chile: Un Pais para invertir en Agroindustria, 1998.

Chilean exports to the North American Free Trade Agreement (NAFTA) represented 21.9% of the total. From this percentage, 80% went to the US market in 1998. Exports to the USA showed an increase of 13% in April 1999, compared with the same period in 1998.

The USA represents the strongest trading partner of Chile (refer to Appendix 2). In 1997 exports to the USA were US$2.7 billion (15.7% of all Chilean exports). Chilean imports during 1998 were US$17,785 million, 5.8% lower than in 1997. From this total, 30.2% came from NAFTA (USA, Canada and Mexico), where the USA represented about 75%. Imports from MERCOSUR represented 17.6%, with Argentina and Brazil as main providers, with 10.7% and 6.1% respectively. The EEC provided 21.6% of the total imports. The main European providers were Germany (21%), France (17.6%), Italy (17.6%) and Spain (17.1%). The main providers for Chilean exports in 1998 are presented in Figure 3.11.

Figure 3.11: Main providers of Chilean Imports in 1998.



Source: Central Bank of Chile.

Chilean trade is highly concentrated on few products, hence, it is vulnerable to external changes. For instance, the Asian economic crisis negatively affected Chilean exports, as the global demand for Chile's main natural resources products, mainly copper, decreased.

3.4.3.7 FOREIGN INVESTMENT

The Chilean government has established a development strategy that includes a welcoming attitude towards foreign investors. The D.L. (law decree) 600 was created in 1974 and has been actualised several times for a better functioning of the system.

Foreign investment in Chile amounted to a total of US$8,092.4 million in 1997 (almost 10% of GDP), increasing 26.6% from 1996. The main investors in 1997 were the UK (22.1%), Spain (21.3%), Japan (14.1%) and the USA (12.7%). Historical foreign investment by economic sector is presented in Table 3.17.

Table 3.17: Foreign Investment D.L. 600 by Sector, 1990 – 1997 (in thousands of US$).

Sector	1990	1991	1992	1993	1994	1995	1996	1997e	Total
Agriculture	8,697	14,460	11,860	15,490	22,304	9,831	16,306	14,324	193,098
Construction	5,413	32,836	23,713	20,905	38,513	59,266	27,538	117,661	449,148
Electricity	0	0	0	2,766	12,550	54,068	386,497	1,378,226	1,834,107
Industry	98,665	238,086	121,054	473,682	323,780	318,775	923,074	495,488	4,138,433
Mining	802,890	440,124	568,312	883,589	1,760,607	1,709,788	995,029	1,626,772	11,181,733
Fishing	5,725	5,717	1,365	1,428	53,506	43,113	21,415	11,636	161,558
Services	372,417	208,103	218,597	254,582	233,405	365,754	1.932,414	1,199,027	5,813,414
Forestry	20,001	10,597	6,813	22,816	12,638	55,284	19,541	27,873	186,258
Trans. & Comm.	6,520	32,025	47,131	54,541	73,826	412,109	478,652	170,225	1,579,200

e: estimate figures. Shown figures represent January – December period.
Source: adapted from http://www.finanzas.cl

As shown, the sector that seems to be most attractive to foreign investors is mining, due to copper and silver production. In second and third place are services and industry, respectively. It is interesting to notice that agriculture recorded its highest amount in 1994, and it shows a total for the period 1990 – 1997 of US$193,098 thousand.

CHAPTER 4: THE AGRICULTURAL SECTOR IN CHILE

4. THE AGRICULTURAL SECTOR IN CHILE

4.1 INTRODUCTION

The Chilean climate and geography have helped the development of agriculture and forestry, giving opportunities for the introduction of new species (animals and plants), such as deer, into traditional agricultural and forestry systems. This process has been done carefully to ensure that environmental impacts do not affect the natural Chilean ecosystems and soils that are seen as being very fragile.

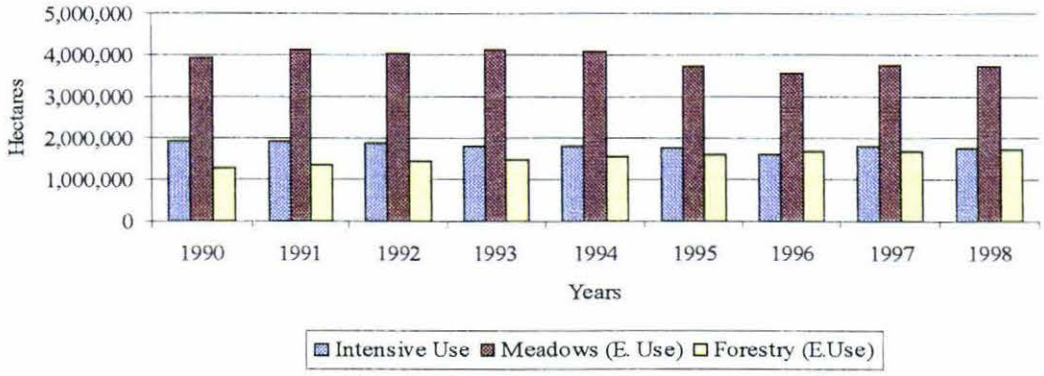
Traditional agriculture (cereals, sheep, dairy and beef cattle) in Chile is not such an attractive activity as it used to be, and the country needs to diversify its production in order to spread the risk. Innovative farmers looking for new farming alternatives have introduced livestock such as deer and ostrich into the country. These new farming systems give new alternatives for farmers who are involved in traditional farming, and who are looking for new investment opportunities.

4.2 GENERAL DESCRIPTION OF THE SECTOR

Chile, after the 1970's agricultural and economic reform, is a country that focuses all its efforts on being more and more open to the external sector. This reform demanded all economic sectors in the country to be more competitive, and agriculture was not an exception. Consequently, agriculture became more intensive, more technology was applied to this sector and the final aim was to export those products that had comparative advantages. Hence, there was an increase in fruit production,

and then, a decrease in annual crops. As shown in Figure 4.1, the land use has been changing as the development process in agriculture continues.

Figure 4.1: Chilean Land Use Evolution, 1990 – 1998.



E. Use: Extensive use.
Source: Agricultural Studies and Policies Office, Chile (ODEPA), National Institute of Statistics, Chile (INE) and Chilean Institute of Forestry, Chile (INFOR).

As seen in Figure 4.1, intensive land use in Chile has experienced a slight decrease in the period between 1990 to 1998. Activities such as annual crops, fruit production, orchards, artificial meadows (pasture) and fallow (uncultivated land) are included in this category. Even though the area of intensive use decreased, some of the components experienced a slight increase, such as fruit production (from 248,900 hectares in 1990 to 300,859 hectares in 1998) and artificial meadows (from 400,750 hectares in 1990 to 424,660 hectares in 1998). The activity that showed a decrease in this period was annual crops, which fell from 987,440 hectares in 1990 to 775,794 hectares in 1998. The only sector, as a whole, that experienced a continued increase in land use from 1990 to 1998 was Forestry, which went from 1,274,023 hectares in 1990 to 1,737,030 hectares in 1998. The changes in the land use in Chile from 1986 to 1995 are presented in Table 4.1. The changes are from the III Region to the X Region in Chile.

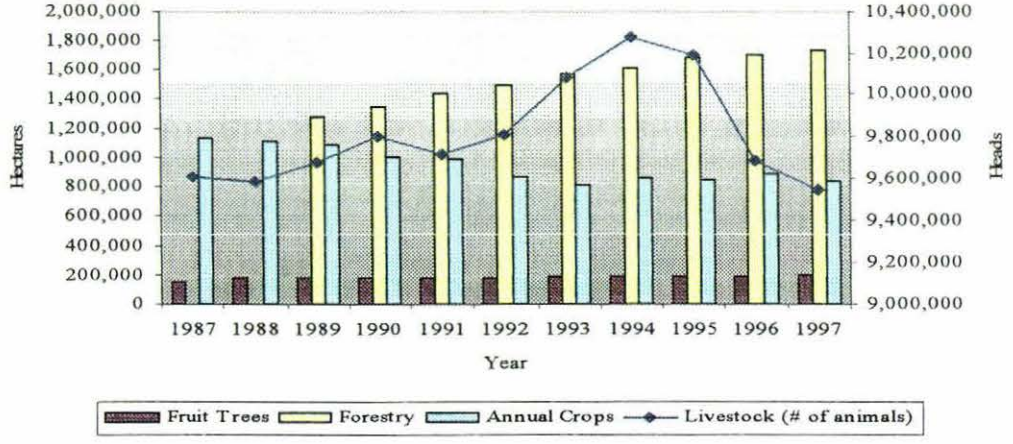
Table 4.1: Land Use Change, 1986 – 1995 (III to X Region), in thousands of hectares.

Land Use	Hectares (Thousands)
Annual Crops	-300
Vegetables and Flowers	34
Fruit Trees and Wine Yards	50
Artificial Meadows	150
Forestry	500
Natural and Improved Meadows	-194

Source: National Institute of Statistics. Chile (INE).

As seen in Figure 4.2, the respective totals for these activities have changed from 1987 to 1997, which has significant impact in the production of agricultural products. The change is mainly driven by the constant changes in the external market that create new opportunities for Chilean farmer/growers. The annual crops have decreased as shown in Table 4.1, and in Figure 4.2. However, forestry shows a steady increase. It is important to notice that in the livestock sector, the decrease shown is due mainly to the decrease in sheep numbers by over one million heads.

Figure 4.2: Evolution of Agricultural Activities, 1987 – 1997. (In hectares and head numbers).



Source: Agricultural Statistics. INE. 1997.

Chilean farms in the year 1981 produced around 281 products for 70 countries. In 1998 (aside from all the hard times for Chilean and world agriculture) Chile exported more than 500 products to 120 markets. Agriculture represents a major industry in Chile and this is reflected in the agricultural participation in the National Gross Domestic Product (NGDP). Since 1985, the Agricultural Gross Domestic Product (AGDP) has been increasing. However, the percentage that AGDP contributes to the NGDP has decreased, as shown in Table 4.2.

Table 4.2: Chilean Gross Domestic Product 1985 – 1998. (In million of Chilean pesos).

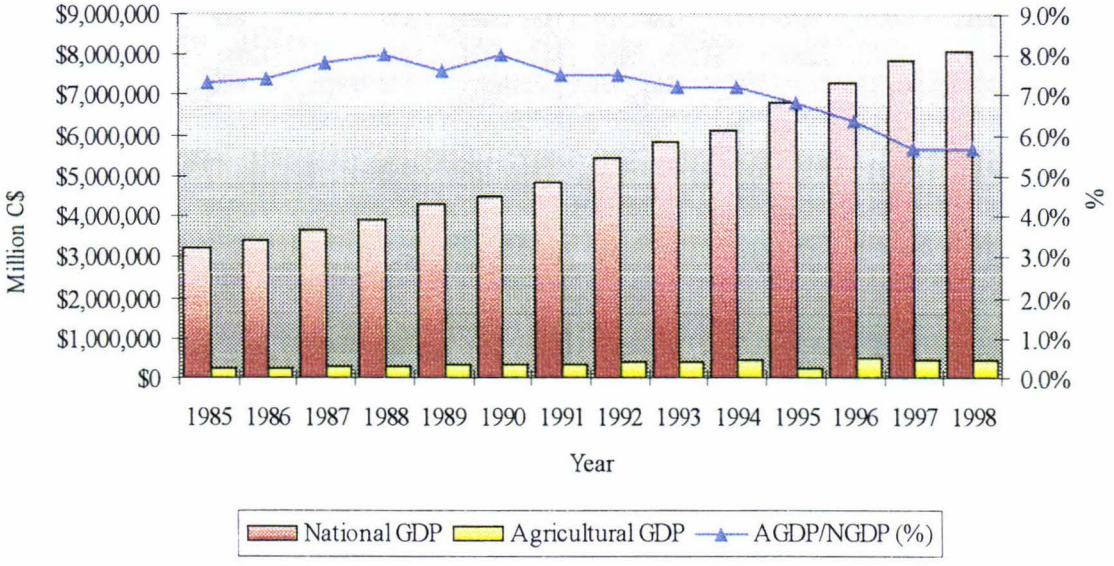
Year	National GDP	Agricultural GDP	AGDP/NGDP (%)
1985	3,238,003	237,112	7.3
1986	3,419,209	253,388	7.4
1987	3,644,681	277,645	7.6
1988	3,911,154	312,716	8.0
1989	4,234,181	329,577	7.8
1990	4,484,071	360,183	8.0
1991	4,841,447	364,667	7.5
1992	5,435,881	405,666	7.5
1993	5,815,646	416,615	7.2
1994	6,147,610	441,515	7.2
1995	6,800,952	464,295	6.8
1996	7,305,141	470,393	6.4
1997	7,858,481	450,830	5.7
1998	8,126,506	464,211	5.7

Source: Central Bank of Chile and ODEPA.

As seen in Table 4.2 and Figure 4.3, NGDP increased from MC$[19]3.2 million in 1985 to MC$8,1 million in 1998, showing the country's growth. The AGDP has followed the same trend in the same period. The participation percentage (AGDP/NGDP) of the AGDP increased since 1985 from 7.3% to 8.0% in 1988. However, this contribution started decreasing in 1990 from 8.0% to 5.7% in 1998. This demonstrates the need to improve and diversify the agricultural productive base in Chile, in order to increase the participation of the AGDP in the NGDP.

[19] Million Chilean Pesos.

Figure 4.3: Chilean National Gross Domestic Product (NGDP), Agricultural Gross Domestic Product (AGDP), and Participation of Agriculture in the National Gross Domestic Product (AGDP/NGDP), 1985 – 1998. (In million Chilean pesos).



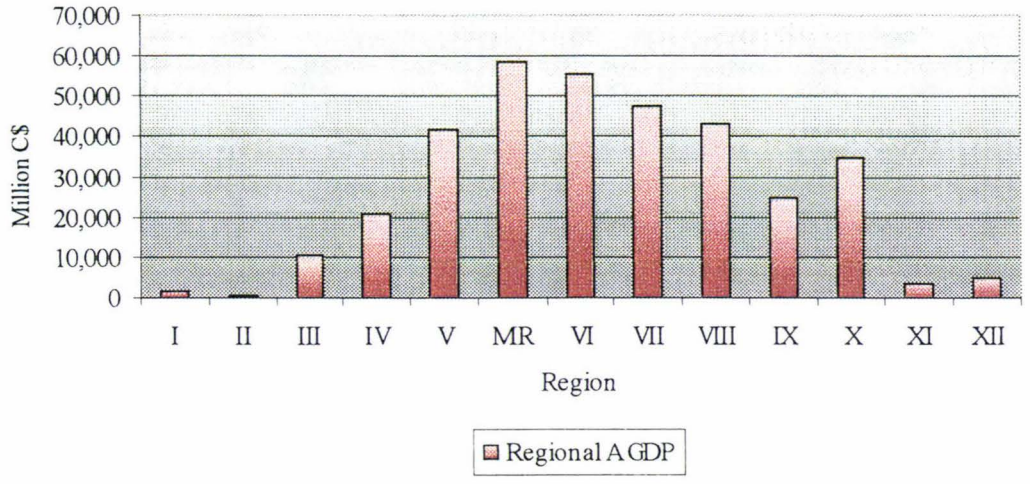
Source: Central Bank of Chile and ODEPA.

Although the level of participation by Chilean agriculture in the NGDP has decreased recently, this sector still plays a very important role in the Chilean economy. In 1996 the AGDP grew only 1.5%, whereas the NGDP grew 6.5%. Factors such as drought, and its negative effects, influenced the low growth rate in the AGDP. The principal sector that made the major contribution to the AGDP was the livestock sector. Inside this sector the different activities show very different behaviours. Activities such as dairy, poultry and pork meat were the most dynamic ones. Beef cattle and egg production grew close to 3.5% in 1996. The second sector in importance, annual crops, was affected by the drought. The land use for annual crops was reduced by 5%, which led to a decrease in production. In the fruitgrowing sector (the third most important), despite the drought in 1996, production and exports increased by 7.5%. The most important fruit involved were table grapes, apples and kiwifruit. In terms of wine production, the volume produced increased by about 390 million litres, and the most important products were fine wines. Horticulture did not show a significant increase in volume, as there is a lack of statistics and information.

The fifth sector, forestry, reduced the forest harvest, as international prices for cellulose decreased. The planted area is growing, however, at a slower rate.

As mentioned before, Chile is subdivided into 13 regions, from north to south, the AGDP and NGDP is distributed between these regions. As climate and production specialisation varies from north to south, the AGDP varies as well. The distribution of the AGDP by region can be seen in Figure 4.4.

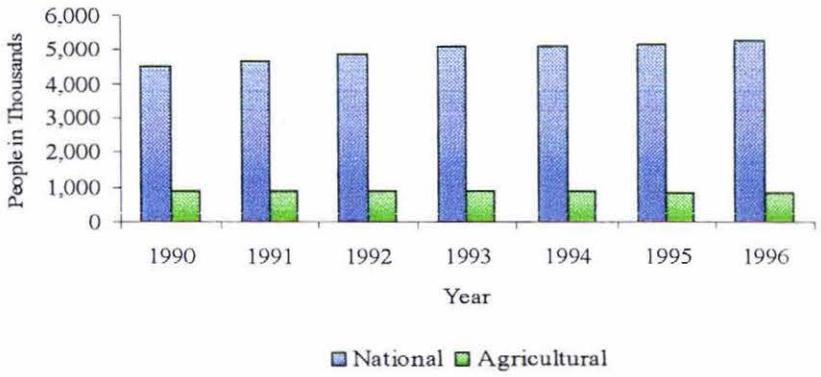
Figure 4.4: Distribution of Agricultural Gross Domestic Product by Region in Chile, 1990. (In million of Chilean pesos).



Source: Chilean Agriculture Overview, 1997. ODEPA.

The agricultural sector plays a significant role also where employment is concerned, contributing about 16% of all the jobs in the country. The total number of jobs generated by this sector in 1996 was almost 840 thousand. In the same year, the unemployment rate for the agricultural sector was 2.7%, compared with the national unemployment rate of 5.4%. The agricultural unemployment rate is clearly below the national rate, despite having seasonal fluctuations. Figure 4.5 shows the National and Agricultural Employed Force from 1990 to 1996.

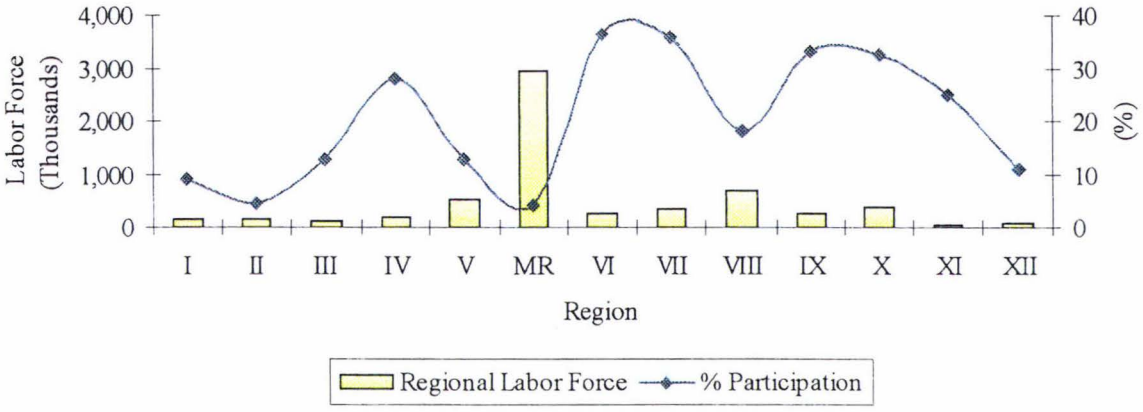
Figure 4.5: National and Agricultural Employed Labour Force, 1990 – 1996.



Source: ODEPA, with information from INE.

As seen in Figure 4.5, the agricultural labour force has been maintained at a level of around 800 thousands workers, with fluctuations during the harvest time in orchards and fruit tree farms. Even though this sector shows a stable labour force in total, the regional scenario is different. Depending on the regional agricultural specialisation, the labour force varies. For instance, in 1996 the region that had more workers (in thousands of workers) was the Metropolitan Region, however the level of participation in the total labour force in the same region was only 4.2%. This is due to the fact that all the financial and business centres are located in the Metropolitan Region, which determines higher percentages of urban population. In contrast, the region that has the highest participation in agricultural labour force is the VI Region, with 36.5%. Therefore 36.5% of the total labour force available in this particular region is involved in agricultural activities. The national and agricultural labour force by region can be seen in Figure 4.6.

Figure 4.6: National Labour Force and Agricultural participation (%) by Region, 1996.

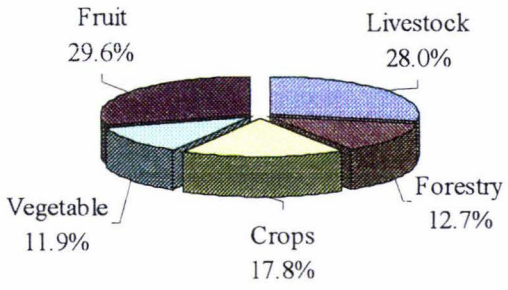


Source: ODEPA, with information from INE.

4.2.1 AGRICULTURAL SECTORS

As mentioned before, the main productive sectors in Chile are Agriculture (10.9%), Mining (49.0%) and Manufacture (43.1%). In terms of agriculture, the main agricultural products in Chile are annual crops, vegetables, fruit production, livestock and forestry products. The most important agricultural activities in Chile are fruit production, then livestock production and in third place vegetable production. Figure 4.7 shows in detail the agricultural productive structure of Chile, expressed in the average gross production value (%) for the period between 1990 and 1996.

Figure 4.7: Agriculture and Forestry Production Structure in Chile 1990 – 1996 (%).



Source: ODEPA.

As seen in Figure 4.7, the most important activity in an average basis is fruit production, which main produce is apples and grapes. The second most important activity is livestock production, with beef and milk production leading the activity.

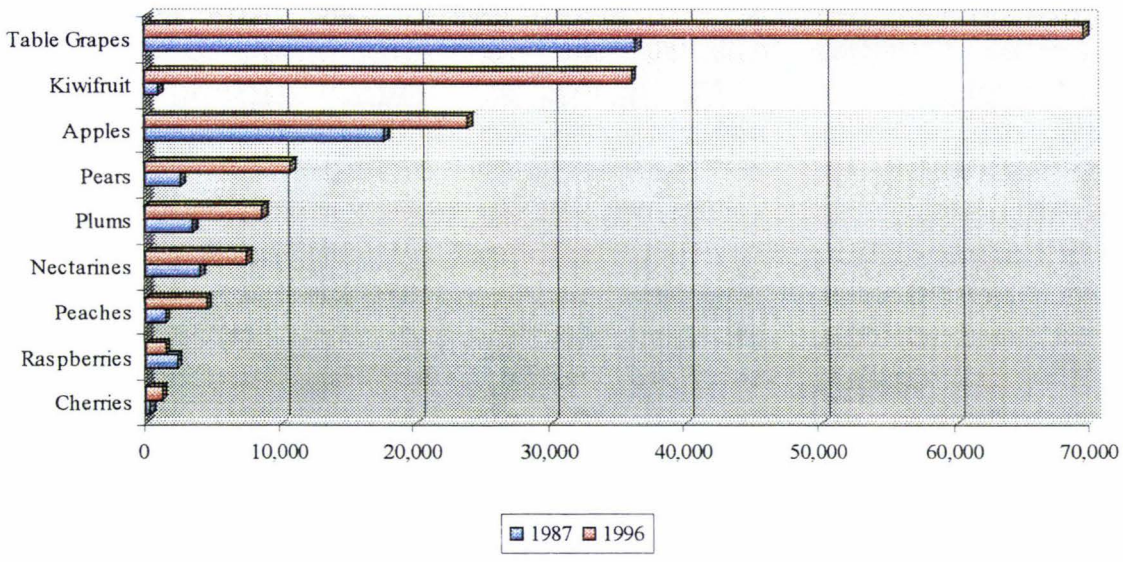
4.2.1.1 FRUIT PRODUCTION SECTOR

The main fruit species that are grown in Chile are Grapes, Apples, Kiwifruit, Pears, and Stone fruit. In the early 1980's, fruit producers began to grow new species in order to meet the needs of the market. Chile produces 28 kinds of table grapes, red apples, plums and pears, 36 varieties of peaches and nectarines, and more than 5 types of kiwifruit and green apples. Since then, most fruit exports of fruit species have doubled. Chilean fruit can meet particular specifications from specific markets. For instance, table grapes are exported seedless, as the US market requires. The total area planted with fruit trees has increased by 4.2% from 1993 to 1996. The increasing changes within this sector are related to the potential access to external markets. The most important increases are in avocado trees, (33.4%), apple trees (11.9%), and plum trees (30.3%), whereas the decreases are in kiwifruit vines (-13.2%) and table grape vines (-3.4%).

In terms of markets, the US and Europe consume close to 70% of all fruit exports. Other markets showing important potential are Brazil and Colombia.

As seen in Figure 4.8, fruit exports have increased dramatically from 1987 to 1996. The most important is table grapes, with almost 70,000 thousand crates being produced.

Figure 4.8: Fruit Exports, 1987 and 1996, in thousand of crates.



Source: Chile Facts, Prochile.

4.2.1.2 LIVESTOCK SECTOR

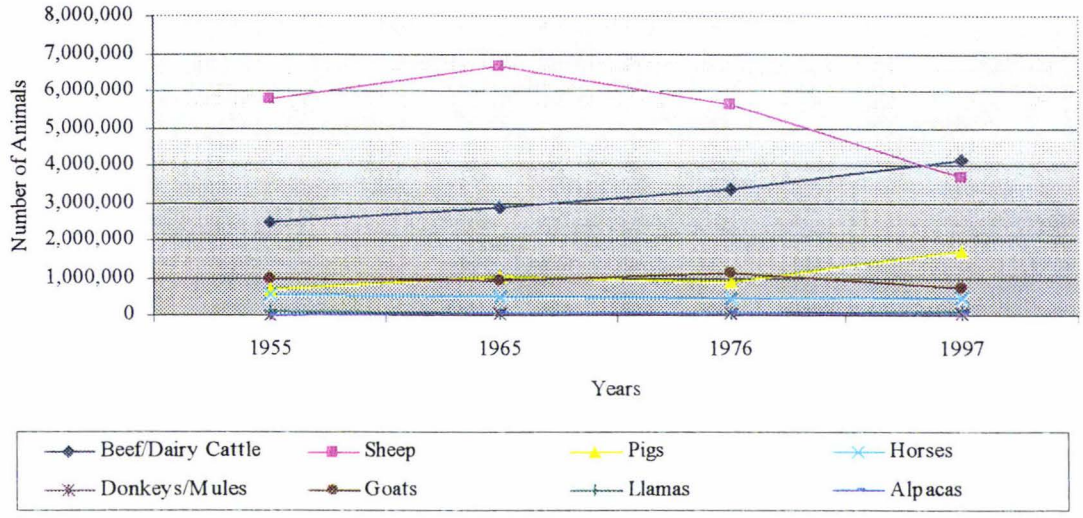
In Chile, livestock production is based in the south of the country. Table 4.3 and Figure 4.9 summarise the historical existence of livestock in Chile in 1955, 1965, 1976 and 1997.

Table 4.3: Number and Type of Animals in Chile, 1955, 1965, 1976 and 1997.

Type of Animal	1955	1965	1976	1997
Beef/Dairy Cattle	2,511,576	2,870,171	3,380,367	4,141545
Sheep	5,786,526	6,690,280	5,678,325	3,710,459
Pigs	704,552	1,021,594	890,781	1,722,403
Horses	533,061	478,303	443,991	415,184
Donkeys/Mules	ND	58,039	44,360	31,172
Goats	955,614	933,007	1,134,516	738,183
Llamas	93,155	64,387	70,338	79,365
Alpacas	ND	27,578	27,264	45,282

ND: No data available.
Source: Chilean Agriculture Census 1997.

Figure 4.9: Types of Animals in Chile, 1955, 1965, 1967 and 1997.



Source: Chilean Agricultural Census 1997.

As seen, the number of beef/dairy cattle has increased from 2.5 million in 1955 to 4.1 million in 1997, showing a 65% increase in a 42 year period. In the case of pigs, the number of animals increased from 0.7 million in 1955 to 1.7 million in 1997 an increase of 244%. In contrast, sheep and goats show a decreasing trend. The number of animals in the country affects meat production in Chile. For instance, sheep meat production decreased from 12 thousand tonnes in 1992 to 9 thousand tonnes in 1997. A similar situation is seen with regards to goats, where production has decreased from 257 tonnes in 1992 to 47 tonnes in 1997. In contrast, beef products (meat and co-products) increased from almost 200 thousand tonnes in 1992 to 262 thousands tonnes in 1997, as seen in Table 4.4. Pork, horses, poultry and milk production show an increase in the same period.

Table 4.4: Livestock Production, 1992 – 1997, in tonnes.

Product	1992	1993	1994	1995	1996	1997
Beef	199,972	224,099	239,615	257,792	259,487	262,105
Sheep	12,784	13,372	12,180	10,229	8,789	9,811
Pork	137,571	147,282	160,814	172,410	184,698	208,703
Goats	257	229	146	74	39	47
Horses	9,513	6,582	7,162	10,831	11,535	11,965
Poultry	219,683	262,994	304,827	320,919	244,372	351,475
Milk (thousand of litres)	1,540,000	1,650,000	1,750,000	1,850,000	1,924,000	2,050,000

Source: Fundacion Chile.

The consulting firm Claro and Associated Engineers and Economists released figures in 1997 showing that meat consumption in Chile has grown 231 percent in the last 20 years. The study shows that in 1976 the demand for meat was 251,905 tonnes, while in 1997, 851,458 tonnes of meat were sold. The consulting firm concluded that these results show that economic progress has become a reality for many Chileans who can now afford to buy meat in greater quantities. In Table 4.5 the per capita consumption of meat by type is shown.

Table 4.5: Chilean per capital meat consumption (kg/year), 1986 - 1997.

Year	Beef	Lamb	Pork	Chicken	Others	Total
1986	14.7	1.0	6.1	6.0	0.7	28.5
1988	15.7	0.8	7.9	8.7	0.7	33.7
1990	18.6	0.6	9.2	8.9	0.8	38.2
1992	17.4	0.8	9.7	15.6	0.8	44.3
1994	21.0	0.6	11.2	21.0	0.5	54.3
1996	23.6	0.5	12.6	23.1	0.9	60.7
1997	24.8	0.5	14.2	23.9	0.9	64.3

Source: ODEPA – INE.

It is interesting to notice that from all the types of meat, only lamb shows a decrease in consumption, and this reduction in production is related to the reduction in the number of animals in the country. In the 'others' categories, meat from ostrich, deer and some other introduced or exotic animals can be found. In addition to this, in the period between 1990 and 1997, Chilean people consumed more poultry meat and less beef meat compared to 1990. In 1990 beef meat represented 48.7% of the total meat consumption whereas in 1997 it only represented 38.7%. On the other hand, poultry meat consumption increased from 23% in 1990 to 37.25% in 1997.

As seen in Table 4.6, the livestock exports are lead by meat and co-products, dairy products and hides. The accumulative growth from 1989 to 1997 achieved a 231.7%, showing the increasing export trend of this sector.

Table 4.6: Livestock Exports, Primary and Industrial, by product, 1997.

Product	Value 1997 Thousands of US$ (FOB)	Participation 1997 (%)	Accumulative Growth 1989 - 1997 (%)
Meat and Co-products	52,132	31.8	306.8
Dairy	28,432	17.3	192.1
Hides	23,862	14.5	293.4
Live Animals	12,195	7.4	261.1
Others	47,414	29.0	122.8
TOTAL	**164,036**	**100.0**	**231.7**

Source: Fundacion Chile.

As seen, the export product that experienced the highest growth rate from 1989 is meat and its co-products, with 306.8% growth. This is due to the fact that Chile has been declared as a Foot-and-Mouth disease (FMD) free zone, helping the export of meat to external markets. In addition, the association of Chile in MERCOSUR has facilitated trade in Latin America. The next product showing high growth is hides, which includes skins and leather, with a 293.4% growth increase from 1989 to 1997.

Slaughterhouses are an important factor for the livestock industry, as they have to be well prepared and meet all the sanitary requirements for meat processing. In Chile, the distribution of slaughterhouses is shown in Table 4.7.

Table 4.7: Slaughterhouses in Chile by region, 1993 - 1997.

Regions	1993	1994	1995	1996	1997
I	4	4	4	5	4
II	4	4	4	3	3
III	3	3	3	3	2
IV	14	11	9	9	7
V	14	14	11	12	10
VI	18	20	17	16	8
VII	31	21	15	11	11
VIII	43	37	21	28	15
IX	34	37	10	12	11
X	33	29	31	27	17
XI	14	21	21	18	3
XII	7	8	7	8	8
MR	13	12	12	12	11
Total	**232**	**221**	**165**	**164**	**110**

MR: Metropolitan Region.
Source: Agricultural and Livestock Service, Chile (SAG).

As shown, all regions have reduced the number of slaughterhouses, showing a decrease in national terms from 232 premises in 1993 to only 110 in 1997. This reduction in slaughterhouses may be due to the increase in meat imports (US$4,299 thousand in 1990 to US$139,377 thousand in 1996).

4.2.1.3 FORESTRY SECTOR

From the total national territory, 45% is suitable for forestry. Most of this area is covered by native forests (in production or protected areas), and represents 13.5 million hectares. The forestry sector in Chile has experienced an increase in the plantation of Radiata Pine and Eucalyptus, (which have a short growing cycle) in the south of Chile. Radiata Pine represents 83% of both the planted surface and, export. The growth in this sector was encouraged also by expansion in the exports of forestry products. In 1996 the total area used for forestry plantation was 1,835,985 hectares. From this total, 1,387,041 hectares were in Radiata Pine, and 308,762 hectares in Eucalyptus (refer to Appendix 3). Forestry is an important activity in Chile, its exports ranking second to copper. According to the World Development report in 1994 and the Infrastructure and Development office of the World Bank, the protected area in a world average basis, cover 5.4% of the country's surface. In contrast, in Chile it covers 18.3% (see Table 4.8).

Forestry exports in 1998 reached a total value of US$1,660.5 million, 9.3% lower than in 1997. This value represented 11.1% of the total national income from exports. The reduction of value is due to the Asian economic crisis, as the major buyers for Chilean forestry products are Japan and Korea. This impact was overcome by an increase in demand from the USA and European countries. The forestry products exported by Chile in 1997 are presented in Table 4.9.

Table 4.8: Protected Areas by country (% of total surface)

Country	Surface (% of country surface)
Brazil	3.3
Uruguay	0.2
Mexico	5.1
Argentina	3.4
Puerto Rico	4.0
New Zealand	10.7
Spain	6.9
Canada	5.0
Ireland	0.6
France	9.8
USA	10.5
Australia	10.6
Singapore	2.6
Finland	2.5
Norway	5.0
Sweden	6.6
Average	**5.4**
Chile	18.3

Source: INFOR, Chile.

Table 4.9: Chilean Forestry Exports, 1997.

Product	Value (Million US$) (FOB)	Participation (%)
Pastes and wood pulps	677,694	41.1
Elaborated wood	317,911	19.3
Cut wood	303,408	18.4
Chips	146,956	8.9
Gross wood	124,534	7.6
Paper	76,602	4.7
Total	**1,647,105**	**100.0**

Source: Fundacion Chile.

Forestry has demonstrated its importance to the Chilean economic sector, not only with the exports, but also with its levels of participation in the national GDP. In 1996 the participation of the forestry sector was 3%, and in 1997 it was 2.8%. The reduction in the level of participation is due to constraint in the international prices for forestry products.

4.3 AGRICULTURAL TRADE

As with many of the other industries in Chile, agriculture exports are disproportionate to the size of the country. For the Chilean agricultural sector, exports are very important as they represent the major source of income. Chilean agricultural trade is based on the export of horticultural and agricultural products. Diversifying production and exports is vital for the agricultural sector in Chile, as it spreads the high risk involved in this activity and offers a larger range of markets and products. In terms of production, as mentioned before, Chilean agriculture is divided into three sub-sectors, forestry, livestock and fruit production (including crops and vegetables). The main aim of the Chilean agro-industry is to supply the external and domestic markets, giving great importance to investment (foreign and national), technology and research. The latter is an important factor, as Chile wants to add value to agricultural production.

Increase in market access and diversification is fundamental for Chilean agricultural exports. In order to be successful, there is a need to find an equilibrium between economic growth and a sustainable use of the resources.

The open economy that Chile possesses, together with its external market orientation has lead to a sustained growth of agricultural exports. In Table 4.10, agricultural exports, imports and trade balance are presented, showing the increasing trend from 1990 to 1996.

Table 4.10: Agricultural Trade Balance, 1990 – 1996. (Million of US$)

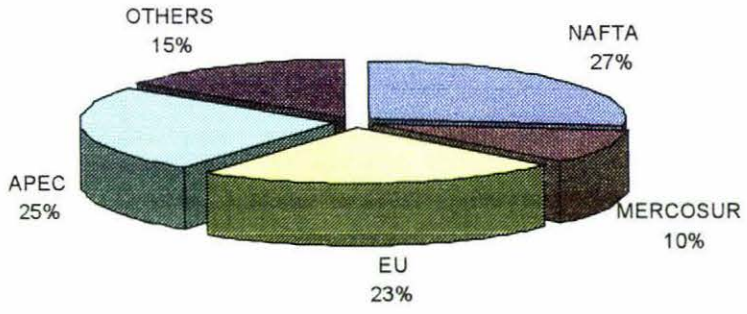
	1990	1992	1995	1996
EXPORTS	**2,414.2**	**3,160.7**	**4988.9**	**4,6686.4**
Agricultural	998.4	1,220.8	1,355.8	1,533.7
Forestry	85.6	69.7	147.7	111.2
Agro-industrial	442.2	699.9	1,122.6	1,359.4
Forestry Industry	888.0	1,170.3	2,362.8	1,682.1
IMPORTS	**420.9**	**700.0**	**1,100.4**	**1,309.5**
BALANCE	**1,993.3**	**2,460.7**	**3,888.5**	**3,376.9**

Source: Central Bank of Chile.

As seen in Table 4.10, agricultural exports show a growth of 94.1%, increasing from almost US$2,500 million in 1990 to US$4,700 million in 1996, demonstrating the dynamism of the sector. However, imports have been increasing too, with a growth of 311.1% from US$420.9 million in 1990 to US$1,376.9 million in 1996. Even though agricultural imports have been growing in such a way, the agricultural trade balance is still positive, with a growth (positive) from 1990 to 1996 of 69.4%.

In 1997 agricultural exports represented 25% of the total exports of the country. In addition to the great dynamism shown by the primary sector, there is an important growth in the agro-industrial sector, specifically in the wines, fruit and vegetable sectors. The destiny of agricultural exports, in an average basis from 1990 to 1997 is shown in Figure 4.10.

Figure 4.10: Structure of the Agricultural Exports by Destiny (average 1990 – 1997).



Source: Prochile.

Figure 4.10 shows the relative importance of the main economic blocks, in the agricultural exports, showing similar values between APEC (without NAFTA), European Union (EU) and NAFTA.

4.4 AGRICULTURAL POLICIES

The final objective of agricultural policies in Chile is to support the development of the agricultural sector, in order to reach a performance that is competitive, sustainable, and that can be flexible enough to adapt to economic, social and environmental changes. In order to fulfil these objectives, the government intervenes in international economic relationships. In this way, the country can take part in the process of regional integration and build closer relations with other economic entities in the world. This represents the backbone for the diversification and growing supply of Chilean agricultural products to the external markets, and for the foreign investment incentive. On the other hand, these policies introduce the government into a regulatory role, that is meant to incentive production in the sector. The government institution that is in charge of playing this role is the Ministry of Agriculture. This Ministry has defined an agenda that is constituted by six fundamental issues:

- Improvement of irrigation systems,
- Recovery of soils affected by erosion,
- Improvement of the Phyto and Zoo-sanitary patrimony,
- Incentive the technological innovation and entrepreneurship management,
- Improvement and development of markets, and
- Forestry development.

4.5 PHYTO-SANITARY SITUATION IN CHILE

Chile is located in an area which provides the country with large natural barriers, such as the Atacama Desert, the Andes Mountains, the Pacific Ocean and Antarctica. These natural barriers protect the country against the entrance of insects and diseases that can affect animals and plants. Apart from the natural environment that helps to protect the phyto and zoo-sanitary patrimony of the country, there are regulations from the Ministry of Agriculture's organisation (Agricultural and Livestock Service, SAG). This organisation is in charge of this area and helps to

protect Chilean phyto-sanitary patrimony. The importance of this organisation is to establish regulations regarding the export and importation of products from and to the country, so that any person who wants to import or export agricultural products has to comply with SAG regulations. Such is the case with animals introduced into Chilean territory, where these animals must comply with a number of regulations in order to be legally introduced in the country. This applies also with regards to exportation matters, such as slaughter practices, processing, packaging, etc. Thanks to this, many of Chile's agricultural products have access to international markets. In Chile there is no foot-and-mouth disease, and this allows the country to export the meat of beef cattle, pigs, and sheep to the most stringent markets (from a sanitary point of view). For instance, Chile exports meat (chilled and frozen) to Asian countries. Without the SAG, the phyto and zoo sanitary patrimony of Chile would be in danger.

4.5.1 AGRICULTURAL AND LIVESTOCK SERVICE, SAG.

This institution operates under the regulations of the Ministry of Agriculture, and acts as a decentralised organisation. The main objective of SAG is to help Chilean agricultural development. This objective is effected by:

- The maintenance of and increase in animal and plant health,
- The protection and conservation of renewable natural resources that affect the agricultural production, and

Ensuring that the raw materials of agricultural production are subjected to regulations under the law.

It deals also with the executive duty of seeing that the laws and regulations are fulfilled. The regulation cover such matters as concerns the production and commercialisation of seeds, alcohol, spirits, vinegar, and meat production. In order to fulfil its objectives, the SAG has the following functions and attributes:

To control the fulfilment of the legal dispositions regarding the conservation of the phyto and zoo-sanitary patrimony of the country and the control of its by-products.

- To maintain a security system and diagnose the current agricultural diseases and those that can occur in the future, with regards to agricultural production.
- To adopt any measure to stop and prevent the introduction of plagues and diseases to the country that can affect animal health and plant sanitary aspects.
- To determine the measures to be adopted in order to prevent, control and fight the diseases or plagues whose control has been declared compulsory.
- To supervise, directly or indirectly, actions regarding the fulfilment of the measures regarding plagues and diseases, that can influence in a significant way the agricultural and forestry production of the country.
- To maintain and update treaties of co-operation with national and international institutions.
- To undertake research and maintain statistics.
- To educate and train people regarding phyto and zoo sanitary aspects.
- To try to eliminate the sanitary barriers imposed by external markets, regarding Chilean agricultural products.
- To propose to the Ministry of Agriculture the formulation of new regulations, and laws, that help to achieve the objectives of the institution.

4.5.1.1 SAG PROGRAMMES

The agricultural and livestock service is divided into three departments, Agriculture Protection, Livestock Protection, and Renewable Natural resources. Each area has a specific programme.

4.5.1.1.1 Horticultural Protection Programme

The objective of this programme is to help the agricultural development of the country by protecting, maintaining and increasing the sanitary aspect of horticultural products. This is done by controlling the sanitary state of products, co-products and other products that may be carriers of diseases and/or plagues.

4.5.1.1.2 Livestock Protection Programme

The objective of this programme is to protect and improve the zoo-sanitary condition of the country in order to avoid the entrance of exotic diseases to the country. Within the same programme another objective is to maintain the control and the eradication of prevalent pathological diseases, so that the national livestock production increases, and to help improve external markets access.

4.5.1.1.3 Renewable Natural Resource Protection Programme

The objective of this programme is to study, preserve and increase the renewable natural resources of the country in order to achieve a sustained development of these resources over time. The principal activities concern the new legal arrangements for hunting, biological pollution, irrigation, rivers, and to monitor pollution sources in the agricultural environment.

CHAPTER 5: DEER BACKGROUND

5. DEER BACKGROUND

5.1. INTRODUCTION

Deer farming is a non-traditional livestock activity in various countries, such as Chile. Having knowledge of the origins and biology of these animals may be helpful in order to develop deer farming in other countries. This Chapter will explain to the reader the origins, and different species of deer. It will explain also the biology deer, such as their reproductive cycle, which is very important regarding farming activities, diseases, etc. It provides also a brief background to deer farming, which may be useful for those farmers willing to start a deer farm operation.

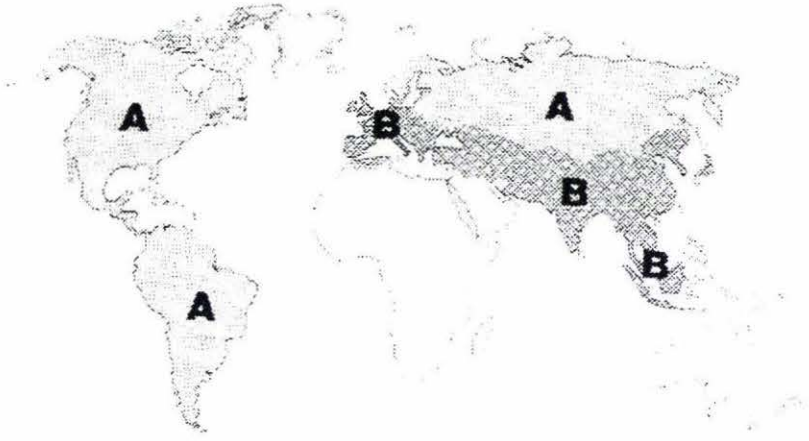
In any agricultural activity it is very important to know which are the possible products that can be produced from the farmed animal (meat, hides, leather, etc.). This could give the farmer a good idea of how much of the animal can be used to generate profit. The main products that can be obtained from deer are presented in this Chapter. All topics considered in this Chapter have been included, as they have an influence on a deer farm income. Such is the case of the reproductive cycle, knowledge of diseases, kind of products, farm facilities, etc.

5.2. GEOGRAPHICAL LOCATION OF DEER

Deer range through North, Central and South America, Europe, Asia and North Africa (see Figure 5.1). In the wild the largest deer populations can be found in mixed wooded and open land, although deer live also in swamps, on mountains, and on northern tundra.

Deer are commonly lithe, with compact bodies and long, powerful legs suitable for rugged woodland terrain. Such physical attributes make them excellent swimmers. Their lower cheek teeth have crescents of enamel, which enable them to grind a wide variety of vegetation. These animals are ruminants, and have a four-chambered stomach. Deer forage on twigs, leaves, barks and buds of bushes and on grasses and other plants.

Figure 5.1: Deer Natural Ranges of the subfamilies: Odoncoilinae (A) and Cervidae (B).



Source: Royal Society of New Zealand: Biology of Deer Production.

Many deer species group into families around the female, with the male often becoming solitary. Red deer associate into small to large herds, each led by a mature female. The female gives birth once a year, usually to one fawn.

The deer species are divided into five subfamilies: the Chinese water deer (*Hydropotinae*), the muntjacs in India and Asia (*Muntiacinae*), the main Eurasian group, *Cervidae*, and the *Odoncoilinae*, which contains the roe deer, moose and reindeer. A detailed list of the *Cervidae* family is shown in Appendix 4.

The most widespread and largest is the Cervus species. This species includes the red deer from Europe, the wapiti from North America, the sambar from Asia and India and sika deer from Japan and Asia. The natural habitat of red deer is in Europe and Asia, Scotland and parts of England and Ireland. It can be found also in North Africa and Asia. Red deer were introduced into Australia and New Zealand from Europe.

5.3. CERVUS SPECIES

5.3.1. RED DEER (Cervus elaphus)

Red Deer are medium to large deer, however this varies among different locations. For instance, the western Europe red deer can achieve a weight of 300 kg, while in Corsica, it reaches only 100 kg. The name red comes from the rich red-brown summer coat. The winter coat is dull brown, and at this time of the year, the male has a fur of longer, coarser hairs on the neck. In the north-east of Asia and across North America, the wapiti *(C. canadensis)* replaces the normal red deer. Wapiti are sometimes also referred to as elk in the USA and Canada. Wapiti are extremely similar to red deer in all aspects, except in size, where Wapiti are larger. They can reach 160 cm at the shoulder and weight from 240 kg to 450 kg.

5.3.2. SIKA DEER (C. nippon nippon)

Sika deer can be found in Japan and neighbouring islands. This kind of deer can reach a weight of 40 to 65 kg, and is a little shorter than red deer, about 80 cm at the shoulder. The winter coat is similar to that of the red deer, thick and grey-brown, in some cases it even tends to be black in males. The summer coat is chestnut-brown with white spots. The antlers are shorter than those of red deer and are never branched.

5.3.3. SAMBAR DEER (C. unicolor) AND RUSA DEER (C. Timorensis)

Sambar deer can be found in the Philippines, through Indonesia and in south China, and are considered as the red deer of India. This is a large deer (61 to 142 cm at the shoulder), uniformly dark brown in colour but with a lightening of brown under

the chin, on the insides of the limbs and under the tail. These deer weigh from 230 kg to 270 kg.

Rusa deer are very similar to sambar deer, and can be found in the Indonesian archipelago.

5.3.4. DAMA (D. Dama) AND AXIS DEER

The genus *Dama* is represented by a single living species, the fallow deer, from which two subespecies are recognised. These are the European fallow (*D. dama dama*) and the Persian fallow (*D. d. mesopotamica*). European fallow are widely spread throughout Europe. Fallow deer are a medium sized deer, with females 70 to 80 cm at the shoulder and males up to 90 cm. The weight varies between females and males, with 35 to 60 kg for females and 70 to 100 kg for males. The summer coat is fawn, with white spots on the back and flanks. In winter the coat turns greyish-brown with the spots less clearly discernible.

Axis deer are very similar to fallow deer, and can be found in India and Sri Lanka. The coat is rufous-fawn with white spots on the back which are present in both the winter and summer coat. The antlers are curved out and back in a striking lyre shape.

Terminology used to refer to different gender and stages of deer varies through different deer species. The different terms are shown in Table 5.1.

Table 5.1: Terms associated with deer species.

Species	Male/Female/Young
Red, Sika	Stag/hind/calf
Fallow, muntjac, Chinese water deer	Buck/doe/fawn
Roe deer	Buck/doe/kid
Reindeer	Bull/cow/calf

Source: Chapman, N. 1991: Deer.

5.4. *REPRODUCTIVE CYCLE*

The breeding season in deer is characterised by an intensive period of hormone activity, often called the 'rut' or 'roar'. The rutting time for fallow, red and sika deer is from late summer to autumn, in red deer commencing in late March to April, and in fallow deer approximately two weeks later. The rut is defined as the period of maximal reproductive activity[20]. In the beginning of October, the male starts to make scrapes and wallows thrash bushes and fray or score the bark of trees. They become very aggressive to rivals but attentive with females. The nature of deer is for every male to gather a harem, but in some deer species, only males that gain certain status can achieve this. This status is determined by age, size and physical fitness. For instance, a male of about 16 months old has little chance to get a group of females, in contrast to males of 5 to 11 years who are more successful. Normally, a male has to check the female in order to see if it is ready to be mated. This process involves sniffing and licking around the rump or tasting her urine. In females the oestrous[21] starts in late March, but it may continue to cycle until August, if conception does not occur. The reproductive parameters of wapiti and red deer are presented in Table 5.2.

Table 5.2: Reproductive parameters for wapiti and red deer.

Parameter	Values
Average low mounts per copulation	4 (1 – 16)
Duration of low mount	15 sec.
Duration of copulation, mount included	5 sec.
Repeat breeding (some hinds only)	0.3 – 7 h.
Duration of post-copulatory straining	3.2 min.
Time taken by hind to return to herd	9 min.
Duration of oestrus	6 – 30 h.

Source: Haigh, J.C. and Hudson, R.J. 1993: Farming Wapiti and Red Deer.

In almost all deer species, females became sexually mature from about 18 months of age. The gestation period varies among species (see Table 5.3), however it

[20] Haigh, J.C. and Hudson, R.J. 1993: Farming Wapiti and Red Deer.

[21] Oestrus is the period of sexual receptivity in the hind/does and is time when she will accept service by the stag/buck.

is always between 180 and 240 days, with the exception of roe deer and Chinese water deer. In general, the larger the animal, the longer the period of gestation. For instance, in Chinese water deer, this period is 176 days, whereas in red deer, it is 230 - 240 days.

Table 5.3: Average gestation periods and birth weights of some deer species.

Species	Average Gestation Period (days)	Average Birth Weight (kg)
Chinese Water deer	176	0.8
Reeve's Muntjac	210	1.0
White Tail deer	200	3.0
Southern Pudu	212	0.4
Brown Brocket	206	1.3
Fallow Deer	230	4.5
Red deer	230	6.5
Roe deer	294	2.0
Pere David's	280	9.4
Japanese Sika	217	2.7 – 3.6

Source: Chaplin, R.E.1977: Deer.

As seen in Table 5.3, the longest gestation period is for roe deer, where the kid is born ten months after conception. Multiple births are uncommon in the *Cervidae* family, and most species give birth to a single offspring.

Fawning date does not vary from wild to farmed deer, and is the 1st of June. However, this date can vary from year to year and from place to place. In wapiti, the male calves tend to be born several days later than female calves. For deer farmers, synchronised calving represents an advantage. However, to prevent late calving, the best way is to remove the stag by November 1st. Table 5.4 shows the estimated fawning dates from mating dates for red deer, hybrids and wapiti.

Table 5.4: Fawning dates from mating dates for red deer, hybrids and wapiti.

Stag X Hind	Red x Red	Wapiti x Red	Wapiti x Wapiti
Gestation length	233 ± 5	242 ± 5	250 ± 7
Start 1st Cycle	22 Mar	22 Mar	22 Mar
Fawning Date	10 Nov	19 Nov	25 Nov
Start 2nd Cycle	9 Apr	9 Apr	9 Apr
Fawning Date	28 Nov	7 Dec	16 Dec
Start 3rd Cycle	27 Apr	27 Apr	2 May
Fawning Date	16 Dec	25 Dec	6 Jan

Source: The Deer Farmer Magazine: The basics of deer farming.

5.5. DEER HEALTH

Even though deer are resistant to a variety of diseases, they are susceptible to many other diseases, of either an individual, or a herd nature. In clinical terms, diagnosis, treatments and prevention are very similar to those in sheep and cattle. Some of the most common diseases in deer are presented in Appendix 5.

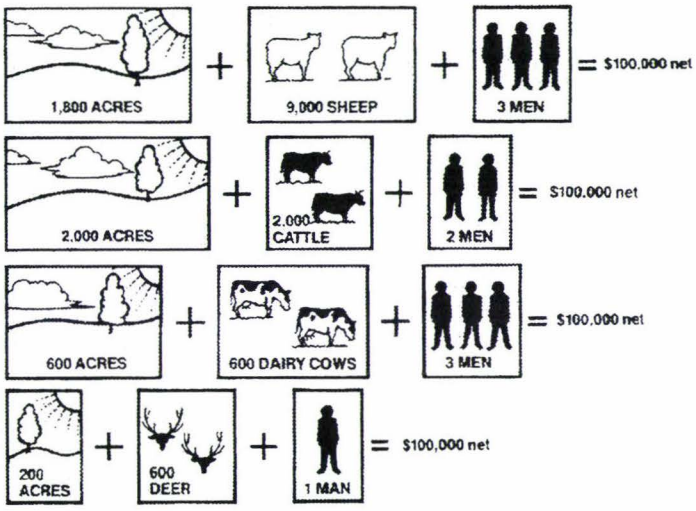
5.6. DEER FARMING BACKGOUND

Deer farming is considered to be a relatively new industry, although there is a long history of game consumption in the world. There is archaeological evidence showing that humans consumed more game meat, including venison, than today's usual meat (beef, pork, lamb and chicken). However, it is only in the last 30 years that deer have been introduced into a successfully farming system. Farmers in North and South America, Australia, Europe and New Zealand saw the opportunity that deer provide for the production of a 'new meat'. Deer meat is low in fat, therefore being attractive to modern and health conscious consumers. Other farmers have opted to farm deer to harvest the velvet antlers, in order to meet the needs of the traditional Korean market for this product. Current deer farming is not too different from the first domestication of these animals, but it differs in terms of the scientific, processing and

marketing support provided to this activity. The best example of a well-structured deer farming industry is New Zealand, which will be discussed in detail in Chapter 6.

Even though the deer farming industry is considered to be a new industry, it shows some advantages over other farming activities, such as traditional sheep and beef farming, and dairy farming. As seen in Figure 5.2, to achieve a net income of NZ$100,000 in different farming options, the one that needs the least land and labour is deer.

Figure 5.2: Resources required to generate NZ$100,000 net income.



Source: NZ Deer Farmers' Associationn.1986: Deer farming a Profitable Alternative.

In order to produce NZ$100,000 of net income a deer farm needs 200 acres of land, 600 deer and only one labour unit. In contrast, in a sheep farm, the farmer needs to have 9,000 sheep and three labour units, to generate the same net income. In the case of beef cattle, 2,000 animals and two labour units are needed. The only other activity which can generate NZ$100,000 with the same number of animals as a deer farm is dairy farming. However, a dairy farm needs 600 acres and three labour units to run the system, compared to only 200 acres and one labour unit in a deer farm.

5.6.1. DEER FARMING FACILITIES

A good deer farm layout, with appropriate fences and effective deer handling facilities can ensure a better, more effectively functioning operation. When thinking of deer farm facilities, the local weather should be taken into account. Deer can resist an annual rainfall of up to 1,000 mm without the need of a shelter. In places where the annual rainfall exceeds the 1,000 mm of rainfall, a shelter must be built.

In general terms, almost all types of land are suitable for deer farming, with the exception of wet areas, such as swamps[22]. However, it is advisable to perform a soil test in the area where the deer farm is to be located. The topography of the ground is relatively irrelevant for deer farms, as hill areas are as suitable as flat ones for deer. In the case of a hill area, is important to take into account that feeding, drinking and handling facilities are centrally located, and that there is road access for vehicles.

Deer farm yards and facilities do not have to be ostentatious and expensive, as long as they keep animals calm. In addition to this, facilities should be safe for deer handling, as deer under stress become dangerous animals. No matter what kind of deer is farmed, the handling facilities must allow a deer mob to be progressively broken down into small groups or individuals (for drenching, weighing, etc). Deer yard planning should consider all the operations required by a deer farming year, and the number and size of pens required when fully stocked. Another factor to be considered with deer yards is the access to electricity, along with loading ramps and all weather turning circles for trucks.

In terms of the size of a deer farm, is obvious that cost will be a strong influence, however, there are other important factors that should be considered. Fences are one of the most important issues in deer farms, as they will prevent deer to escape from the property. For instance, a 25 ha. square block with six equal paddocks and a bisecting central lane has 4,000 m of fencing. At about NZ$7.70/m, the cost is nearly NZ$31,000, and at a stocking rate of 14.8 SU/ha, the block could run about 195 breeding hinds.[23]

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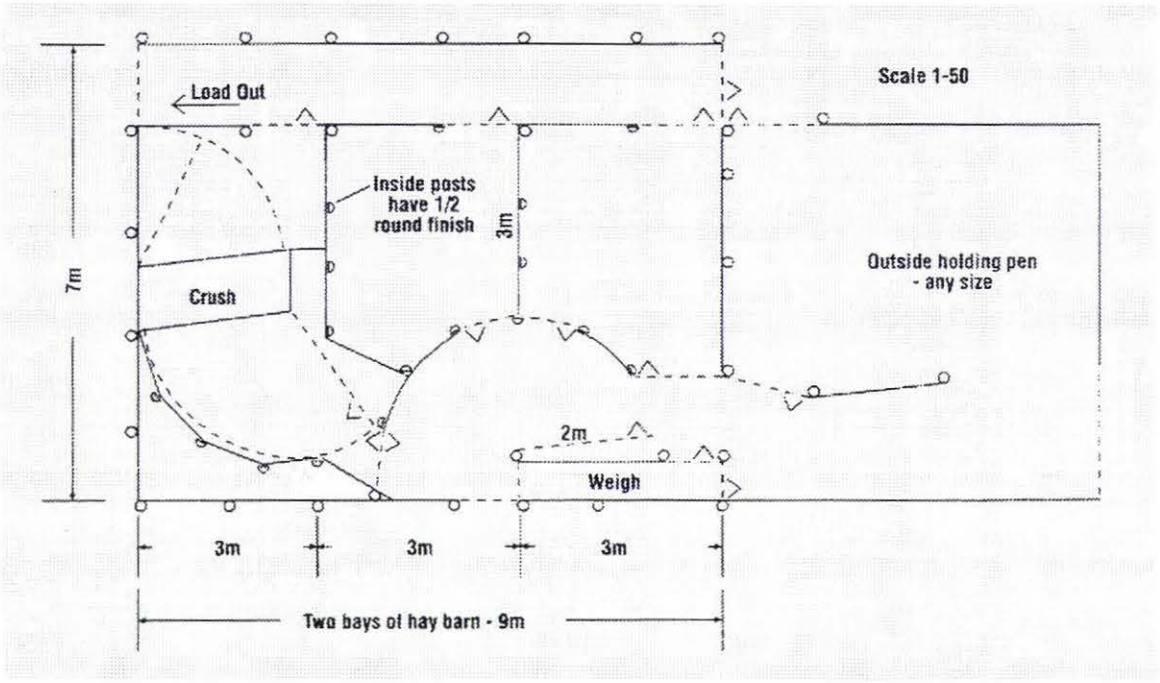
[22] Reinken, G.: Deer Farming, a practical guide to German techniques.
[23] Example provided in The Deer Farmer Magazine: Yards and Fencing for deer farms.

5.6.1.1.SHED AND YARD DESIGN

As mentioned before, deer yard and sheds should be functional, so the farmer can be happy, feel safe and get the job done efficiently. These facilities should be built with the needs of both the animals and the farmer in mind, as they should fit both. Requirements for the 'right' shed can change over time, as the objectives of the farm can change (velvet production or venison production). Designing a deer shed involves certain features, which make the shed work better. The first feature is the 'circle rule'. Deer like moving around the outside of a circle, so in the shed, the leading wall should be continually falling away out of sight. This will encourage deer to keep moving forwards. The second feature or concept is the one related to breaking down a mob into smaller numbers. In all deer sheds (large or small) there are one or more quite small pens or races where most of the work is done (e.g. drenching, tuberculosis testing, ear tagging, etc). This represents an advantage for new deer farmers, as the shed and surrounding pens can be smaller and capital savings can be substantial. The last concept is the one which ensures that deer held in pens have no visual contact with deer leaving the shed. Deer waiting to be treated get agitated if they can see others leaving (apparently escaping) the shed. There must be concrete floors in the main working areas, and running water to maintain a clean system, particularly for velvet production. All walls, doors and door latches should be designed and installed in a way that minimises the chance of injury for the animals and for the handler. Examples of a deer shed, the two plans which follow illustrate the design and prices for this facility. As seen in Figure 5.3, shed A measures 7 m x 9 m.

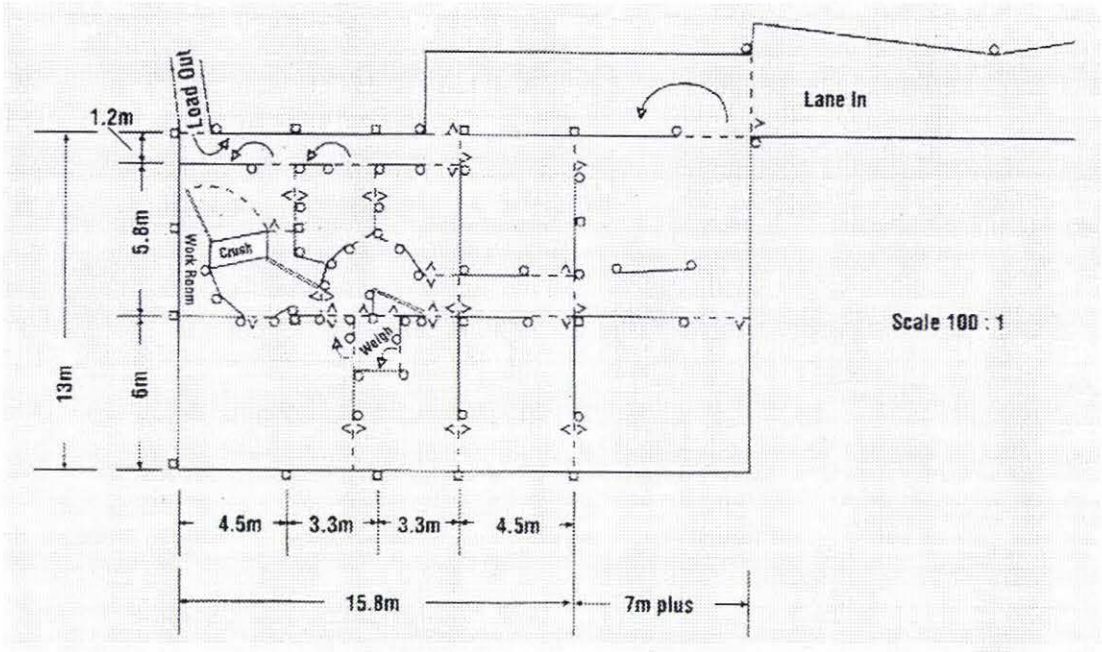
Figure 5.3: Deer Shed design, Shed A.



Source: The Deer Farming Magazine: Yards and Fencing for deer farms.

The materials and labour price to build this shed in an existing shed (including weight box and loading ramp), could be around NZ$8,000 to NZ$10,000, excluding GST. This price does not include a crush and the surrounding pens. Shed A has timber walls solid to 1.2 m, then gapped to 2.3 m high. All walls are cap railed. The price for the same shed where no existing shed was available would be around NZ$14,000. The shed's corrugated iron roof is 3.6 m high at the front, with a fall of 0.7 m to 2.9 m high at the rear. Shed B in Figure 5.4 shows an extension of Shed A for a larger deer handling facility.

Figure 5.4: Deer Shed Deign, Shed B.



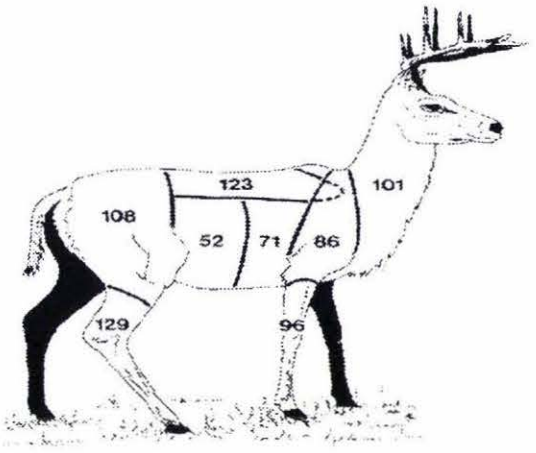
Source: The Deer Farming Magazine: Yards and Fencing for deer farms.

5.6.2. PRODUCTIVITY OF FARMED DEER

Farmed deer can be productive for more than ten years (even close to twenty). Deer possess a competitive advantage compared to other farming options, as they have a low susceptibility to disease and a very high level of efficiency in converting grass to protein (compared to sheep, deer require one-third the amount of feed intake to produce 1 kg of meat[24]). As seen in Figure 5.5, deer present a better indices in percentage of the muscle weight distribution, when compared to bulls (bulls = 100).

[24] Bryan ,C., A Perspective on Profitability, in Deer Farming... A Profitable Alternative.

Figure 5.5: Muscle weight distribution of male white-tail deer relative to bulls.



Note: Index Figures are of Total muscle in each group relative to the same group in cattle=100.
Source: Adapted from Berg & Butterfield, 1976. Royal Society of New Zealand: Biology of Deer Production.

5.7. DEER PRODUCTS

5.7.1. DEER VENISON

Venison is the name given to deer meat. Farm raised venison is lean, tender, and easy to prepare. It is low in fat and cholesterol. At a time when many people are restricting their consumption of beef, lamb, and pork, venison is an alternative to chicken, turkey, and seafood (see Table 5.5). Farm raised venison has a less "gamey" flavour than wild venison, due to its mild taste.

Table 5.5: Nutritional Properties of Venison and Other Meats.

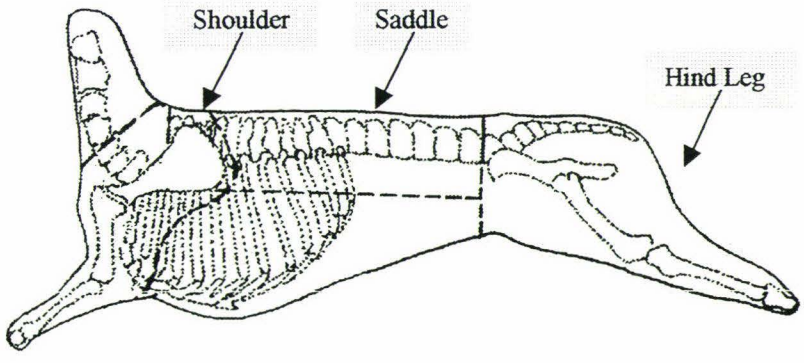
Item (per 100g)	Calories	Fat (g)	Cholesterol (mg)	Protein (mg)
Venison, loin cut	159	3.3	66	25
Beef, lean bottom rd.	214	9.8	92	31
Ground Beef, lean	265	18.4	85	24
Pork Shoulder Cut, lean	219	10.6	404	29
Lamb Leg Roast, lean	178	7.6	83	25
Veal Cutlet	213	10.4	125	26
Chicken Breast	159	3.4	83	31
Turkey, light meat	154	3.5	68	29
Salmon, pink	138	5.8	39	20
Scallops, breaded	215	11.0	77	17

Source: U.S. Department of Agriculture. 1978: "Nutritive Value of Food".

5.7.1.1.DEER CARCASS CUTS

In contrast to beef cattle carcasses, deer carcasses are made up of five primal cuts (see Figure 5.6), and they are not split down the backbone.

Figure 5.6: Deer Carcass cuts.



Source: Study Guide, Deer Production, Massey University, New Zealand. 1999.

The five primal cuts constitute about 75% of the total carcass (see Table 5.6), with a remaining 25% of which ribs, trim and neck constitute 19% (prepared as boneless cuts), and 6% of discarded bones, generally for pet food.

Table 5.6: Primal cuts from a Deer Carcass

Cuts	% of Carcass
Hind legs (2)	40%
Saddle (1)	15%
Shoulders (2)	20%
Total	**75%**

Source: Deer Production Paper Study Guide. Massey University, NZ. 1999.

Generally speaking, venison is not exported as a primal cut, but in smaller portions or sub-portions of the primal cuts. The sub-portions are boneless and in some cases have the epimysuim (silver skin) removed. Examples of cuts without the silver skin are tenderloin, striploin, 8 rib-rack from the saddle, the rump, knuckle and inside of the leg, and the boneless shoulder roast and diced meat from the shoulder.

5.7.2. DEER VELVET ANTLER

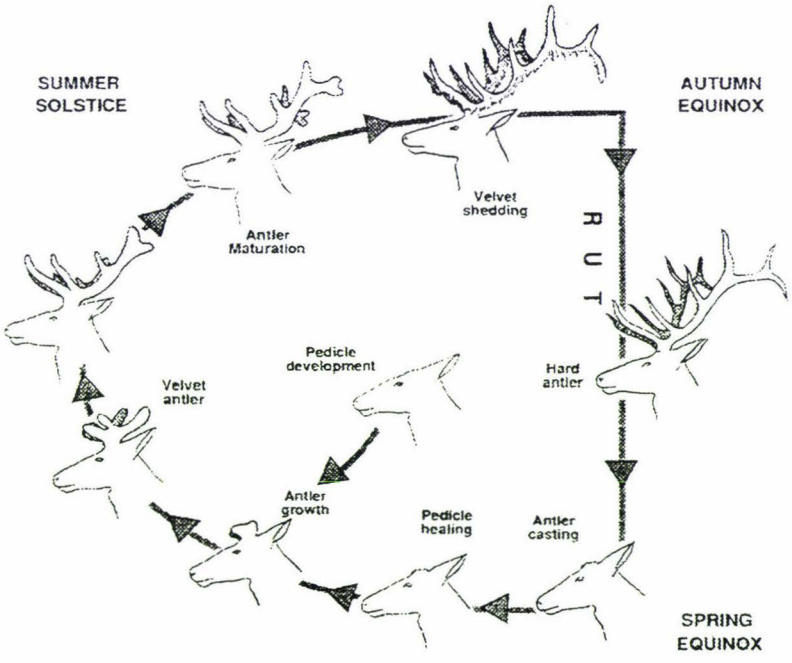
For thousands of years, throughout Asia in particular, there has been substantial trade in deer velvet. Perhaps the largest trading is done in Korea, where it competes with some of the rarer types of ginseng as an elixir of the gods and an essential ingredient in the preparation of the most expensive Chinese or Oriental medicines.

Oriental medicine has been keeping Asians well for thousands of years. Fundamental to its practice is the use of deer velvet antler. The basis of this ancient medicine is the philosophy of Yin and Yang. Both forces are dependent on each other, and the ideal state within the body and within the universe is to have the two forces in relative balance and harmony. The most important animal to oriental medicine is deer. Of the products derived from deer, the most prized is velvet.

Antlers are defined as the appendages which grow annually from the pedicle formation of the frontal bone of deer. They are therefore quite unlike the horns of cattle, sheep and goats, which do not regrow if removed correctly. The surgical removal of velvet antler without some form of anaesthesia will cause incredible pain and distress to the animal. Velvet is the name given to the "horns" or "antlers" that

grow each year on a stag's head, even though in some deer species hinds also grow antlers. When these antlers begin to grow, around August – September each year, they are soft, blood filled tissue, covered by skin with soft, furry coating- hence the name 'velvet'. If they are not removed, this tissue hardens into bone, loses its layers of skin and eventually falls off around May – June each year (see Figure 5.7). Once hard, antlers are a formidable and dangerous weapon, which stags in the wild use against each other in displays of aggression around mating time in order to establish dominance. This is one reason why antlers are removed from farmed deer while they are soft and before the stag enters the 'roar'. As well as minimising the risk of stags injuring each other, velvet is also removed to protect farmers who must handle deer. The easier handling also has positive consequences for deer, which will experience less stress during this process than they could if they were in velvet.

Figure 5.7: Deer Antler Cycle.

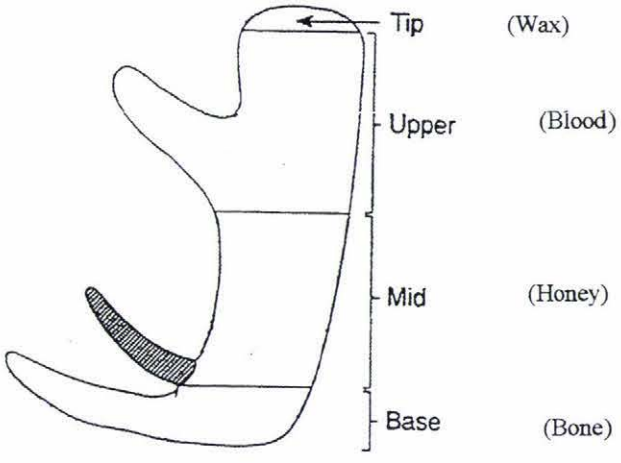


Source: Haigh , J.C. and Hudson, R.J.1993: Farming Wapiti and Red Deer.

The countries most widely recognised for the production of velvet antler from farmed deer are New Zealand, Russia and China. Velvet is commonly produced in New Zealand from Red deer, Elk (wapiti), Hybrids (relks) and Fallow deer (in relatively small volumes). The different species offer a variety of characteristics, and farmers need to assess the style of velvet they wish to produce against the

opportunities offered by different species. However, there is an Oriental system which is used to classify deer velvet antlers, giving different values to the different cuts and qualities. This oriental system for classifying velvet divides the velvet stick into four areas, (Figure 5.8).

Figure 5.8: Oriental System for classifying the sections of Velvet Antler.



Source: Deer Production Paper Study Guide 1998. Massey University, New Zealand.

The Tip or Wax is the most valuable area, and the Base or Bone is the least valuable one. The different values of the cuts depend on the different chemical compositions. Table 5.7 shows the differing chemical composition of a velvet stick.

Table 5.7: Chemical composition of Velvet Antler (percentage)

	ASH (%)	Ca (%)	N (%)	Lipids (%)
Tip (Wax)	6.5	0.3	12.0	5.5
Upper (Blood)	28	9.5	9.0	2.5
Mid (Honey)	38	13.5	8.0	2.0
Base (Bone)	39	14.5	7.5	2.5

Source: Deer Production Paper Study Guide 1998. Massey University, New Zealand.

A more detailed analysis of velvet antler identifies:

- *47% Protein*: Major protein collagen with glutamic acid, alanine, glycine and proline, the major amino acids.

- *33% Mineral:* Calcium, potassium, chlorine, sulphur, phosphorus, silicon, magnesium, sodium, nitrogen, manganese, iron, copper and zinc.
- *3 – 4% Fat/Lipids:* Major lipids are gangliosides, sphingomyelins, and steroids with a small fraction of prostaglandin.
- *3% Sugar:* Less than 1% acid mucopolysaccharides.

As shown, the most valuable area of the velvet antler (TIP) has the highest percentage of lipids and the base or bone has the lowest percentage. The differences in values can be explained by the difference in lipids concentration, as these are considered to be the active component of velvet antler.

Velvet antlers are graded based on the size, shape, degree of mineralization, blood content and damage. To see the grading system for wapiti and red deer velvet in New Zealand and Canada, refer to Appendix 6. The colour of the sliced velvet stick should also be considered in order to get higher prices. In the past, producers have not been too worried about good velvet colour, because there was no premium for it. Good colour means the appropriate shade of brown or red for the specific part of the stick. Achieving the 'good' colour depends on both the actions of the producer and the ability of the processor. It can be influenced by the processor in a number of ways, depending on how much blood is in the velvet stick at the time of cutting, and how the producer handles the velvet after cutting. Velvet has gone through centuries of use, and modern research shows velvet is easily assimilated by the human body with no adverse side effects. Recently, the pharmacological properties of deer velvet antler have been more rigorously tested in relation to many illnesses. In New Zealand, scientists have proved what oriental medicine has known for more than 2000 years, that deer velvet is good for human beings. Research at Agresearch Invermay (near Dunedin, New Zealand) showed that treating human white blood cells with extracts of deer antler velvet stimulates the immune system, as measured by an increased production of white blood cells. This means that velvet can be used either to prevent, or to support, some remedial treatments by strengthening the body's own immune system. Although deer antler velvet has been used for over 2000 years in Asia, it is often regarded with scepticism in western societies. However, with the generation of this rational scientific evidence, western markets will be easier to approach with New Zealand velvet products.

Some of the pharmacological and bioactive effects of deer velvet are:

- Stimulating and tonic effect.
- Androgenic/gonadotrophic effects.
- Haematopoietic effects.
- Hypotensive/cardiovascular effects.
- Anti-stress effects.
- Growth-stimulation.
- Retardation of ageing.
- Help in Asthma attacks, Digestion problems and Inflammation.
- Skin disorders or injuries.
- Menstruation problems.
- Accelerated recovery from injury.
- General well being.

However, there is no evidence for a specific anti-microbial or anti-viral function for velvet. There is evidence that the use ofvelvet antlers hastens the recovery of patients suffering from gastro-intestinal disease, but the most likely reason for this is a build up in strength rather than an anti-microbial effect. Some of the future applications are in the context of strengthener, restorer and stimulator of nerves and blood vessels. The word "tonic" is frequently used to describe the velvet antler. Tonics are unusual in western medicine relying as they do on scientific purity and experimentation, but the Oriental medicine system of measuring effects leads to the conclusion that velvet is truly a tonic. Therefore consider velvet antler as a restorer, supporter and enhancer. It is not a cure in its own right, and may not operate successfully for all human users, but applications consistent with the properties described above should have widespread benefits for consumers of velvet products.

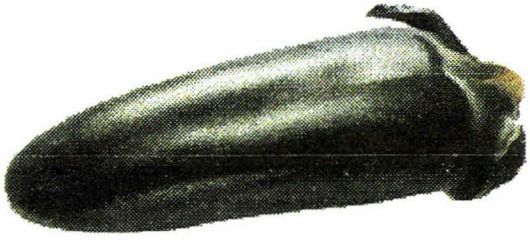
5.7.3. DEER CO-PRODUCTS

Besides venison and velvet the market demands other deer products, called co-products. The most important markets for these products are China, Hong Kong, Taiwan, Republic of Korea (ROK), United States and Italy among others. Deer co-products include deer sinews, deer pizzles (stag's penis), deer tails and others. Skins are considered as being a different product.

5.7.3.1.DEER TAIL

The *deer tail* is the most commonly consumed part of the deer, second to velvet (excluding venison). Processing is extremely difficult and time consuming. The finished product (see Figure 5.9) should be hairless, jet-black in colour and possess a very distinctive odour.

Figure 5.9: Deer Tail.



Source: http://www.deer.co.nz/

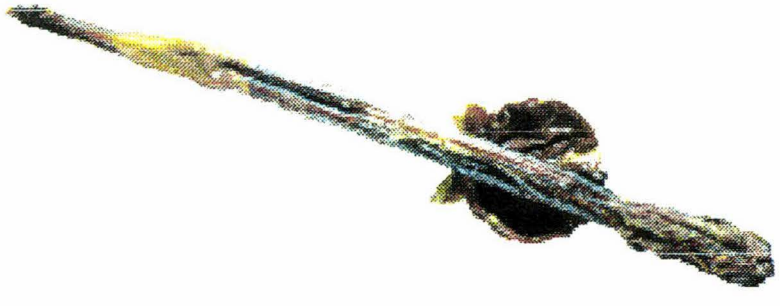
Deer tails contain sulphur, calcium and phosphorus, and have a high level of lipid and are low in protein and ash levels. Oriental medical beliefs consider deer tails beneficial in reducing stress and of high value towards curing joint, kidney and nervous disorders. Its value per kilogram makes it one of the most expensive forms of medicine derived from deer. It is used to replenish the yang system, enrich bone marrow and kidneys, and promote the flow of vital energy. It is also reputed to be useful during times of sexual exertion. Tails are consumed mostly in winter when they

are usually stewed over a low fire, with or without other herbal and animal medicines, and served with chicken or duck soup. Another utilisation is to soak the tail in yellow liquor[25] for 30 days, then drink the liquor and cook the tail and eat it. The process to get a good product (*deer tail*) is to cut through the junction with the backbone, take off the hair, and dry either naturally or artificially.

5.7.3.2.DEER PIZZLES

The *deer pizzles* (the male deer sex organ) are consumed exclusively by men as a genital tonic, which is said to rejuvenate and enhance sexual performance and overall vigour. They are said to help cure impotency and promote general wellbeing. The appearance and size is critical in marketing this product. The "larger is better" theory is generally accepted, and is reflected in the higher value obtained for the larger article. The pizzles are processed to a dry preserved state with a portion of the pelvic bone still attached. This is necessary to safeguard against imitations. Generally consumed in tonic form, it can also be sliced, soaked with wine, whiskey or cognac (for drinking small quantities each night) or be added to food preparations. Deer pizzles are composed primarily of protein with traces of several minerals. Figure 5.10 shows a *deer pizzle* in its dried form, as Lowe Products in New Zealand present it.

Figure 5.10: Deer Pizzle.



Source: http://www.deer.co.nz/

[25] Special processed alcoholic liquor, which is widely used in China for medical purposes.

The process to obtain this organ from the male deer is as follows: Take the penis, testes and epididymis and foreskin together, cut off the muscle and fat and wash with fresh, clean water. Pull the penis straight and fix it on a board, to dry either naturally or artificially.

5.7.3.3.DEER SINEWS

The *deer sinews* are preserved to a bright natural colour with, or without, the inclusion of the rear claw. Consumed in the form of tonic soup with vegetables and herbs it is popular during festive occasions, and is believed to be beneficial in muscular conditions, eyesight ailments, building up vital functions and energy. It can also cure weak body conditions. The sinews are taken from the four legs and pulled straight before natural drying. Figure 5.11 shows dried *deer sinews.*

Figure 5.11: Deer Sinews (Dried).

Source: http://www.deer.co.nz/

5.7.3.4.DEER HARD ANTLER

The *hard antler* has the functions of promoting blood flow and assisting in the subsidence of swelling after injury. It can cure malignant sores, pain from reduced blood flow, lactation deficiency in women, mammary swelling and other body

conditions. It is especially good for mastitis and mammary gland hyperplasia. Deer antler extract is a very valuable traditional Chinese medicine.

5.7.3.5.DEER FOETUS

During pregnancy, the hind is slaughtered and the *foetus*, afterbirth and amniotic fluid are retained and dried by machine. This product is used for the treatment of menstrual disorders, infertility, and uterine bleeding in women.

5.7.3.6.DEER VELVET ANTLER BLOOD

The *blood* is collected during velveting and then dried. *Velvet antler blood* contains sexual hormones and different kinds of amino acids. It can be used for the treatment of impotence, emission, palpitation, insomnia, and illness or weakness from old age. The common way to sell deer blood is in capsules of 200 and 500. They are rich in iron, and they should be taken daily to promote good health. As the capsules contain powdered deer blood, this is an ideal method of ensuring the recommended daily intake of iron.

5.7.3.7.DEER SKIN

Deer skin has a unique character, which is quite distinctly different from that of lamb and cattle. Nappa and Suede are two products that can be obtained from deer's skin. *Deer skin* is enormously strong and has very tight fibre weaves. This means that the range of thickness, which can be used, is extraordinary, compared to other raw material types. An important factor in the production of deer skin is the care of the skin, so the final product can have a lack of healed scars, open scratches, sores, or bacterial damage from either the curing process or tick damage. To prevent such

damage, farmers must have a quality management system in order solve possible problems with deer skin. Some important markets for deer skin products are the United States and Japan. The lower end of the deer product range (suede and nu-buck) goes to a much wider market than the United States and Japan. This is because the leather or other products cannot be identified as deer products as such. These kinds of products enter a competitive pool of products where surface touch, appearance and pricing are important. The final purpose of *deer skin* is to produce clothing products and not footwear products.

CHAPTER 6: THE NEW ZEALAND DEER INDUSTRY

6. THE NEW ZEALAND DEER INDUSTRY

6.1. INTRODUCTION

Before analysing the New Zealand Deer Industry, is important to consider the background of the country, as it can be useful in further analysis. Geography, economy, climate and agriculture are some of the aspects that will be analysed in this section.

6.1.1. NEW ZEALAND GEOGRAPHY

New Zealand is in the southern Pacific Ocean, 1,600 km east from Australia. It is made up of the North and South Islands and some smaller islands, with a total land area of 268,021 square km from which 60% is useful for agricultural activities. Mountain ranges and hill country are characteristic of New Zealand's landscape. These, along with fjords, glaciers and lakes, and the coastal plains of Canterbury and Southland, add to the variety of the South Island scenery. In the North Island, the volcanic interior contains New Zealand's largest lake, Lake Taupo, and most of the country's active volcanoes are usually dormant.

6.1.2. THE NEW ZEALAND CLIMATE

January and February are the warmest months, with July being the coldest. The climate is temperate, with average temperatures from 8°C in July to 17°C in January. Summer temperatures occasionally reach the low 30s in many inland and

eastern regions. The main average rainfall varies widely, from less than 400 mm in Central Otago to over 12,000 mm in the Southern Alps. For most of the North Island and the northern South Island the driest season is summer. However, for the west coast of the South Island and much of inland Canterbury, Otago and Southland, winter is the driest season.

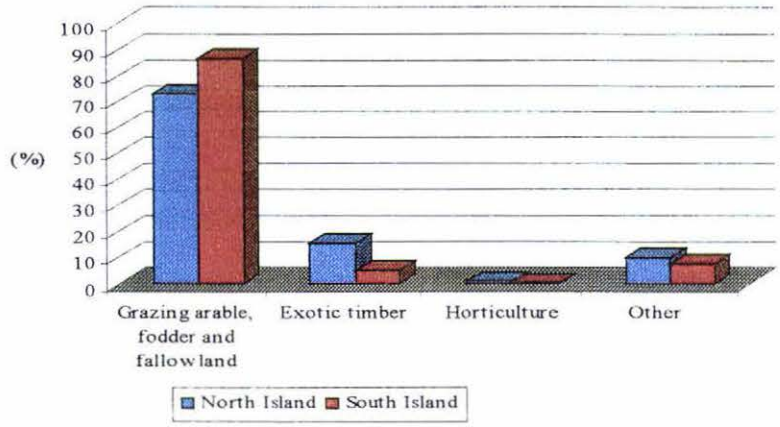
6.1.3. THE NEW ZEALAND ECONOMY

New Zealand's economy is highly dependent on overseas trade. Traditionally, a large proportion of New Zealand's exports come from agricultural activities, with the main market being the UK. In the past two decades, New Zealand has adapted to a changing world, where the Asian markets are now more dominant. The largest export markets are Australia, Japan, USA, the UK and Korea. New Zealand agriculture has been developed in order to produce the goods demanded by niche markets, and to satisfy consumers' needs.

6.1.4. AGRICULTURE IN NEW ZEALAND

Agricultural activities in New Zealand provide a high proportion of the country's export earnings. The traditional agricultural activities have been based on sheep and cattle farming, however, in recent years new types of livestock including deer, goats, ostriches and llamas have been introduced. With 13 million hectares of meadows, New Zealand has 8.8 million cattle beasts (50% beef cattle and 50% dairy cattle), 46 million sheep, 1.6 million deer and 0.3 million goats. The land is predominantly used for grazing and for fallow. Horticulture represents a small portion of the land use in New Zealand (see Figure 6.1)

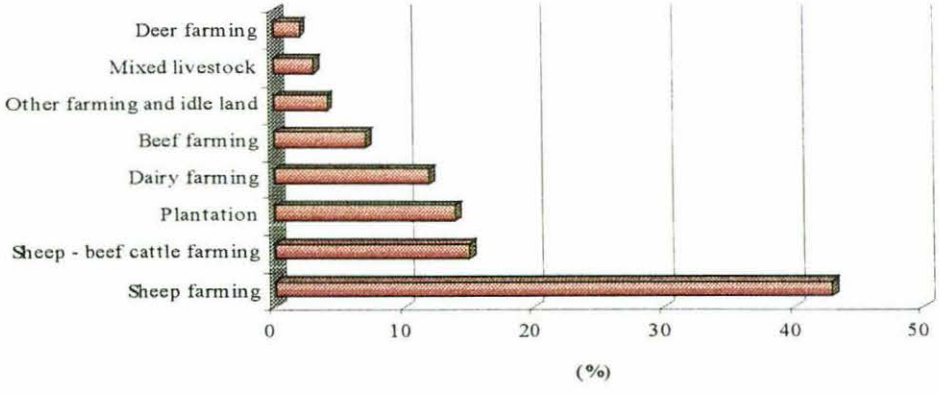
Figure 6.1: Land Use in New Zealand, 1996. (%).



Source: Statistics New Zealand.

In New Zealand mainly sheep, beef cattle, and dairy farming comprise the agricultural activity. However, deer farming has become an important component of the industry. Farmland by type of farms in New Zealand in 1996 is presented in Figure 6.2.

Figure 6.2: Farmland by type of farm in New Zealand, 1996.



Source: Statistics New Zealand.

In New Zealand, the livestock numbers are determined and influenced mainly by the world market demand and prices for farm products, such as meat, wool and dairy products. In recent years, products such as venison, velvet and goat fibre have become more important in terms of livestock numbers.

6.2. *THE DEER INDUSTRY IN NEW ZEALAND*

6.2.1. INTRODUCTION

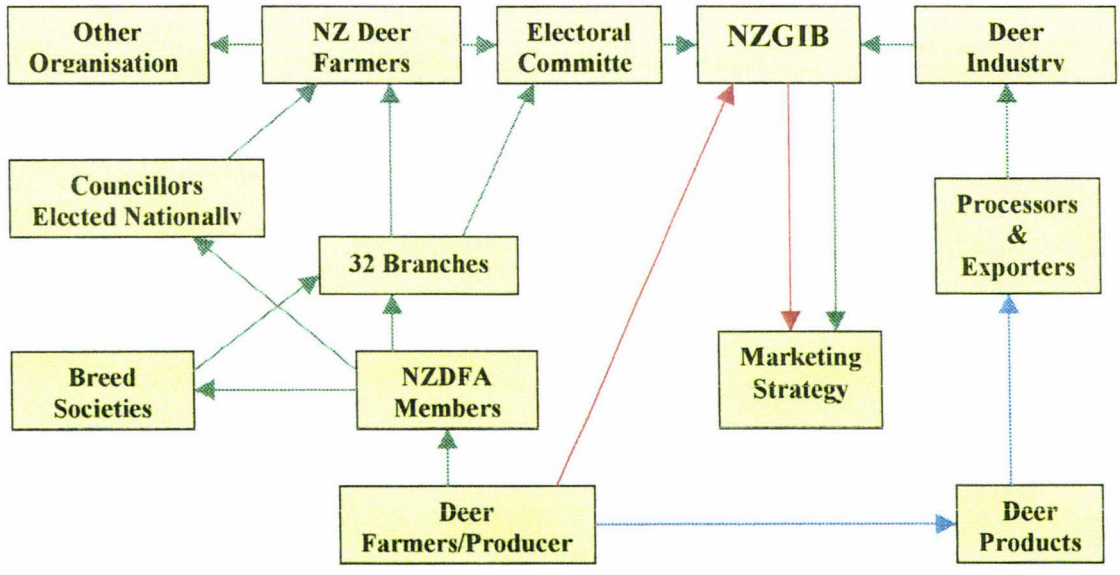
An important factor to be considered before starting a business activity concerns not the technical part of it, but the market for the products. The most important issue is not to sell the product, but to know to whom, when and how to sell it. For this it is essential to know how the market of a specific product (in this case deer products) works. However, this does not mean that the technical part is not important, but it is useless if there is a lack of understanding of the market. The following overview of the New Zealand deer industry gives in full detail to who, when and how of selling deer products in the world market.

New Zealand was the first country to develop a viable modern deer farming industry. This industry establishment involved all the processing and marketing operations needed to sustain this export activity. Other countries had found it difficult to develop a 'critical mass', whereas the New Zealand industry has more than 4,000 farmers running 1.6 million deer behind wired fences. Another factor influencing the success of this industry in New Zealand is the size of the country that enables the processing facilities to attain economies of scale. In New Zealand, feral deer were present in large in numbers, and hunting became an attractive activity. An established and sizeable market for venison already existed in Europe, and New Zealanders had already established marketing links for feral product. When the deer industry started in New Zealand the government had an active policy of promoting agricultural diversification, helping farmers to build up herds rapidly. In New Zealand, deer are an introduced species, and until recently there was an abundance of them in the wild. The early European settlers began arriving in increasing numbers from the middle of the last century. At the same time, imports of Red deer from British parks for release into the wild for hunting began in New Zealand. The wild stock quickly spread and expanded in numbers in New Zealand's good climate and landscape. This occurred to the point where, by the middle of this century, concerns about their impact on the natural environment prompted the government to hire hunters to control numbers, if not to exterminate them outright. This eventually led to the development of a

commercial feral venison industry, and the first links were made with export markets in Europe. This trade was so successful that by the late 1970's it seemed the feral source would soon be exhausted. At this point, New Zealand farmers began trapping animals that strayed onto their property, or hiring professionals to capture them by helicopter. The processing and marketing of farmed venison grew based on the feral industry, and farmed venison joined feral in shipments to established game markets in northern Europe, and particularly Germany. The deer industry in New Zealand has had an average growth rate of 7% in the last five years, showing the dynamism of the industry[26].

As mentioned before, the processing and marketing of deer products is based on an industry structure (see Figure 6.3). The main participants in the industry are the New Zealand Game Industry Board (NZGIB), the New Zealand Deer Farmers' Association, the New Zealand Deer Industry Association, the New Zealand Velvet Processors' Association and the New Zealand Deer Development Council.

Figure 6.3: New Zealand Deer Industry Structure.



: Flow of information; : Flow of products; : Flow of resources
Source: Adapted from The NZ Deer breeding and management Manual, 1995.

The main functions of the NZGIB are to promote and assist in the development of the game industry, and the marketing of game products. The Board

[26] MJ Loza (Personal contact) Velvet Manager, NZGIB, 1999.

has the power to collect levies from farmers on velvet and venison. In the past, the NZGIB maintained a leadership position, however, the current position is one of a supporter to farmers and industry participants.

The New Zealand Deer Farmers' Association represents deer farmers in all matters of common interest. The final objective is to encourage and promote advancement of information and expertise to deer farmers. It also provides a scheme and ventures to all those involved in the deer farming industry, including research.

The New Zealand Deer Industry Association represents the interests of the processing and exporting companies. In contrast, the New Zealand Velvet Processing Association represents the owners of game packinghouses involved in processing. Finally, the New Zealand Deer Development Council was formed in order to stimulate the application of new technology into deer farming, so that genetics can be improved.

6.2.2. NEW ZEALAND DEER VENISON

In New Zealand, deer were originally hunted for recreational purposes where the antlers were the final aim (as a trophy) and meat (venison) the sub-product. As time went on, new markets have been found for new products. The New Zealand deer industry produces not only deer meat (venison), but also a great variety of products including velvet antler, leather, and special co-products for specific market demands. No growth hormones or steroids are used on farm raised venison in New Zealand, which ensures that the meat is natural and chemical-free. All venison is inspected by the Ministry of Agriculture and Forestry (MAF) and must meet all quality control standards established by the NZGIB and MAF before it is shipped to restaurants and retailers all over the world.

Venison is significantly different in appearance from beef, and consumers perceive it as being true game meat. Venison in its various forms (fallow deer, red deer, etc.) is accepted by consumers as deserving a special meat price greater than that of traditional red meats.

Table 6.1: Per Capita Consumption of New Zealand Venison in the world market (1990 and 1997).

Country	Per Capita Consumption (Kg)	
	1990	1997
(West) Germany	0.0346	0.0725
United States	0.0022	0.0034
Sweden	0.0580	0.0801
Switzerland	0.0609	0.0974
Japan	0.0019	0.0011
Australia	0.0130	0.0002
Denmark	0.0260	0.0276
Canada	0.0020	0.0008
Belgium	0.0050	0.0496
Hong Kong	0.0050	0.0079

Source: New Zealand Game Industry Board, 1997.

Table 6.1 shows that almost all countries where venison is sold have increased their per capita consumption of New Zealand venison. Interestingly, two of the three countries that have decreased their consumption of New Zealand venison are New Zealand's competitors (Australia and Canada). A reason for this decrease may an increase in the consumption of domestic products rather than a reduction in venison imports from New Zealand. In contrast, the per capita consumption of New Zealand venison has risen in countries, such as the USA, where the Cervena strategy has been used in the last few years. The consumption of game meats per capita in the European countries is very different from Western countries, depending on habits, history, climate and prosperity. Venison in European countries is usually perceived as a seasonal product, and is consumed during winter and autumn. In Europe, the main geographical market for New Zealand venison, the venison production is around 6,200 tonnes and the imports from New Zealand are more than 12,400 tonnes a year. In the last World Deer Farming Congress (Ireland 1998), Karl Vilhelm Beckman estimated that the European consumption of deer meat would be about 50 grams per person a year. Traditionally, in north European countries, people tend to eat more game meats, (which include deer meat). For instance, the consumption of game meat in Sweden, Norway and Finland is more than 1,5 kilos per capita. In the south of Europe, in countries like Austria, Switzerland and Germany, people consume about 0,5 kilo per capita. The lowest per capita consumption of game is in countries like

Greece, Spain and Portugal, due to the warmer winters and autumns, compared with those of northern Europe.

New Zealand, the major world supplier of venison, exports around 88% of its venison volume to Europe with Germany the main market, taking up to 51% in 1997. The NZGIB has created different strategies for each of the deer products. For deer meat or venison, the NZGIB created two marketing strategies; one is for emerging markets and the other for established markets.

6.2.2.1.CERVENA

cervena®
NATURAL TENDER VENISON

The word "Cervena" is a new word in the food language. It is a derivation from the Latin, *cervidae*, meaning deer, venison, the word for deer meat plus an A, for a premium product. Figure 6.4 shows the composition of the name Cervena.

Figure 6.4: Composition of the name Cervena.

[CER]VIDAE + [VEN]ISON + A [grade] = CERVENA

Cervena is the appellation for fresh raised venison from New Zealand. The final aim of Cervena is to change the perception of venison away from a tough and gamey product with seasonal availability and irregular quality, to one that reflects the very real product benefits of New Zealand farmed venison. The name Cervena was created to differentiate New Zealand Venison from others available around the world. The standards for Cervena are strict. Healthy red deer or fallow deer must be between 18 and 30 months of age to guarantee a proper size and texture and must be raised without antibiotics, hormones, steroids or growth stimulants. This venison is very lean, low in fat and cholesterol and yet very high in protein. Cervena is less gamey than domestic venison, but still richer in flavour than traditional red meats. The

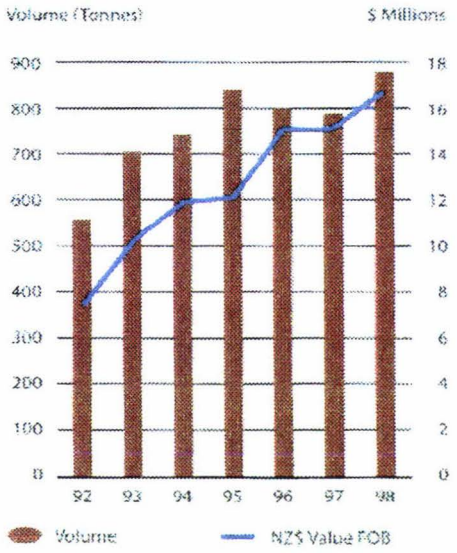
Cervena label guarantees that chilled venison has been aged 21 days at -1° C and has average shear values of no more than 5 kgF, no part is greater than 10 kgF and 95% is less than 8 kgF.

This strategy is used for emerging markets such as North America, Australia, New Zealand and Mexico. According to the NZGIB the strategy is as follows "...high standards from a geographic location associated with quality, category imagery and position, room for competitive brands"[27]. The NZGIB is looking for a market perception of Cervena based on the nutritional profile, versatility, taste and tenderness of New Zealand venison. In addition, the natural New Zealand free-range origin offers an attractive product to create a new market among affluent and quality conscious consumers. Cervena differentiates itself from other venison by its innovative cuts, specification and service (such as Cervena online in http://www.cervena.com). The use of the Cervena name is restricted to franchised New Zealand exporters meeting strict quality and marketing criteria, including the ISO 9002 accreditation for processors. This is to maintain its premium quality positioning in the market. The specific cuts are middle and hind leg. Cervena venison is packaged distinctively; gold stripes for chilled products and silver stripes for frozen products. A good packaging design not only reinforces the brand's characteristics and meets functional and legal requirements, it also leaves the end user in no doubt about the name of the product. The Cervena vacuum packs take the opportunity to brand, and to visually improve the look of the product.

Figure 6.5 shows the total volume of Cervena exported to the U.S.A, the value in NZ$ FOB (Cervena performance). As seen, the values have increased between 1992 and 1996, but in 1997 the trend for them was to decrease, or to be maintained. However, the volume and values achieved in 1998 show a new record at NZ$16.7 million FOB, representing a 11.5% increase, compared with 1997. The volume exported follows the same trend, with 880 tonnes in 1998, 11% higher than in 1997. According to the NZGIB the average price per kg. of exports to the USA market was around $19 per kg. in the 1998 season.

[27] NZGIB, Information Pack, January 1997.

Figure 6.5: Venison Exports to U.S.A (NZ$ Millions FOB, 1992 - 1998).



Source: New Zealand Game Industry Board Annual Report 1997-98

Figure 6.5 shows that from the launch of the Cervena strategy in 1992, there has been an incredible increase of 126% from NZ$7.4 million FOB to NZ$16.7 million FOB in 1998. In terms of market share, the Cervena market represents about 12% of all New Zealand venison exports. According to the NZGIB, Cervena accounts for 37% of the total value and 26% of the total volume for chilled venison exports, and is by far the largest market for chilled venison.

6.2.2.2. ZEAL

New Zealand Quality Assured Venison™

The Zeal mark is used for established markets such as Europe and for all other non-Cervena markets. The Zeal quality mark distinguishes quality assurance New Zealand product from competitors. Venison is often considered a traditional product, with a strong association with the hunted or feral venison, served mainly in autumn

and winter in traditional "game" restaurants. The final aim of Zeal is to maximise value by shifting product volume to niche markets where the New Zealand identification reaches the end user; both within Europe and in other geographical markets. Use of the Zeal quality mark is licensed to exporters who meet specific quality and marketing criteria, including accreditation of ISO 9002 quality standards for processors.

6.2.2.3.NEW ZEALAND VENISON MARKETS

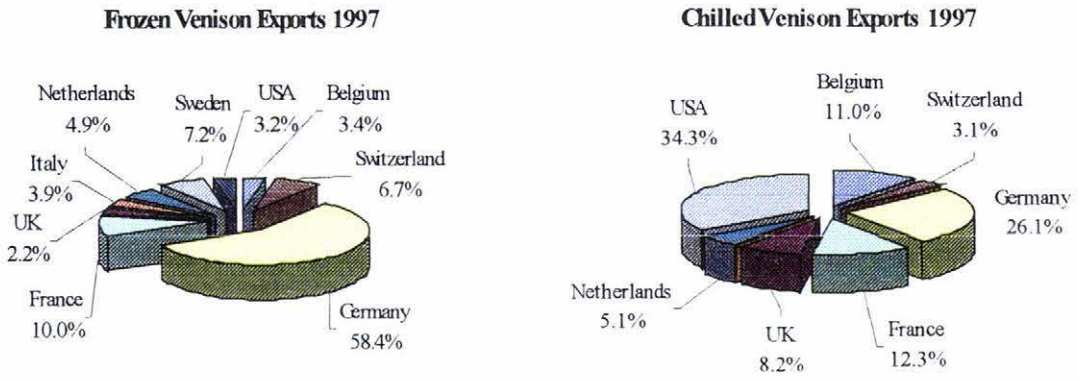
Trade of deer meat (venison) is not a small business in Western Europe. The imports of deer meat come mainly from Eastern Europe and from New Zealand. Germany represents the largest market for New Zealand's venison. Germans eat venison during autumn and at Christmas, explaining the higher prices in spring for the New Zealand product.

Exports of frozen, chilled and total venison from New Zealand to Asian countries were about NZ$4 - 5 million (5% of New Zealand total venison export business) in 1996 – 1997. Within Asia, Japan is the strongest importer, particularly of chilled venison. Korea is a limited, but, growing market.

Venison prices are related to the carcass weight. Top prices can be achieved with a carcass of 50 to 60 kg (100 kg. liveweight). Another factor that can influence prices is the season of the year, with higher values between September and November (European autumn). As shown in Figure 6.6, New Zealand exports venison as chilled and frozen products to a variety of countries, with the European countries and the U.S.A, the most important marketplaces.

In Europe, the highest demand for venison is in its chilled form. From August to November, New Zealand's marketing advantage is in its chilled products, with its consistent quality, long shelf life and good packaging. Outside the "chilled season", the market is dominated by frozen products. (refer to Appendix 7).

Figure 6.6: New Zealand Venison Exports, Frozen and Chilled, 1997.



Source: New Zealand Game Industry Board, 1998.

5.1.1.1.1 EUROPEAN COUNTRIES

In the 1997 season, the volatility in the European market was the major influence on venison returns, when the anticipated chilled season peak prices fell below expectations and the market remained flat. The German market is a 60,000 tonne market for venison, from this total 30,000 are imported, of which New Zealand exports 6,000 tonnes. This shows the importance of the German market to New Zealand venison exports (51% in volume and 43% in values in 1998). In the major European venison market (Germany), New Zealand is a witness of the inevitability of prices falling under the weight of rapidly increasing supply after a period of high prices driven by short supply. This is a classic commodity market behaviour.

Apart from Germany, another European country that represents a major opportunity for New Zealand venison is Sweden. Since Sweden joined the European Union (EU), the opportunities for New Zealand wine and meat producers to export to the Swedish market are increasing. In the past five years Sweden has been the second largest market for New Zealand wine and venison and has the second largest per capita consumption of New Zealand venison in 1997, after Switzerland.

5.1.1.1.2 USA & CANADA

North America is one of the largest consumer markets in the world. As shown in Table 6.2, the volume of venison commercially available and consumed during the period 1993 – 1996 increased by approximately 82%, or by an average of 27% per annum.

Table 6.2: North American Venison Market Volume (in tonnes), 1993 – 1996.

	1993	1994	1995	1996
CANADA				
Production (Tonnes)	-	109	223	225
Imports (Tonnes)	53	65	36	27
USA				
Production (Tonnes)	118	179	232	302
Imports (Tonnes)	573	708	765	802
Total Consumption (Tonnes)	744	1061	1256	1356

Source: Proceedings of the 2nd World Deer Farming Congress, Ireland, June 1998

From these values, over 90% of the imports come from New Zealand. The value of the imports to these countries from New Zealand is shown in Table 6.3. Here it is shown that the values for the North American market as a whole increased during the period of 1993 to 1996, by 118%, or an average of 39% per annum.

Table 6.3: Total Value of North American Market, 1993 – 1996 (US$ million).

	1993	1994	1995	1996
CANADA				
Production	-	0.91	1.51	1.55
Imports	0.56	0.99	1.79	0.82
USA				
Production	1.17	1.67	1.92	1.99
Imports	2.75	4.94	7.53	10.92
North America	7.35	10.94	13.09	16.02

Source: Proceedings of the 2nd World Deer Farming Congress, Ireland, June 1998

Both volume and value figures are encouraging and show how both increased during this period of time. This shows that the North American market is very attractive for New Zealand venison exports. The U.S.A market now accounts for more

than 12% of the total export earnings (doubled from 6% when the Cervena programme was launched). However, the total venison export earnings slipped by 5% to NZ$131.9 million (from NZ139.4 million). Reflecting the rising kill levels, total venison exports volumes rose by 18% to 13,400 tonnes.

The U.S.A market now contributes a growing proportion of the industry's value, especially for chilled venison (see Figure 6.6). This programme is increasingly proving its worth as an industry investment, and it provides valuable pointers for a European differentiation strategy, as is acknowledged in an issue of "The Deer Farmer" (June 25, 1998).

Opportunities can be seen for the future in the deer industry for venison products. One of these opportunities is the farming of organic venison, which is already being farmed by some farmers. This is the case of a Wairarapa farmer in New Zealand, Ian Atkinson. According to Mr. Atkinson, "We've to produce what the consumer wants and overseas consumers are demanding chemical-free food. Unless we as producers change, we will not be able to sell our produce except at discounted prices to countries that cannot afford anything else."[28] However, at present the low volume of organic venison makes the marketing process difficult. This is due to the large numbers of stock needed at regular intervals to meet the customers' demands and to the Biogrow certification of each step of the process. As a consequence, the actual organic venison is traded as conventional venison. If we look to the organic market, New Zealand's organic exports in the last years rose from NZ$12.6 million to NZ$20 million, and according to the industry, these figures can easily achieve the NZ$60 million level in the year 2000. As an example of the future success of this *special* venison, Atkinson tried to export to Japan at a 50% premium price. Even though consumers were prepared to pay the premium, this market required a high volume per month that represented the farmer's annual production. One of the most difficult problems that organic venison production has to face is the actual processing of the meat after slaughter. Even though the current process is under the Deer Quality Programme of the NZGIB, more regulations are applied to organic venison. New consumers' trends are related with the reduction of faecal contamination of carcasses to the maximum extent practicable, in order to achieve the desired food safety objectives. Venison carcasses examined at three export plants in New Zealand had

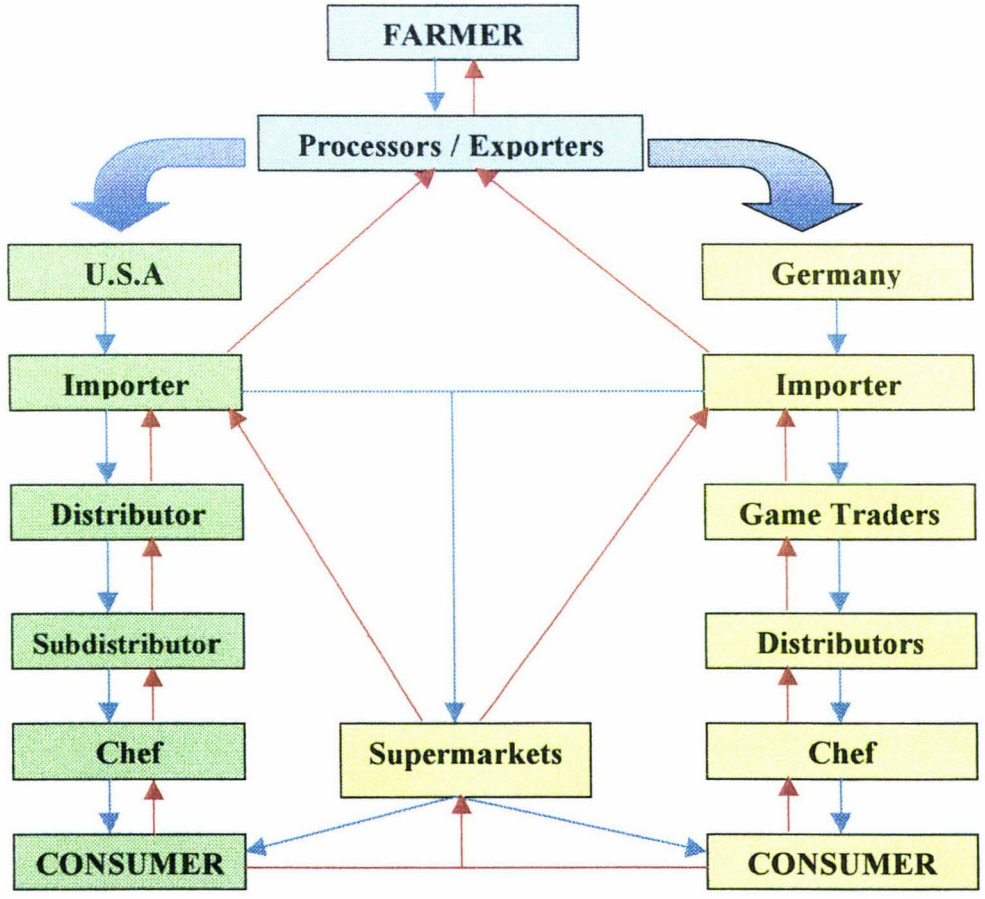
[28] The New Zealand Farmer, June 18, 1998. Page 19 ("20% premium for organic venison" report)

average bacteriological loadings of less than 100c.f.u/cm^2 off the slaughter chain. If well managed, farmed deer can be slaughtered so that bacteriological quality at the point of slaughter is much lower than that for traditional ruminant carcasses. It should be possible for chilled venison to fulfil the customers' expectations of products where other meats have so far failed.

6.2.2.4.NEW ZEALAND VENISON MARKETING CHAIN

The venison supply chain has different steps, as seen in Figure 6.7, and they depend on the market where venison is sold, such as the U.S.A or Germany. This chain can be considered long, however, it is the best way to approach the consumer with a high quality product.

Figure 6.7: New Zealand Venison Marketing Chain.



→ : Product Flow; → : Money Flow.
Source: New Zealand Game Industry Board.

The supply to supermarkets does not seem to be a good strategy at the moment. As the constant and high demand (volume and quality) for venison by supermarkets cannot be met by the New Zealand deer industry, as it is not prepared to supply such quantities every month. On the other hand, if New Zealand does not satisfy the supermarket demand, then the image that the NZGIB has been working on could be damaged. Most New Zealand venison is sold to restaurants, where chefs value its lean meat, taste and versatility. Alternatively, the restaurants' demand gives the venison an image of exclusivity and high quality product. Game restaurants and Chefs expect also:

- Consistency and reliability of supply.
- Consistency of product.
    - Size
    - Rounded muscle conformation
    - Colour
    - Cut
    - Weight
    - Texture
- Value for money.
    - Convenient cuts with no wastage.
    - Price levels to meet consumers.
- Delivery on time every time.

The strategy of the NZGIB for marketing New Zealand venison aims to spread the market exposure. This means to reduce or maintain the exports to the dominant European markets, and to increase the exports to new markets such as North America and Asia. Another objective is to reduce the volatility of returns by balancing supply and demand and by diverting New Zealand venison out of market sectors subject to commodity price fluctuations. In order to achieve these objectives, New Zealand venison has been differentiated from all competitors on the basis of its consistent quality and product benefits.

6.2.2.5. NEW ZEALAND VENISON TRADE

According to the New Zealand Farmer magazine (September 2, 1999), farm gate prices for AP Stags of 60 kg had increased from NZ$ 5.84 four weeks previously to NZ$6.19 by September 2. Table 6.4 shows the New Zealand Farmer information about Venison farm gate prices in NZ$/kg-gross. For further detail information on venison prices refer to Appendix 8.

Table 6.4: Stag and Hinds Farm Gate Prices. (NZ$/kg-gross) September 1999.

	September 2	Previous Week	4 weeks ago	3 months ago	98/99 Low	98/99 High	97/98 Ave.
AP Stag 60 kg	6.19	6.14	5.84	5.13	4.68	6.19	4.82
AP Hind 40 kg	4.71	4.69	4.42	3.83	3.42	4.71	3.55

Source: The New Zealand Farmer, September 2, 1999.

5.1.1.1.3 Forecast for 1998/99 to 2000/02

New Zealand production is forecasted to increase by around 9% per annum, however, the current growth rate is 7%[29]. According to MAF in its "Situation and Outlook for New Zealand Agriculture and Forestry" (SONZAF) 1998 for deer, the increasing production is due to a greater demand in deer products because of:

- Continuing economic growth in OECD countries.
- A return to a normal European autumn.
- Continuing promotion of the Cervena brand in the USA, and Zeal quality marks.
- New Zealand quality assurance programmes enabling trace back to the place of origin.

The forecasts for New Zealand venison export and price per kg, and production of stags and hinds are shown in Table 6.5 and Figure 6.8.

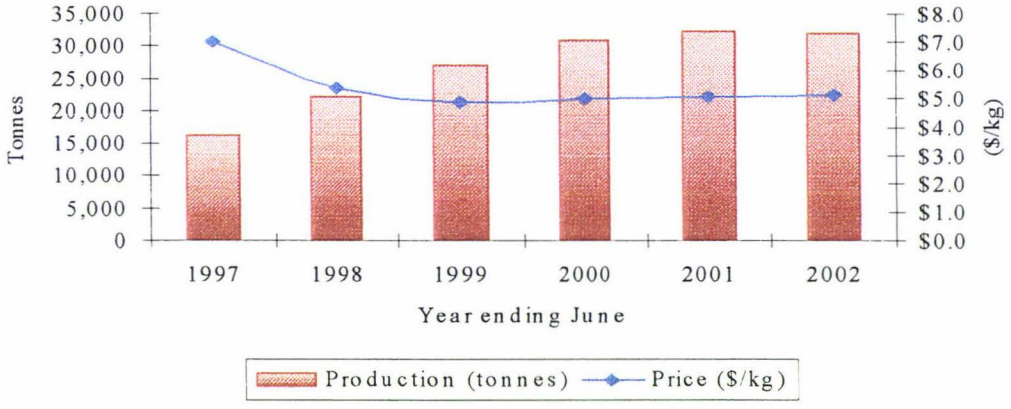
[29]MJ Loza, NZGIB Velvet Manager, (Personal contact).

Table 6.5: Exports, Prices and Production Forecast for New Zealand Venison, 1998/99 to 2001/02.

June year	1997	1998e	1999f	2000	2001	2002
PRICES						
Exports (NZ$ mil FOB)	$136.8	$141.3	$173.1	$197.3	$208.4	$202.8
Schedule Prices(NZ$/kg[1])	$7.0	$5.40	$4.90	$5.00	$5.05	$5.10
PRODUCTION						
Stag Kill (000's)	192.7	266.9	298.6	331.3	331.9	319.7
Hinds Kill (000's)	88.9	109.9	214.0	275.5	305.6	314.2
TOTAL Kill (000's)	281.6	376.8	512.5	606.8	637.5	633.9
Weight (Tonnes[2])	16.079	22.200	26.950	30.950	32.340	32.043

1 AP2 Stag net of levies. 2 Product weight.
e: estimated, f: forecast
Source: Game Industry Board and MAF.

Figure 6.8: New Zealand Venison Prices and Production, 1997/98 to 2001/02.

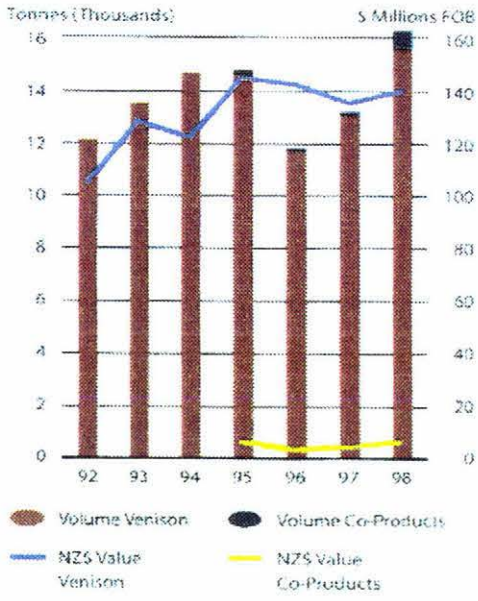


Source: New Zealand Game Industry Board and MAF.

As seen in Figure 6.8, venison production shows a trend to increase in number of animals slaughtered (volume), but prices will decrease and remain around the NZ$5 level. In the first seven months of 1999, the New Zealand national average published schedule prices were about $5.50 per kg.

The ways to maintain New Zealand venison on an exclusive and competitive position in the market (Europe and U.S.A), are by the promotion and marketing of Cervena and Zeal as special and different products, and by developing new markets for New Zealand venison.

Figure 6.9: Venison Total Exports, in million NZ$ FOB, and Tonnes (thousands), 1992 – 1998.



Source: New Zealand Game Industry Board Annual Report 1997 – 98.

As seen in Figure 6.9, venison exports have been increasing since 1992, with venison value reaching a peak in year 1995. However, the export returns and volume during 1996 and 1997 declined compared to those in 1995. Even though venison exports' volume decreased during the 1996 season it shows a very large increase in 1998. The venison price also showed an increase, however not as large as that of the volume.

6.2.2.6. NEW ZEALAND VENISON COMPETITION

There are some other countries in the world that are not as large venison producer as New Zealand, but nevertheless they have an important presence in the industry. Table 6.6 shows the approximate populations of farmed deer in different countries in 1997.

Table 6.6: World approximate population of farmed deer in 1997, by country.

Country	N° of Deer
New Zealand	1,600,000
China	1,000,000
Russia	400,000
Australia	250,000
United States	250,000
Korea	230,000
Germany	150,000
Taiwan	128,000
Canada	98,951
Eire (Ireland)	61,000
Mauritius	60,000
France	58,000
England	36,000
Denmark	30,000
Sweden	25,000
New Caledonia	20,000
Vietnam	15,000
Malaysia	15,000
Argentina	14,000
Chile*	5,500
Thailand	5,000
Norway	1,000

*: Estimated population by the NZGIB, no census has been done recently by Chilean Organisations.
Source: Adapted from: Proceedings of the 2nd World Deer Farming Congress, Ireland, June 1998

5.1.1.1.4 Australia

The Australian industry is in fourth place, after Russia, in terms of farmed deer population. Australian venison is present in the U.S.A and Asian markets, directly competing with New Zealand products. Australian venison production in 1997 was around 1,000 tonnes, with 80% exported; approximately 50% to Europe, with most of the remainder to Asia and the USA. Farming in Australia is generally on a broadacre basis. Large cattle properties are more extensive than those in some European countries. However, the deer industry in Australia has not progressed to this scale yet. The Australian deer industry comprises about 250,000 animals farmed on around 1,200 farms. Red deer and fallow deer are farmed in almost equal numbers, with the vast majority of the herd destined for venison, with rusa deer being used for velvet production. Large distances in this country create major problems in providing quality slaughter systems for venison production. The Australian deer industry needs

to solve this difficulty if it is to develop its potential and increase its production base. One of the trends with high priority in this industry is to increase both the number of deer farmed, and the herd size of existing farmers. Much of the farming field technology is similar in Australia to New Zealand, although it must be applied to a wide range of environments, especially hot and dry summers. One of Australia's competitive advantages is the freedom from diseases such as tuberculosis, brucellosis and Johne's disease. The Australian industry has huge potential to work with European countries and all other international markets. Land prices in Australia can be considered inexpensive (compared with other parts of the world), and the fact that this country has a variety of climates gives Australians the ability to develop different farming systems. Even though the Australian industry is not well co-ordinated and its processing and distribution costs are high, Australian venison is competing with New Zealand venison in Europe, the U.S.A and Asian markets.

5.1.1.1.5 Argentina

This country enjoys virtually all of the same geographical advantages as New Zealand for deer production. However, climate is a crucial factor that gives New Zealand a huge competitive advantage over Argentina. Due to experience in the German meat market, it could be easy for Argentina to achieve a national coverage in Germany in the near future for deer products. Argentina is back as a major player in the world beef trade and is making its first incursion into venison exporting. In Argentina there are 24 deer farms and 14,000 deer.

5.1.1.1.6 Canada

The Canadian deer farming industry has developed as a result of consumer demand for velvet and venison in Europe and Asia and to the need to diversify the farming economy. The total farmed deer population in Canada was approximately

57,816 animals by the end of 1992 and 98,651 in 1,667 farms by 1997, as shown in Table 6.7.

Table 6.7: Deer Farming in Canada, 1997.

Province	Elk	Red Deer	White tail	Fallow Deer	Reindeer	Other	Total Animals	Total Farms
Yukon & NWT	99	-	-	-	9,500	-	9,599	7
Brit. Columbia	-	-	-	15,000	250	-	15,250	74
Alberta	15,700	-	3,600	-	50	350	19,700	325
Saskatchewan	13,500	-	900	5,000	25	300	19,725	342
Manitoba	768	-	60	600	-	30	1,458	49
Ontario	3,700	6,500	750	4,000	-	900	15,850	275
Quebec	1,100	5,500	5,100	3,500	-	500	15,700	575
Maritimes	112	907	100	250	-	-	1,369	20
TOTAL	**34,979**	**12,907**	**10,510**	**28,350**	**9,825**	**2,080**	**98,651**	**1,667**

Source: Proceedings of the 2nd World Deer Farming Congress, Ireland, June 1998

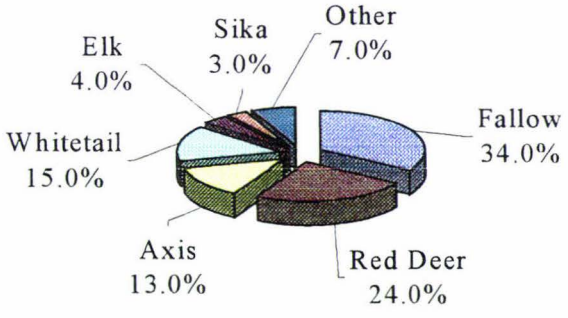
Agriculture in Western Canada has become too dependent on grain production, which leaves many producers vulnerable to wide swings in commodity prices with little warning. Therefore, business-minded farmers in Canada looking for diversification opportunities find the game farming industry appealing. The game farming industry in Canada comprises several hundred enterprises where elk, fallow deer, red deer, bison, and wild boar are being managed under controlled conditions on individual farms and ranches. The Canadian game farming industry has the potential to develop into a global leader. The open and relatively clean land in Canada provides a strong competitive advantage for Canadian producers. This aspect is important as the demand for game meats in the world is strongly related to the production of natural and hormone-free meat. Elk are the most valuable of the farmed deer in Canada at an approximate value of US$390 million (livestock value), with nearly 35,000 animals being farmed. The greatest concentrations of elk in Canada are located in Alberta and Saskatchewan with nearly 84% of the total elk herd. Agriculture Canada officials state that since 1991 the farmed deer industry in Canada has grown over 300%. The fallow deer industry is the second largest in Canada with approximately 30,000 animals. The fastest growth in the fallow deer industry has occurred in British Columbia, with a population of approximately 15,000 animals in 1997. Red deer and fallow deer both initially arrived in Canada from New Zealand

and Europe. There are approximately 12,907 red deer farmed in Canada, with close to 51% being located in Ontario.

5.1.1.1.7 USA

It comes as a surprise to many people that the first country this century to examine the possibility of deer domestication for farming purposes was the USA. In the USA there were approximately 250,000 farm-raised deer in 1997. The different species raised are shown in Figure 6.10.

Figure 6.10: Species Raised in the USA, 1997.



Source: Proceedings of the 2nd World Deer Farming Congress, Ireland, June 1998.

The four major species raised are Fallow, Red Deer, Elk and Sika. The primary markets outlets for these animals are Breeding Stock, Venison Production, Trophy Hunting, Velvet and Co-products.

The USA has all the facilities to increase the production of all deer products, representing a major and important competitor to New Zealand. Fallow or fallow hybrids are the most common and popular breed. This portion of the industry is the most mature in regards to venison production, economic cycles with respect to breeding stock and establishing baseline values for breeding stock based on the market values of the male offspring. Red and red hybrids are also popular, particularly since the price of breeding stock more recently reflects the venison and velvet value of a marketable animal. They have become more readily available in the last five

years, particularly in regards to the accessibility of various bloodlines, which has added to their appeal. The United States Department of Agriculture (USDA) and United States Food and Drugs Administration (FDA) cause some problems as a result of their self-imposed inactivity regarding any meaningful change to the red meat laws in the USA. Venison is not included in the USDA RED MEAT ACT and as such it is not recognised by the USDA as a red meat but rather as an *ingredient* like dextrose or spices. USDA labelled venison is a prerequisite to enter certain markets. The marketing of smoked and further processed venison products is further discriminated again, by the FDA with labelling requirements stipulating the addition of beef or pork. These regulations prevent venison producers from entering large, lucrative markets. These issues are important because the majority of venison consumed in the USA is imported as a commodity. Primal cuts and trim are not sold as value-added but are viewed and purchased for what they are, raw products at the cheapest price. These products are imported without a tariff under the classification of game, which, of course, they are not. The commodity pricing mentality of some venison importers makes it difficult for domestic producers to compete in certain markets because of the inherent differences in the cost structure of producing venison. US venison typically commands a premium, which is due, to a large extent, due to the fact it is marketed as a value-added product.

5.1.1.1.8 Russia and Asian countries

There are significant numbers of deer in Russia. However, the infrastructure is not set up to support a commercial deer industry. When Russia's economy and infrastructure develops, this country could become a competitor to New Zealand deer products (mainly in velvet). The venison production in Russia is from a range of feral and farmed deer, but almost all of it is used in the domestic market. Export opportunities to western Europe are very limited and, due to quality management issues, will not be in direct competition to New Zealand in the chilled venison market.

The different countries that farm deer in Asia range widely in latitude from near the equator (Malaysia, Thailand and Indonesia) to northern countries with cold winters such as Japan, Korea and the eastern parts of the Combined Independent

States (C.I.S). Sika deer represent the most farmed deer species in the winter-cold countries of China, Korea and Eastern C.I.S. As seen in Table 6.8, there is a wide variety of deer species throughout the Asian countries and the C.I.S.

Table 6.8: Asian and C.I.S estimated deer populations, 1997.

Country	Deer Species	Number (estimated)
China	Red, Wapiti, Sika	1,000,000
Far East C.I.S.	Sika, Wapiti	400,000
Korea	Sika, Wapiti, Red	230,000
Taiwan	Sika, Sambar, Red	128,000
Vietnam	Sika	15,000
Malaysia	Red, Fallow, Rusa	15,000
Thailand	Sambar, Rusa	5,000
Indonesia	Sambar, Rusa	Small number

Source: Proceedings of the 2nd World Deer Farming Congress, Ireland, June 1998.

Next to New Zealand, China has the largest farmed deer population in the world with about 1,000,000 animals. The industry is based on feedlot management where most of the feed is cut from crops to feed the deer. In relation to the country and population size, China is only producing products for its domestic market.

5.1.1.1.9 European Countries

Europe is a complicated patchwork of countries, farming different deer groups in different ways. The industry has arisen from a demand for venison, particularly in Germany, which goes back many centuries and continues through deer hunting. These countries have small deer farming industries. The farm sizes are small but their production costs are very high. Unfortunately for the New Zealand deer industry, this difference in costs causes the European farmers to use political/economic pressures such as subsidies in the attempt to balance their costs and have a competitive price. Deer farms in Europe vary depending on the landscape, structure of agriculture, human mentality, behaviour of the governments and agricultural subsidies. Some of the countries that farm fallow deer are Austria, Denmark, France, Germany, Italy,

Sweden and Switzerland; those farming red deer are Great Britain, France and Ireland. However, other European countries, such as Norway, Portugal, Spain, Benelux, Czech Republic, Hungary, Poland and Slovakia are developing deer farms. Europe has more than 10,000 deer farms (as seen in Table 6.9), and the number is increasing. There are more intensive deer farms and the numbers of 'hobby' deer farms are decreasing.

Table 6.9: Deer Farming in Europe 1997.

Country	Number of Farms	Number of Does[30]	Number of Hinds	Total Number of Animals	Deer Meat (Tonne)
Austria	1,678	15,800	4,000	39,600	522
Benelux	70	200	1,450	3,300	68
Denmark	646	12,900	2,700	31,200	361
France	907	12,000	17,000	58,000	1,026
Germany	4,474	49,240	2,590	103,660	1,463
Great Britain	255	3,600	14,400	36,000	709
Ireland	601	13,800	16,700	61,000	1,175
Italy	406	10,000	2,000	24,000	329
Portugal	62	300	350	1300	22
Spain	10	0	2,000	4,000	96
Sweden	572	8,700	4,200	25,800	437
EU	**9,681**	**126,540**	**67,390**	**387,860**	**6,238**
Norway	18	100	300	800	17
Switzerland	479	3,500	300	7,600	98
Czech Republic	70	3,200	1,700	9,800	151
Hungary	5	50	500	1,100	23
Poland	10	900	200	2,200	31
Slovakia	7	800	200	2,000	28
EUROPE	**10,270**	**135,090**	**70,590**	**411,360**	**6,586**

Source: Proceedings of the 2nd World Deer Farming Congress, Ireland, June 1998

The European yearly meat (venison) production is close to 7,000 tonnes, representing 5% of the total game production in Europe. This means that on average, this production can supply every person in Europe with approximately 17 grams of farm produced deer meat[31]. This is not a very great amount considering that the supply of lamb, beef, pig and poultry together in western European countries varies from 50 and 70 kilos per person a year. Production varies between different countries. At the top of the range are Germany and Ireland, with a production of 1,463 and 1,175 tonnes respectively (approx. 305 grams per person/year) and at the bottom of the

[30] Denomination fallow deer female animals
[31] Proceedings of the 2nd World Deer Farming Congress, Ireland, June 1998

range, with less than two grams a person, Spain, Portugal and Benelux. In Germany and Scandinavia, red deer are considered almost sacred and farming operations are largely confined to fallow deer. In the UK red deer is the main farmed animal although fallow deer are important in some areas. Italy farms both red and fallow deer for venison and in Spain, breeding for trophies is the main objective. In France there are red deer farmers who are who usually sell directly to restaurants and/or consumers.

6.2.3. NEW ZEALAND DEER VELVET ANTLER

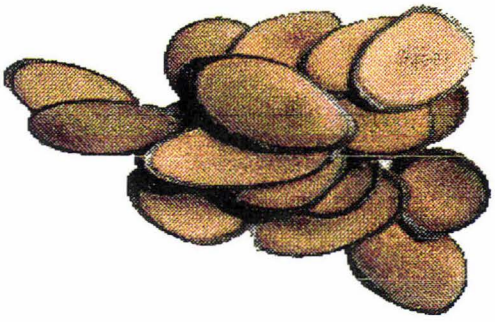
The New Zealand velvet trade is still dependent on one major market (Korea). In order to retain New Zealand's present share of this market, as well as to guarantee top price for the producer, the highest possible quality must be achieved. Product quality is vital for developing new markets and cutting the dependency on one sole market. An important part of velvet quality is given by the correct velveting process. To see the velveting process, refer to Appendix 9.

6.2.3.1.VELVET ANTLER PRODUCTS

Recently there has been a great deal of interest in the development of capsules and tonic drinks to meet the demand for a more "user friendly" way of taking velvet. It is interesting to note that with these new product forms there has been an increasing level of interest in velvet and other Oriental medicines from western consumers. Currently, the majority of New Zealand velvet is exported in whole stick form, dried after a pasteurisation process from the frozen state in which farmers sell it.

The whole stick is sliced by licensed manufacturers for sale to wholesalers and then on to oriental medicine doctors, as seen in Figure 6.11.

Figure 6.11: Sliced Velvet.



Source: http://www.deer.co.nz/

Some velvet processors in New Zealand are moving toward producing non-traditional forms of velvet. These new products are designed to allow busy consumers to take velvet without the necessity of going to the time and trouble of making a "brew" themselves. Manufacturers are producing velvet capsules and tonics which are easy to take, and which are often combined with other medicine such as Ginseng.

6.2.3.2.NEW ZEALAND DEER VELVET ANTLER TRADE

Velvet has been prized throughout the Orient for its wide-ranging medicinal and tonic qualities. As one of the basic ingredients of traditional Oriental medicine, velvet is used as a major tonic for promoting strength and stamina, for maintaining good health and curing illness. In 1998 New Zealand exported NZ$35.8 million of deer velvet, showing a decrease of 44% compared with the 1997 value. In terms of volume, in 1998 New Zealand exported 219,070 kg of velvet, showing an increase of 13.8% compared with the volume exported in 1997. The major international market for velvet is the Republic of Korea, where the practice of Oriental medicine is very strong. The demand for more convenient velvet products is increasingly evident in Korea. As most velvet is sliced, this end - use is important in determining what the market regards as "good" velvet. The most important features of sliced velvet are size and colour. The circumference of the stick determines the size. Colour is affected by the degree of calcification of the stick, which is determined by the time of cutting. As

a rule of thumb, "early cut thick" velvet is most desirable because it gives proportionally higher value slices than "late cut skinny" velvet. In the whole stick market, traditional perceptions that "bigger is better" still remain. However, as velvet is increasingly being traded in sliced form under new regulations in Korea, the internal quality of velvet is becoming more important than its size. Therefore, the trade is moving away from the traditional "bigger is better" attitude to focusing on well-cut sticks. The NZGIB's velvet marketing strategy aims to increase the demand for New Zealand velvet by providing a differentiated product to Korea and other markets, also by developing a market and product diversification and a branding strategy. The differentiation programme is based on the development of branded velvet products in Korea, removing velvet from commodity markets, improving doctor awareness and preference for New Zealand velvet, and by improving consumer awareness and perception of New Zealand velvet. The market diversification process is carried out by developing new markets, such as China, Hong Kong, Taiwan and USA and by developing non-traditional market segments in Korea. The product diversification programme is based on the commercialisation of new products, such as velvet extracts, tonics, capsules, liquors, soaps, honey, etc. Even though the NZGIB has started a marketing plan for deer velvet, New Zealand has been promoted in some Asian countries as a tropical, Pacific island, beach destination for tourism, and this does not fit with the perception of a good velvet growing climate. Another problem is the low level of awareness of consumers about New Zealand velvet. Around 60% of the velvet consumed in Korea comes from New Zealand, and there is only a two percent consumer awareness of New Zealand velvet. Most of the Board's materials and advertising shows New Zealand as a clean, green, cold country. This is to make the most of New Zealand's natural advantages and to combat the perception of New Zealand as a tropical, Pacific island, beach country. The advertising goes in women's magazines (relatively wealthy women being the main purchasers of velvet), and with a consumer's Guide to Deer Velvet (explaining what to look for in velvet, how to take it, when to take it and for what expected benefits, etc.). New Zealand velvet is identified in the Korean market by the New Zealand Nogyong logo, shown in Figure 6.12. The meaning of Nogyong is New Zealand deer velvet in the Korean language.

Figure 6.12: Nogyong Logo for New Zealand Deer Velvet..

Source: New Zealand Game Industry Board.

The main reason foe the identification of New Zealand Velvet with the Nogyong logo is to provide a branded product into the Asian market, making it different from other velvet producer countries, like China and Russia. This is part of the differentiation programme of the NZGIB.

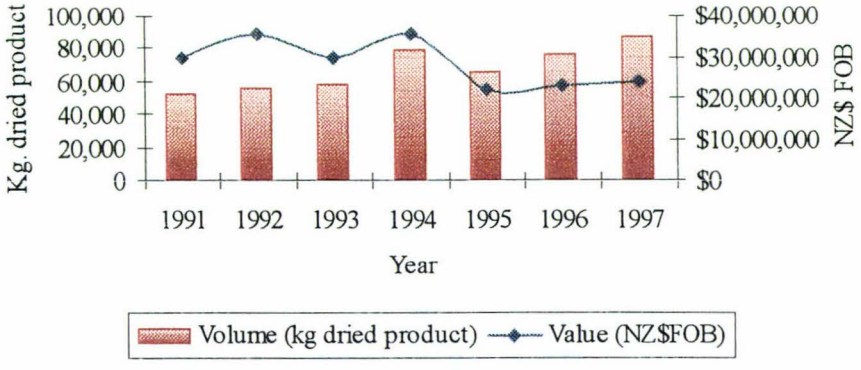
5.1.1.1.10 Korea

Korea continues to be New Zealand's most important market for velvet products. Unlike other developing countries, the Korean population seems to maintain its traditional medical beliefs. In fact, Korean consumption of traditional medicine items such as velvet grows with the increase in the per capita income. Velvet is marketed in Korea both in its traditional form, and as non-traditional products (tonics and capsules) for easier consumption. The capacity to produce velvet extract for use in such tonics exists in New Zealand through Velvet Antler Research New Zealand (VARNZ), a joint venture between the NZGIB and AgResearch. Although the velvet price for New Zealand farmers has fallen, prices in Korea have not decreased to the same extent. This is because the Korean currency, the Won, was devaluated 60% against the US dollar in 1997. As a result, import costs, which include velvet imports, have increased. At the same time, the Korean economic depression dampened demand for all traditional medicines. Both doctors and consumers have been looking for cheaper alternatives to velvet, either substitutes or low value velvet grades.

New Zealand remains as the leading supplier of velvet. After the Asian economic crisis, New Zealand's velvet exports to Korea declined by 72% and exports from China declined by 65%, Russian velvet experienced a much lower decrease of 26%, partly due to price and perceived quality attributes. The economic recovery of Korea continues, and consumption is up 9% in the high-income group. This represents a positive aspect for New Zealand velvet, as there is more money to spend in luxury goods like velvet. In 1997 the average price across all grades was NZ$42, whereas the top grades (SA, A, B and C) achieved a higher price of NZ$56. However, according to the NZGIB, processors are not making any money, given international prices and once processing costs and drying are taken into account. There is a risk associated with being reliant on a sole market, such as Korea. It is important for the industry to look towards ways of diversifying its markets and market segments to minimise these risks. Obtaining access for New Zealand deer products in new markets is one way of diversifying into new markets. In addition to this, developing velvet extracts and other value-added products for the production of tonic-drinks represents an example of diversifying into new market segments.

The export values and volumes to Korea from 1991 to 1997 are presented in Figure 6.13. This Figure show that the Korean market has increased the volume of New Zealand velvet consumed, reducing the prices for the last three seasons compared with the 1994 level. However, the export value has shown a slight increase from 1995 to 1997.

Figure 6.13: New Zealand velvet exports to Korea 1991 – 1997 (volumes and values).

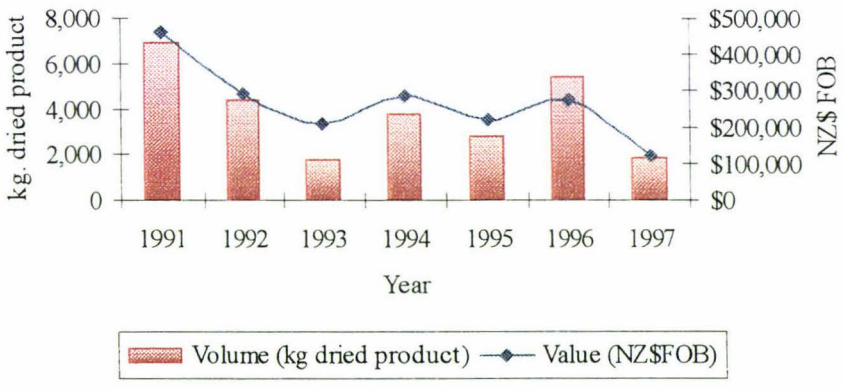


Source: New Zealand Game Industry Board.

5.1.1.1.11 Taiwan

Taiwanese people prefer to consume velvet in a frozen sliced form, mainly in wine. Velvet in this particular form is sometimes sold at an even higher premium on farm with the customer in attendance at the removal of the velvet to ensure its freshness. The dried antler imported into Taiwan is generally of poor quality. The better part of the velvet stick is sliced and the rest is powdered for use in capsules. Much of the deer velvet destined for South Korea where the demand has fallen, is making its way to Taiwan, causing an excess resulting in declining market prices. At the present time, Taiwan prohibits the import of fresh, chilled, frozen and processed forms of deer velvet. This represents a trade barrier to New Zealand exporters in order to protect domestic Taiwanese farmers. Figure 6.14 show the New Zealand velvet exports to Taiwan from 1991 to 1997.

Figure 6.14: New Zealand Velvet Exports to Taiwan 1991 – 1997 (volumes and values).



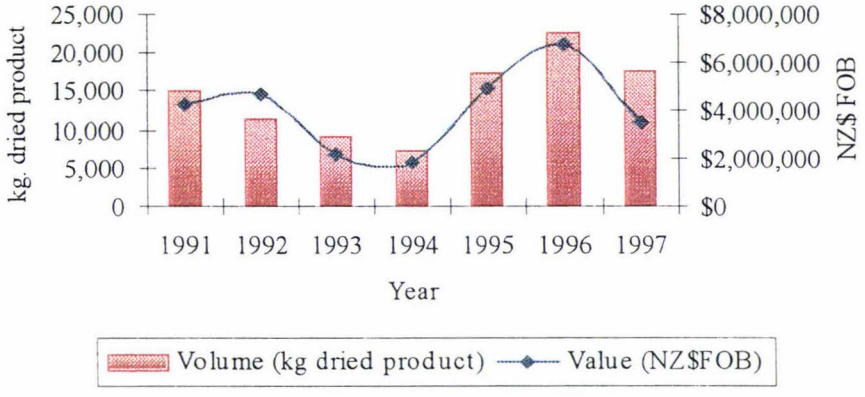
Source: New Zealand Game Industry Board

As can be seen, the volume exported and the value have shown great variability since 1993. It is interesting to notice that the value follows the same increasing or decreasing trend as the volume, in contrast with the last three seasons in the Korean market, where value was increasing.

5.1.1.1.12 U.S.A

The U.S.A is a significant market for New Zealand velvet. Velvet is becoming an important product for western natural medicine, since the beneficial effects of velvet have been proved scientifically in New Zealand. An important fact in this market is the one related to the acceptance of deer velvet by the FDA as a "dietary supplement". The New Zealand velvet exports to the USA are shown in Figure 6.15.

Figure 6.15: New Zealand Velvet Exports to Canada and the USA, 1991 – 1997 (volume and value).



Source: New Zealand Game Industry Board

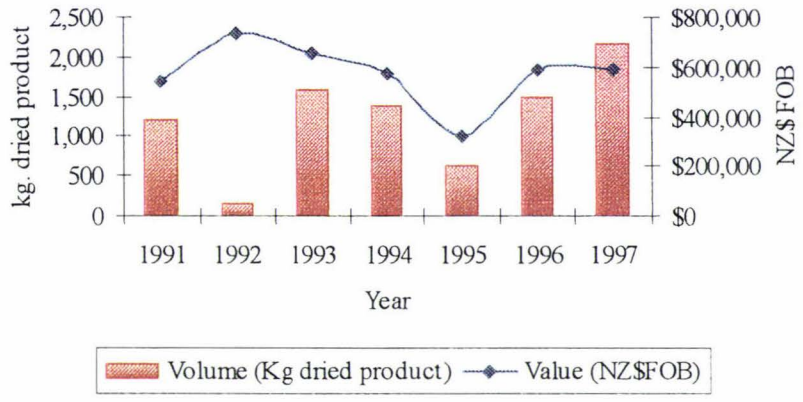
As Figure 6.15 shows, after a decreasing trend in the volume exported the market recovered in 1995, followed by an increase in value. However, both volume and value decreased in 1997.

5.1.1.1.13 Australia

Between 1992 and 1995 Australia took an average of around 1% of New Zealand's total annual velvet export (volume and value). While some of this velvet is re-exported, the size of the Australian oriental population means that Australia should not be underestimated as a potentially important market for New Zealand velvet. The

New Zealand velvet exports to Australia during the 1991 – 1997 period are presented in Figure 6.16.

Figure 6.16: New Zealand Velvet Exports to Australia, 1991 – 1997 (volume and value).



Source: New Zealand Game Industry Board.

As Figure 6.16 shows, value has increased since 1995 and stayed steady for 1996 and 1997. On the other hand, volume has been increasing from 1995 till 1997.

5.1.1.1.14 European countries:

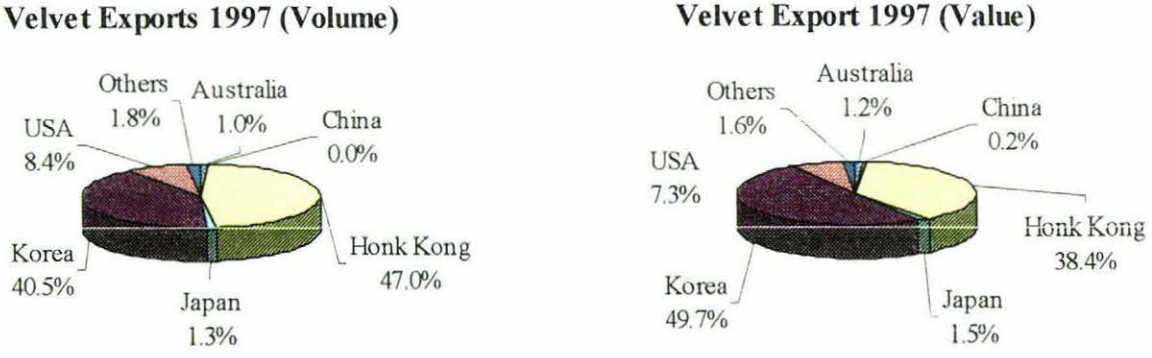
As velveting is not permitted in European countries, they represent a potential market for New Zealand Velvet products. However, the sensitivity of the Europeans for animals is steadily increasing, and therefore there are no velveting practices. The same applies for the use of hormones, growth promoters, antibiotics and gene technology. The NZGIB does not want to put in danger the success of the current venison marketing strategies, as velvet commerce would raise issues about animal welfare matters with European consumers. At the moment, the European market is not seen as a velvet market, and in the way in which it represents a potential risk to the venison product's image, it will be avoided. It is a very important restraint of competition for European farmers.

Even though the velvet market is concentrated in one sole market (Korea), New Zealand velvet antler is sold to many countries in the world, some of whom re-export the products often to countries where New Zealand's velvet products do not have access. This gives New Zealand and the NZGIB an opportunity to reach and develop new markets for New Zealand deer velvet products. Oriental medicine doctors are the main purchasers of velvet, and although New Zealand velvet has a market share of approximately 60%, few doctors or consumers are aware of the fact that New Zealand velvet has often been misrepresented in the market.

Velvet from China and Russia is generally preferred by the trade and by doctors for traditional reasons, and for their perception that "bigger is better", although this is not supported by science.

Even though the Asian economic crisis affected velvet exports, the velvet industry is not lying down. As has been said, the main markets for velvet are Korea and Hong Kong (unfortunately there is no detailed information available for the Hong Kong market). New Zealand sells about 90% of its velvet production to these markets as seen in Figure 6.17.

Figure 6.17: New Zealand Velvet Exports (% of Volume and Value by country) 1997.



Source: New Zealand Game Industry Board, export sheet 1997.

It is interesting to notice that Hong Kong is the most important market in terms of volume (46.5%), but in terms of value, Korea represents the market with best returns to the velvet exporters, with almost 50% of the total. Details of the velvet exports in 1997 are shown in Table 6.10 (Volume) and Table 6.11 (Value). These Tables show

the different forms in which New Zealand velvet is exported and the variety of countries that buy these products.

Table 6.10: New Zealand Velvet Exports. Volume by category in 1997.

	Antlers	Frozen	Dried	Powder	Other	TOTAL
Australia	600	16	1,164	85	310	**2,175**
Canada	-	-	1,722	230	-	**1,952**
China	-	-	1,901	-	-	**1,901**
Hong Kong	4,843	33,913	65,039	111	853	**104,759**
Japan	-	-	2,994	-	-	**2,994**
Kenya	-	-	200	-	-	**200**
Korea	4,068	3,635	81,533	653	500	**90,389**
Singapore	-	-	140	-	-	**140**
Taiwan	-	-	1,819	-	-	**1,819**
USA	3,536	1,542	12,988	497	235	**18,798**
TOTAL	**13,047**	**39,106**	**169,500**	**1,576**	**1,898**	**225,127**

Source: New Zealand Game Industry Board.

As Table 6.10 shows, the most important markets in terms of volume are Hong Kong, Korea and the USA. These countries buy velvet in all the different forms in which New Zealand offers it. The most common way of selling velvet is the dried form, which comprised 75.3% of the total exports in 1997. The dried product is demanded in all markets, in contrast to other velvet products (antlers, frozen, powder and other). The frozen form is the second most common way of exporting velvet, with 17.4% of the total volume exported in 1997.

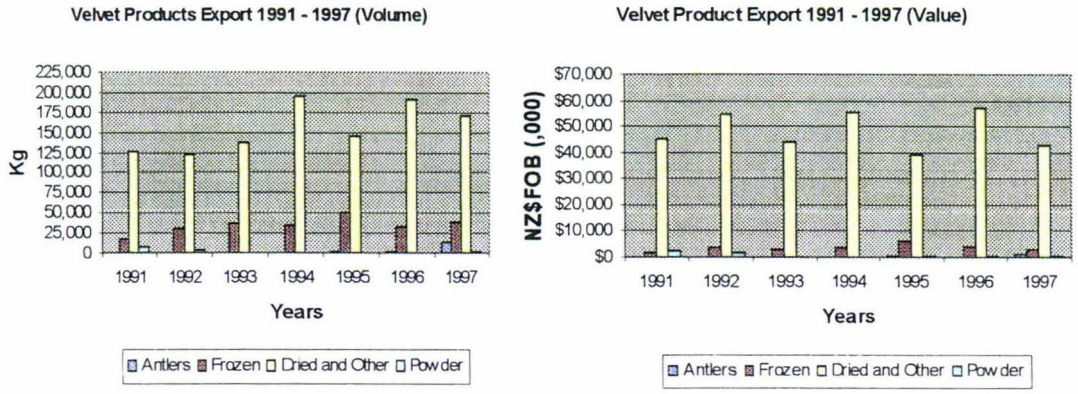
Table 6.11: New Zealand Velvet Exports Value by category in 1997 (NZ Dollar FOB).

Country	Antlers	Frozen	Dried	Powder	Other	TOTAL
Australia	33,906	1,940	427,520	55,499	74,800	**593,665**
Canada	-	-	567,429	43,157	-	**610,586**
China	-	-	107,314	-	-	**107,314**
Hong Kong	410,000	2,771,438	15,048,489	51,791	187,330	**18,469,048**
Japan	-	-	710,343	-	-	**710,343**
Kenya	-	-	17,856	-	-	**17,856**
Korea	276,759	317,484	22,958,091	281,057	42,857	**23,876,248**
Singapore	-	-	19,954	-	-	**19,954**
Taiwan	-	-	119,545	-	-	**119,545**
USA	400,514	179,961	2,722,403	143,935	47,542	**3,494,355**
TOTAL	**1,121,179**	**3,270,823**	**42,698,944**	**575,439**	**352,529**	**48,018,914**

Source: New Zealand Game Industry Board.

The highest returns from velvet exports are received fo the dried form, with 88.9%, leaving the rest of the forms with insignificant percentages. In terms of value, the most important market is Korea, which takes 49,7% of the total exports. The export performances (volume and value) of each velvet product from 1991 to 1997 are presented in Figure 6.18.

Figure 6.18: Export performances (volume and value) of New Zealand velvet products, 1991 – 1997.



Source: New Zealand Game Industry Board.

Factors that influence New Zealand velvet marketing are the velvet stocks held in Hong Kong and the increased quantities of Russian velvet, traditionally used in the manufacture of velvet extract, that are competing directly with the New Zealand product. Due to a weak demand and increasing supply, the average New Zealand velvet pool price returns for the season are estimated to be around NZ$42/kg.

Low velvet prices are expected to reduce world production in the future. New Zealand production is expected to decline to around 480 tonnes in the year 2000, and then recover as soon as Asian economies can be prepared to pay a higher price and when stock levels fall and prices improve. By the year 2000 some improvement in demand may occur (in developing countries), following more general appreciation of specific findings that velvet of New Zealand origin is effective. This, (focusing on traditional oriental medicines) especially in strengthening the immune system, the stimulation of cell growth and acting as an anti-inflammatory. All these findings are the results of studies made by the NZGIB, as part of their marketing strategy. Table

6.12 shows the exports, prices and production for 1997, 1998 and the forecast until the year 2002.

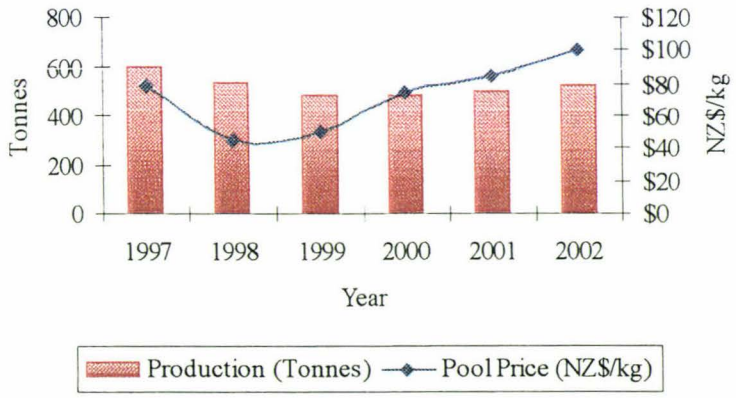
Table 6.12: New Zealand Velvet Exports, Prices and Production forecast 1997 – 2002 (NZ$ FOB).

	1997	1998e	1999f	2000	2001	2002
PRICES						
Export (NZ$ mil FOB)	$48.1	$24.5	$24.7	$37.1	$43.2	$53.7
Pool Price (NZ$/kg[1])	$78	$45	$50	$75	$85	$100
PRODUCTION						
(Tonnes[2])	592	530	480	480	500	525

1 Weighted overage all grades, 2 Green weight.
e: estimate, f: forecast
Source: Game Industry Board and MAF

Figure 6.19 shows the velvet's forecasted prices and production for the 1997 – 2002 period.

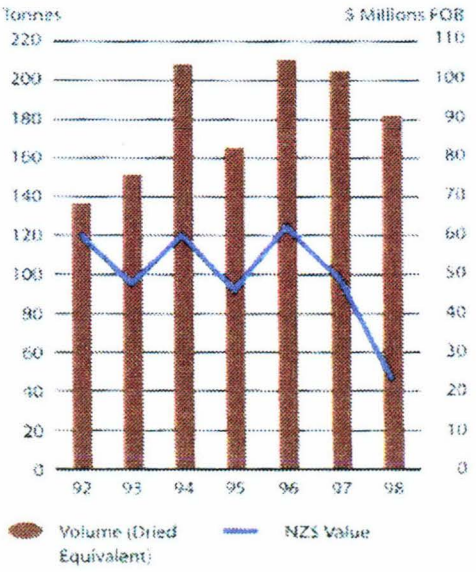
Figure 6.19: New Zealand Velvet Prices and Production, 1997 – 2002



Source: New Zealand Game Industry Board and MAF.

The total exports of New Zealand velvet are presented in Figure 6.20. As can be seen, the earnings show a constant variability, independent of the volume.

Figure 6.20: New Zealand Velvet Exports 1992 – 1998.



Source: New Zealand Game Industry Board Annual Report 1997 - 1998.

Since 1991, velvet production has increased in New Zealand, but the value of the exports has stayed largely static at around $50 million FOB (excluding the 1998 season). From 1992 to 1997 most of New Zealand's velvet was exported to Korea and Hong Kong. It is likely that most of the velvet exported to Hong Kong was then re-exported to Korea. In terms of export value both Hong Kong and Korea dominate New Zealand's velvet export trade. New Zealand deer velvet exports have been influenced by the economic crisis in the Korean market, as the total earnings dropped from almost NZ$50 million in 1997 to NZ$23 million in 1998, showing a decrease of 53%. The export volume was not affected as badly as was their value, however, it experienced a drop of 10%, from 201 tonnes in 1997 to 182 tonnes in 1998 (see Figure 6.20). There is a substantial velvet trade in the USA, and there are strong markets in Taiwan, Japan, Canada and Australia. The average prices for the 1998 season for the different velvet grades are presented in Table 6.13 (refer to Appendix 10 for detail information of velvet pool prices and pool composition).

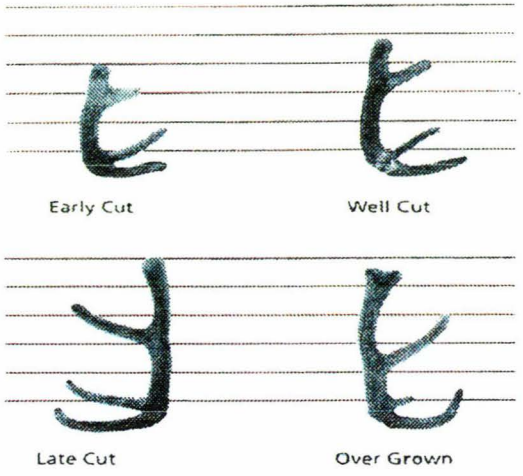
Table 6.13: Average Velvet Prices for different velvet grades, 1998 season.

Grade	Price (NZ$)/kg
Super A1	$60
A1Short	$45
B1 Short	$40
C1 Short	$35
D1 Short	$30

Source: The Deer Farmer Magazine, December 1998.

The amount of Super A1 and A1 short grade from New Zealand velvet production is increasing constantly, due to better quality in velvet sticks. The increase in Super A1 and A1 short grade compared with the 1994/95 season (10%) is about 25%. In contrast to this, the production of D and E grades velvet dropped from 12% to 5% in the same period. The grading system is reviewed after each season, in consultation with representatives of deer farmers, velvet pool operators, velvet processors and exporters. This grading system does not imply a value for each grade. It puts similar velvet together based on features which the market thinks are important, so that buyers can put a price on the product based on its relative value to them. As shown in Figure 6.21, the velvet antler has different dimensions depending on the cutting time, hence the difference in price.

Figure 6.21: Variations resulting from different time of cutting velvet.



Source: New Zealand Game Industry Board Velveting Guidelines

Korean importers have established a new quality system, based on the ash content of the velvet stick. Due to the fact that it is very difficult to predict the ash content of a stick before the test. The test is carried out on a random sample of five sticks in a consignment, and only products that test at a pooled average of 25% ash content or below will be classified as velvet. Product that tests between 25% and 35% will be called velvet middle class, and those over 35%, hard horn. This new Korean quality control may be in the long term good for the New Zealand deer industry. The ash content penalty could eventually lead to stags being selected for the quality of the velvet they grow, and not for the size.

A typical stick of dry deer velvet contains 10% water, 53% protein, 3% fat and 34% ash. Ash represents the mineral content in velvet, but does not have any value. The therapeutic part of the velvet is contained in the protein and fat. Koreans buyers want an ash level of 25% because that equates to a 75% level of active components. Some stags have a naturally lower ash content, which gives rise to the opportunity of selecting them on this basis for the future breeding and velvet harvesting. Probably the future markets for velvet will be based on the product's active components rather than on the size and the weight.

6.2.3.3.NEW ZEALAND VELVET ANTLER COMPETITION

It is very difficult to obtain data on the production from countries competing with New Zealand. As accurate figures are not available, some important trends can be analysed.

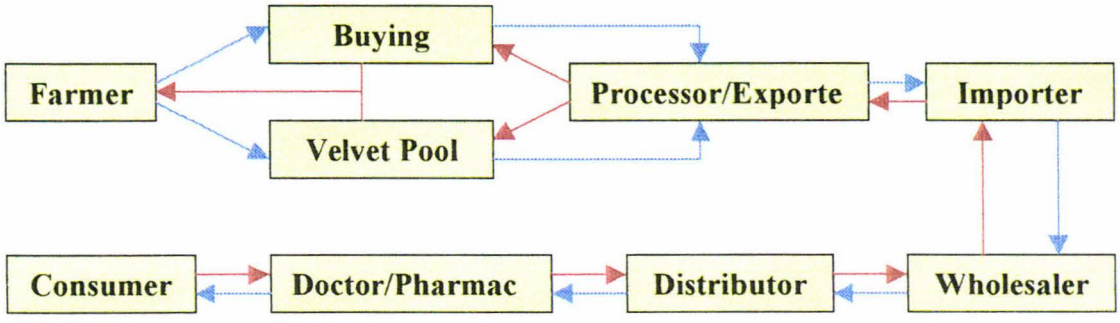
China is consuming more of its velvet domestically and could become an important importer of New Zealand velvet. The quality of Chinese velvet has always been good.

The volume of velvet coming from Russia is stable. The quality of Russian velvet seems to be decreasing slightly, with an increasing volume of lower grade velvet being traded. This lower grade velvet was previously used in manufacturing pantocrin, the Russian velvet extract. Canada has been trading relatively small, but increasing, volumes of good quality elk velvet.

6.2.3.4.NEW ZELAND VELVET ANTLER MARKETING CHAIN

As shown in Figure 6.22, the supply chain for velvet involves importers, doctors and pharmacies, and the final consumer. This supply chain will tend to change with time, with the further development of new "consumer friendly velvet products" (tonics, capsules, etc.). In fact, consumers can find velvet products (e.g. capsules) in some pharmacies in New Zealand, because the NZGIB uses the New Zealand market as a test market for new products.

Figure 6.22: New Zealand Velvet Antler Marketing Chain



:Product Flow; : Money Flow.

Source: New Zealand Game Industry Board.

According to the NZGIB, there are 4.500 farms with approximately 1.6 million deer and from those, 60% get into the pool. Processors buy approximately half of each year's velvet crop, leaving the other half to the velvet pools. There are two main pool operators in New Zealand, Wrightsons and Velpool, and they are run as confidential bidding systems. The velvet pools are a sale system for velvet, where:

- Farmers, supply their velvet to a company (pool operator) who 'pools' it together with other farmers' velvet.
- The pool operator:
  - Grades the velvet according to industry agreed Grading Guidelines.
  - Stores the velvet pending sales.

- Notifies buyers of the volume of product (weights) available in each grade.
- Receives buyers tenders.
- Awards the tender as appropriate for each grade.
- Pays farmers for product sold (less pool operator's commission).

Other methods of purchasing velvet are:

- To deal directly with a farmer(s).
- To come to an arrangement with a larger buyer from the velvet pools.

The processors must be licensed to a Game Packinghouse to process or pack deer products. MAF controls such licensing. Although the supply chain is long, New Zealand velvet products are commercialised through oriental doctors and pharmacies. They also have been informed about New Zealand velvet characteristics and benefits, so they can communicate them to the final consumers.

5.1.1.1.15 Velvet Sales System

Velvet can be sold privately on the property, in one of the locally run Deer Farmers Association (DFA) velvet pools, or in one of the commercial national pools run by Wrightson and Velpool. Deer farmers can sell through pools where buyers bid confidentially for different grades of velvet, to buyers' agents.
When velvet is sold through either system, a levy is payable. In September 1997, the levies' rates were:

- NZ$3.40/kg, from which NZ$3 goes to the NZGIB and 40 cents goes to the Animal Health Board.
- For Fallow velvet, the levy rate is NZ$1.40/kg, from which NZ$1 goes to the NZGIB and 40 cents to the Animal Health Board.

In addition, a commodity levy of 13 cents/kg of velvet is paid to the New Zealand Deer Farmers' Association. The Goods and Services Tax (GST) of 12.5% is payable in addition to all levies.

6.2.4. NEW ZEALAND DEER CO-PRODUCTS

There are more than thirty parts of deer that are considered to have medicinal qualities. New Zealand processes and exports approximately ten of these products. The most common ones are velvet, tails, pizzles, testicles, sinews and blood. New Zealand represents the largest single producer of deer products for Asian raw medicine materials, and it is considered the biggest producer of deer products in the world. The size of the national farmed herd, the consistency of quality and quantity, and the high quality of processing procedures and facilities, make it possible for New Zealand processors and marketers to obtain premium values for these products. In 1998, these products had a total export value of NZ$13.7 million, making this a very important segment of the New Zealand deer industry. Two of the most important factors to maximise values or obtain premium prices, are the processing and the preparation of deer co-products. The processing facilities in New Zealand operate under stringent regulations of the Meat Act, administrated by MAF. To generate all the necessary documents to gain entry into the market place, deer co-products are treated as comestible products through all the stages of processing, in order to give customers information about consistent quality and quantity. The removal technique of deer co-products at the deer slaughter plant is critical if the final aim is to present a superior product to the market. A relatively standard criterion has been developed for the removal of deer co-products. The major factor in quality control is having the ability to identify the product from each individual animal right through all stages of processing (traceability). The New Zealand Standard for the inspection and processing of deer pizzles, tails, sinews and velvet has the final aim of setting:

- Standards for inspection of deer pizzles, deer sinews, deer tails and deer testicles.
- Standards for processing and export certification of deer pizzles, deer sinews, deer tails, deer testicles and deer velvet.

6.2.4.1.NEW ZEALAND DEER CO-PRODUCTS MARKETS AND PRODUCTS

It has been confirmed from the long history of traditional Oriental medicine that deer co-products (besides velvet) have high nutritional value and aid in the treatment of disease. However, it must be acknowledged that the Asian perception of product quality varies from country to country, and also often from consumer to consumer. For instance, the Taiwanese market, in relation to pizzles, gives extreme importance to the colour, shape and size. On the other hand, the Chinese market, for the same product, looks for a more well-preserved product with the testicles attached. Trying to meet the different markets' needs has been a difficult task for New Zealand processors and exporters (refer to Appendix 11 to see a full display of deer co-products packaging). The constant pressure imposed by the markets and the high standard of products from New Zealand have helped this country to become the world leader in deer products marketing. The success of the marketing strategies is based in the understanding of the final use of the products. As with almost all deer products, usage is based on Oriental medicine. Oriental medicine is based on the yin and yang, which together control all life processes. When oriental doctors detect an imbalance of one or the other is believed to cause ill health. To correct this imbalance and restore the vital energy, a pharmacist or oriental doctor prescribes a mixture of herbs and deer products. This represents an enormous opportunity for New Zealand deer product exporters to increase exports, in a market with various seasonal demands.

The future production of deer co-products is based on the slaughter level. For instance, some products such as pizzles can be obtained only from stags, so stag slaughter levels are crucial for pizzle production. The slaughter level fluctuated until 1997, but according to the NZGIB, the level will increase and be maintained by the year 2000.

6.2.4.2.NEW ZEALAND DEER CO-PRODUCTS EXPORTS

New Zealand deer exports have been reduced, due to Asian countries being in a critical economic situation. In the year 1996, exporers of deer co-products were totally pessimistic, (as shown in Table 6.14), but in the following seasons 1997 –

1998), the Asian market demand increased. It is true that co-products do not represent the most important income to the New Zealand deer industry, but for many farmers they provide a significant alternative income.

Table 6.14: Value and Volume of New Zealand Deer Hide, Leather and Co-Products Exports, 1995 – 1999.

July Years	1995	1996	1997	1998	1999 Prov.
VALUE					
Co-Products	13,189,063	7,671,153	8,182,406	13,775,506	11,756,187
Hides	8,659,350	10,128,641	7,454,251	8,367,908	6,012,827
Leather	4,394,864	4,962,773	5,727,376	474,198	5,150,874
VOLUME					
Co-Products (kg)	1,032,567	957,398	1,043,033	2,661,582	1,026,218
Hides (number)	309,220	368,073	245,189	239,189	578,693
Leather (sq. Metre)	92,530	104,193	124,016	96,638	91,327

* Included in Venison Exports
Source: New Zealand Game Industry Board.

It is important to notice that in export levels (value and volume), only deer co-products (sinews, tails and pizzles) have constantly increased. Hides show a decrease from 1996 to 1997 (start of the Asian economic crisis), but recover in value for the year 1998. However, deer co-products have increased much more, in nominal terms, than deer hides and leather. This may be a result of the development of new products such as capsules (blood, velvet, calcium, etc) and the quality of these new products. Interestingly, the co-products' export volume in 1998 was double that of 1997 (1 tonne to 2.6 tonnes), but this is not represented in the value (from NZ$8.1 million to almost NZ$13.7 million). This shows the market reaction to the economic crisis, making the exporters reduce prices and increase the volume of the exports. In 1999, the value for deer co-products continued increasing, however, the volume decreased to 54.5%. Hide products have the highest level of participation in the export of deer co-products and are commonly exported to Italy, USA and Japan. The details of hide exports are shown in Table 6.15.

Table 6.15: New Zealand Deer Hides Exports (January 1996).

Hides Products	Export Earnings ($NZFOB million)	% of Total
Italy	$4.3	42.5%
USA	$3.0	29.7%
Japan	$1.3	12.9%
Other	$1.5	14.9%
TOTAL	**$10.1**	**100%**

Source: New Zealand Game Industry Board Export Information Sheet 1996.

As hide products have a fashion destination, Italy has the highest level of participation with NZ$4.3 million. The second most important market is the USA with NZ$3.0 million. Leather products have a total export earning of NZ$4.2 million, with markets such as the Republic of Korea, Hong Kong and USA. As shown in Table 6.16, the export values are spread between the three markets without an apparently significant difference. But considering the percentages, Korea represents almost a third of the total, leaving Hong Kong and USA with 14.3% and 12.2% respectively.

Table 6.16: New Zealand Deer Leather Exports (1996).

Leather Products	Export Earnings ($NZFOB million)	% of Total
Republic of Korea	$1.2	24.5%
Hong Kong	$0.7	14.3%
USA	$0.6	12.2%
Other	$2.4	49.0%
TOTAL	**$4.9**	**100%**

Source: New Zealand Game Industry Board Export Information Sheet 1996.

In Table 6.17 the different markets for deer co-products are presented, by volume and value for the years 1997 and 1998. In terms of tails, pizzles and sinews, the most important markets are Hong Kong, China, USA and Taiwan. Hong Kong accounted for 60.4% of the total exports (value) but only 8.8% in volume for the year 1998.

Table 6.17: Deer Co-Products Exports, years 1997 – 1998.

Country	1997 Total Volume (kg)	1997 Total Value (NZSFOB)	1998 Total Volume (kg)	1998 Total Value (NZSFOB)
Australia	87,852	$82,319	62,451	$41,646
Austria	0	$0	15,912	$28,875
Belgium	0	$0	2,946	$3,567
Canada	32,362	$20,575	67,688	$120,469
China	7,538	$130,201	411	$31,120
Fiji	15,000	$10,650	26	$40
Finland	0	$0	18,318	$167,382
France	0	$0	1,292	$16,792
French Polynesia	0	$0	100	$1,470
Germany	16,014	$16,698	51,336	$153,884
Honk Kong	195,308	$6,802,875	229,553	$8,302,122
Italy	0	$0	1,071	$10,075
Japan	0	$0	5,260	$11,940
Kenya	0	$0	800	$2,172
Korea	4,109	$251,871	4,815	$241,340
Netherlands	0	$0	498	$1,266
Papua New Guinea	26,000	$21,884	0	$0
Russia	0	$0	93,786	$45,186
Singapore	84	$1,180	2,638	$26,405
Sweden	0	$0	200	$474
Switzerland	0	$0	8,427	$225,013
Taiwan	1,728	$61,337	1,651	$90,508
United Arab Emirates	0	$0	120	$2,351
USA	567,906	$642,929	1,899,138	$3,299,655
Vietnam	124	$3,300	0	$0
Others	89,008	$136,587	143,145	$931,754
TOTAL	**1,043,033**	**$8,182,406**	**2,611582**	**$13,755,506**

Source: New Zealand Game Industry Board Export Information Sheet 1998.

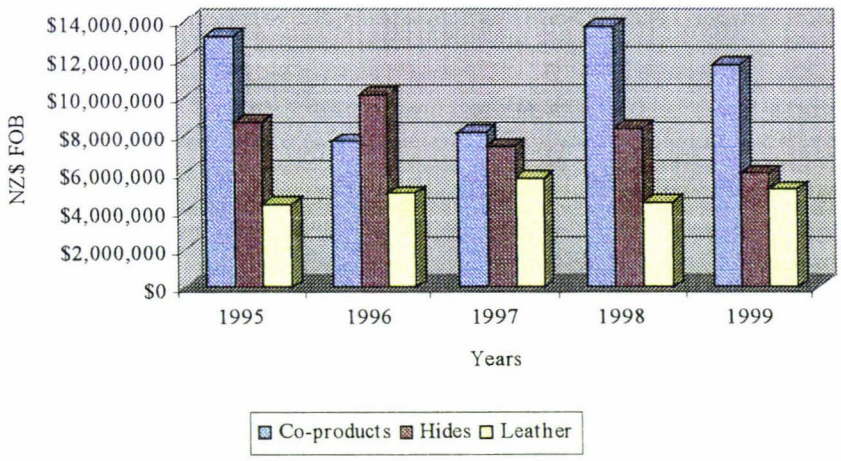
As Table 6.17 shows, there are several countries (other than Asian countries) that consume deer co-products. There are countries such as Austria, Belgium and Finland that started buying New Zealand deer co-products in 1998. Others, such as Papua New Guinea and Vietnam, did not import any New Zealand deer co-products during 1998.

In 1998 the country that showed the highest value was Hong Kong, but the country with the highest volume was the United States. This demonstrates the difference in the value (as for products and for consumers) of deer co-products in different countries. In the United States, the deer co-products consumed are tails, pizzles, sinews and blood.

It is interesting to notice that the products consumed in Hong Kong are the same types as in the United States and volumes are far higher in Hong Kong than in

the United States. This shows the traditional consumption and use of these products in that country. More detailed information of individual products and markets is presented in Appendix 12. Figure 6.23 show the volume of deer co-products, hides and leather exported from 1995 to 1999. In the specific case of skins and co-products, the value does not represent a major issue to the industry as a whole. In contrast, for some deer farmers, the production and further export of deer skins and co-products is of real importance to their total farm income. As can be seen, co-products have a lesser participation in the industry, but they represent the most exotic export products (tails, sinews and pizzles) in the industry. Co-product values show a decrease in 1996, but an increase from 1997 to 1998.

Figure 6.23: Total Exports Value of Deer Hides, Leather and Co-Products (1993 – 1999).



Source: New Zealand Game Industry Board.

As shown in Figure 6.23, the values for leather products are totally variable, increasing and decreasing during 1996 to 1999. Hides present a similar scenario.

An example of the impact of the Asian economic crisis in the deer industry and in the export of deer co-products is the decrease in prices for frozen tails and pizzles of 10 and 15 cents respectively. Nowadays, tails are sold by weight but the demand for small bony tails is tipped to dry up if the market signals stay still. Asian consumers do not consider deer co-products as a necessity, so they can wait until prices come down. As Macy Liu from Hang Hing Company said, "large tails, which

normally command large premiums, are proving very hard to move...when people are poor, they see small as good as big, when they are rich they only buy big..."[32]. Traders in Hong Kong are increasingly shifting their processing to China, to protect their margins in an increasingly tight market. At the moment, tails are traded for about HK$ 800 – 10,000, which in New Zealand dollars is about NZ$ 200 – 2,500. Tails have to be trimmed, shaped, de-haired, de-membraned and air-dried to meet the special needs of the consumer. Producers can reduce costs by poor drying combined with refrigeration, but this, more than reducing cost, will increase it, due to the fact that consumers will not buy those tails again. Together with losing consumers, the image of New Zealand deer products will be damaged. This business represents a large risk and low profit for those small processors who are facing losses in their companies.

Pizzles are considered as one of the most exotic products of the deer industry. This product is block frozen, thawed, de-fatted, de-haired and otherwise processed and dried for sale to discerning Chinese consumers. Prices for pizzles have dropped about 15% since March 1998. The landed frozen price is about HK$100/kg (approx. 20 pieces per kg). The dried product (penis and testicles) wholesales for HK$55 per item.

[32] The Deer Farmer Magazine, July 1998.

CHAPTER 7: THE DEER INDUSTRY IN CHILE

7. THE DEER INDUSTRY IN CHILE

7.1. HISTORY OF DEER FARMING IN CHILE

The first introduction of European deer in Chile was in 1880 for aesthetic purposes in the south of Chile. These deer were fallow deer (*dama dama)*. In 1926, the Grob family (in the X Region of Chile), imported 6 fallow deer from Germany. These deer were settled in the Pichi-Colcuma Island in the province of Valdivia (X Region in Chile). Four years later, the Haverbeck family imported red deer (*cervus elaphus*), fallow deer (*dama dama*), roe deer (*capreolus capreolus*) and wild boars. These animals were imported to be part of a game operation (hunting) on the Allipen Farm, in the province of Cautin (in X Region of Chile). Due to unknown reasons the roe deer population did not survive, however, red and fallow deer were successfully raised. In 1948, the Wagner family imported eight red deer from Junin de los Andes (Argentina). These animals were also put in a hunting operation in Osorno (X Region of Chile). Between 1952 and 1954 there was a massive importation of red deer fawns (180 fawns) from Argentina. These fawns constituted the base of the current red deer population in the X Region of Chile. Table 7.1 shows the year, origin and place of introduction of exotic deer in Chile.

Table 7.1: History of Introduced Deer in Chile

Year	Specie	Origin	Introduction Place
1926	Fallow Deer	Germany	X Region
1929	Fallow Deer	Germany	IX Region
1929	Red Deer	Germany	IX Region
1948	Red Deer	Germany	IX Region
1952	Red Deer	Argentina	X Region
1953	Red Deer	Argentina	X Region
1953	Red Deer	Argentina	X Region
1954	Red Deer	Argentina	X Region

Source: Caldumbide, R.P. 1986.

The first deer census in Chile was in 1984, and it was carried out by the Chilean Deer Farmers' Association. According to this census, it was determined that in Chile there were about 4,000 red deer and 4,000 roe deer. The second census, in 1990, showed that the number of roe deer had dropped dramatically to 700 animals. However, the NZGIB estimates that the present deer population in Chile is about 5,000 deer[33].

In Chile, currently there are both deer hunting operations and deer farms. The former are those that are established with the final purpose of hunting or for synergetic purposes. The latter are those with the aim of breeding without a hunting purpose. This category also comprises all those properties for recreational purposes. At the moment in Chile, there are about 15 deer hunting operations and about 20 deer farms (refer to Appendix 13). The current deer business in Chile is characterised by different stages. The first stage in a new deer farm is to buy animals (hinds and breeding stags) to build up a herd. The herd size will depend on the purpose of the farm. If the farm has a velvet orientation, then the criteria for selection of the breeding stags will be antler development and temper. If the farm has a venison production purpose, the criterion will be the weight of the breed, for instance breeding wapiti have a heavier carcass weight than a red or fallow deer. If the deer farm is breeding deer to supply deer hunting operations, then the criterion will be the historic antler production of the breeding stag, as this will determine the quality (size and number of points) of the trophy. The animals come mainly from other farms in Chile, however, they can be imported from Argentina, New Zealand or European countries. The second stage of a deer farm is to cull the herd so that only the best animals stay. For instance, in venison orientated deer farms in Chile, the criteria used to determine which animals should be culled, are age and weight, old and dry hinds, and those stags, which are developed (light body weight). In the case of a velvet or trophy orientated farm the animals that are eliminated are those with bad velvet antler formation. Generally, farms sell yearling hinds for the formation of new herds in new farms. The value for each animal in Chile varies from US$800 to US$2,500 for fallow and red deer. Once the herd is built, deer farms can start sending animals to the works for venison, or in the case of velvet production, to keep a good genetic herd. It is important to notice that in stages one

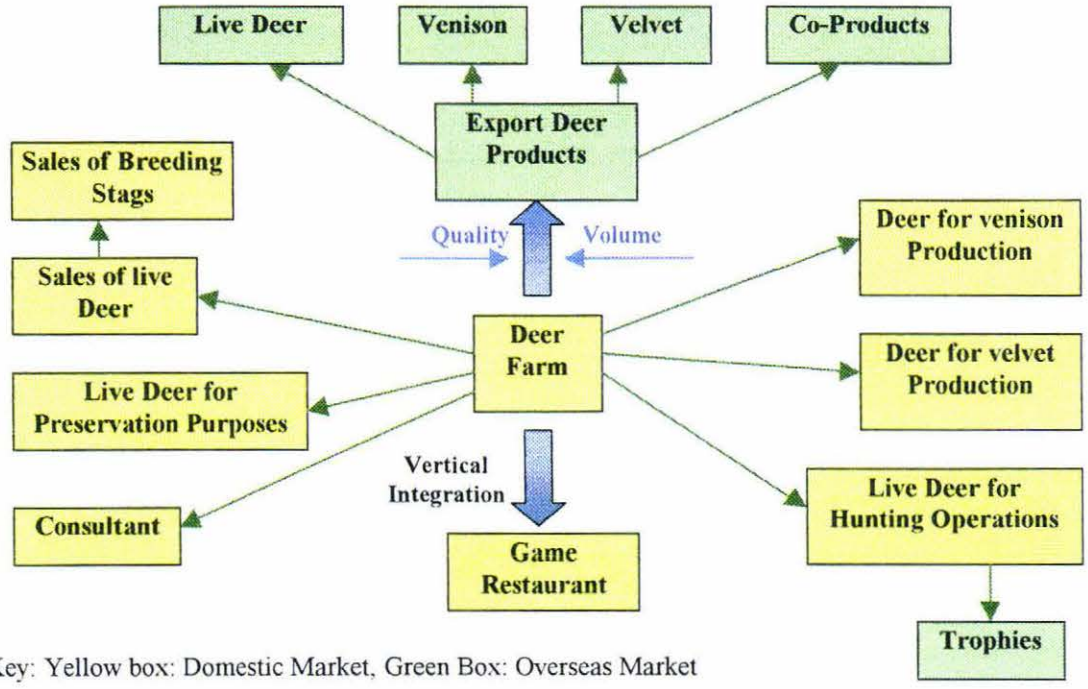
[33] Kerry Gibson, Marketin Executive, NZGIB. Personal Communication.

and two, farms can be producing venison, and receiving income for this product, however, volume is not high, and it is not enough to supply the market's demands. In the specific case of Chile, this volume is not even enough to supply the domestic market, whose demand for deer products is considered to be very low. Deer farms have different choices to sell their products, option for alternative income (see Figure 7.1), giving the farmer a wide range of opportunities to develop the activity. In the case of the restaurants, deer farmers have the opportunity to start a specialised deer or game restaurant as in New Zealand, attracting, informing and marketing deer products to normal red meat consumers. This is called vertical integration, as the supplier becomes his/her own buyer. This alternative could represent a good business opportunity for those farmers who have been in the business for a long time, and want to look for a new source of income. On the other hand, this kind of alternative business to the deer farm has an advantage over others, as it gives consumers the opportunity to try deer products that are scarce in the market (e.g. chilled venison, venison pastrami, venison ham, venison salami, etc). Those farmers who have a herd that can produce a consistent volume and fulfil all the export regulations are able to send their products to international markets. Even if farmers have a consistent volume of venison and/or velvet, the prime factor for the export of deer products is quality. Quality must be consistent through all exported products and processes (packaging, transport, etc).

Another source of income is the consultant role of those farmers who sell deer to new farms. As information about deer farming in Chile is scarce, those Chilean farmers with more experience in the deer business sell the animals and give advice to the new farmer by visiting their farms and facilities.

From all the different income alternatives for a deer farm, only five (sales of breeding stags, sales of live deer, venison production, deer for hunting operations and consultancy) are currently available in Chilean farms. New Zealand is an industry where all these income alternatives can be found, as New Zealand deer farmers are able both to export deer products and to have a vertical integration to restaurants, apart from the ones mentioned before. For instance, in Taihape, New Zealand, a deer farmer vertically integrated his farming business to a game restaurant, where deer products from his farm are sold. This restaurant offers a variety of deer products, which range from venison burgers to venison pastrami, salami, etc. This represents not only a good way of selling deer products, but it also gives people more access to them.

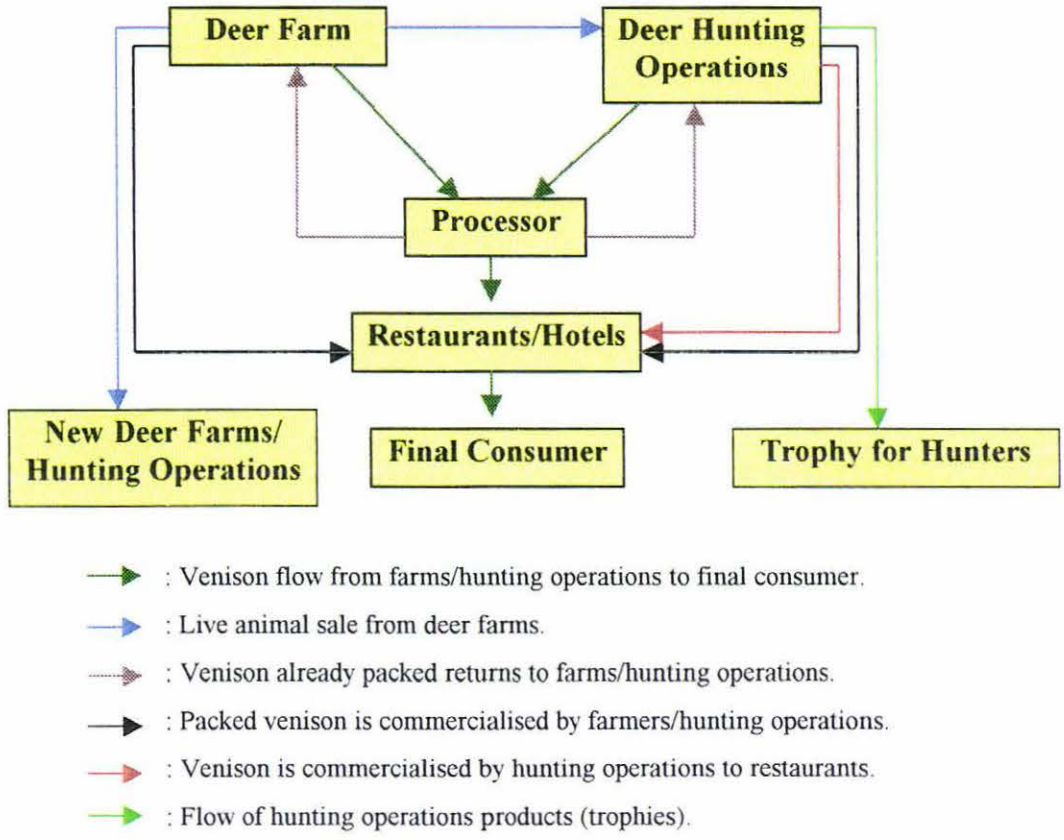
Figure 7.1: Income Alternative for Chilean Deer Farmers.



Key: Yellow box: Domestic Market, Green Box: Overseas Market

In Chile there are only two slaughterhouses that are allowed to process deer and these are sheep and beef cattle facilities (Frimas S.A. and Frigorifico Osorno S.A.). They work under an exception law, as the slaughter regulations cannot be met by deer farms and hunting operations. A percentage of the total venison production is sold to Frimas S.A. or Frigorifico Osorno S.A., which commercialises it frozen in vacuum packs, mainly in Santiago (Chile's capital). The rest of the venison production is sold by the owners of deer hunting operations after the slaughterhouse processes the carcass. At these slaughterhouses, carcasses are boned out, then the individual cuts are packed and stored in their own storage facilities. The rest of the venison production is sold by the owners of hunting operations and/or hunters directly to restaurants, without fulfilling sanitary regulations. The Chilean deer industry marketing chain is shown in Figure 7.2.

Figure 7.2: Chilean Deer Industry Marketing Chain.



The Deer industry in Chile is a new activity, with an unstructured marketing chain. The normal flow for venison is represented by the green arrow. In this flow, farmers and hunting operations send the carcass/animals to the processor. Processors have two choices, one is to buy these products from farmers or hunting operations and commercialise them through their own marketing channels (green arrow). The second choice is to return the product to the farmers and charge for the process cost (purple dot arrow). Some farmers believe that they can get a better price by commercialising these products themselves, after the carcasses have been processed and packed. In this case, farmers/hunting operations pay the processor for the packaging and processing of the carcasses only, and venison cuts go back to the farmer/hunting operation, so they can sell the products to restaurants or hotels (black arrow). The blue arrow represents the flow of live animals that deer farmers sell to other (new or old) farms and new and/or old hunting operations, showing the interaction and relationships between participants in the industry. In some cases, deer hunting operations try to sell the product to restaurants and hotels without the proper and required process (red dot

arrow), creating a bad image for deer products in the domestic market. The light green arrow shows the flow of deer hard antlers trophies that are obtained by hunters at deer hunting operations.

7.1.1. NATIONAL DEER FARMERS ASSOCIATION IN CHILE (ANCC)

In Chile, no deer industry has yet been established, however, there are farmers who have deer on their properties for hunting or farming purposes. In order to manage this activity, there is a National Deer Farmers' Association in Chile. The association was established in 1974 in Osorno (X region in Chile), by the initiative of a group of deer farmers[34]. In the beginning, the objective was to promote the development of deer farms for hunting. Nowadays, the objectives have changed. Important issues such as the promotion of deer management concepts and organisation of conferences and congresses are the main responsibilities of the association.

7.2. INTRODUCED DEER IN CHILE

There are only two native species of deer in Chile, the Huemul (*Hippocamelus bisculus*) and the Pudu (*Pudu puda*). Both deer species are in danger of extinction, and are not eligible for production purposes, only for conservation purposes. Even though other deer species such as Red, Fallow and Roe deer can be seen in the natural ecosystems of the south of Chile, they were introduced into Chile and are considered as exotic animals.

In Chile, there are three introduced deer species, which are currently maintained in game operations and on deer farms. Initially all introduced deer were in captivity, but due to political factors in 1971 they were let free. The current populations of deer in Chile are a result of this action. For some people, the introduction of deer in Chile represents a threat (due to the exotic character of deer) to

[34] Those farmers in Chile that have deer in their properties will be referred as deer farmers.

the natural ecosystems of the IX and X regions. A negative aspect of introduced deer in Chile is that some farmers see these animals as a threat to their current activities (competition and damage to crops and farms). In addition to this, some people consider deer to be a plague.

In spite of these negative factors, one positive aspect is the creation of a deer management programme by the ANCC. Due to the vast extension of land occupied by deer, the only way to manage them is by farming systems or by a selective and controlled hunting system. As German influences predominate in the south of Chile, deer were hunted based on the German hunting system. The basis of this system was the quality of the antler, as a trophy of the male deer. However, factors such as body weight and health status were important, too. As a consequence of this hunting system, in Chile, the deer population structure by sex and age was totally uncontrolled. A major issue in Chile was the decision whether or not to manage red deer. The different populations of red deer in Chile can be found either free or in different levels of 'captivity'. Each of these management levels has different objectives, which can be seen in Table 7.2.

Table 7.2: Classification of the different deer population and the kind of management applied in Chile.

Kind of population	Population Status	Objectives	Management
No Limits	Free	Synergetic	Selective Hunt
Big Deer	No domestication	Synergetic and others	Selective Hunt
Small Deer	Domesticated	Meat, Velvet , etc	Deer Farming

Source: Cervus Magazine ANCC, Issue 1, February 1998. Chile.

7.2.1. FREE DEER POPULATIONS

- Selective Hunting: The management of free deer populations through selective hunting has shown that this is the best way to develop and control the population. For this, population control is of great importance so that there is no conflict between the ecosystem and the deer population in the

wild. The final aim of the selective hunt is to take out of the deer population all those individuals that are sick, weak or have some kind of physical problem. It is of great importance to maintain the equilibrium between sex and ages, so the potential development of the species can be high.

- No Management: Populations that are let free (as it was in the beginning in New Zealand), can cause problems in the ecosystem if no control is applied. The control can be by predators, migrations or by natural or auto regulation.

- Badly Managed: These are populations in which man intervenes, and which have suffered the loss of the natural equilibrium of the population. Some of the results of these interventions are high stress in the population, more migrations and a high negative effect in the ecosystem.

7.2.2. SEMI-DOMESTICATED POPULATIONS

These are populations that live on islands or big farms where they have some kind of management. However, these individuals have similar lives to those that live in the wild.

7.2.3. DOMESTICATED POPULATIONS

The final objective of domesticated deer is to have maximum production of the different products of deer (venison, velvet and co-products). The management is intensive, similar to beef cattle management systems. The costs are higher, but they

generate higher returns[35]. In Chile this is a new activity, in which some farmers are becoming interested.

Introduced deer have adapted very quickly to the geographical and climatic situation of the southern regions of Chile, becoming part of the natural ecosystem. Farming of introduced deer in the southern regions of Chile could become an important economic factor to farmers, and it would also contribute to the regional and global diversification process of the country's productive base.

7.3. DEER FARMING REGION IN CHILE

Deer in Chile are located between the IX and XI Regions, however the main concentration of deer farms and deer hunting operations is located in the X Region.

7.3.1. X REGION IN CHILE

The X Region of Chile has a total population of 948.809 inhabitants, which represents 7.1% of the total population of the country. It is composed of 5 provinces, Valdivia, Osorno, Llanquihue, Chiloe and Palena. The productive activities of the region are distributed along the region, showing a different productive profile in each province. In effect, Valdivia has the forestry plantations, Osorno the livestock production, and in Llanquihue and Chiloe the main aquaculture activities of the country are located.

This region is characterised by a humid, dry and temperate climate, with a rainfall level of 1,300 to 1,400 mm a year. In summer the rainfall level tends to decrease, the moisture levels in the soil are very low, and in some cases pasture growth is negatively affected. Soil pH varies from acid pH of 5.0 to 5.5, representing a limitation for the cultivation of some crops. The topography of the region is mainly flat.

[35] Cervus Magazine. ANCC, Issue 1, February 1998. Chile.

7.3.1.1. REGIONAL PRODUCTION

The main productive activities of the region are those related to agriculture, forestry and fisheries. The regional GDP was around the US$2,256 million in 1996, representing 3.9% of the total national GDP. The regional GDP has registered a lower growth compared to the national GDP, however, in the last few years the average growth was 0.5% greater than the national growth average. The extent of participation in the regional GDP of the three most important activities in the region in 1985, 1990 and 1995 is shown in Table 7.3.

Table 7.3: Regional Gross Domestic Product, X Region in Chile. (TM Chilean pesos).

	1985	1990	1995	Variation 1985/95 (%)
Agriculture and Forestry	$24,341	$35,751	$40,276	65.5%
Commerce	$15,603	$21,828	$31,914	104.5%
Manufacture	$14,061	$21,123	$31,442	123.6%
Regional GDP	$114,469	$162,368	$223,803	95.5%

Source: Ministry of Economy, Chile

The AGDP of the X Region represents about 10% of the NGDP. The land use in the region has been changing from annual crops and natural meadows to fallow land, improved meadows and forestry plantations. This means that the surface that is being used by agriculture is over 1.2 million hectares, showing a productive transformation that enhances livestock rising and forestry.

The livestock sector in the region accounts for more than 850 thousand heads (the largest number amongst regions). The main species present in the region are beef and dairy cattle, pigs, sheep and horses (see Table 7.4). It is important to notice that there has been an increase of 1.8% in the number of all animals between 1990 and 1996, contrasting with the national decrease shown in the same period.

Table 7.4: Existence of Animals by species in the X Region in Chile. 1990 – 1996.

Specie	1990	1996	Participation in Total Country (%)	Variation 96/90 (%)	Country Variation 90/96 (%)
Cattle	1,220,230	1,403,172	36.93	14.99	11.63
Sheep	490,890	359,076	9.56	-26.85	-21.79
Pigs	85,970	66,867	4.04	-22,22	32.23
Horses	29,040	30,083	9.41	3.59	-7.40
Total	**1,826,130**	**1,859,198**	**19.51**	**1.81**	**-2.78**

Source: Ministry of Economy, Chile.

7.3.1.2. REGIONAL EXPORTS

The exports of the X Region have expanded by 6.3% in 1998 (-10.2% being the other regions' average), with a total value of US$914 million. The export level per labourer in the region reached US$2,484 in 1998, being 9% inferior to the national average export level per labourer (US$2,725).

Salmoniculture, fisheries and forestry lead the economic structure of the exports in this region. The regional exports in 1998 by product can be seen in Table 7.5.

Table 7.5: Regional Exports by Product. X Region Chile, 1998.

Product	TMUS$ F.O.B	Participation (%)
Fillet and other salmon meat	179.8	19.7
Frozen Pacific Salmons	118.3	12.9
Frozen Trout	108.8	11.9
Frozen Salmon fillets	60.4	6.6
Frozen Atlantic Salmons	56.3	6.2
Wood	48.8	5.3
Frozen cod fillet	34.4	3.8
Frozen trout fillet	32.3	3.5
Fishing boats	23.8	2.6
Others	250.9	27.5
Total	**913.8**	**100.0**

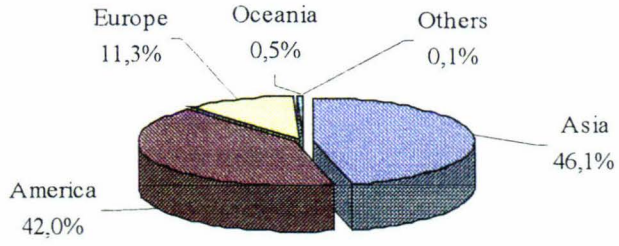
Source: Ministry of Economy of Chile, and Prochile.

It is interesting to notice that, even though this region is the largest producer of red meat in Chile, there is no export registered to meat products. This is due to the fact

that Chilean demand for meat products exceeds the total domestic supply, encouraging meat imports from Argentina.

The main destiny of the regional exports is Asia, which takes 46% of the total (Figure 7.3).

Figure 7.3: X Region of Chile Exports Destination, 1998.



Source: Ministry of Economy of Chile and Prochile.

In terms of destination, the most important countries are Japan (44%) and USA (34%). The export concentration in the two main countries give to the region a vulnerable character in relation to the economic state of those countries.

The X Region in Chile has been developing those economic activities related to the external markets, following the national trend. The association with MERCOSUR opens new opportunities to the region, giving it the chance to achieve a new market made up of more than 200 million people.

7.4. DEER FARMING REGULATIONS IN CHILE

As deer farming is new in Chile, regulations regarding this activity are minimal. Chilean agricultural regulations make a distinction between hunting operations (for native and exotic animals, including deer) and farming activities. According to the Hunting Law number 19,473 in Chile, hunting operations are defined as being all those properties that are specially designed for hunting. It also makes a distinction between

kinds of hunting. It defines small hunting as the 'hunting of animals that reach in their natural and adult state a weight not higher than 40 kg'. Mayor hunting is defined as the 'hunting of those animals that can reach in their natural and adult state a weight of more than 40 kg'. Before the establishment of a hunting operation, the owner(s) need to carry out an environmental impact study. This law also recognises the existence of reproductive centres, with the final objective of farming protected species, preserving, conserving and repopulating them. Article 54 and 55 recognises farming of exotic and native animals, for commercial purposes. These farms are allowed to sell all the products, including live animals, and co-products any time of the year. According to Article 60 in this law, these farms and reproductive centres will have to fulfil the following conditions:

- These properties should have a proper fencing system, that prevents animals from escaping, and the entry of predators to the property,
- To take the proper measures in order to assure the safety of people on the property,
- All the facilities assigned to animals should present the environmental conditions required by every type of animal on the property; the space needed for the physiological needs of the species, with the final aim of protecting the animal health of every species.
- To have a sanitary management plan and a fire prevention programme for the herd.
- Establish an emergency plan in case of animals' escapes.

7.4.1. SANITARY REQUIREMENTS FOR IMPORTED DEER IN CHILE

As mentioned before, Chile is free from numerous plagues and insects. In order to protect the sanitary patrimony of Chile, there are some regulations regarding the importation of live deer and deer meat.

In the case of imports of live deer to Chile, there are some requirements that must be met:

- The country of origin must be officially declared free of: Rinder Pest, Contagious Bovine Pleuropneumonia, Contagious Ecthyma (contagious protular dermatitis), Rift Valley Fever, Akabane Disease, Vesicular Stomatitis and Cowdriosis (heartwater). This sanitary condition must be recognised by the Chilean Sanitary Authorities.
- The country of origin must be officially declared free of Foot-and-Mouth disease (FMD) without vaccination, and Chile must recognise this condition.
- The country of origin must be officially declared free of Theileriases, Tuberculosis, Brucellosis, Blue Tongue, Epizzotic Hermorrhagic Disease (EHD), Anaplasmosis, Dermopatic Herpes and Malignant Catarrhal Fever (MCF).
- In the imported herd, and in the surrounding farms in the place of origin, within the last 90 days previous to the shipment, the following diseases should not be detected: Rabies, Enzootic Bovine Leucosis (EBL), Infectious Bovine Rhinotretis, Bovine Viral Diarrhoea (BVD), Hemorragic Septicaemia, Trihomoniasis, Campylobacteriosis, Leptospirosis, Sarcoptic (mange in cattle), Babesiosis and Johne's Disease.
- When deer are born and raised in the place of origin, or they have stayed at least 12 months before the shipment in this place, during a 45 days' period after the importation, these animals should be kept isolated under official control. During this period of time, deer should be tested and vaccinated against Leptospirosis, Infectious Bovine rhinotretis, Bovine Viral Diarrhoea, Enzootic Bovine Leukosis, Johne's Disease, Blue Tongue, Campylobacteriosis, Tricomoniasis, Tuberculosis, Brucellosis and Parasitism.
- The test will be done in laboratories officially recognised, and they will not be done if the country of origin is free of these diseases, with the correspondent accreditation.
- The animals should not be vaccinated with live germs, and at the time of shipment, they should not present symptoms of contagious diseases.
- The transport from the farm of origin to the shipment place, should be supervised by official sanitary authorities, and must be in sealed, clean and disinfected vehicles. These vehicles should not be in contact with other animals other than those to be exported.

- All animals should come with a sanitary certificate from the sanitary authorities of the country of origin. This document should guarantee the fulfilment of the sanitary requirements of Chile. It also should specify the number and identification of animals, the destiny (farm) and the type of transport, with a complete health historic document of the animals involved.
- SAG can ask for more tests, apart from those mentioned before, if applicable.
- Once the animals arrive in Chile they will have to be placed in a quarantine location, which cost will be charged to the new owner.

In the case of deer meat imports to Chile, the same sanitary requirements mentioned before are applied to the animals. In addition to this, the meat should fulfil all the requirements from the country of origin, and come from carcasses that have been processed through a maturation process with temperatures between 2°C and 7°C for at least 24 hours. The meat should not present antiseptics, antibiotics or other chemical additives as a conservation method. After the cooling process, the meat should not be exposed to temperatures over 0°C for chilled meat and -12°C for frozen meat. Once the meat products arrive to Chile, the products will have to pass the controls and tests determined by the SAG.

7.4.1.1. QUARANTINE REQUIREMENTS

The quarantine facilities should fulfil some minimal requirements in order to guarantee the phyto-sanitary patrimony of Chile. These requirements concern the physical place of the facilities (which must be close to the place of disembarkation, far from public roads or agricultural products factories, at least one km from livestock farms, have good roads, have facilities that can ensure good conditions for animals, and to have protection against insects and rodents). The place should be built of washable materials, have a loading and unloading ramp, pens, and eating and drinking facilities. The requirements also include the qualification of the place, such as personnel and the proper gear is needed. It is important to notice that in these places (or farms close to them) there should not be detected any disease that can be

transmitted. The quarantine facilities should be clean and disinfected before the arrival of animals.

7.4.2. SLAUGHTER AND COMMERCIALISATION OF DEER MEAT IN CHILE

In Chile, the law regulates only deer meat coming from hunting operations, and not from deer farms, as the latter is a very small activity in the country. The law establishes that the slaughter and commercialisation of deer meat from hunting operations, with the final destiny of human consumption, must adhere the following conditions:

7.4.2.1. GENERAL CONDITIONS

The slaughter of deer in authorised hunting operations should be with elements and/or mechanisms that do not constitute a source of contamination for the meat. The blood drain should be done in the slaughter place, and immediately after the death of the animal. The removal of the guts should be done in authorised facilities. The deer carcass must be transported to a place authorised by the health authority, so that the boning of the animal can take place. In this place, a veterinarian should be present, who will check the meat for abnormalities. Venison can be commercialised for human consumption only, if it is maintained in the cool chain in every step of the process.

7.4.2.2. HUNTING OPERATIONS

The hunting facilities have to have certain facilities so the slaughter process of deer can be carried out. These places must be away from contamination, have washable floors, walls and ceiling. Hot and cold drinking water must be available for the final purpose of cleaning. In order to maintain an extremely clean carcass, the

facilities must have a system that allows the suspension of the carcass (30 cm from the floor, and 80 cm from any wall). It is also important to have a chilling room, where the carcass can be maintained at no more than 7°C. All the slaughter processes must be supervised by an authorised veterinarian, who will certify that the slaughtered animals are in normal condition and do not show any symptoms of diseases.

7.4.2.3. DEER CARCASS TRANSPORT

The transport of the deer carcass from the hunting operation facilities to the proper and authorised slaughterhouse should be done in a period that does not exceed 12 hours from the time of death. The vehicle should fulfil the requirements established in the supreme decree N°977/96 for meat transport. All carcasses and guts must be identified with a card, which has the following information:

- Origin,
- Identification of the hunting operation,
- Characteristics of the animal (weight, gender, etc),
- Correlative number,
- Certificate emitted by the Veterinarian in the hunting operation.

7.4.2.4. DEER BONING

The boning of deer carcasses will be done in a First Class slaughterhouse. These slaughterhouses are considered to be the most complete ones, and are those that comply with all the sanitary and building requirements. By law, the boning must be done in a line process, specialised for deer, or at a different time from other species. This process must consider all the steps of a normal boning/slaughter process, and must be at temperatures that do not exceed 15°C. The process steps are as follows:

- Cut of the carcass,
- Post-mortem inspection by a veterinarian of the Health Service of Chile,

- Cleaning/washing of the carcass,
- Weighing of carcasses,
- Confiscation of parts or carcasses not suitable for human consumption.

7.4.2.5. PACKAGING AND LABELLING OF DEER MEAT

The packaging and labelling of deer meat for human consumption needs to fulfil the requirements established in Article 107 of the supreme decree 977/96. The label in the package must include *"Deer meat, hunting product"*.

7.5. PROFITABILITY OF THE CHILEAN DEER INDUSTRY

According to ODEPA, about two thirds of the Chilean national territory is classified as non-productive land. This percentage represents about 50 million hectares. From this point of view it is interesting to consider that, by using only a small percentage of this land, under a good and efficient management, deer farming has interesting economic prospects. A study conducted by the former chairman of the ANCC, Dr. Claudio Ortiz, showed that in Chile deer carcasses have a higher efficiency for venison production, on a percentage base than those from Scotland and New Zealand (see Table 7.6).

Table 7.6: Deer Carcass Efficiency. Percentage of Total carcass.

Country	Carcass efficiency for venison
Chile	57.4% – 58.8%
Scotland	53.0% - 58.0%
New Zealand	54.0% - 58.0%

Source: Ortiz, C.: Posibilidades de la explotacion del ciervo, 1979. Chile.

It is important to notice that these data are from 1979, and may have changed since then. However this shows that Chile has the potential to produce venison and to be more efficient than, or as efficient as other venison producers.

The profitability analysis for the deer industry in Chile was carried out by using the economic information of two deer farms in Osorno, X Region in Chile, and then analysing their gross margins. The names of the farms and farmers will not be revealed, and they will be referred to as Farm A, and Farm B. The technique that will be used to determine the profitability of the deer enterprises in the farms is the Gross Margin Analysis. A gross margin is defined by Agriculture New Zealand as "the total income from a particular enterprise less the variable costs associated with the enterprise". This will indicate if a deer farming operation in Chile is profitable or not, by analysing the results of both farms. In order to obtain the necessary data to run a gross margin analysis, the farmers in Chile had to answer a questionnaire and fill in a spreadsheet with the income and expenditures of their deer operations. Table 7.7 presents a summary of the results from the cost/income Table (refer to Appendix 14). Results shown in Table 7.7 are all in US dollars, and before tax, as taxing practices may vary from country to country. This makes the results of the cost/income Tables comparable on an equal basis.

Table 7.7: Summary of cost/income Results (US dollars).

Result	Model Farm New Zealand	Farm A Chile	Farm B Chile
Total Gross Farm Income	$58,889	$22,227	$13,679
Total Farm Expenditures	$33,963	$2,358	$10,765
Total Farm Surplus	$24,926	$19,868	$2,913

The model farm in New Zealand has a gross farm income composed of deer products different from velvet (90.5%), leaving the rest to velvet sales (9.5%). In terms of expenditures, the most relevant ones that have a major influence in the total expenditure value are fertiliser (26.64%), vehicles (12.9%) and administration (15.8%). It is interesting to note that the total farm expenditure represents 57.67% of the gross farm income, showing that the latter can cover the costs and have a surplus of US$24,926.29.

In contrast to the New Zealand model farm, Farm A in Chile has a gross farm income composed entirely of the sales of live deer and venison. From this gross income, 98.9% comes from the sales of live deer, and only 1.02% from venison sales. This can be explained due to the fact that Farm A operates as a hunting operation as well as a deer farm, where the final product is the trophy and venison is the co-product. The composition of the farm gross income shows that the farmer's interest lies in the sales of live deer for hunting, rather than in raising deer for venison production purpose. With regards to expenditure in Farm A, the costs that influence the final value are animal health (29.16%), feed (23.6%), and repair and maintenance (19.67%). However, the farm expenditure represents only 10.61% of the gross farm income, showing a larger farm surplus percentage of 89.39% (US$19,868.76) than the model farm in New Zealand. in terms of real values, the New Zealand model deer farm showed the highest farm surplus (US$24,926.29).

Farm B in Chile has a gross farm income composed of sales of deer products (only venison at this stage), which represent 84.63% of the total, and velvet sales with 15.37%. In a normal year, Farm B would have realised an income from venison and live deer sales only. The velvet sales are considered by the farmer to be an extra or plus for this seasons income, as it is very uncommon to find buyers for this product. The total farm expenditures are mainly composed of wages (20.68%), fertiliser (15.74%) and administration (25.73%). The farm expenses represent 78.70% of the farm gross income, leaving only 21.30% for the farm surplus (US$2,913.91).

It is interesting to note that neither of the Chilean farms has costs associated to deer purchase, which increases the farm surplus considerably. However, this may be due to the fact that these farms are able to produce their replacements. Costs structures are very different in the New Zealand Farm in comparison with both Chilean Farms. However, Farm B in Chile has a similar cost structure compared to the New Zealand model farm, in items such as administration and fertiliser. Costs such as vehicles, electricity, weed and pest control and freight are low in the Chilean farms as at the current stage of business, these costs are minimal and are not highly required. On the other hand, some of these costs may be subsidised by other farm activities, such as beef and dairy cattle.

7.5.1. DESCRIPTION OF CHILEAN DEER FARMS

The information from the farms was collected by sending questionnaires and constant communication with farmers contacted in Chile, who are currently farming deer. The questionnaire included general, production and income/cost questions. Even though both farmers were most helpful, the information was not very extensive, as this activity is somewhat limited in Chile. Also information from government institutions was difficult to obtain. The description of the farms will not be based on a common structure, as the information received from both farmers was different.

7.5.1.1. FARM A IN CHILE

Farm A is located in Osorno, in the X Region in Chile. The total area of the farm is 334 hectares, from which 200 hectares are used for deer production. The main reason for starting the deer farm was the fact that it was a family business, so the farmer continued with this activity. The farmer has been involved in deer farming/hunting operations since 1952. The origin of the deer herd is mainly from Argentina. Farm A is a deer farm and at the same time, it is also a deer hunting operation, with the final objective of producing both trophy stags and venison. Venison is sold to restaurants in the domestic market after fulfilling the SAG and the Chilean Health Service regulations.

The fawning percentage of this farm is 72%. The main business in the farm at the moment is to sell live deer, either for hunting operations or to new deer farms. In the current season Farm A sold 16 deer, with a price of US$1,000 each hind, and US$1,500 each stag.

7.5.1.2. FARM B IN CHILE

Farm B is located in Osorno, in the X Region in Chile. The total area is 444 hectares. From this total area, deer occupy 92 hectares, which comprise mostly low lands. The main reason for starting with the deer farming business was to get out of the

commodity market (beef and milk product) and create a niche market for a special product (deer). Apart from deer, Farm B has other enterprises, which constitute the farm's main business. The farm livestock composition is shown Table 7.8.

Table 7.8: Livestock in Farm B.

Class	Number	S.U	Total S.U
CATTLE			
M.A Cows	180	6.0	1,080
M.A Hybrid Cows	50	6.0	300
Heifers	176*	4.0	704
TOTAL CATTLE	**230**		**2,084**
DEER			
FALLOW			
M.A Does	240	0.8	192.0
R1 Does	45	0.6	27.0
Bucks	15	1.0	15.0
R1 Bucks	15	0.7	10.5
RED			
M.A Hinds	51	1.9	96.9
Stags	27	3.0	81.0
Fawns	11	1.0	11.0
TOTAL DEER	**404**		**433.4**

*Considering a 2.0% loss.

The farm started with 30 fallow deer captured on the property. In the case of red deer, some were captured and others imported from Argentina. These imports (2) of 100 fawns had a lot of trouble and the loss percentage was very high. The reason for this was the lack of a proper transport infrastructure (roads and vehicles). In the 1998/99 season the farmer imported 4 spikers from Argentina in order to improve the current genetics on the farm. This deer farm has a venison focus (mainly from fallow deer). However, it started as a velveting farm, but due to low prices, lack of volume to supply the market and lack of critical mass, those velveting stags are currently used to produce trophies for hunters. The venison production is restricted to fallow spikers and from those fallow and red deer that are eliminated from the herd. In the case of red deer, the ones that are eliminated or sent to the works are those from 2 years old that have bad antler formation, or are not likely to develop a good trophy, and spikers that present less developed antlers. In the case of hinds, the ones that are eliminated are the old and dry ones. In terms of fawning percentages, these are very different between fallow and red deer. The fawning percentage for fallow is 79.8%, and for red only

24%. The low percentage for red deer could be due to stress. The red hinds were brought from Argentina where they were in a very quiet place. Now these hinds are in a smaller paddock close to the main road (1,000 m from the city). Next season's fawning percentage will determine if stress was the reason for the low fawning percentage, or if there is another factor affecting the hinds.

Farm B has a venison production of about 3,200 kg. a year. The deer farm represents 15% of the total income of the farm and 10% of total costs. For the next season, the farmer is expecting to sell about 50 does at about US$200 to US$300 each. In the future there will be an opportunity to sell some bucks to Argentina at about US$1,500 to US$2,000 FOB each.

7.5.2. GROSS MARGINS ANALYSIS OF DEER FARMS

The summary of the gross margin analysis for both farms is presented in Table 7.9 (to see the full gross margin analyses refer to Appendix 15). This Table shows a comparison between the two deer farms in Chile and a model deer farm in New Zealand. All values shown in the Table are in US dollars and before tax, so the data among farms can be compared in a consistent way.

Table 7.9: New Zealand and Chilean Deer Farms' Gross Margins Analysis Results 1998/99. (US dollars).

Farm	Total	Per Ha.	Per S.U.
Farm A (Chile)	$20,982	$104	$52
Farm B (Chile)	$10,578	$129	$27
Model Farm (NZ)	$43,208	$320	$21

Table 7.9 shows that both deer farms in Chile have a positive gross margin result. However, there is a significant difference between farms in Chile and the model farm in New Zealand. The New Zealand model farm shows the highest total, and per hectare gross margin values. However, in terms of stock units, both Chilean farms

show higher values than the model farm in New Zealand. Farm A in Chile shows the highest value in a per stock units basis, compared to the other farms. The stock unit value for Farm A in Chile was assuming that this farm has maintained the same number of animals as is shown in the registered list of SAG, in the year 1996. The difference in S.U. gross margins results can be due to the fact that the New Zealand farm has 2,007 stock units, a much higher number as compared to 400.5 and 433.4 stock units on Farm A and Farm B respectively in Chile. Farm B shows higher values in per hectare terms than Farm A in Chile. Again, this may be due to the number of hectares in Farm B (92 ha), which is less than half the area of Farm A (200 ha). It is important to notice that in the gross margin analysis of Farm A, only two major variable costs were included, as no other variable costs were identified by the farmer. This may be due to the fact that those variable costs such as electricity, freight, seeds, weed and pest control, etc., can be subsided by other enterprises on the farm. It is important to notice also that the New Zealand farm has an income from venison and velvet, whereas the Chilean farms have an income from venison and sales of live animals only. Furthermore, Farm B shows a velvet income of US$2,102, increasing the total income of the deer operation. This velvet sale is not common, and it was sold to a Korean doctor in Santiago de Chile, but there is no established market for it. On the other hand, between the deer farms in Chile, there is a big difference, as Farm A derives 98.98% of its total income from sales of live deer to other farms or to hunting operations. In contrast, Farm B obtains most of its income (84.63%) from venison sales.

Even though the gross margin results for the Chilean deer farms are low, they suggest that deer farms in Chile are profitable. In the way that deer farms in Chile are able to increase their stocking rate per hectare, currently only 2.0 S.U/ha on Farm A and 4.7 S.U/ha on Farm B, productivity may rise. These values compared to the 14.9 S.U/ha on the New Zealand model deer farm suggest that the Chilean farms should increase the stocking rate per hectare and intensify their production system. This would enable the Chilean deer farms to be more profitable, as production rate may increase. If production rises, and quality problems are solved, in conjunction with the used of marketing plans focused on export markets, then deer farmers in Chile would be able to sell their products in both the domestic and international markets. In addition to this, it is important to realise that the industry is new in the country, and it needs to be

developed. An increase in production levels is not enough to be successful. Associated activities, such as marketing and promotion, processing sector, quality assurance, etc., should also be involved in this development process of the deer industry in Chile. In this way the industry would not only increase the production level, but would also be able to produce what the markets are demanding, quality and consistency.

7.6. PORTER'S FIVE FORCES INDUSTRY ANALYSIS FOR THE CHILEAN DEER INDUSTRY

In order to determine the industry environment for the Chilean Deer Industry, Porter's industry analysis will be performed on the Chilean Deer Industry. This will analyse the five forces in an industry: new entrants, power of suppliers, power of buyers, competition within the industry participants, and substitute products. This will give a profile of the current situation of the Chilean deer industry at an industry level.

7.6.1. THREAT OF NEW ENTRANTS

In the Chilean deer industry the threat of new entrants is weak, and is not a negative aspect, as the industry needs more participants in order to be competitive. This means that the entry of more participants into the industry would benefit the current participants, as Chile as a whole would be able to produce the necessary volume level of deer products to export. Barriers to entry in this industry are relatively low. Any Chilean farmer who is currently farming livestock can start with a deer operation. However, an important entry barrier is the "know how" of deer farming, as it is not a traditional activity in the country. Farmers will have to learn by experience, consultancy, or by visiting farms overseas and attending conferences about deer farming.

The deer industry in Chile is in an embryonic stage in the industry life cycle, so new participants in the industry are not a threat. On the contrary, this represents an opportunity to further develop the industry in Chile.

In an international scenario, New Zealand leads the industry, which is the largest producer of deer products in the world. The entry of Chile in the international scene is not important, as representing a threat to other deer producer is far in the future, and at the moment Chile is not in a position to compete with other countries in terms of deer products.

One of the most important entry barriers to this industry in Chile is the high cost involved to start a deer operation (farming or hunting). There is a need to buy the livestock and build the proper facilities (pens, handling facilities, fences, etc.), involving large amounts of money.

As the deer industry is a new activity in Chile it does not present economies of scale. However, small or new deer farmers can face a cost disadvantage compared with other (large scale or more experienced) deer farmers.

Product differentiation is a major issue in both the domestic and in the international market. New Zealand has differentiated its product by using the Cervena trade mark, and changing consumers' perception of a seasonal and feral product to a whole year available farmed deer product. In Chile, only consumers with international experience know about venison, and these consumers demand venison at restaurants. However, in Chile there is a general lack of knowledge about deer products. Most of the products that reach Chilean consumers come from deer farms, but there is a percentage of the venison available in the market that comes from deer hunting operations that do not fulfil the slaughter and packaging requirements. The final consumer does not know this, but restaurants' chefs can see the difference, as the legal products come in a vacuum pack, and the illegal products are without packaging, and are considerably cheaper compared to the legal product. This represents a disadvantage to the deer industry, as the differentiation process is very difficult if the quality is not consistent. To establish this process for deer products in Chile is a great task, however it is not impossible.

In terms of marketing or distribution channels, the Chilean deer industry has a very simple and unstructured chain. In the way that Chilean deer farmers work together, they will be able to create a marketing chain that can secure a high quality product, and can meet both farmers' and consumers' needs.

Switching costs in the deer industry are relatively low, as to leave this activity the farmer(s) need to sell the livestock and all facilities can be adapted for other

livestock activities. However, all the resources (time and money) invested in the 'know how' of deer farming would represent a big loss.

7.6.2. POWER OF SUPPLIERS

Suppliers in the deer industry are represented by deer farmers, and they are supplying the domestic market with what can be considered as a new product. The facts that deer products (only venison at the moment) are new in the market and that there is a limited number of farmers in the country, give high bargaining power to farmers. However, as demand is low in the domestic market, the power of suppliers over buyers is reduced. The deer industry in Chile is currently at the stage of building up the herds so farmers can produce the necessary volume to satisfy market needs. Therefore, at the moment, selling venison to restaurants represents a small portion of the deer farmers' business. This gives more bargaining power to deer farmers, as they are prepared to bargain with buyers (Restaurants' Chefs). However, from a processor point of view, farmers have to accept the levies charged to process the deer carcasses. This is as there is a demand for deer products in the limited domestic market, and there are only two slaughter facilities authorised to process deer in Chile.

7.6.3. BARGAINING POWER OF BUYERS

Buyers of deer products in Chile are restaurants' Chefs and people who have international experience with deer products and have enough money to purchase these products in restaurants and hotels. In Chile consumers are not very sophisticated, and they lack knowledge about deer products. These consumers demand high quality products, as the money they are paying for them is high (average price of meal including deer is about US$30 to US$35). Even though these consumers demand deer products at restaurants and hotels, they are prepared to consume other traditional

dishes if deer is not on the menu. Demand for deer products in Chile is low, due to the fact that general consumers know neither the product nor its characteristics.

In terms of restaurants and hotels as buyers, they apply pressure to deer farmers to ensure that the product they are buying is of high and consistent quality, and has been through a quality control process (slaughter and packaging).

In general, buyers in Chile have weak bargaining power, and they have to accept suppliers' conditions.

7.6.4. RIVALRY WITHIN THE INDUSTRY

In Chile the deer industry is composed of about 20 deer farms which raise deer to commercialise their products (venison, velvet and co-products), and about 15 deer hunting operations, which have the final purpose of attracting hunters (mainly from overseas) to hunt deer on their properties. Rivalry among participants in the industry is weak, as the number of participants is limited. As the industry is in an embryonic stage, participants need to work together to establish an industry base. In the case of New Zealand, some deer farmers think that working together, not only within New Zealand, but also with world deer farmers is vital for the industry as a whole[36]. Even though the industry in Chile has a fast growth rate, there is insignificant rivalry among participants, and they are looking for integration between farms and hunting operations, but this will involve investment in sanitary aspects for the latter parties. Even though this growth cannot be seen in terms of exports, it can be seen in terms of increasing numbers of animals, and interest among farmers.

The deer industry in Chile has a potential market in South America, and can gain access to the traditional deer product markets such as Germany and Korea, due to current free trade agreements between countries.

In the Chilean deer industry, rivalry is between farms and hunting operations and is related to venison quality, as the market in Chile is for venison only, and quality is not consistent among providers. Rivalry is not for market share or price, but for

[36] Roger Aitken, New Zealand Deer Farmer, Taihape, NZ. Personal Communication.

quality of products. Venison from hunting operations is inferior to that from deer farms, as the latter fulfils the sanitary requirements for processing and packaging of deer meat.

If the industry participants can work together, quality assurance systems, transport regulations for live animals and venison, and general guidelines for deer farming can be created.

7.6.5. SUBSTITUTE PRODUCTS

Generally speaking, there are no substitute products for venison, deer velvet antler and deer co-products, as they have unique characteristics and attributes. Furthermore, all these products are perceived by consumers as being different from everything else. However, when talking about venison, substitute products can be considered to be other sources of protein in restaurants' menus such as beef, chicken, fish, pork, etc. In the case of velvet, this product has unique and special characteristics, not only physically but also in consumers' beliefs. Substitute products for deer velvet antlers are other herbal tonics, which can emulate the effects produced by deer velvet and co-products.

7.7. MACRO-ENVIRONMENTAL FORCES IN THE CHILEAN DEER INDUSTRY

7.7.1. DEMOGRAPHIC ENVIRONMENT

Deer products are well known in Asia, Europe and the USA. In Asian countries, deer velvet antler and deer co-products are traditionally consumed. In Europe and the USA, venison is traded through specialised game restaurants. In recent years, New Zealand has being trying to introduce deer velvet antler into the American

market, as it represents a large market for tonics and natural brews. For both products, demand is increasing, as there is a trend towards consuming healthier products.

In South America, deer products are unknown by general consumers and this makes this market an interesting one to be explored and exploited. Specifically in Chile, venison is traded in the domestic market only, due to its low volume, also for sanitary and packaging reasons. Potential growth of the Chilean industry is high, as if Chilean farmers can meet quality and volume requirements, the size of South American market makes it very attractive for the introduction of a new product. Considering the MERCOSUR as a potential market, the number of potential consumers of deer products is encouraging.

Currently, the number of consumers who purchase deer products is very low, however, with the proper marketing and chef training, consumers can be attracted to purchase these products.

7.7.2. MACRO-ECONOMIC ENVIRONMENT

The Chilean economy was negatively affected by the Asian economic crisis, however, it is recovering. Even though the GDP growth rate is lower than in previous years, it is still growing (both NGDP and AGDP). Unemployment represents an important issue for the Chilean economy. After the Asian economic crisis, unemployment grew to 10.8% in April-June 1999, but it is expected to decrease, as the country's economy is showing a reactivation process. In terms of exchange rates, the Chilean peso has been devaluating against the US dollar since 1989. Exchange rates in relation to the deer industry are very important, as all products are traded in US dollars, and this can be considered as an advantage for Chilean deer farmers.

Chile presents a good macro-economic situation in which to start and develop a new industry. The Chilean economy is considered to be the most stable, dynamic and successful among South American countries and due to this, it is attractive for foreign and domestic investors. On the other hand, people in Chile are now able to spend more money on products such as venison as their economic situation has improved.

7.7.3. POLITICAL AND LEGAL ENVIRONMENT

The Chilean government has an open attitude for the development of new industries/business in Chile. The Chilean deer industry is a small activity compared to other productive activities such as fruit production, dairy and beef cattle farming and forestry. The deer industry is in its beginnings, lacking regulations in relation to processing, transport, farming, etc. Marketing regulations are minimal, assuring that there must be a pre and post mortem inspection of the carcasses for slaughter. Legally, only deer farms and some hunting operations fulfil the regulations and quality requirements. This represents a big issue, as venison that does not fulfil the sanitary requirements is traded in the same market as the products fulfilling all requirements, giving the consumer a bad image of deer products. Legally speaking, regulations must be developed in order to produce a standard product, with standard packaging and labelling. Deer slaughter regulations in Chile are minimal and very basic. If the slaughter volume is growing, more attention should be paid to this sector of the industry.

In Chile velveting is permitted by national laws. However, there is no evidence of any regulations regarding animal welfare with regards to velveting. This should be taken into account, as velvet is a very important part of the deer farming business. The regulations regarding velveting must be controlled by the SAG and Ministry of Health, as they should take care of both the animal welfare issues and the health and sanitary issues as velvet is considered a human consumption product.

Chilean regulations regarding the phyto-sanitary aspect are very rigorous, securing a clean environment for the production of agricultural products.

7.7.4. SOCIO-CULTURAL ENVIRONMENT

In general, venison consumers are very sophisticated (from a high-income level sector), and purchase this product in specialised game restaurants. In the case of velvet, consumers are generally rich Asian (mainly Korean) housewives, looking for high quality products. In Chile, normal meat consumers are either not aware, or have a

low level of awareness, of deer products, however those who are aware of them have gained this knowledge either in other countries or by family traditions.

Generally in Chile there is a 'Bambi effect', on consumers, which is when consumers see deer as Bambi as featured in Walt Disney's films and they relate cruelty with deer farming. This effect is more intense in consumers with no, or little, knowledge about deer products, and in countries where deer consumption is not a tradition, such as in Chile. Knowledge about deer products in Chilean consumers is very low, as deer is not part of the traditional diet. However, consumers can be informed about the kind of products that can be obtained from deer, how to cook them, etc. By doing this, consumers will get more used to deer products, creating demand (new need) for these products in the market.

In European countries velveting is not permitted due to socio-cultural aspects concerning animal welfare. In Chile, as mentioned before, velveting is permitted, but the animal welfare culture is not very developed, so regulations are minimal regarding this activity. Farmers who have done some velveting use international velveting guidelines, such as those that apply in New Zealand. However, velveting is not an important activity at present in Chile.

Socio-cultural trends are very strong in society behaviour. Nowadays the trend is to purchase healthier products meaning products low in cholesterol, fat, etc. Venison is one product 'comparable' with beef meat, in terms of protein level, but it has lower levels of cholesterol and fat, giving the consumer a healthier product. If consumers are aware of this fact, and the products are available in the market then demand for them would increase. All these efforts must be done carefully, as the introduction of a new product into consumers' diet is not an easy task.

7.7.5. TECHNOLOGICAL ENVIRONMENT

Nowadays, technology changes very quickly, and it will get faster every day. In agriculture the development of new software related to livestock, orchards, and management in general has helped farmers to improve performance by making things easier and more efficient. Technology related to the deer industry can play an

important role in the development of this activity in Chile. Processes related to slaughterhouses can be improved by using new technology. Technology can also positively affect the packaging of deer products, with the final purpose of supplying the market with a high quality product. In Chile, the slaughter and packaging of deer are done in normal (sheep and beef cattle) slaughterhouses due to a volume problem. However, technology is available to build a specialised slaughterhouse for deer (an example of a New Zealand deer slaughterhouse is presented in Appendix 16).

7.7.6. NATURAL ENVIRONMENT

Chile has a clean environment, comparable with New Zealand. The region in Chile where deer farming is developing is an agrochemical pollution free area. In addition to this, Chile has an excellent (internationally recognised) phyto-sanitary situation, thanks to government regulations.

Chile presents all the geographical and climate characteristics needed to farm deer. The only concern about the environment is the potential damage that deer can cause. Deer farmers and deer hunting operation owners must be aware of the potential damage that deer can cause to the Chilean natural environment if they are let free without control. It is important that regulations regarding deer farms and deer hunting operations ensure that deer must be kept inside the properties, by establishing a minimal fencing requirement.

7.7.7. COMPETITION ENVIRONMENT

At the present life cycle stage of the Chilean deer industry (embryonic), competition is not important. Even though literature says that in an embryonic stage, rivalry amongst the participants of the industry is high, in the Chilean deer industry situation is the opposite. Chilean deer farmers need to get together in order to produce a certain level that can be exported. Currently, deer farmers are trying to build their

herds by either purchasing deer from other farms, or importing them. Quality is a major issue in the Chilean deer industry, as it varies from producer to producer. Farms are able to fulfil the legal sanitary requirements imposed by the sanitary institutions in Chile, but some hunting operations are not able to do so. Venison production is insignificant (compared to other venison producers, such as New Zealand), so competition is not an important issue. When Chilean deer farmers begin to export deer products, the international competition is very tough, as countries such as New Zealand supply markets (USA, Europe and Asian countries) with a high quality and differentiated product. To introduce the Chilean product into these traditional markets will not be easy. However, it could be done by ensuring a high quality product, and by giving these products a differentiated aspect. Possibly the idea of introducing the Chilean product in the traditional markets is not the best. Probably it would be easier to introduce Chilean deer products in the MERCOSUR market, giving Chilean deer farmers the advantage of being one of the first (after Argentina) to supply these products in the South American market.

7.8. SWOT ANALYSIS FOR THE CHILEAN DEER INDUSTRY

7.8.1. STRENGTHS

Strengths in the Chilean deer industry are mainly due to physical or geographical aspects, such as appropriate climate and geography, location of Chilean deer farms, pollution situation of the farming zone, non-existence of predators, etc. Other strengths of the industry are related to deer characteristics when compared to other animals, such as beef cattle and sheep. However, aspects such as high marginal returns per S.U and per hectare are considered to be industry strengths. The following list shows the Chilean Deer Industry strengths.

1. Agrochemical pollution free zone,
2. Appropriate climate and geography in Chile for deer farming,

3. Chilean government is open to foreign investment,
4. Continued growth of NGDP and AGDP,
5. Deer posses high conversion rate from pasture to protein compared to other animals,
6. Ease of handling with proper facilities,
7. Excellent genetics in Chilean deer herds,
8. Excellent phyto-sanitary situation of Chile,
9. Geographical location, in relation to the reaching of new markets (e.g. South America),
10. Hemispheric location of Chile,
11. High marginal returns per S.U and per hectare,
12. Increasing agricultural products and markets,
13. Industry located in a pastoral zone in the south of Chile,
14. Land is relatively cheap compared to other countries,
15. Minimal requirements of labour in deer farming,
16. No competition in the domestic market,
17. No existence of natural predators of deer in Chile.

7.8.2. WEAKNESSES

Weaknesses in the Chilean deer industry are related to the size of Chilean deer farms, their low production levels (volume), and lack of proper legislation and facilities such as slaughterhouses. Issues regarding farmers' attitudes such as individualism were found to be an important factor to be improved, as they produce problems such as quality variability among producers in the market. The following list shows the weaknesses of the Chilean Deer Industry.

1. Bambi effect in non-traditional deer markets,
2. Deterioration of the exchange rate,
3. Differences between deer farmers and deer hunting operation owners regarding quality control for venison production,

4. Distance from traditional target markets, related to high transport costs,
5. Farmer individualism,
6. High competition level in the international market for deer products,
7. Lack of economies of scale in Chilean deer farms,
8. Lack of knowledge about deer products in the domestic market, where products are currently marketed, and in new markets such as Latin America.
9. Lack of proper deer slaughterhouses,
10. Lack of proper facilities for deer operations in Chile,
11. Lack of proper marketing strategies for deer products in Chile,
12. Lack of recognition of deer farmers by authorities,
13. Lack of the 'know how' of deer farming, only a few farmers have deer in their properties,
14. Low production level of Chilean deer farms (volume),
15. Low stock units/hectare relationship, compared to New Zealand.
16. No proper legislation regarding deer farming in Chile,
17. Limited number of deer farms in Chile,
18. Small size of the industry in Chile.

7.8.3. OPPORTUNITIES

Among the main opportunities in the Chilean Deer Industry those related to land availability, meat and healthier product consumption trends in Chile and the existence of world markets for deer products were found to be important. In addition to this, opportunities such as the increasing foreign investment in Chile and the potential market size may influence and increase this activity in the future. The following list shows the opportunities regarding the Chilean Deer Industry.

1. Availability of land suitable for deer farms in Chile,
2. Large size of potential market for deer products in South America,
3. Crisis in traditional livestock activities (dairy and beef cattle), with high costs and low returns,

4. Growing trend in the consumption of healthy products (products low in fat and cholesterol, such as venison),
5. Increasing foreign investment in Chile,
6. Increasing consumption of meat and healthier products in Chile and other countries,
7. Introduction of new farming technology in Chile (software, new processes, etc),
8. New activity in the country,
9. New trade agreement with Korea,
10. Production of organic deer products,
11. Recovery of Chilean economy after the Asian economic crisis,
12. Vertical integration from deer farmer to a specialist game restaurant.

7.8.4. THREATS

The main threats to the Chilean Deer Industry are related to the variability of venison quality and the proper quality controls in the processes. The following list shows the threats to the Chilean Deer Industry.

1. No government protection for domestic producers against overseas producers, in an oversupply or low prices scenario,
2. Subsided industries in other countries (Europe and USA),
3. Supply of venison without the proper quality control,
4. Venison sales by producers who consider this product as a co-product, without fulfilling the sanitary requirements (black market), resulting in a variability of venison quality in the market.

CHAPTER 8: CONCLUSIONS

8. CONCLUSIONS

Results from an analysis of the data concerning both Chile as a deer farming environment and deer as a farmed animal, together with the gross margin analysis performed for the Chilean deer farms, suggest that deer farming is a profitable activity in Chile. As a profitable activity it may represent an alternative to increase the diversification process of agriculture and increase the productive and export base in Chile. It may also help to increase the growth rate of agricultural activities, in the form of Agricultural Gross Domestic Product (AGDP), and consequently, increase its contribution to the National Gross Domestic Product (NGDP).

Both, Chilean and New Zealand economies are strongly based on the export of agricultural products. Moreover, they already compete in the same markets regarding these products, such as apples and kiwifruit. Both countries show similarities in climate and geography. Even though both countries have similar agricultural systems, New Zealand has been able to successfully diversify its productive base by farming non-traditional livestock such as deer, emus and ostriches, among others.

Deer farming has also been demonstrated to be a profitable activity in New Zealand. This country has developed the activity, researched the markets and marketed deer products for a long time. Deer farming is a growing activity in New Zealand, and the search for new markets increases the potential growth and further success of this industry. The New Zealand deer industry, apart from being a well-structured industry, has been able to take advantage of deer as a farmed animal. These advantages are related to less land, labour and fewer animals being required for deer farming compared with other farming activities (sheep, beef and dairy cattle) to generate profit. In addition to this, deer have a higher conversion rate from pasture to protein than other farmed animals, and their products are considered by international consumers of deer products to be special and unique.

Despite the Asian economic crisis in 1997, Chile has shown a constant growth in its Gross Domestic Product ((GDP) National and Agricultural) since 1985, with a

growth average of 7% per annum. This has had a positive impact on the productive sectors of the country, such as fruit, forestry and livestock.

Chilean government policies and free trade agreements signed by Chile enhance agricultural exports, where Chile has comparative advantages over other producing nations. Apart from economic factors such as GDP, labour force, exchange rates, etc., Chile has the appropriate environmental and physical factors to develop a new livestock industry such as deer. These factors are characterised by suitable land and climate (temperatures and rainfall) for deer farming. In addition to this, livestock production in the south of Chile is based on pastoral systems similar to those in New Zealand. However, these systems in Chile do not have the same productive results as those in New Zealand. In addition to the economic growth and suitable physical environment in Chile, the fact that Chile possesses high phyto-sanitary status could encourage deer products exports to some of the strictest markets in the world (e.g. European countries).

In Chile deer products are commonly sold in 'elite' restaurants, where prices are high, and inaccessible for a vast number of consumers. Low production volume (quantity) and lack of culinary culture relating to deer products in Chile may be reasons for the low level of demand in the domestic market. The scarcity of deer products does not allow consumers to have easy access to them. In addition to this, the lack of marketing, promotion and advertising for deer products in the domestic market may also contribute to the low level of demand. A continuous growth of the per capita GDP and increasing meat consumption in Chile may lead to higher level of consumption of deer meat products and the further development of the domestic market for deer products. In the way that deer production levels rise, more products will be available in the domestic market, lowering the prices and making deer products more accessible to the general consumer. On the other hand, once production volume reaches an export level, the amount of deer products available in the domestic market may be reduced. This may be, because some deer farmers may prefer (higher returns and a more attractive market) to export their products rather than to supply the domestic market.

The region where deer are currently farmed in Chile (X Region) has a history of economic growth, with 65% growth in its regional Agricultural Gross Domestic Product (AGDP) from 1985 to 1995. In addition to this, the regional exports expanded by 6.3% in 1998, showing an increase in regional production for exports from 1997.

Even though the regional exports do not register red meat products exports, there is an opportunity for deer farmers to develop the activity in the region and export deer products. As a new economic activity, deer farming could increase the productive and export base of the X Region in Chile. The study demonstrates that deer farming in the region could increase regional investment and could further increase not only the regional AGDP, but also the National Agricultural Gross Domestic Product. In terms of labour force, it is interesting to notice that the X Region in Chile has one of the highest level agricultural participation in the total labour force. This shows that the region has an agricultural specialisation compared to other regions in Chile. The agricultural specialisation of the labour force and the physical environments of the region enhance pastoral production systems, and could enhance a system such as deer farming.

The potential development of the Chilean deer industry is based on physical factors such as the availability of land suitable for deer farming. It also concerns potential markets, such as South/Central America or the MERCOSUR, where deer products may be introduced and marketed, helped by the participation of Chile in this free trade bloc. Another important factor that may determine the further development of this activity in Chile is the interest of livestock farmers looking for new production alternatives due to low returns from traditional livestock activities.

It is important to take into account that deer farming is a new production activity in Chile, and that there are still some requirements that need to be fulfilled. Such is the case of specialised transport for deer, which includes regulations regarding animal health and animal safety. Furthermore, infrastructure such as slaughterhouses is needed if Chilean deer farmers are considering exporting deer products. The slaughterhouse requirements involve cleanliness, safety and packaging factors, which will determine the final quality of deer products produced in Chile. These facilities could be built by a co-operative among Chilean deer farmers, if production volumes increase, and it becomes necessary for them to comply with domestic and international regulations regarding deer slaughter. On the other hand, if the activity shows interesting prospects in Chile, investors or those who operate current slaughterhouses for sheep and beef may establish a deer slaughterhouse, charging for the service they provide to farmers.

One way to maintain the domestic and international competitiveness of Chile is to promote the diversification of markets and products. This diversification process

includes creation of new activities in the country and the creation of new markets for new products. Currently, deer farmers in Chile are in the early stages in the process of diversifying the productive base of Chile. This process involves the creation and further development of a new industry, which in the future may be able to export a variety of products to a variety of countries.

When comparing costs and income from the Chilean farms, as seen in Table 7.7 (Chapter 7), Farm A shows a higher farm surplus than Farm B, due to a very low farm expenditure in the formers' costs/income structure. This low expenditure level may be due to the omission of some costs in the cost structure. Farm B presents a more complete costs and income structure, which includes all the costs such as in the New Zealand model farm. Expenditures for the deer operation in Farm B represent 10% of the total farm expenditures. Even though the farmer calculated this percentage, farm accounts do not indicate the relative level of participation of the different enterprises of the farm in the total farm expenditure. When discussing income, the deer operation in Farm B has a 15% participation in the total farm income. Comparing these percentages, Farm B in Chile has been able to manage its deer operation in a profitable way, however, not as profitably as either Farm A in Chile or the model Farm in New Zealand, on a total farm basis.

Even though Chilean farms are profitable, their cost structures are not well organised. For instance, neither of the Chilean deer farms considered deer purchase as part of the cost structure. This may be due to the fact that these farms are producing their own replacements to maintain and/or increase livestock numbers. If this is the case, then the process of building a herd capable of producing enough deer products to reach export level would be very slow. Another example of cost structure is the case of Farm A, which did not include some costs such as electricity, freight, seeds, weed and pest control and vehicles. This may be due to the fact that all these costs are being subsided by other activities (e.g. sheep, dairy and/or beef cattle) on the farm, or due to the non-existence of these costs on the farm. The latter seems to be a less probable option, as these costs are required to run a deer farm. On the other hand, as deer is not a common farm enterprise in Chile, it needs other farm activities such as sheep, dairy and beef cattle to support it. Once deer farming is able to be productive and profitable by itself, then other farming enterprises will be needed for strategic purposes (e.g. pasture control) only.

Chilean deer farms analysed in this study are considered to be profitable. However, compared to the New Zealand model deer farm, the profit generated is low. Deer farms in Chile (Farm A and B) have a higher per stock unit gross margin (US$52 and US$27 respectively) than the New Zealand model deer farm (US$21). Chilean deer farms have about one fifth (1/5) of the stock units per farm compared to the New Zealand model deer farm (2007 S.U and 14.9 S.U/ha). This means that Chilean deer farms have a less intensive system than the New Zealand model farm. The current task for Chilean deer farmers is to increase the number of stock units per hectare (2.0 S.U/ha in Farm A and 4.7 S.U/ha in Farm B), to be able to farm deer in a more intensive system. This would help to develop not only the deer farming activity but also the marketing of its products, as the deer products supply could rise. The increase in supply may also develop other side-activities related to deer farming, such as packaging, transport, etc. The difference between the gross margin analysis results from the Chilean deer farms and the New Zealand model deer farm may be due to better management practices in New Zealand. In addition to this, the experience and know-how of deer farming in New Zealand may play an important role in the industry's profitability and success. Low results from the Chilean deer farms' gross margin analysis compared that of the to New Zealand model deer farm may also be related to the lack of a well-structured and established industry in Chile. A well-established industry, such as the New Zealand deer industry, includes proper deer facilities for slaughter, marketing and promotion and regulations regarding deer products. The marketing and distribution systems in New Zealand are well organised and have been responsible for this country's becoming the world leader in the deer industry. However, this process took a long time, and experience is regarded to be one of the most important assets in the industry. In the case of the Chilean deer industry, supply or production volumes have not reached a level, which can meet both the domestic and international demand for deer products. In addition to this, marketing and distribution channels for deer products in Chile, especially those concerning export regulations and market requirements need to be developed. Prior to development of the infrastructure and marketing strategies for the deer industry in Chile, there must be a growth in the supply or production level. All services and infrastructure related to deer farming in Chile may have to be developed as a result of an increase in farmed animals (critical mass) and production volumes.

As shown in Table 7.9 (Chapter 7), results of the gross margin analysis of the Chilean farms show that Farm A is more profitable than Farm B on both a total farm basis and a per stock unit basis. However, Farm B shows a higher margin on a per hectare basis. This difference in results may be due to the fact that Farm B has about half the area of Farm A (92 vs 200 hectares respectively). When comparing the New Zealand model farm and the Chilean farms, it is interesting to notice that the New Zealand model farm has higher total and per hectare gross margin results than both the Chilean farms. As mentioned before, the New Zealand model farm has a lower per stock unit result compared to the Chilean deer farms. This is due to the significant difference in the number of stock units in both deer operations in Chile, compared to that in New Zealand.

Deer as a farmed animal presents a variety of different products, which have different markets and demands. Such is the case of the New Zealand deer industry where products such as venison, velvet and co-products are sold to a variety of countries. Apart from these 'traditional' deer products, New Zealand deer farmers sell live deer for hunting operations, new deer farms and for conservation purposes (e.g. Zoos). There are also other activities from which the farmer is able to produce profit, such as the case of vertical integration from the farm to Hotel, Restaurants and Institutions (HRI). Another activity is to provide consultancy services among newer or inexperienced deer farmers. Chilean deer farmers should be aware of all these different alternatives that deer farming provides to generate profit, in order to develop this industry in Chile.

Information regarding regulations, infrastructure, and the know-how of deer farming is currently needed in Chile, in order to develop the deer industry in the country. By making this information available, deer farmers may be able to establish a well-organised industry, capable of producing high quality products for both the domestic and international markets.

In order to increase deer production in Chile, deer farmers, deer hunting operations and government institutions should consider working together to study the quality and quantity requirements of deer markets, and organise production to meet those needs. A key element for the future success of the Chilean deer industry is the unification of deer farms and deer hunting operations. This could help to produce a standard quality product in Chile, as the lack of uniform quality is considered to be a constraint to the further development of the activity. Apart from all the structural and

regulatory restrictions for deer farming in Chile, Chilean deer farmers may be considered lucky to have a model industry such as the New Zealand industry, which they may follow and emulate its good aspects. Further more, Chilean deer farmers may learn about New Zealand deer industry successes and mistakes with regards to production and marketing of deer products in global and competitive markets.

In terms of Porter's Five Forces Analysis of the Chilean Deer Industry, new entrants to the domestic industry are not considered as a threat, in fact they would help and further develop the industry in Chile. The analysis also shows that farmers need to work together in order to be part of a successful industry. Regarding buyers of deer products, the analysis shows that in Chile there is a lack of culinary culture regarding deer products. However, some people are prepared to purchase these in hotels, restaurants and institutions (HRI). It is important to realise that, as in Chile there is a lack of tradition regarding deer products, consumer education related to these products is very important and necessary. In terms of rivalry within industry participants, the current volume of deer products is very low, so there is only weak rivalry among deer farms in Chile. However, rivalry is high between deer farms and hunting operations, regarding sanitary aspects and quality of products.

The SWOT analysis for the Chilean Deer Industry shows that the strengths of the industry rely on physical or geographical aspects in Chile and the advantages of deer characteristics. It shows also that a high per hectare and per stock unit gross margins represents strength of the Chilean Deer Industry. However, these gross margins may be high due to the lower number of animals and hectares compared to New Zealand. The most important weaknesses of the Chilean Deer Industry are related to the size of the Chilean farms, production levels, legislation and farmers' attitude regarding individualism. In relation to opportunities of the Chilean Deer Industry, the most important ones are related to land availability for deer farming in Chile, the increasing meat consumption trend in Chile, and the increasing foreign investment in Chile. The main threat to the Chilean Deer Industry is the variability of venison quality in the Chilean domestic market.

Further research should be done in relation to management and farming practices on Chilean deer farms. Even though deer farms in Chile are profitable, this profit is low, and by improving the farm management practices the profit from these deer operations may be increased. This and government support for new activities such as deer farming will determine the potential success of the industry in Chile.

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10. APPENDICES

APPENDIX 1: SOVEREIGN RATING LIST, BY STANDARD & POORS, (20/10/1999).

	Local Currency			Foreign Currency		
Sovereign	Long-term rating	Outlook	Short-term rating	Long-term rating	Outlook	Short-term rating
Argentina	BBB-	Negative	A-3	BB	Negative	B
Australia	AAA	Stable	A-1+	AA+	Stable	A-1+
Austria	AAA	Stable	A-1+	AAA	Stable	A-1+
Belgium	AA+	Stable	A-1+	AA+	Stable	A-1+
Bermuda	AA	Stable	A-1+	AA	Stable	A-1+
Bolivia	BB+	Stable	B	BB-	Stable	B
Brazil	BB-	Negative	B	B+	Negative	B
Bulgaria	B	Positive	B	B	Positive	B
Canada	AAA	Stable	A-1+	AA+	Stable	A-1+
Chile	AA	Stable	A-1+	A-	Stable	A-1
China				BBB	Stable	A-3
Colombia	BBB+	Stable	A-2	BB+	Stable	B
Cook Islands	B-	Stable	C	B-	Stable	C
Costa Rica	BB+	Stable	B	BB	Stable	B
Croatia	BBB+	Negative	A-2	BBB-	Negative	A-3
Cyprus	AA	Stable	A-1+	A+	Stable	A-1
Czech Republic	AA-	Stable	A-1+	A-	Stable	A-2
Denmark	AAA	Stable	A-1+	AA+	Positive	A-1+
Dominican Republic	SD		SD	B+	Stable	C
Egypt	A-	Stable	A-1	BBB-	Stable	A-3
El Salvador	BBB+	Stable	A-2	BB+	Stable	B
Estonia	A-	Stable	A-2	BBB+	Stable	A-2
Finland	AA+	Stable	A-1+	AA+	Stable	A-1+
France	AAA	Stable	A-1+	AAA	Stable	A-1+
Germany	AAA	Stable	A-1+	AAA	Stable	A-1+
Hellenic Republic	A-	Positive	A-1	BBB	Positive	A-3
Hong Kong	A+	Negative	A-1	A	Negative	A-1
Hungary	A	Stable	A-1	BBB	Positive	A-3
Iceland	AA+	Stable	A-1+	A+	Positive	A-1+
India	BBB	Stable	A-3	BB	Stable	B
Indonesia	B-	Watch Neg	C	CCC+	Watch Neg	C
Ireland	AA+	Stable	A-1+	AA+	Stable	A-1+
Israel	AA-	Stable	A-1+	A-	Stable	A-1
Italy	AA	Stable	A-1+	AA	Stable	A-1+
Japan	AAA	Stable	A-1+	AAA	Stable	A-1+
Jordan	BBB-	Stable	A-3	BB-	Stable	B
Kazakhstan	BB-	Negative	B	B+	Negative	B
Korea	A-	Positive	A-2	BBB-	Positive	A-3
Kuwait	A+	Stable	A-1+	A	Stable	A-1
Latvia	A-	Stable	A-2	BBB	Stable	A-3
Lebanon	BB	Negative	B	BB-	Negative	B
Liechtenstein	AAA	Stable	A-1+	AAA	Stable	A-1+
Lithuania	BBB+	Stable	A-2	BBB-	Stable	A-3
Luxembourg	AAA	Stable	A-1+	AAA	Stable	A-1+
Malaysia	A-	Stable	A-2	BBB-	Stable	A-3
Malta	AA-	Negative	A-1+	A	Negative	A-1

cont.	Local Currency			Foreign Currency		
Sovereign	Long-term rating	Outlook	Short-term rating	Long-term rating	Outlook	Short-term rating
Mexico	BBB+	Stable	A-2	BB	Positive	B
Morocco	BBB	Stable	A-3	BB	Stable	B
Netherlands	AAA	Stable	A-1+	AAA	Stable	A-1+
New Zealand	AAA	Stable	A-1+	AA+	Negative	A-1+
Norway	AAA	Stable	A-1+	AAA	Stable	A-1+
Oman	BBB	Negative	A-3	BBB-	Negative	A-3
Pakistan	B	Stable	B	SD		SD
Panama	BB+	Stable		BB+	Stable	B
Papua New Guinea	BB	Negative	B	B+	Negative	B
Paraguay	BB-	Negative	B	B	Negative	C
Peru	BBB-	Stable	A-3	BB	Stable	B
Philippines	BBB+	Stable	A-2	BB+	Stable	B
Poland	A	Positive	A-1	BBB	Positive	A-3
Portugal	AA	Stable	A-1+	AA	Stable	A-1+
Qatar	BBB+	Stable	A-2	BBB	Stable	A-3
Romania	B	Negative	C	B-	Negative	C
Russia	CCC	Stable	C	SD		SD
Singapore	AAA	Stable	A-1+	AAA	Stable	A-1+
Slovak Republic	BBB+	Negative	A-2	BB+	Negative	B
Slovenia	AA	Stable	A-1+	A	Stable	A-1
South Africa	BBB+	Stable	A-2	BB+	Stable	B
Spain	AA+	Stable	A-1+	AA+	Stable	A-1+
Sweden	AAA	Stable	A-1+	AA+	Stable	A-1+
Switzerland	AAA	Stable	A-1+	AAA	Stable	A-1+
Taiwan	AA+	Stable	A-1+	AA+	Stable	A-1+
Thailand	A-	Stable	A-2	BBB-	Stable	A-3
Trinidad & Tobago	BBB+	Stable	A-2	BBB-	Stable	A-3
Tunisia	A	Stable	A-1	BBB-	Stable	A-3
Turkey				B	Stable	B
United Kingdom	AAA	Stable	A-1+	AAA	Stable	A-1+
United States	AAA	Stable	A-1+	AAA	Stable	A-1+
Uruguay	BBB+	Stable	A-2	BBB-	Stable	A-3
Venezuela				B+	Negative	B

Source: http://www.standardandpoors.com/ratings/sovereigns/ratingslist.htm

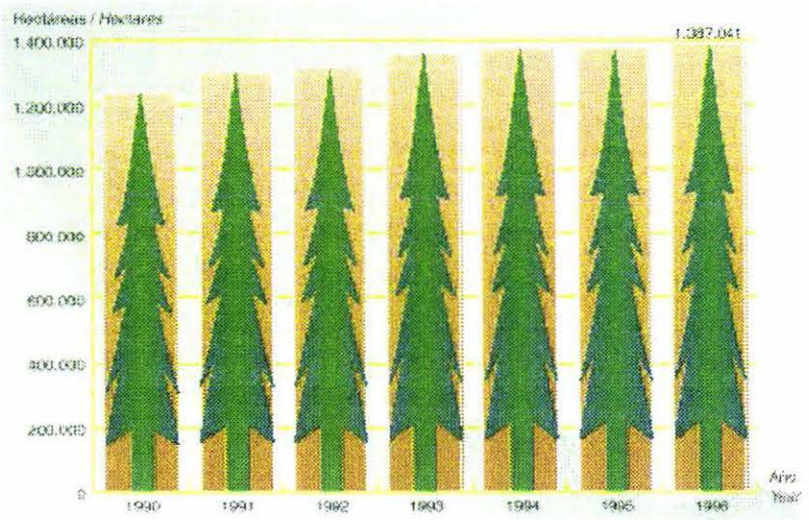
APPENDIX 2: CHILEAN TRADE PARTNERS, 1996 AND 1997. (US$ MILLION).

	1996			1997		
Country	Exports	Imports	Balance	Exports	Imports	Balance
USA	$ 2,559.50	$ 4,109.50	-$ 1,550.00	$ 2,710.50	$ 4,332.60	-$ 1,622.10
Japan	$ 2,495.70	$ 949.70	$ 1,546.00	$ 2,675.80	$ 1,054.70	$ 1,621.10
Argentina	$ 700.90	$ 1,634.20	-$ 933.30	$ 780.90	$ 1,837.20	-$ 1,056.30
Brazil	$ 934.50	$ 1,605.70	-$ 671.20	$ 957.20	$ 1,242.80	-$ 285.60
Germany	$ 742.30	$ 729.90	$ 12.40	$ 747.00	$ 842.70	-$ 95.70
South Korea	$ 864.10	$ 556.80	$ 307.30	$ 989.70	$ 588.80	$ 400.90
Mexico	$ 146.60	$ 927.20	-$ 780.60	$ 376.30	$ 1,076.20	-$ 699.90
UK	$ 886.50	$ 281.70	$ 604.80	$ 1,061.60	$ 320.20	$ 741.40
Italy	$ 475.30	$ 550.80	-$ 75.50	$ 499.50	$ 699.70	-$ 200.20
China	$ 354.10	$ 515.00	-$ 160.90	$ 432.10	$ 659.10	-$ 227.00
Taiwan	$ 629.10	$ 220.90	$ 408.20	$ 785.60	$ 225.10	$ 560.50
Spain	$ 281.80	$ 530.30	-$ 248.50	$ 345.20	$ 621.10	-$ 275.90
France	$ 392.80	$ 581.90	-$ 189.10	$ 458.00	$ 502.10	-$ 44.10
Canada	$ 139.50	$ 408.10	-$ 268.60	$ 131.00	$ 432.50	-$ 301.50
Holland	$ 393.60	$ 123.90	$ 269.70	$ 423.20	$ 108.60	$ 314.60
Peru	$ 321.30	$ 117.90	$ 203.40	$ 347.80	$ 118.50	$ 229.30
Sweden	$ 73.60	$ 271.30	-$ 197.70	$ 104.50	$ 352.00	-$ 247.50
Venezuela	$ 141.20	$ 313.20	-$ 172.00	$ 158.30	$ 273.40	-$ 115.10
Colombia	$ 194.80	$ 222.40	-$ 27.60	$ 227.90	$ 201.20	$ 26.70
Equator	$ 144.20	$ 224.90	-$ 80.70	$ 156.30	$ 258.60	-$ 102.30
Belgium	$ 247.60	$ 135.80	$ 111.80	$ 272.40	$ 132.30	$ 140.10
Bolivia	$ 207.90	$ 35.90	$ 172.00	$ 228.50	$ 62.50	$ 166.00
Indonesia	$ 145.00	$ 97.10	$ 47.90	$ 155.50	$ 109.00	$ 46.50
Finland	$ 85.10	$ 103.70	-$ 18.60	$ 108.70	$ 140.40	-$ 31.70
Hong Kong	$ 113.10	$ 120.80	-$ 7.70	$ 166.00	$ 62.20	$ 103.80
Malaysia	$ 69.00	$ 80.80	-$ 11.80	$ 108.40	$ 95.70	$ 12.70
Australia	$ 74.80	$ 153.30	-$ 78.50	$ 52.90	$ 138.90	-$ 86.00
Switzerland	$ 68.30	$ 120.60	-$ 52.30	$ 69.90	$ 114.30	-$ 44.40
Thailand	$ 117.90	$ 50.30	$ 67.60	$ 133.50	$ 44.70	$ 88.80
Singapore	$ 86.20	$ 44.10	$ 42.10	$ 115.20	$ 48.40	$ 66.80

Source: Prochile.

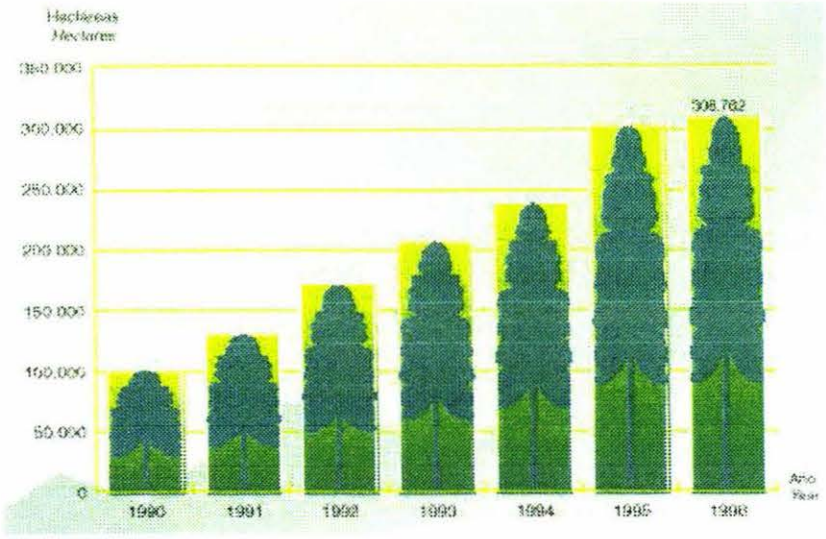
APPENDIX 3: PINE AND EUCALYPTUS PLANTATIONS IN CHILE. 1990 – 1996.

Figure 3.1: Radiata Pine Plantations in Chile, 1990 – 1996. (in hectares).



Source: ODEPA: Chilean Agriculture Overview 1997, Chile

Figure 3.2: Eucalyptus Plantations in Chile, 1990 – 1996. (in hectares).



Source: ODEPA: Chilean Agriculture Overview 1997, Chile

APPENDIX 4: MODERN DEER FAMILY CERVIDAE.

1. Subfamily Moschinae: Musk deer

- *Moschus moschiferus*: Siberian musk deer (Russia, Korea, northern China) 3 subspecies.
- *Mochus berezovkii*: Dwarf musk deer (southern China and Vietnam)
- *Mochus chrysogaster*: Himalayan or alpine musk deer (west and southern China, Burma, Kashmir, India and Nepal) 5 subspecies.

2. Subfamily Hydropotinae: Water deer

- *Hydrpotes inermis*: Chinese water deer (China, Korea; introduced UK and elsewhere) 2 subspecies.

3. Subfamily Muntiacinae: Muntjacs and tufted deer

- *Muntiacus muntjac*: Indian muntjac (India, Sri Lanka, Tibet, southwest China, Burma, Thailand, Vietnam, Malaysia and Indonesia) 15 subspecies.
- *Muntiacus reevesi*: Reeves's or Chinese Muntjac (east China, Formosa; introduced UK)2 subspecies.
- *Muntiacus crinifrons*: Hairy-fronted muntjac or black muntjac (eastern China)
- *Muntiacus rooseveltorum*: Roosevelt's muntjac (north Vietnam)
- *Elaphodus cephalophus*: Tufted deer (Burma, southern and central China) 3 subspecies.

4. Subfamily Cervinae: Eurasian deer

- *Cervus elaphus*: Red deer (Europe, north to Scandinavia; North Africa (Barbary deer), Asia Minor, Tibet (shou), Kashmir (kashmir deer or hangul), Tukestan (Yarkand deer) and Afghanistan (Bactrian or Bokharan deer); introduced Australia, New Zealand) 12 subspecies.
- *Cervus nippon*: Sika deer (Japan, Formosa, Vietnam, Manchuria, Korea, China, introduced UK and New Zealand) 13 subspecies.
- *Cervus canadensis*: Wapiti (western North America, eastern China, Manchuria, Mongolia; introduced to New Zealand) 13 subspecies.
- *Cervus unicolor*: Sambar (Phillippines, Indonesia, south China, Burma, India, Sri Lanka; introduced Australia and New Zealand) 13 subspecies.
- *Cervus timorensis*: Rusa or Java deer (Indonesia; introduced Australia, New Zealand, Fiji, New Guinea) 6 subspecies.
- *Cervus duvauceli*: Swamp deer or barasingha (central and northern India, Nepal) 2 subspecies.
- *Cervus eldi*: Eld's deer, thamir, or blow-antlered deer (Manipur, Thailand, Vietnam, Burma, Tanasserim) 3 subspecies.
- *Cervus albirostris*: Thorold's deer (Tiber and China)
- *Elaphurus davidiensis*: Pere David's deer (not known in the wild state; formerly throughout China, Korea, Japan, now being reintroduced into China
- *Dama dama*: fallow deer (widespread Europe and Asia; introduced Australia, New Zealand, North Africa and South America) 2 subspecies.
- *Axis axis*: Chital or spotted deer (India, Sri Lanka; introduced New Zealand) 2 subspecies.
- *Axis porcinus*: Hog deer (India, Sri Lanka, Burma, Thailand, Vietnam; introduced Australia) 2 subspecies.
- *Axis kuhli*: kuhl's or Bawean deer (Bawean Island)
- *Axis calamianensis*: Calamian deer (Calamian Island)

5. Subfamily Odoncoilinae

- *Capreolus capreolus*: Roe deer (Europe and Asia, north to Scandinavia, Siberia, east China and Korea) 3 subspecies.
- *Odocoileus virginianus*: White-tail deer (north-central US, northern parts of South America; introduced Scandinavia, New Zealand) 38 subspecies.
- *Odocoileus hemionus*: Mule deer (western North America, Central America) 11 subspecies.
- *Mazama americana* : Red brocket (Central and South America) 14 subspecies.
- *Mazama gouzoubira*: Brown brocket (Central and South America) 10 subspecies.
- *Mazama rufina*: Little red brocket (Venezuela, Ecuador, southeast Brazil) 2 subspecies.
- *Mazam chunyi*: Dwarf brocket (Bolivia and Peru)
- *Pudu puda*: Southern pudu (Chile and Argentina)
- *Pudu mephistopheles*: Northerns pudu (Ecuador, Peru, Colombia) 2 subspecies.
- *Blastocerus dichotomus*: Marsh deer (Brazil to Argentina)
- *Ozotocerus bezoarticus*: Pampas deer (Brazil, Argentina, Paraguay, Bolivia) 3 subspecies.
- *Hippocamelus bisculus*: Chilean huemul (Chile, Argentina)
- *Hippocamelus antisensis*: Peruvian huemul (Peru, Ecuador, Bolivia, northern Argentina)
- *Alces alces*: Moose (northern Europe, Canada, northeastern US) 6 subspecies.
- *Rangifer tarandus*: reindeer or caribou (Scandinavia, European Russia, Greenland, Canada, Alaska; introduced arctic and Antarctic islands) 9 subspecies.

APPENDIX 5: DEER DISEASES.

1. ACTINOBACILLOSIS

This disease is caused by the bacterium *Actinobacillus lignieresi*, and it occasionally affects the mouth. Normally, the animal starts losing weight slowly and develops a hard yellowish swelling in the mouth. The major importance of this disease is that lesions may develop in lymph nodes and resemble tuberculosis.

2. BLACKLEG

Blackleg is more common in stags than in hinds or young deer. The organism that causes blackleg is the *Clostridium chauvoei*, which is often present in normal muscle. The onset of the clinical blackleg is caused by bruising or injury. Stags are more susceptible to blackleg during the rut. Carcasses of deer dying of blackleg distend with gas extremely quickly and the skin, particularly along the lower abdomen, develops a blue tinge.

3. COPPER DEFICIENCY – MOLYBDENUM EXCESS COMPLEX

Copper deficiency in deer may be associated with low copper intakes, however, often the deficiency is due to high levels of molybdenum, sulphur, iron, zinc or manganese in pasture. This excess helps in the reduction of copper absorption from the digestive tract. Copper deficiency can be detected and confirmed by post-mortem inspection of the spinal cord of animals with enzootic ataxia, but is more commonly detected by analysis of copper levels in blood or liver samples. Minimum values of 8 μmol of copper per litre of blood or liver levels of more than 100 μmol per kg have been established. A good practice in order to prevent copper deficiency is take pasture samples to check for copper, molybdenum, sulphur and iron levels. These samples will establish whether the deficiency is due to low copper *per se* or to the presence of competing elements.

4. DYSTOCIA (DIFFICULT CALVING)

Dystocia in deer is not very common. Over-fatness of the dam, use of large terminal sires (e.g. wapiti over red hind), abnormal position of the fawn, or disturbance during the fawning process, are all predisposing factors. Interestingly, dystocia appears more common on flat areas than on hill country.

5. FACIAL ECZEMA

Facial eczema is a result from liver damage caused by sporidesmin, a toxin produced by the pasture fungus *Pythomyces chartarum*. Fallow deer appear to be more susceptible than red deer. Moreover, red deer and wapiti appear to be less susceptible than sheep. Due to deer skin and coat colour, they rarely show skin lesions typical of facial eczema, however, the head and mouth are the most common parts to be affected. Those deer with facial eczema lose condition extremely quickly as a result of loss of appetite. Facial eczema may be fatal.

6. FOOT ABSCESS

Occasionally, deer develop an infection of the first joint in the hoof, which progresses to an infection in both the joint and bone. Initially the tissue above the infected claw will be swollen and hot and eventually the abscess will break out at the coronet, immediately above the horn of the hoof. A foot abscess may begin by a scald or penetrating lesion around the hoof, allowing the invasion of bacteria. Cases usually occur individually but occasionally outbreaks have been seen particularly associated with severe fence pacing in wet and muddy conditions.

7. FOOT ROT

Deer may develop a severe infection between the claws of the hoof and this infection may under-run the horn, resulting eventually in the loss of the hoof. Foot rot is also

known as 'slipper foot'. The infection usually enters through abrasions and is more common in wet conditions. The first sign of foot rot is swelling between the horns of the hooves, usually with broken tissue between the claws.

8. GRAIN OVERLOAD

Excessive intake of grain can result in stomach acidosis, which, if severe, is rapidly fatal. The risk of grain overload is considerably reduced by introducing grain in small quantities. It is advisable not to supplement grain to more than 50% or 60% of total food requirements.

9. GUT PARASITES

Stomach and intestinal parasites are common in deer but frequently cause clinical or subclinical problems. High density stocking and sub-optimal feeding and management may help heavy gut worms burdens. Deer have some stomach and intestinal worms in common with sheep and cattle, but they may also be affected by a number of deer specific worms. Young animals from fawning to 12 months are more susceptible to gut parasites.

10. JOHNE'S DISEASE

This disease is caused by *Mycobacterium paratuberculosis*, and is becoming more common in deer herds. It is believed that it is the sheep strain of Johne's disease that affects deer. Generally only deer older than 18 months are infected and appear to be wasting away. The detection of Johne's disease is difficult to confirm clinically, but blood and fecal tests are indicative. The best confirmation of Johne's disease is by post-mortem inspection.

11. LEPTOSPIROSIS

Adult deer are susceptible, but most outbreaks are in deer three to nine months of age. *Hardjo*, *pomona* and *copenhageni* all infect deer, but *pomona* is the most serious pathogen. The disease has characteristic pathological signs, but confirmation requires bacterial isolation, particularly of the kidneys. All serovars of leptospire affected deer can also infect humans.

12. LICE

Heavy lice infestations are not common on deer. The infection may be by biting lice (*Damalinia longicornus*) or of the deer-specific sucking lice (*Linognathus burmeister*). Lice are small and need careful observation. Biting lice are usually white in colour while sucking lice are a dark brown-black colour.

13. LUNGWORM

The lungworm of deer is *Dictyocaulus viviparus*, the same lungworm that infects cattle. Lungworm burdens usually develop in deer during the first three months of life and by fawning in early March, many deer may have considerable burdens. If lungworms are left untreated, burdens may end with fatal consequences. Huge numbers of mature and/or immature lungworms can block the major air passages of the lungs and animals may die of asphyxiation. It takes about 21 days for larvae ingested with pasture to mature to produce eggs in the lungs. Thus the appropriated choice of drenching frequencies can break the lungworm life cycle.

14. MALIGNANT CATARRHAL FEVER (MCF)

MCF is the most common disease of farmed deer. It usually affects deer of 12 months or older with higher incidence during winter and early spring. Stress factors such as climate and under-nutrition help precipitate the disease. The cause of MCF has not yet

been confirmed but is believed to be a herpes virus carried by sheep, which are unaffected by the virus. Deer are considered to be the end host which die rather than pass the condition to other deer. The usual course of MCF in deer is rapid death associated with severe bloody diarrhoea.

15. PARAPOXVIRUS

Parapoxvirus is spread from animal to animal by objects in the environment, particularly thistles and thorny plants. This is the reason why antlers appear particularly prone to the infection. Similarly, parapox can affect the mouth regions. Deer velvet antlers with paraoxvirus lesions should be destroyed and not sold as the disease can be transferred to humans, producing skin lesions.

16. PINK EYE

The cause of pink eye in deer has not yet been identified but is presumed to be bacterial. The outbreak usually occurs following transport or dry dusty conditions, at any time of the year. The organism may be spread via the environment in dust particles. Eye lesions may progress to perforated ulcers resulting in permanent blindness.

17. ENTEROTOXAEMIA (PULPY KIDNEY)

Pulpy kidney usually occurs in individual cases, but may occur as an outbreak. It has similar clinical signs to Yersenosis or Salmonellosis and it is therefore important to have the condition accurately identified. Usually well-grown weaners are more susceptible, especially when feed quality and quantity are abundant.

18. SALMONELLOSIS

Salmonellosis occurs occasionally in deer, particularly during winter in young age groups. Clinical signs are similar to Yersenosis and the condition may occur either as individual cases or as an outbreak.

19. TUBERCULOSIS

Tuberculosis is an infection caused by the organism *Mycobacterium bovis*. Deer are susceptible and can develop a range of clinical signs. These depend on localisation, which may be in any organ or tissue of the body, but primarily involve lymph nodes, internally above the jaw. Other common sites are the respiratory and gastrointestinal lymph nodes. Tuberculosis is a fatal disease, and it spreads rapidly within deer herds.

20. YERSENOSIS

Yersenosis is a gastrointestinal infection with the organism *Yersenia pseudotuberculosis*. It generally affects animals 3 to 12 month of age. Individual cases occur but often result in an outbreak. The organism is picked up from the environment and may be carried by a range of wildlife species including birds and hares. Almost all deer will become infected during the first year of life and, if they do not become clinically affected, develop a resistance to infection and disease as older animals.

APPENDIX 6: GRADING OF RED DEER AND WAPITI VELVET IN NEW ZELAND AND CANADA.

Table 6.1: GRADING OF RED DEER VELVET IN NEW ZEALAND.

Grade	Grade Designation	Weight Range	Length	No. Tynes	Remarks
Super A	SA1	1.8 kg and over		1	As for A grade except the heavier weight range.
	SA2	1.8 kg and over		2	
A Grade	A1 Heavy	1.3 kg and over	>40 cm	1	Velvet must be of good conformation. The bottom tynes are not to be too large and trhe stick must have trez tyne. Early cut type velvet.
	A1 Medium	1.0 kg and over	<40 cm	1	
	A1 Short	0.7 kg and over	<30 cm	1	
	A2 Heavy	1.3 kg and over	>40 cm	2	
	A2 Medium	1.0 kg and over	<40 cm	2	
	A2 Short	0.7 kg and over	<30 cm	2	
B Grade	B1 Heavy	1.3 kg and over	<40 cm	1	Velvet of poorer conformation that A grade type velvet. Must have a trez tyne. Not for OG type velvet
	B1 Medium	1.0 kg and over	<40 cm	1	
	B1 Short	0.7 kg and over	<30 cm	1	
	B2 Heavy	1.3 kg and over	>40 cm	2	
	B2 Medium	1.0 kg and over	<40 cm	2	
	B2 Short	0.7 kg and over	<30 cm	2	
C Grade	C1 Long			1	Inferior velvet from B grade. Not for OG type velvet.
	C1 Short		<30 cm	1	
	C2 Long			2	
	C2 Short		<30 cm	2	
	C Poor Long				
	C Poor short		<30 cm		
D Grade	D1				Slioght skin damage and/or broken brow tyne. All other damage.
	D2				
Overgrown	OG1				Slightly overgrown indentation in bulb. Overgrown royal tynes developed.
	OG2				
Hardhorn	HH				Royal pointed
Taiwan	TW1	0.5 kg and over	Max	1	Poor quality light, thin TW grade.
	TW2	0.5 kg and over	25 cm	2	
	TW3	Under 5 kg			
	TW poor	Under 5 kg			
Spiker	SP1		10.25 cm		Thick with good conformation. No trez tyne. Some calcification; no trez tyne.
	SP2				
	Rest RS or HH				
Second cut	RG1				Short/thick, little calcification. Some calcification.
	RG2				
	Rest RS or HH				
Rubbish	RS				

Source: Haigh, J.C. and Hudson, R.J., 1993: Farming Wapiti and Red Deer.

Table 6.2: GRADING OF WAPITI VELVET IN WESTERN IN CANADA.

Grade	Green weight (kg/pr)	Shape	Notes
Super A	6.8	Thick beam with bulb or slight dimple	Prime
A1	5-6.7	Thick beam with bulb or slight dimple	Prime
A2	3.6-4.9	Thick beam with bulb or slight dimple	Prime
A3	2.3-3.5	Thick beam with bulb or slight dimple	Prime
Taiwan	1.0-2.2	Beam with brow tine	Sike-like
Spiker 1	1	Long/thin	Good Quality
Spiker 2	1	Overmature	Slight calcification
B	Same as A	Dimple up to 2 in.	Past prime
D	Same as A	Short/thick	damaged

Source: Haigh, J.C. and Hudson, R.J., 1993: Farming Wapiti and Red Deer.

APPENDIX 7: MARKETS FOR NEW ZEALAND CHILLED AND FORZEN VENISON, 1997.

	Frozen Venison		Chilled Venison	
Country	Volume (kg)	Value (NZ$FOB)	Volume (kg)	Value (NZ$FOB)
Austria	101,843	$1,141,293	0	0
Australia	150	$3,490	5,030	$118,853
Belgium	338,784	$4,420,865	148,896	$2,918,516
Canada	20,197	$393,334	10,618	$238,342
Switzerland	672,026	$6,805,504	42,026	$1,000,978
Germany	5,855,679	$53,610,555	354,740	$7,862,146
Denmark	144,070	$2,197,157	601	$13,016
Finland	27,906	$409,209	5,716	$98,503
Fiji	101	$3,940	0	0
France	1,006,904	$8,766,215	167,862	$2,447,704
UK	221,181	$1,551,566	111,928	$1,453,694
Guadeloupe	101	$546	0	0
Hong Kong	64,022	$1,647,678	1,292	$21,024
Croatia	14,768	$95,149	0	0
Italy	400,086	$4,927,431	4,225	$77,609
Japan	85,404	$2,043,707	33,721	$913,412
Korea	18,366	$114,810	6,605	$52,171
Norfolk Island	24	$887	0	0
Netherlands	495,553	$5,432,281	68,458	$1,473,571
Norway	38,840	$699,780	0	0
French Polynesia	812	$21,388	1,934	$48,905
Reunion	12,495	$101,076	2,632	$35,558
Russia	15,117	$110,983	0	0
Sweden	718,952	$5,809,982	0	0
Singapore	116,894	$1,648,434	5051	$91,442
Thailand	412	$15,705	0	0
Taiwan	12462	35083	0	0
USA	317,043	$3,728,479	467,219	$11,252,797
Samoa	25	$1,022	0	0
Total	10,700,217	$105,737,549	1,438,554	$30,118,241

Source: New Zealand Game Industry Board.

APPENDIX 8: NEW ZEALAND VENISON PRICES (US$ DOLLAR). SEPTEMBER 2, 1999.

VENISON PRICES													(DOLLARS PER HEAD)
		NORTH ISLAND						SOUTH ISLAND					
Grade	Weight Range	DUNCAN (Young)		GAME MEATS Non-Contract		MAIR		DUNCAN (Young)		MAIR (Young)		PPCS (Young)	
		Stag	*Hind*	*Stag*	*Hind*	*Stag*	*Hind*	*Stag*	*Hind*	*Stag*	*Hind*	*Stag*	*Hind*
AP	30	104	101	102	99	108	105	117	114	120	117	145	142
AP	37	147	143	145	142	154	150	174	171	172	168	195	191
AP	40	159	155	158	154	167	163	189	185	187	183	211	207
AP	45	205	200	217	212	211	206	232	227	233	229	261	257
AP	50	271	266	266	261	265	260	281	276	285	280	291	286
AP	55	315	310	319	313	317	312	329	323	334	328	338	333
AP	60	344	338	348	342	347	341	359	353	365	359	370	364
AP	65	374	367	378	371	376	370	390	383	396	389	401	394
AP	70	403	396	400	393	396	389	421	414	427	420	432	425
AP	75	432	425	388	381	379	372	451	444	436	428	455	448
AP	80	462	454	370	362	385	357	482	474	457	449	486	478
AP	85	491	483	356	347	359	350	512	504	469	461	516	508
AP	90	520	511	377	368	380	371	543	534	497	488	516	507
AP	95	550	540	398	389	402	392	573	564	525	516	545	535
AT/AF1	50	242	237	214	214	205	200	235	230	235	231	149	144
AT/AF1	60	308	302	258	258	269	263	302	296	302	297	180	174
AT/AF1	80	406	398	262	262	277	269	287	279	385	378	242	234
AF2	70	245	238	264	264	273	266	290	283	309	304	183	176

Source: The New Zealand Farmer Magazine, September 2, 1999.

APPENDIX 9: VELVETING PROCESS.

1. TIME OF CUTTING

The stage at which velvet is cut is crucial. If it is too early, there is a loss of weight. If too late, there is a risk of downgrading. Either will reduce the income of a velvet operation. Wapiti stags are ready for cutting 55 – 65 days after casting and once the first stags have neared the cutting stage the mob should be checked every three days. In the case of red deer, stags are ready for cutting at 45 to 48 days after casting, and older stags up to 60 days. As the antler of mature stags approaches optimum cutting stage it increases in length by about 1 cm and in weight by about 50 grams each day. For instance, on an A grade antler at 1995/96 prices that means the value is rising by about $6.75 a day. Cutting at precisely the right time can, therefore, make a substantial difference to velvet returns. The time at which velvet from two year stags is cut depends at which market it is aimed. Velvet from two-year-old stags tends to calcify more quickly than those from mature stags, so it is better cut sooner rather than later. The cutting principles for fallow velvet are essentially the same as for red or wapiti velvet. If it is allowed to grow out much further it will have started to calcify and its value will drop markedly. The whole objective in any profitable velveting operation must be to get a high proportion of the harvest (at least 80%) in the A grades. In order to achieve this, the herd needs to consist of good quality mature velveting stags.

2. VELVET REMOVAL

In general terms, velvet can be removed only by a veterinarian or by a farmer supervised by a veterinarian under an approved programme such as the National Velveting Standards Body (NVSB) programme in New Zealand. Velvet removal must be undertaken in accordance with the:

- New Zealand Animal Welfare Advisory Committee Code of Recommendations and Minimum standards for the Welfare of Deer During the removal of Antlers (the AWAC Code).
- New Zealand Animal Protection Act 1960.
- New Zealand Animal Remedies (Develveting) Regulations 1994.

The overall effect of this system is to ensure that in any velveting operation, the welfare of the animal is of the utmost importance.

3. *VELVET HANDLING AND STORAGE*

Freshly cut velvet should always be handled with the cut end uppermost to prevent blood loss. Latest research suggests that rather than hanging the velvet, it should be placed with the cut end uppermost on an angle which is sufficient to prevent blood loss from the cut end (15 degrees is suggested to be the best angle). This does not only retain the blood in the velvet but it also leaves the blood evenly distributed throughout the stick. This simplifies the drying process and improves the quality of the final product. "Hanging" velvet, especially for long periods, is no longer a preferred practice. Velvet should be frozen as soon as possible after cutting, it should be initially stacked cut up, again to stop blood loss and be placed in clean plastic bags. Care should be taken to avoid squashing the top end of the stick as this will force blood out of the stick and deform the top. Once velvet is frozen it can be stacked in any way that suits, however it should remain frozen at all times and treated as any edible frozen product of high value. The recommended Velvet Handling Techniques by the NZGIB are shown in .

4. *VELVET CERTIFICATION*

The overall aim of this programme is to ensure that in any velveting operation, the *welfare of the animal* is of the greatest importance. The NVSB programme is endorsed by the Animal Welfare Advisory Committee (AWAC) on whose Code of

Practice it is based. The programme also meets the requirements of the Animal Remedies Board's Regulations regarding access to restricted drugs.

The Code of Practice says that the farmer should know:

- Legal requirements
- Veterinary supervision
- Principles of animals welfare
- Principles of stress and wellbeing
- Pain and recognition of pain
- Antler physiology and anatomy
- Principles of surgery
- Principles of hygiene
- Diseases conditions
- Handling emergencies
- Global implications of velveting

Figure 9.1: Techniques for Velvet Handling Recommended by the NZGIB.

1. Yard stags quietly and select those ready for velveting; release others so that stags spend minimum time in yards.
2. Restrain the stag, using crush or workroom, or approved drugs, and give local anaesthetic.
3. Wait the recommended period. Place a tourniquet in position just before removing antler.
4. Cut evenly and accurately, using a sharp clean saw.
5. Remove tourniquet and release stag into clear pasture.
6. Observe stag closely over the next few hours; seek advice if any unusual behaviour is observed.
7. After removal, do not hang the antler upside down but place it on a clear surface at an angle of 15°. Do not touch the cut base.
8. The antler should never come into contact with the ground or a dirty surface, and should be handled as little as possible.
9. Not more than four hours after removal, freeze the antler keeping it at the same angle of 15°.
10. Storage facilities must provide a clean and hygienic environment and prevent blood loss.
11. Freezing facilities must freeze velvet rapidly and maintain it in frozen state.
12. Transportation must be in clean packaging which keeps the velvet frozen during transport.
13. In addition, it is strongly recommended that farmers keep records which include the velvet grade and weight, as well as style and traits for individual animals. This helps improve product quality and animal performance through monitoring breeding and culling programmes.

Source: Game Industry Board Velveting Guidelines.

APPENDIX 10: NEW ZEALAND VELVET POOL PRICE COMPOSITION, 1995 – 1998.

Table 10.1: Comparison between Velvet Pool Seasons, 1995 - 1998.

	Class/Season	1994/95	1995/96	1996/97	1997/98
Average Weighted Pool Price		$124.13	$107.77	$77.71	$41.40
Average Grade Pool Price	A/B	$152.65	$128.75	$92.49	$55.89
	C/D	$134.68	$111.41	$76.27	$37.60
	SA	$188.01	$164.69	$118.18	$71.16
	A	$160.05	$134.87	$98.10	$59.51
	B	$149.87	$125.99	$88.23	$52.28
	C	$141.34	$118.89	$78.68	$40.89
	D	$128.01	$102.89	$70.38	$28.56
	E	$104.91	$81.25	$55.09	$19.54
	TAIWAN	$137.15	$120.95	$106.06	$57.77
	SPIKER	$103.94	$97.04	$76.83	$27.53
	DAMAGED	$111.83	$100.50	$62.29	$28.71
	MANUFACTURING	$67.41	$59.92	$45.10	$21.20
	REGROWTH	$81.88	$79.36	$57.17	$17.95

Source: New Zealand Game Industry Board, June 1998.

Table 10.2: Velvet Pool Composition, 1995 - 1998.

	Class/Season	1994/95	1995/96	1996/97	1997/98
Pool Compostion	SA & A	10.36%	12.24%	19.85%	25.61%
(Grade % of Total Pool Volume)	D & E	13.69%	11.69%	7.71%	5.45%
	EW	3.28%	4.78%	2.69%	0.95%
	SA	0.72%	0.88%	1.50%	2.46%
	A	9.64%	11.36%	18.35%	23.15%
	B	25.70%	25.19%	24.15%	23.19%
	C	11.45%	11.59%	15.37%	12.36%
	DAMAGED	11.42%	10.16%	6.28%	4.49%
	E	2.27%	1.53%	1.43%	0.95%
	TAIWAN	0.71%	0.34%	0.44%	0.63%
	SPIKER	6.16%	5.37%	4.60%	4.79%
	DAMAGED	5.05%	5.44%	4.52%	4.21%
	MANUFACTURING	5.27%	5.89%	4.89%	4.43%
	REGROWTH	13.21%	13.28%	12.13%	13.85%
TOTAL VOLUME (tonnes)		558	596	592	550

Source: New Zealand Game Industry Board, June 1998.

APPENDIX 11: DEER CO-PRODUCTS PACKAGING, LOW PRODUCTS NEW ZEALAND.

- *DEER TAIL*

Source: http://www.deer.co.nz/

- *DEER SINEWS*

Source: http://www.deer.co.nz/

- *DEER PIZZLES*

Source: http://www.deer.co.nz/

- ***DEER BLOOD***

Source: http://www.deer.co.nz/

APPENDIX 12: NEW ZEALAND DEER CO-PRODUCTS MARKETS, 1997 - 1998.

Table 12.1: New Zealand Deer Co-products Exports by Market, 1997.

	Tails Cat 03		Pizzles Cat 02		Other Offal Cat 05		Sinews Cat 2		Blood Cat 12		Other Blood Cat 31		Other Cat 35	
Country	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)
Australia							80	$3,132	87,750	$71,937			22	$7,250
Canada													32,362	$20,575
Fiji									15,000	$10,650				
Germany													16,014	$16,698
Hong Kong	25,933	$2,938,741	56,287	$1,360,390	2,011	$13,469	109,959	$2,409,849	1,100	$76,426			18	$4,000
Korea	9	$1,285							4,100	$250,586				
Papua New Guinea									26,000	$21,884				
Singapore			30	$653	54	$527								
Taiwan			440	$27,147			916	$9,079					372	$25,111
USA			3,644	$9,576	16,052	$13,637	1,194	$36,757			12,483	$12,019	534,533	$570,940
Vietnam													124	$3,300
Total	25,942	$2,940,026	60,401	$1,397,766	18,117	$27,633	112,149	$2,458,817	133,950	$431,483	12,483	$12,019	583,445	$647,874

Source: New Zealand Game Industry Board.

Table 12.2: New Zealand Deer Co-products Exports by Market, 1998.

	Tails Cat 03		Pizzles Cat 02		Other Offal Cat 05		Sinews Cat 2		Blood Cat 12		Other Deer Product Cat 35	
Country	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)	Volume (kg)	Value (NZ$)
Australia					51	$1,124			30,000	$26,590	32,400	$13,932
Austria											15,912	$28,875
Belgium					2,946	$3,567						
Canada					1,357	$27,498					66,331	$92,971
China									411	$31,120		
Fiji					26	$40						
Finland			13,314	$146,778	5,004	$20,604						
France					1,292	$16,792						
French Polynesia					100	$1,470						
Germany	3,680	$56,300	24	$950	339	$5,860	1,068	$18,318			46,225	$72,456
Hong Kong	28,408	$3,775,477	52,888	$1,337,324	4,822	$60,389	121,785	$3,056,474			21,650	$72,458
Italy	1,071	$10,075										
Japan											5,260	$11,940
Kenya					800	$2,172						
Korea					2,100	$9,114			2,715	$232,226		
Netherlands											498	$1,266
Russia											93,786	$45,186
Singapore	45	$1,427			2,593	$24,978						
Sweden							200	$474				
Switzerland	1,354	$41,127			7,073	$183,886						
Taiwan			600	$45,163	81	$7,115	300	$3,437			670	$34,793
United Arab Emirates					120	$2,351						
USA	2,366	$64,269	350	$7,901	14,800	$16,289	1,053	$58,109	104	$7,917	1,880,465	$3,145,170
Total	36,924	$3,948,675	67,176	$1,538,116	43,504	$383,249	124,406	$3,136,812	33,230	$297,853	2,163,197	$3,519,042

Source: New Zealand Game Industry Board.

APPENDIX 13: CHILEAN DEER FARMS AND HUNTING OPERATION LIST, 1996.

	Name of Farm	*City*	*Type**	*Area*	*Animals*	*Details***
1	Pred. EmilagroL.Rupanco	Osorno	H	497 ha	195	R
2	Predio Mision de Cuinco	Osorno	F		121	R/F
3	Predio Rupanquito	Osorno	H	938 ha		R/F
4	Predio Rupanquito	Osorno	F			R/F
5	Fdo. Sta. Anselma	Temuco	F		31	R/F
6	Predio Sta. Isabel,Los lago	Valdivia	F		217	R/F
7	Fdo. Meiquen, Camino a Villarrica	Loncoche			5	R/F
8	Fdo.Maria Ester, Traiguen	Victoria			46	R/F
9	Predio Cahuilco, Rionegro	Osorno	F		107	R/F
10	Predio Centinela, Frutill	Frutillar	F		7	R
11	Tarilonco, Entrelagos	Osorno	F		20	R
12	Predio Pedernal, Rrutillar	Purranque	H	511 ha	44	R
13	Predio Antimahuida	Osorno	F		15	R
14	Predio Millantue,Los muer	Pto.Montt	F		29	R
15	Fdo. Pichilafquen, Puyeh	Osorno	H	500 ha		R
16	Predio Estancia Carmen				102	R
17	Host.Salto Laja Km 485	L.A.	F		24	R/F
18	Fdo. El Retamo, Frutillar	Frutillar	F		76	R/F
19	Predio Crucero Viejo, Purr	Osorno	H	581 ha	11	R/F
20	Predio Rupanquito, Puyeh	Osorno	F		26	R/F
21	Fdo. La Vega, Fresia	Osorno	H	486 ha	114	R/F
22	Fdo. Altue	Osorno	H	324 ha	85	R/F
23	Predio Panguima, Fresia	Osorno	H	350 ha		R/F
24	Predio Palitue, Puyehue	Osorno	H	396 ha	43	R
25	Tegualda	Osorno	F			R/F
26	Predio Los Ciervos, Frutill	Osorno	H	600 ha	49	R
27	Predio Sta. Rosa, Radal				61	R/F
28	Predio Curileufu	RioBueno	FH		221	R
29	Fdo.Los Tilos Rio Blanco	Pto.Montt	F		27	R
30	Predio Estro	Coyaique			63	R
31	Predio Lago Rosellot				89	R
32	Isla Teja, PredioTejaNorte	Valdivia	F		3	R
33	Predio Vellehue	Osorno	F		7	R
34	Pred. Flor del Lago	Villarrica				R/F
35	Fdo. Los Coligues	Frutillar	F		66	R
36	Reserva El Chingue	Frutillar	FH			R
37	Lago Puyehue	Osorno	FH	400 ha	107	R

* F= Deer Farm; H= Hunting Operation; FH= Deer Hunting opartion and Deer Farm.

** R= Red Deer ; F= Fallow Deer.

Source: SAG, Chile.

APPENDIX 14: COST AND INCOME FROM CHILEAN DEER FARMS AND NEW ZEALAND MODEL DEER FARM, 1998/99. US DOLLAR.

Effcetive Area NZ Farm (ha)	135
Effcetive Area Chilean Farm A (ha)	200
Effcetive Area Chilean Farm B (ha)	92
Stock Units NZ Farm	2007
Stock Units Chilean Farm A	400.5
Stock Units Chilean Farm B	433.4
Exchange Rate (US$/NZ$)*	$ 1.94
Exchange Rate (US$/C$)*	$ 539

	New Zealand 98/99			Chilean Farm A 98/99			Chilean Farm B 98/99		
Item	TOTAL	Per Ha	Per S.U	TOTAL	Per Ha	Per S.U	TOTAL	Per Ha	Per S.U
INCOME									
Deer	$53,296.91	$394.79	$26.56	$ 22,227.04	$111.14	$ 55.50	$ 11,576.99	$125.84	$ 26.71
Velvet	$9,458.76	$70.06	$4.71	$ 0.00	$0.00	$ 0.00	$ 2,102.04	$22.85	$ 4.85
Deer Purchase	-$ 3,865.98	-$ 28.64	-$ 1.93	$ 0.00	$0.00	$ 0.00	$ 0.00	$0.00	$ 0.00
*GROSS FARM REVENUE***	$58,889.69	$436.22	$29.34	$22,227.04	$111.14	$ 55.50	$13,679.04	$148.69	$31.56
EXPENDITURES									
Wages	$1,340.21	$9.93	$0.67	$ 222.63	$ 1.11	$ 0.56	$ 2,226.35	$ 24.20	$ 5.14
Animal Health	$2,680.41	$19.85	$1.34	$ 687.76	$ 3.44	$ 1.72	$ 399.81	$ 4.35	$ 0.92
Electricity	$1,134.02	$8.40	$0.57	$ 0.00	$ 0.00	$ 0.00	$ 348.24	$ 3.79	$ 0.80
Feed	$2,835.05	$21.00	$1.41	$ 556.59	$ 2.78	$ 1.39	$ 463.82	$ 5.04	$ 1.07
Fertiliser	$9,046.39	$67.01	$4.51	$ 56.42	$ 0.28	$ 0.14	$ 1,694.62	$ 18.42	$ 3.91
Freight	$721.65	$5.35	$0.36	$ 0.00	$ 0.00	$ 0.00	$ 536.73	$ 5.83	$ 1.24
Seeds	$644.33	$4.77	$0.32	$ 0.00	$ 0.00	$ 0.00	$ 74.40	$ 0.81	$ 0.17
Weed & Pest	$1,340.21	$9.93	$0.67	$ 0.00	$ 0.00	$ 0.00	$ 296.85	$ 3.23	$ 0.68
Vehicles	$4,381.44	$32.46	$2.18	$ 0.00	$ 0.00	$ 0.00	$ 103.53	$ 1.13	$ 0.24
Repair & Maintenance	$2,525.77	$18.71	$1.26	$ 463.82	$ 2.32	$ 1.16	$ 974.03	$ 10.59	$ 2.25
Administration	$5,370.10	$39.78	$2.68	$ 371.06	$ 1.86	$ 0.93	$ 2,769.94	$ 30.11	$ 6.39
Other	$1,943.81	$14.40	$0.97	$ 0.00	$ 0.00	$ 0.00	$ 876.81	$ 9.53	$ 2.02
TOTAL FARM EXPENDITURES**	$33,963.40	$251.58	$16.92	$2,358.28	$11.79	$5.89	$10,765.12	$117.01	$24.84
*FARM SURPLUS***	$24,926.29	$184.64	$12.42	$19,868.76	$99.34	$49.61	$2,913.91	$31.67	$6.72

* Exchange rates s for the 14th of November 1999. Source: http://finance.yahoo.com/m3?u

** Only inlcudes deer operation in the farm.

APPENDIX 15: GROSS MARGIN ANALYSES.

Table 15.1: Gross Margin Analysis of New Zealand Model Deer Farm, 1998/99. (Values in US Dollar).

Number of Stock Units	2007.00
Area (ha)	135

Income	Total	Per ha	Per S.U
Venison	$ 53,296.91	$ 394.79	$ 26.56
Velvet	$ 9,458.76	$ 70.06	$ 4.71
Total	**$ 62,755.67**	**$ 464.86**	**$ 31.27**

Expenditures	Total	Per ha	Per S.U
Deer Purchase	$ 3,865.98	$ 28.64	$ 1.93
Animal Health	$ 2,680.41	$ 19.85	$ 1.34
Electricity	$ 1,134.02	$ 8.40	$ 0.57
Feed	$ 2,835.05	$ 21.00	$ 1.41
Freight	$ 721.65	$ 5.35	$ 0.36
Seeds	$ 644.33	$ 4.77	$ 0.32
Weed & Pest	$ 1,340.21	$ 9.93	$ 0.67
Vehicles	$ 4,381.44	$ 32.46	$ 2.18
Other	$ 1,943.81	$ 14.40	$ 0.97
Total	**$ 19,546.90**	**$ 144.79**	**$ 9.74**

Gross Margin	Total	Per ha	Per S.U
Deer	**$ 43,208.77**	**$ 320.06**	**$ 21.53**

Table 15.2: Gross Margin Analysis of Farm A in Chile, 1998/99. (Values in US Dollar).

Stock Unites Calculations

Total Number of Animals in Farm A	225.0
S.U. Average Rate	1.8
Total S.U. in Farm A	400.5

Number of Stock Units	400.50
Number of Hectares	200

Income	Total	Per ha	Per S.U
Venison	$ 227.04	$ 1.14	$ 0.57
Live Deer	$ 22,000.00	$ 110.00	$ 54.93
Total	$ 22,227.04	$ 111.14	$ 55.50

Costs	Total	Per ha	Per S.U
Deer Purchase	$ 0.00	$ 0.00	$ 0.00
Animal Health	$ 687.76	$ 3.44	$ 1.72
Electricity	$ 0.00	$ 0.00	$ 0.00
Feed	$ 556.59	$ 2.78	$ 1.39
Freight	$ 0.00	$ 0.00	$ 0.00
Seeds	$ 0.00	$ 0.00	$ 0.00
Weed & Pest	$ 0.00	$ 0.00	$ 0.00
Vehicles	$ 0.00	$ 0.00	$ 0.00
Other	$ 0.00	$ 0.00	$ 0.00
Total	$ 1,244.35	$ 6.22	$ 3.11

Gross Margin	Total	Per ha	Per S.U
Deer	$ 20,982.69	$ 104.91	$ 52.39

Table 15.3: Gross Margin Analysis of Farm B in Chile, 1998/99. (Values in US Dollar).

Number of Stock Units	433.40
Number of Hectares	92

Income	Total	Per ha	Per S.U
Venison	$ 11,576.99	$ 125.84	$ 26.71
Velvet	$ 2,102.04	$ 22.85	$ 4.85
Total	**$ 13,679.03**	**$ 148.69**	**$ 31.56**

Costs	Total	Per ha	Per S.U
Deer Purchase	$ 0.00	$ 0.00	$ 0.00
Animal Health	$ 399.81	$ 4.35	$ 0.92
Electricity	$ 348.24	$ 3.79	$ 0.80
Feed	$ 463.82	$ 5.04	$ 1.07
Freight	$ 536.73	$ 5.83	$ 1.24
Seeds	$ 74.40	$ 0.81	$ 0.17
Weed & Pest	$ 296.85	$ 3.23	$ 0.68
Vehicles	$ 103.53	$ 1.13	$ 0.24
Other	$ 876.81	$ 9.53	$ 2.02
Total	**$ 3,100.19**	**$ 19.01**	**$ 4.03**

Gross Margin	Total	Per ha	Per S.U
Deer	$ 10,578.84	$ 129.68	$ 27.53

Stock Unites Calculations

Fallow Deer			
Stock	Deer	S.U	Total S.U
M.A Does	240	0.8	192.00
R1 Does	45	0.6	27.00
M.A Bucks	15	1.0	15.00
R1 Bucks	15	0.7	10.50
Total S.U			244.50
Red Deer			
Stock	Deer	S.U	Total S.U
M.A Hinds	51	1.9	96.90
M.A Stags	27	3.0	81.00
Fawns	11	1.0	11
Total S.U			188.90
Total S.U. In Farm B			433.40

APPENDIX 16: DEER SLAUGHTERHOUSE IN NEW ZEALAND.

- *Picture 1*

- *Picture 2*

- *Picture 3*