

# **E-commerce and its Projected Impacts on Agriculture**

---

**Ministry of Agriculture and Forestry**

---

June, 2000

**NZ INSTITUTE OF ECONOMIC RESEARCH (INC.)**

8 Halswell St. Thorndon

P O BOX 3479 WELLINGTON

Tel: (04) 472 1880

Fax: (04) 472 1211

## **Authorship**

This report has been prepared at NZIER by Chris Nixon and reviewed by Alex Sundakov and John Feil.

---

## EXECUTIVE SUMMARY

---

E-commerce is not a fad. E-commerce will have a major impact on how goods are bought and sold in agricultural markets. Two conflicting influences are at play. On the one hand, lower transactions costs of internet business-to-business trading will allow agricultural producers and exporters to reduce their own input costs and to satisfy customers' needs at less cost. On the other hand, the benefits of greater productivity are most likely to accrue to consumers, who in the case of agricultural exports are foreigners. Thus, e-commerce may result in a redistribution of welfare from New Zealand producers to foreign consumers.

This report looks specifically at the e-commerce impact on three of New Zealand's key export markets: dairy, wool and meat.

The dairy industry appears most at risk. To date, the Dairy Board has been able to derive a premium from lack of price information in the market, and from its ability to arbitrage between geographic markets. This ability to price discriminate is likely to be undermined by e-commerce.

By contrast, some wool sellers may gain from the advent of internet market exchanges. There may be some scope for closer contact between buyers and sellers that will halt price erosion. Also, traceability, which consumers are demanding, may improve quality and prices as signals get through to the farmgate level. However, wool that is grown just as a by-product will face renewed price pressure from the onslaught of e-commerce.

Meat companies will face real pressures to enter buyer controlled market exchanges. This will increase the pressure on price. Their lack of size and reluctance to introduce an open-ended e-commerce trading system, such as the one developed by Woolpro, suggest a reactive rather than proactive approach to the development of e-commerce. This closed strategy seems to run counter to the way e-commerce in the business-to-business markets work.

These developments pose a challenge for the Government. The Government may be able to assist in three ways:

- Keep the regulatory environment for agricultural exporters under review to ensure that there are no artificial barriers to New Zealand's ability to respond and to lead market development;
- Review the legal framework affecting e-commerce. Is the current New Zealand legal framework creating the best possible environment for the development of e-commerce in New Zealand?
- Help co-ordinate activities of various agricultural exporters where the transactions costs of private co-operation are prohibitively high. In particular, the Government may play a useful role in disseminating information and helping industry participants learn from each other.

---

# CONTENTS

---

<b>1. Introduction</b> .....	<b>1</b>
<b>2. Analytical framework</b> .....	<b>2</b>
2.1 What is e-commerce? .....	2
2.2 Tools of analysis .....	2
2.2.1 New economy influences .....	3
2.3 Summary of questions.....	8
<b>3. Assessment of developments likely to impact on New Zealand</b> .....	<b>10</b>
3.1 Wools of New Zealand .....	10
3.1.1 E-commerce up-take by farmers.....	10
3.1.2 Introduction to Woolnet.....	10
3.1.3 Critical mass is important.....	11
3.1.4 Comparison with the auction system .....	13
3.1.5 Role of Government.....	14
3.1.6 Other issues .....	14
3.1.7 Expected Impact.....	14
3.2 Meat New Zealand .....	15
3.2.1 Introduction.....	15
3.2.2 Expected Impact.....	17
3.3 New Zealand Dairy Board .....	18
3.3.1 Impact of e-commerce .....	18
3.3.2 Price discovery .....	19
3.3.3 Future price falls .....	19
3.3.4 Role of Government.....	20
3.3.5 Expected impact .....	20
<b>4. Analysis of policy implications</b> .....	<b>22</b>
4.1 Market effects .....	22
4.1.1 Productivity gains .....	22
4.1.2 Ability to maintain margins.....	22
4.1.3 Market power.....	23
4.1.4 New business opportunities .....	23
4.2 Role of government.....	24
<b>5. Bibliography</b> .....	<b>26</b>

---

## FIGURES

---

Figure 1: Framework for analysing the impact of e-commerce on agri-businesses .....	3
Figure 2: Application of economics to e-commerce: supply increase .....	7
Figure 3: Expected e-commerce development: medium term .....	12
Figure 4: Stylised representation of e-commerce impacts on wool.....	15
Figure 5: Meat Board e-commerce links .....	16
Figure 6: Stylised representation of e-commerce impacts on meat .....	18
Figure 7: Likely profit erosion as a result of e-commerce .....	19
Figure 8: Stylised representation of e-commerce impacts on dairy .....	21

---

## TABLES

---

Table 1: Economic evaluation of new e-commerce market structures.....	5
Table 2: Comparison of auction systems .....	13
Table 3: Economic evaluation of new e-commerce market structures.....	25

---

# 1. INTRODUCTION

---

The NZIER carried out this research project for the Ministry of Agriculture and Forestry on the likely effects and implications of business-to-business electronic commerce (e-commerce) on New Zealand agricultural exports.

The purpose is to define policy issues and consider possible policy responses to the threats and opportunities for New Zealand's main commodity exports, posed by the development of lower transaction costs in the electronic trading environment.

Our research methodology is to examine how e-commerce is already impacting on commodity trade and other primary products, drawing inferences for the near term prospects of international dairy, wool and meat markets. Specifically we have:

- Reviewed the business and economic literature on e-commerce.
- Interviewed relevant dairy, meat and wool industry personnel in New Zealand to collect their views and understand the economic e-commerce developments that directly affect New Zealand.

The report is broken up into three components:

- Development of an analytical framework, based in part on literature review.
- An assessment by the Boards' of likely economic developments relevant to New Zealand.
- Analysis of policy implications.

---

## 2. ANALYTICAL FRAMEWORK

---

### 2.1 What is e-commerce?

E-commerce is business conducted via the Internet as a world-wide distribution channel for goods and services (Chapman Tripp (2000)). Unlike previous forms of electronic commerce – via fax, telephone and telex, e-commerce represents a qualitative jump in the ability to bring buyers and sellers closer together. In the process, buyers and sellers can communicate more effectively about their requirements, product and price information is more readily available, and just-in-time delivery of customised goods is more easily achieved.

The development of new technology, such as e-commerce, is of major importance because it impacts on the relationship between efficiency, market structures and market outcomes.

While most media attention has focused on the business-to-consumer side of e-commerce, there are more important and fundamental changes taking place in the business-to-business space. In this project we are concerned with the impact of e-commerce in the business-to-business space. In particular, we are interested in e-commerce's impact on major agri-businesses in New Zealand.

E-commerce draws on at least three fundamentally new developments:

- It is based on the existence of a ubiquitous telecommunications infrastructure, and the hardware required to move large amounts of data cheaply.
- It relies on a simple to use and cheap browser.
- It allows a firm to gain information from purchasers of its products, and/or suppliers of its inputs, which is critical to the running of its business. It also supplies that information to managers in an easily accessible way, and in an understandable fashion.

### 2.2 Tools of analysis

There is little argument that the rapid evolution of information technology will change the business landscape. However, the fundamental tools to analyse markets, and the key determinants of success for a firm or an industry do not change.

A key message from the literature is productivity improvements will be gained by all, but market power is for very few firms in the new e-commerce environment. Productivity improvements occur because of the reduction in transaction costs, and the ability to define more precisely what consumers and suppliers require. Market power will be diluted because customers will have more product information, price knowledge and readily accessible alternative supplies than otherwise would have been the case.

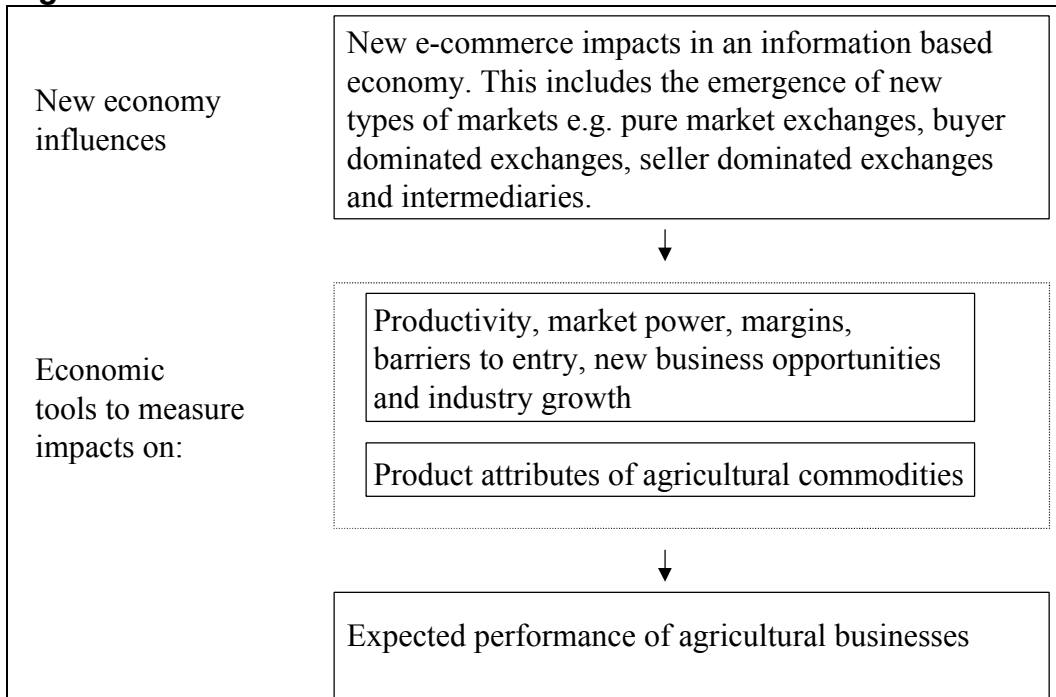
Rapid advancement in information technology will bring costs and benefits to all firms and significantly change the structure of most industries, including agricultural businesses. In agriculture, customer access to vastly improved price information has the potential to significantly dilute margins, particularly in dairy and meat.

The basic framework developed is set out in Figure 1. In essence, the benefits of higher productivity derived from lower transactions costs will be allocated between producers, marketers, and consumers. While we know that consumers will benefit through lower prices, how the allocation between consumers, marketers and producers is shaped will depend on the

market structure, and on characteristics of the transactions involved.<sup>1</sup> These factors will determine whether New Zealand-based firms are net beneficiaries or net losers from the transformation that is taking place.

Assessing the relative performance of markets as e-commerce impacts on agriculture centres around the information technology intensity, i.e. how sensitive are agricultural businesses to (vast) improvements in market information?

**Figure 1: Framework for analysing the impact of e-commerce on agri-businesses**



Source: NZIER

## 2.2.1 New economy influences

### *How buyers and sellers interact*

E-commerce will change market structures. We can demonstrate this by classifying transactions in terms of how buyers and sellers are brought together (see new economy influence in Figure 1). Four broad options appear available:

#### *1. Pure exchange*

Buyers and sellers converge to a common exchange point (e.g. a commodity exchange). With many buyers and many sellers this structure is as close to the perfect competition as a market can be. Companies such as: E-Bay, VerticalNet, Ventro, e-Steel and Agex; to name a few, have set up e-commerce sites to connect buyers and sellers in what is described as a “butterfly” shaped market. “Butterfly” shaped markets are so called because the wings of the butterfly are identical on each side, hence the analogy that buyers and sellers approach the market equally. Kaplan and Sawhney (2000) suggest markets such as food and paper fit into this type of structure.

<sup>1</sup> Most consumers of New Zealand’s primary produce are located outside the country, while producers are all domestic.

Since these types of market exchanges are commodities themselves, the emerging business strategy is one of attaining critical mass: becoming the one site for a particular commodity or groups of commodities. The first signs of this are already being exhibited in the market where companies such as Ventro have changed their business-to-business strategy to operate not one market exchange but a range of market exchanges (Redherring (2000)). The size of the market exchange is very important because of the small return made on each transaction. It has been estimated that anywhere between \$NZ500 million to \$NZ5 billion turnover is required to make a pure exchange viable (Campbell, NZ Dairy Board, 2000). New Zealand, for example, may only be able to sustain one internet portal for agriculture. Whether portals grow larger than this will depend on how successful the strategies adopted are. At this stage it is difficult to speculate on how each business model for internet portals will develop.

## *2. Buyer dominated exchanges*

Many sellers converge to bid for a single buyer's purchase intention (e.g. a competitive procurement tender). Major manufactures such as car, aerospace, retailing and agricultural groups have banded together to create markets. Companies such as General Motors, Ford, and Daimler-Chrysler (cars components); Sears-Roebuck and Carrefour (inputs into retailing); and Cargills, Du Pont and Cenex Harvest (agriculture) are in the process of or already have set up buyer controlled exchanges for purchase of inputs.

These exchanges are described as "pyramid-like", with few buyers and many sellers and clearly benefit the buyer. Kaplan and Sawhney (2000) see advantages for the buyer because of the:

- Biased nature of these markets (it favours few large buyers over many smaller sellers).
- Ability of the markets to reach critical mass quickly because of the size of the buyer participants.
- Control of the market by the buyer. They are financed and owned by the buyers.

Understandably sellers have been nervous about entering these market structures because of the emphasis on cutting costs by buyers. This is despite the claims by buyers that they place heavy emphasis on quality and reliability of supply.

## *3. Seller dominated exchanges*

Many buyers converge to bid for a single seller's products (e.g. a house auction). The common characteristic for this type of transaction would be an association with specific valuable products. While many sellers have tried to create these types of markets (or dreamed of doing so), only De Beers have been successful in sustaining this type of market. Kay (2000) suggests that these markets will remain extremely rare and that De Beers are the exception that proves the rule.

## *4. The use of intermediaries*

Sellers and buyers deal with unrelated intermediaries, who in turn trade among themselves (e.g. over the counter financial markets). In goods markets, intermediaries are used where they have good contacts with buyers (relative to the seller), and/or local knowledge of laws is required to improve the efficiency of the transaction.

## **Rent capture**

Each one of these arrangements may represent different amounts of rent from each transaction accruing to different market participants. For example, (3) is preferable from the seller's point of view to (2).

E-commerce may upset the existing trading arrangements, and force agricultural exporters into arrangements that are less desirable from their point of view. Equally, it may provide opportunities for shifting to more favourable arrangements.

Related to this, e-commerce may change who captures the value along the “value chain” of producer – trader/marketer – distributor – buyer. Some of these functions may disappear (“disintermediation”), with a question as to who captures the economies. On the other hand, intermediation may in fact capture more of the wealth, if it is seen as being an entry-point into other future growth opportunities. Thus, Amazon.com seems to have captured wealth from publishers, despite the fact that it still has not made a profit.

Market structure is critically important to understanding the nature of market outcomes. Thus, the effects of e-commerce may depend on the following dimensions outlined in Table 1. The Table has been left empty at this stage, and will be completed in section 4.1.5.

**Table 1: Economic evaluation of new e-commerce market structures**

	Pure exchange	Buyer dominated exchange	Seller dominated exchange	Use of intermediaries
Productivity gains				
Ability to maintain margins				
Barriers to entry				
Market power				
New business opportunities				
Industry growth/demand potential				

Source: NZ Institute of Economic Research

### **Productivity gains**

E-commerce improves efficiency and increases productivity. Productivity gains can be represented in simple economic terms by using a standard economic model shown in Figure 2. In Figure 2 the economy is at equilibrium where the aggregate demand and supply curves intersect. In what has been described by many as a reverse oil shock effect, quantity increases from  $Q^1$  to  $Q^2$  as a result of the introduction of e-commerce. The price also falls from  $P^1$  to  $P^2$ . This is a standard economic reaction to any new innovation that improves efficiency. Two points of interest, relating to Figure 2, that will be addressed later on in the report are:

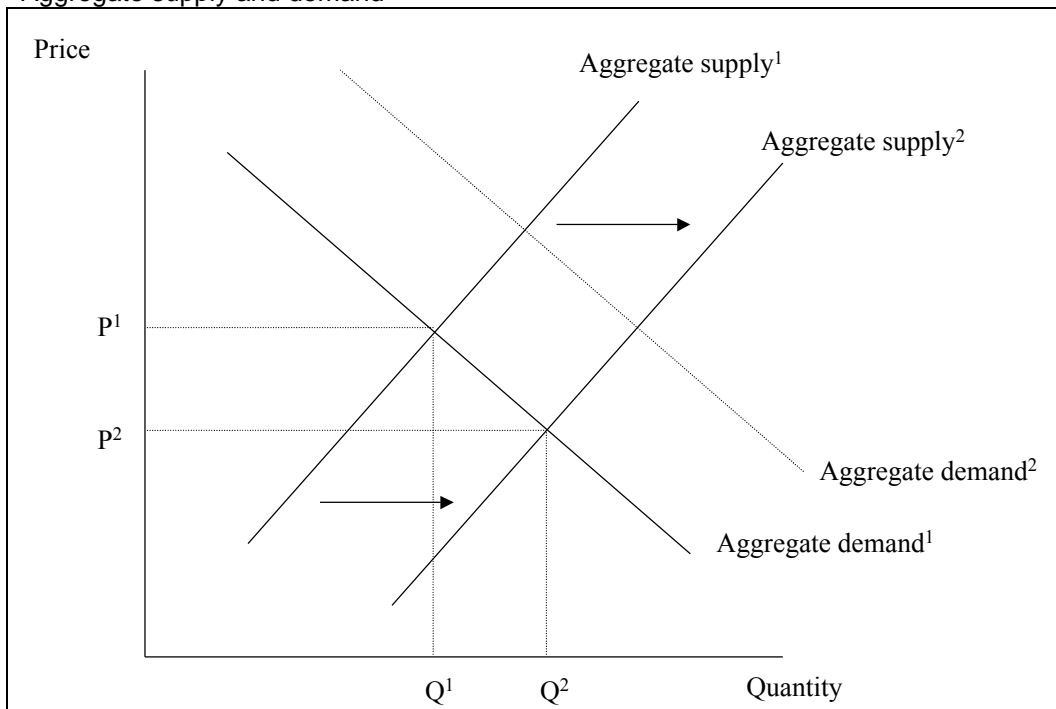
- Should we expect the aggregate demand schedule for agricultural products to be steeply sloped (inelastic); and
- What is the likely movement of the aggregate demand schedule (if any)?

The aggregate demand curve would shift if consumers enjoy an increase in their real income as a result of lower prices derived from lower transactions costs, all other things being equal.

However, this effect may be negligible. Overall, while the effect of the change in market efficiency on quantity is unambiguously positive, the effect on price would be determined by the slope of and magnitude of shift in the demand curve.

## Figure 2: Application of economics to e-commerce: supply increase

Aggregate supply and demand



Source: Adapted from The Economist (2000a)

Productivity benefits in agriculture will come from:

- More efficient pricing of supplies.
- Lower inventory costs.
- Higher speed and lower cost of nearly all communications, particularly with farmers.
- Lower distribution costs.

### **Cost savings from disintermediation**

E-commerce may also reduce costs through disintermediation. The Australian Government (NOIE (1999)) has identified some of the opportunities that can be capitalised in the business-to-business space. These include:

*Changes in production costs:* E-commerce will allow firms to extend 'just in time' processes to reduce inventories and other input costs. It may also streamline purchasing and order processing, sales, and the cost of after sales service. These improvements should improve productivity.

*Changes in the value added chain:* E-commerce changes the cost trade-offs between individually tailored and mass-produced goods, and permits interaction with customer requirements, and greater interaction within a supply chain, as a result. The value added chain becomes a value added business network, with feedback loops that improve the value of the product to the customer.

*Changes in international competitiveness:* Businesses have greater scope to advertise and sell their products into a global market at lower cost. The domestic market also becomes more accessible to foreign businesses.

*New products and ways of doing things:* It is likely that the impact of e-commerce will be magnified many times over when changes in capacity are reflected in completely new products and services. The overall nature and impact of such new products, however, is particularly difficult to assess at this time.

## 2.3 Summary of questions

The framework identified above is designed to help us answer the following questions.

### 1. *Potential for productivity gains.*

- What proportion of the cost base is related to information collection?
- What is the role of information?
- Can improved information add to competitiveness?
- To what extent are agriculturally based industries already connected to the Internet, and how long will it take to capture any gains?

### 2. *Ability to maintain margins.*

- Will increased information flows and competition drive down prices?
- Can lower input prices offset lower output prices?
- Do buyers or sellers gain?

### 3. *Barriers to entry.*

- Will new entrants be created by e-commerce?
- If entry is considered, how would new players enter the market? Would they copy existing players or develop a completely different approach to servicing customers?
- Will industries follow similar patterns and even converge to be part of the same industry?

### 4. *Market power.*

- How can firms influence the industry structure and how can they offset competitive threats?

### 5. *New business opportunities.*

- Can e-commerce allow for vertical or horizontal integration?
- Can cross industry alliances be formed?

### 6. *Industry growth/demand potential.*

- What is the growth potential from e-commerce in agriculture?
- Will it add to GDP growth?

## **Attributes of New Zealand's Primary Industry**

Market structures have traditionally evolved over decades as a function of competitive action and regulation. With much of the fabric of industry increasingly dependent on information technology, we now have the situation where structures can change in a single year. In this environment it is critical to understand the attributes of each industry and how they will be affected by the development of e-commerce in agriculture.

These attributes include:

- Most New Zealand agricultural products are sold in bulk form.

- The product specifications are well known to the buyer.
- There is a seasonal pattern to agricultural production.
- Commodity products from New Zealand do have distinctive characteristics (high and consistent quality product).
- New Zealand agricultural product faces tough competition from subsidised competitors (mostly inefficient producers).
- Spatial relationships are important, i.e., comparatively high transport cost relative to competitors.
- Buyers can be generally characterised as: large government-run buying agencies, supermarkets, joint ventures and or multinational competitors.
- The increasing importance and value attached by customers to traceability.
- Inelastic supply and demand schedules.

Product attributes are important because they will impact on the behaviour of market players (Abbott, (1998)). Product specifications, institutional relationships and other industry specific characteristics and arrangements will determine the applicability of e-commerce in any particular industry. It is difficult to predict, from first principles, the impact of any particular industry “shock” without fully understanding how the “shock”, in this case e-commerce, interacts with all product attributes.

---

## 3. ASSESSMENT OF DEVELOPMENTS LIKELY TO IMPACT ON NEW ZEALAND

---

To assess the impact of e-commerce on major agri-businesses the NZIER interviewed staff from three statutory boards:

- Wools of New Zealand.
- Meat New Zealand.
- NZ Dairy Board.

The following is a general description of their attitude and approach to e-commerce, the types of business models that these agri-businesses are likely to follow (or are following), and their views on the role of government in the e-commerce field.

### 3.1 Wools of New Zealand

#### 3.1.1 E-commerce up-take by farmers

One of the limiting factors in the up-take of any technology is the cost associated with accessing that technology. E-commerce is no different. Woolpro estimate that farmer take-up rates are at the pre-growth stage:

- 30-40% of farmers own or have access to personal computers.
- Of those that own a personal computer, 50% of farmers have an Internet connection (approximately 20% of farmers).
- Of the remainder, approximately 50% probably know how to use the Internet (approximately 10% of farmers).
- Within five years all wool farmers will be connected to the Internet.

Use of Woolnet is doubling every few months, however, it has been operating for only eight months.

#### 3.1.2 Introduction to Woolnet

Wools of New Zealand, through the New Zealand Wool Group, have set up a site where farmers and traders can buy and sell wool. Woolnet owned by Woolpro, a subsidiary of the New Zealand Wool Group, has been operating for the past eight months. Woolnet is designed to offer:

- 24 hour, seven day-a-week operation.
- An easy-to-use buy and sell operation.
- Universal access and an open ended system. Features include:
  - Woolnet is open to all NZ based sellers and buyers of wool.
  - The open-ended nature of the system will allow its extension to overseas buyers, once the technology for moving money quickly between off and on-shore banks is put in place.
  - The ability to sell wool from any source (domestic and off-shore). Despite opposition from some farmers, Chilean wool has been sold on Woolnet.
- Free home pages, where buyers and sellers can develop a branding strategy.

- Specialist markets for organic, high bulk or specific micron wools.
- Access to Woolnet by overseas buyers is limited, at the moment, to identifying wool types available. To buy wool, overseas buyers are required to use existing marketing channels.
- Seller choice. Farmers can use brokers, sell the wool themselves or use the Woolnet system as a comparison with existing selling systems.
- Instant price comparisons with other comparable quality wool.
- Commissions to be paid on sale.
- Traceability. Buyers can trace product back to the farm, check who has assessed the wool (the name of the assessor) and get a detailed quality breakdown. If Woolpro have tested the wool they will guarantee quality.
- Woolpro registers buyers, so that it limits the possibility of default. As foreign buyers are registered on Woolnet, reliability of payments will become increasingly important.

Other aspects of the Woolnet system that are of potential importance include:

- The possibility of feedback loops between buyers and sellers. In the present system, farmers have only a partial understanding of what the buyer wants. The Internet increases the ability of buyers and sellers to engage in a discussion about their requirements. This may reduce the production push philosophy at the farm level.
- As the system moves to international buying and selling, buyers and sellers can be given reliability grades. E-bay, for example, rate buyers on a star system which reflects their past buying (i.e. whether they paid) and selling (i.e. whether the quality was what they said it was) record.
- Woolnet is what is termed an infomediary. Its aim is to make the buying and selling of wool easier. It breaks down the barriers to entry into buying and selling product.

### 3.1.3 Critical mass is important

Critical mass is vital in an Internet strategy. In the medium term, Woolpro believe that wool will be only part of larger trading portal (Figure 3). Wool trading alone will not reach the necessary size required to make Woolnet a stand-alone enterprise.

Woolpro's vision for the future envisages farmers going to one site to do their consumer shopping, buying of inputs, selling of stock (meat and wool), banking, collecting mail and receiving other news. New Zealand and maybe even Australia are too small to have more than one portal operating. Wool would be only one part of that portal.<sup>2</sup>

The strategy adopted by Woolpro in launching Woolnet requires it to be as inclusive and open ended as possible. The technology that drives the Internet determines this approach, since if required, customers will go elsewhere.

Why haven't Woolpro forged strategic alliances with other businesses? By teaming up with another agri-business partner, in the New Zealand business environment, Woolpro would automatically exclude other agri-businesses. Since this is not compatible with the Woolpro strategy the decision was made to set up by itself – in the beginning at least.

By approaching it in this fashion, Woolpro are taking the risk in building a site and inviting wool industry participants to become involved. While the "build it and they will come" approach involves risk, it does seem appropriate that this type of project (without commenting

---

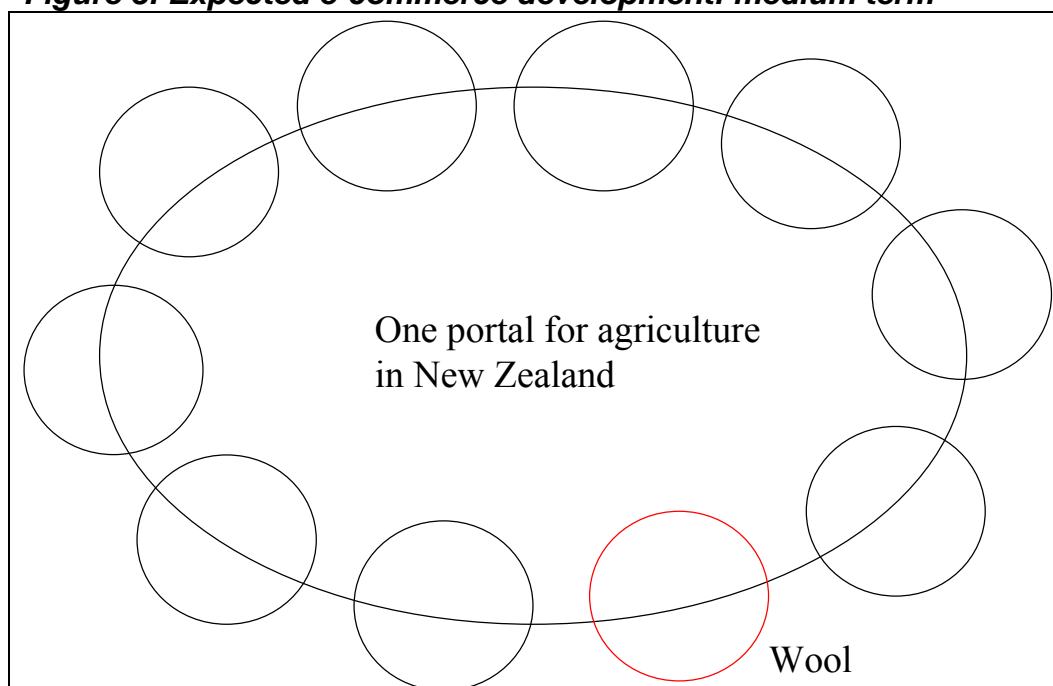
<sup>2</sup> Revenues gained from each e-commerce transaction is very small, since the costs of setting up an e-commerce portal are not insubstantial, a large turnover is required to break-even.

on the specifics) should be undertaken by an organisation that purports to represent the whole industry. Woolpro was not received well by the industry. The comments included:

- They were meddling.
- E-commerce was only the latest trendy thing and Woolpro was only following the fashion.

In the eight months Woolnet has been operating, most major businesses dealing in wool (except Wrightsons) have had second thoughts and joined Woolpro to offer services on Woolnet. Many wool businesses have signalled that they will join Woolnet over the next few months. Views have changed about Woolnet because farmers have found the system useful in assisting their business.<sup>3</sup> Companies that deal with wool farmers have had to adjust their marketing strategies to include e-commerce to accommodate those farmers or risk losing business.

**Figure 3: Expected e-commerce development: medium term**



Source: Lance Wiggins, Woolpro.

<sup>3</sup> The advantages to farmers include: more choice in the marketing channel they use, easy access to price information, more alternative sources of input supply and greatly improved communication with buyers.

### 3.1.4 Comparison with the auction system

In developing Woolnet, Woolpro believe that e-commerce will bring about significant changes to the marketing structure associated with wool sales. Table 2 illustrates some of the differences that Woolpro believe could occur as e-commerce develops.

**Table 2: Comparison of auction systems**

<b>Current auction system</b>	<b>E-commerce system</b>
Auction is an infrequent event.	24 hour-a-day seven days a week.
Instant price referencing not possible.	Comparisons for similar volumes sold are available.
Farmers pay transport and storage costs associated with the auction.	Farmers can choose whether they store wool on or off farm. Possible disintermediation will occur.
Brokerage fees.	Farmers can chose whether they use a broker or not. Possible disintermediation will occur.
No seller/buyer contact.	Information on sellers and contact between buyer and seller is straight forward.
Disposal mentality.	More contact between buyer and seller means that sellers will be able to more accurately gauge buyer demands. If the buyer receives the type of wool specifications exactly required, they are less likely to treat the auction as a disposal market and prices will alter accordingly. However, if sellers are not prepared to meet strict buyer specifications or provide a differentiated product, then prices could be lower than they otherwise would be without e-commerce.
Wool is a generic product therefore, the buyer will develop gaming strategies that push the price down as much as possible.	Gaming will reduce if sellers meet tighter specifications. E-commerce facilitates this process.
Fewer new buyers.	Buyers that the New Zealand industry has never heard of before are making enquiries about Woolnet.
More difficult to trace product back to the farm.	Traceability becomes much easier.
Reinforces current disposal attitudes by farmers.	As tighter specifications are adhered to, new markets may develop.
Source: NZIER	

### 3.1.5 Role of Government

Woolpro believe that if the government has any role at all, it would be in facilitating the development of a single portal.

However, Woolpro were well aware that the fractious nature of the New Zealand agricultural business scene could preclude such a co-operative effort.

### 3.1.6 Other issues

According to the Meat & Wool Boards' Economic Service the average age of sheep and beef farm managers is 48 years old.<sup>4</sup> If farmers are going to embrace Internet technology they are going to need:

- A simple system.
- Confidence in the technology of the Woolnet system.
- Guarantees on the workability of the system.
- Payment surety.

### 3.1.7 Expected Impact

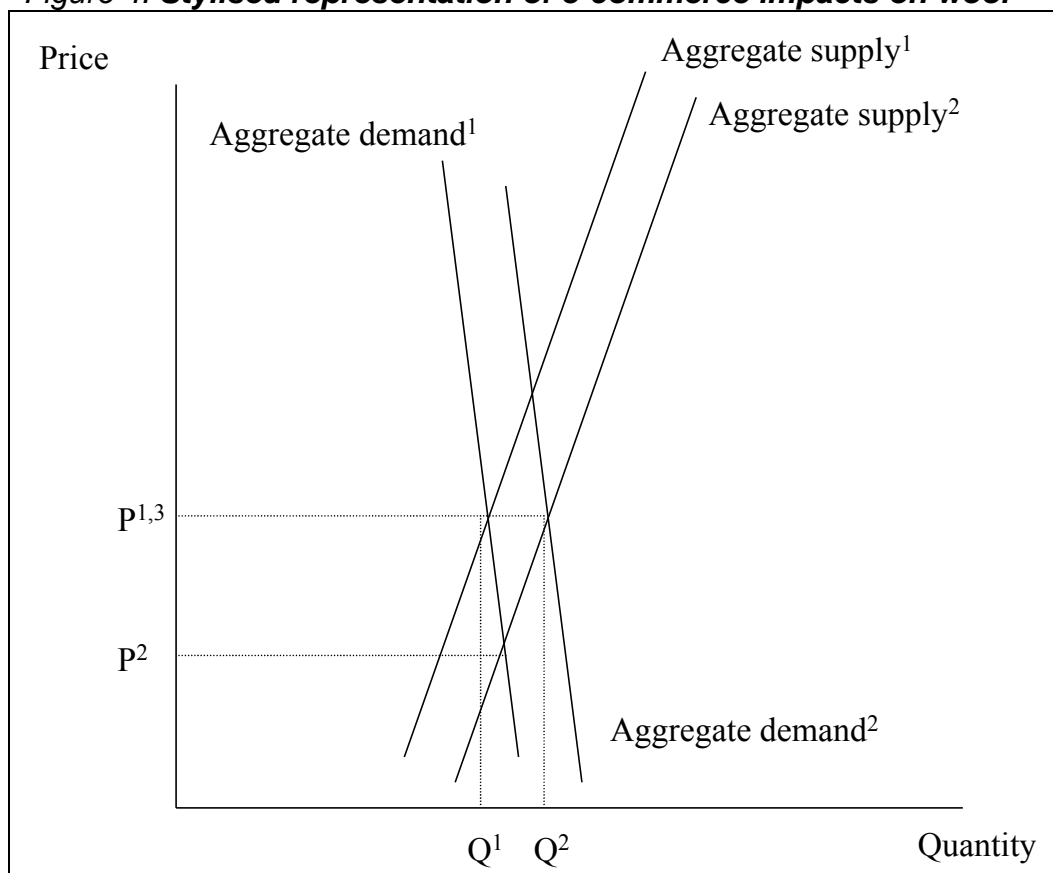
How will e-commerce impact on the wool industry? Figure 4 illustrates, in a stylised way, how e-commerce could impact on wool. Agricultural products can be characterised as having steeply sloping demand and supply schedules (inelastic). Prices move further and faster in a short time frame relative to industrial products. Usually when input prices fall (through a technological advance), the aggregate supply schedule moves out to the right and prices drop to  $P^2$ .

In the case of wool, e-commerce could bring significant demand side advantages, i.e., traceability, more contact between buyer and seller that fosters better understanding of each players needs and improved product information. This could mean that prices hold up more firmly relative to the auction system that is currently the dominant form of exchange. Aggregate demand would move outward to the right with a corresponding increase in quantity sold to  $P^3Q^2$ . Of course wool that is being sold as a by-product only, with no recognition of buyer needs, will not capture the demand side effects and prices could fall further ( $P^2$  and beyond).

---

<sup>4</sup> The MWBES draw a distinction between owners and managers; managers, on average, are younger than farm owners.

Figure 4: **Stylised representation of e-commerce impacts on wool**



Source: NZIER.

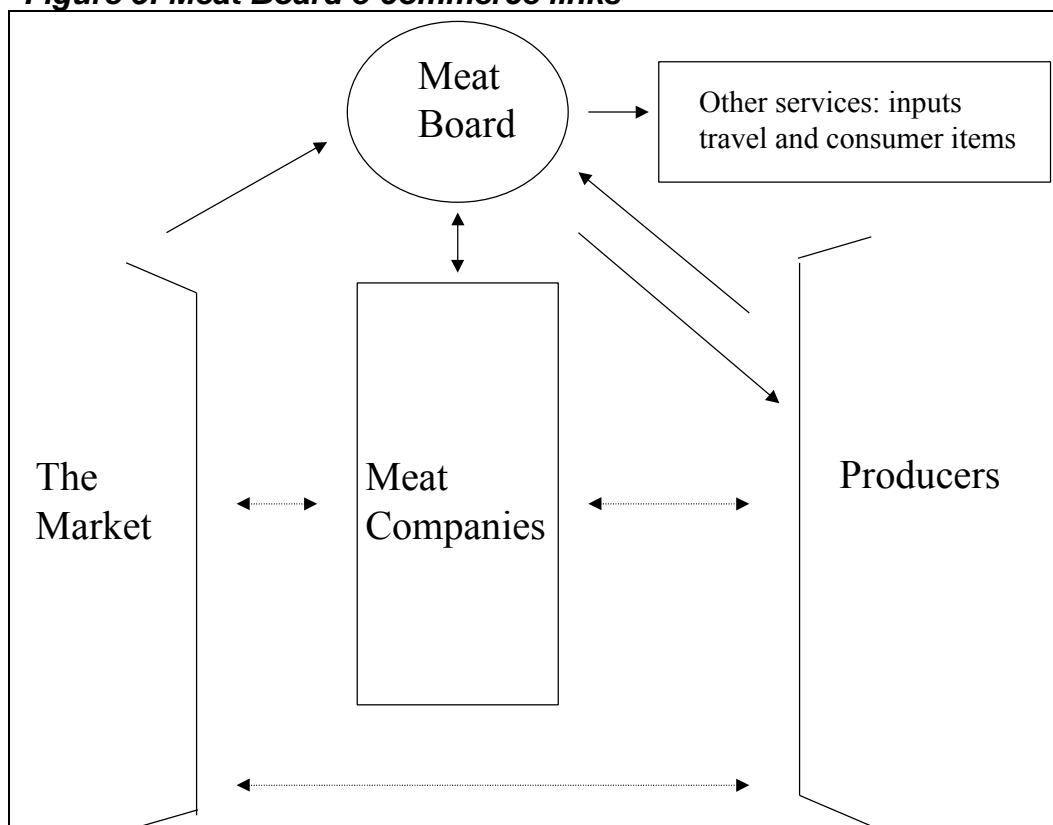
## 3.2 Meat New Zealand

### 3.2.1 Introduction

Meat New Zealand's redesigned website will "go live" in July 2000. The strategy behind constructing the site is to provide farmers with meat-related information, purchasing consumer and input items, and to facilitate contact with meat companies. Figure 5 illustrates the development of e-commerce links that Meat New Zealand wish to achieve. Specifically the e-commerce strategy is aimed at:

- *Farmer-to-Board contact.* In time, the site will allow farmers easy access to information about Board activities. Information on markets, research and development, and annual reports, to name a few applications, could all be placed on the site.

Meat New Zealand will be able to make this information, which in the past has been in the public arena, appropriable only to farmers. To receive this information, farmers will have to register with the Meat Board; others will have to pay. In this respect Meat New Zealand envisage setting up a closed e-commerce system.

**Figure 5: Meat Board e-commerce links**

Notes: The solid arrows are developments in e-commerce that are being put in place. The dotted lines represent e-commerce strategies that are not well developed.

Source: NZIER

- *MNZ-to-Processor*. The Board is developing an interface with each processor that will be subject to continual modification and improvement. Better communication with the processor will reduce transaction costs. An early application will be to give meat processors up-to-the minute details on quota allocation. Companies will be able to know the exact state of their quota allocation at any given time in the season.

However, there was some reluctance by meat companies to fully embrace an e-commerce strategy. While e-commerce dealings with Meat New Zealand were developing, processor dealings with farmers and the market were not. Meat New Zealand did not elaborate on why meat companies were unwilling e-commerce participants, however, some of the reasons could include:

- Security concerns. The cut-throat nature of the business means that every bit of secrecy counts. They do not want other companies being able to gain access into their information systems, or their communications with the Board, farmers or buyers.
- Processors want opaque price discovery. Any small advantage they can receive from masking prices from farmers/wholesalers/retailers is a bonus in the meat industry. An e-commerce strategy will introduce some unwanted transparency.

Some meat companies are attempting to develop their own e-commerce sites (as are some dairy companies). Will this work? This will depend upon the level of sophistication required to achieve the e-commerce goals of the company. Setting up a basic web page is

very cheap and easy to do; all that is required is a fax or phone number on the website and business can start. As the number and type of transactions that a business wants to perform with its e-commerce system increases, the tradeoffs between money spent on increasing the complexity of a site and the ability to generate enough business become more acute. To set up Woolnet, for example, with buying and selling capabilities on-line, information sharing on-line, ability to deal with tax considerations, and the facilities of a full service e-commerce site, requires a large customer base to breakeven.<sup>5</sup>

- *A corporate interface for farmers.* The Board is establishing links with other corporates to provide farmers with a large range of products. These include farm inputs, consumer goods and other news and information relevant to farmers.
- *Board-to-market.* The Board is following a strategy to attempt to differentiate New Zealand beef and lamb in the marketplace. The Board will put information on the website that allows those interested in New Zealand beef and lamb to discover product information. The information will cover markets where New Zealand product is sold. These will be multilingual web-pages that match the relevant market to the relevant languages.
- *Farmer-to-market.* Some small but well-documented farming operations have been able to export directly to markets. E-commerce will facilitate this process.

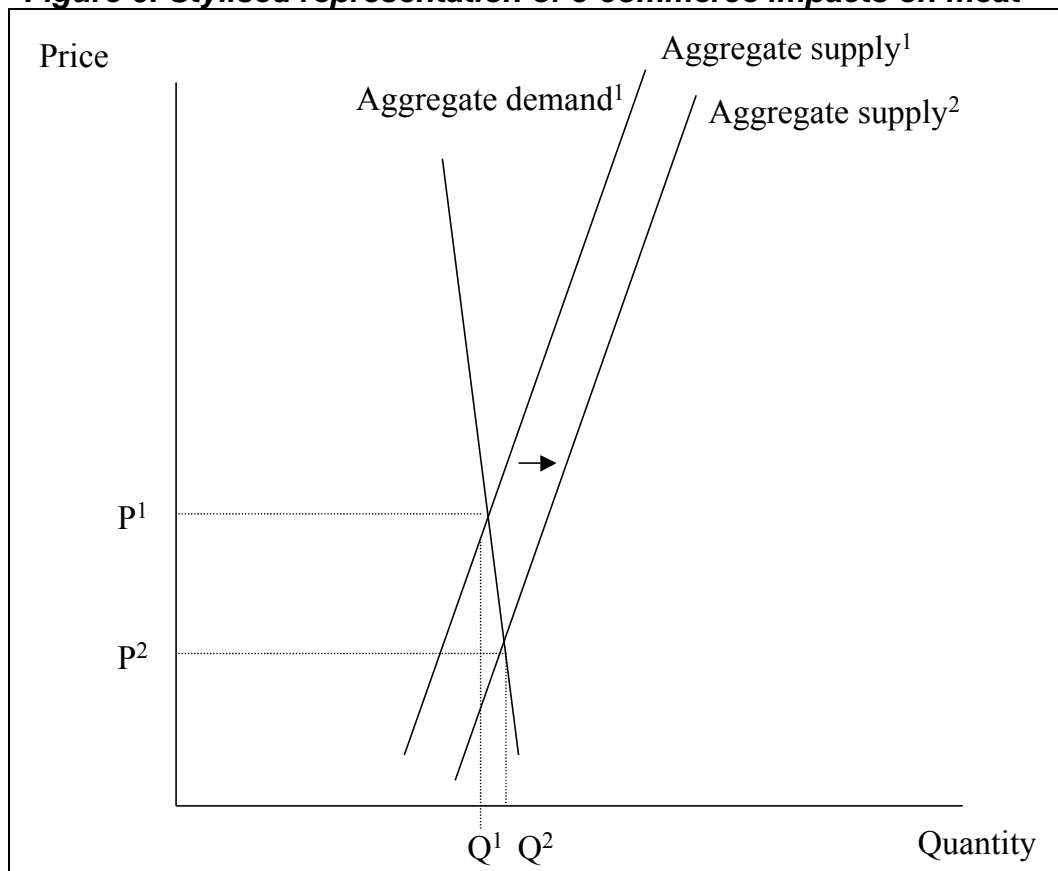
### 3.2.2 Expected Impact

E-commerce could have a negative impact on the meat industry. Figure 6 illustrates, in a stylised way, how e-commerce could impact on meat. As in wool the steeply sloped demand and supply schedules means that prices fall as the supply schedule moves to the right in Figure 6 ( $P^1$  to  $P^2$ ).

Will there be any factors that shift aggregate demand? Although traceability of meat will improve, it is difficult to see how the meat industry in its current form, will be able to create any significant improvement in demand. Prices, therefore, could face a one-off drop because of e-commerce.

Producers are worse off because their revenue, represented by the rectangle  $P^2Q^2$ , after the introduction of e-commerce, is lower than their revenue prior to the event – rectangle  $P^1Q^1$ .

<sup>5</sup> This is why the Woolpro believe the next step is for them to develop a wider agricultural portal, e.g. see Figure 3.

**Figure 6: Stylised representation of e-commerce impacts on meat**

Source: NZIER.

### 3.3 New Zealand Dairy Board

E-commerce will have a major impact on the New Zealand Dairy Board's operations. While there are some opportunities there are significant threats to the premiums they have been able to earn in the market place through price discrimination. The Board, while realising that there are productivity gains to be made, are keenly aware that e-commerce will greatly diminish their market power.

#### 3.3.1 Impact of e-commerce

The Board saw the e-commerce revolution occurring in a number of different markets that impact on the dairy business:

- *Procurement exchanges.* These are pure market exchanges that are being set-up to market a huge variety of different commodities. In these markets, the Board is being pressured on price. The customers are small, infrequent buyers of dairy products. In the past, the Board could deal with these smaller players individually, and maintain some price opaqueness (i.e., ability to price to market). With easy access to price information, and willing (usually subsidised) alternative supplies, margins are being eroded in this market. Amongst smaller customers, there is potential for significant value to be lost.

On the buying side the Board is succeeding in pushing down costs through the use of e-commerce. Its large size had allowed it to achieve cost savings in this area.

- *Supply chain management.* Electronic Data Interchange (EDI) is already well developed within the industry. In this way, the industry is able to operate as one. Therefore within the dairy industry, e-commerce will have only marginal impact on stock holding and logistical issues.

Figure 7 shows the likely impact of e-commerce on the dairy industry.

**Figure 7: Likely profit erosion as a result of e-commerce**

		Products	
		Commodity	Consumer
Likely impact of e-commerce	Low	Where buyers want opaqueness. Where price discovery is already well known.	Where products are not easily copied.
	High	Small customers where NZDB is forced to sell on e-commerce market exchanges.	Where consumer products are commoditised.

Source: NZIER

- *Advertising and cataloguing.* This splits into two categories:
  - Firstly contact with the shareholders. R&D, Dairy Board news, payments etc could be given to farmers in a form that would drastically reduce communication costs for the Board. However this raises questions about how they could contact all farmers if they did not have PCs with an Internet connection.
  - More information for non-regular buyers. This is related to the provision of buyer catalogues.

### 3.3.2 Price discovery

There is potential for significant loss in the dairy industry with the development of e-commerce. This will come about with the increased information on products being available and price transparency (basically erosion in market power).

Areas of major concern are:

- Commodities sold to non regular and/or very small volume buyers
- The danger of some ingredients and consumer products being commoditised.

### 3.3.3 Future price falls

Real food commodity prices are declining at something like 2 to 2.5% per annum. To keep pace the Board will need to squeeze costs out of the dairy business at the same rate or more to keep farmer payouts at the same level. E-commerce combined with biotechnology is going to force down costs even further. This will be difficult to combat.

E-commerce in the dairy industry will mean that:

- In the mean time, a lot more products will have been commoditised due to a one off gain in productivity, i.e., e-commerce will show up as a one-off reduction in dairy product prices. This will not occur instantaneously, but over a period of time.

- Most of the gains will accrue to players outside New Zealand.
- Most of the professional expertise that could assist the NZDB on e-commerce is located off-shore. Those professionals that are on-shore are quickly snapped up by overseas companies - talent is mobile. For the Board this means they will have to consider how they retain e-commerce talent (a make or buy issue). The Board will have to buy talent off shore (mainly in the United States) and continue developing e-commerce systems from off shore locations.

### 3.3.4 Role of Government

The Dairy Board's view of the New Zealand Government's role in e-commerce, is to set an environment that allows businesses to exploit the e-commerce revolution as much as possible.

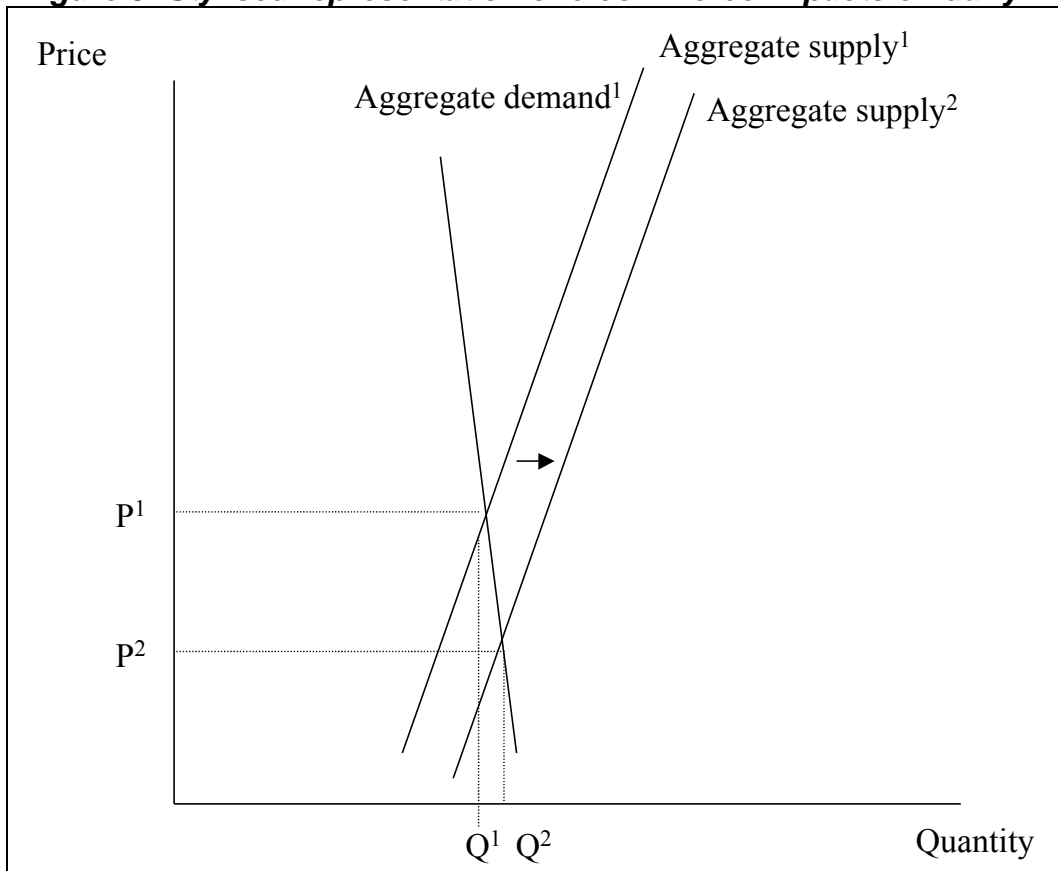
Issues that will be important include:

- Regulatory issues. E-commerce enables companies to move money around the world even more easily than before. Further regulation in this area will not work, particularly in the area of tax.
- Privacy issues and encryption will become more important.
- Attempting to limit or redirect e-commerce business in a command and control fashion will fail, because of the mobility of resources.
- Keep any legislation on e-commerce simple.

### 3.3.5 Expected impact

E-commerce (Figure 8) could have far reaching consequences for the dairy industry. E-commerce will move the aggregate supply schedule with little or no impact on the aggregate demand schedule (in a similar fashion to meat). Producers are worse off because their revenue, represented by the rectangle  $P^2Q^2$ , after the introduction of e-commerce, is lower than their revenue prior to the event – rectangle  $P^1Q^1$ . The NZDB argue that size will counter some of the downward pressures on price brought about by e-commerce. This, however, will not stop significant erosion of premiums right across the NZDB businesses.

**Figure 8: Stylised representation of e-commerce impacts on dairy**



Source: NZIER.

Since the dairy industry is going through major changes at the moment, significant reductions in the premiums, which they receive through price discrimination, will create further tension amongst industry players.

Zwart (2000) identifies strategy as being of major importance when dealing with the new business environment. The environment in which NZDB operates is changing and e-commerce, among other things, is part of that change. If agri-businesses are unable to reinvent themselves to meet the challenges facing the industry, then disintermediation of the dairy industry, in particular, will occur.

## 4. ANALYSIS OF POLICY IMPLICATIONS

E-commerce is going to change the shape of business-to-business commerce in agriculture over the next five years. In New Zealand agriculture, there is a real prospect that these changes will be driven by off shore customers, with commodity prices being driven down further than they otherwise would have been, i.e., without e-commerce.

### 4.1 Market effects

#### 4.1.1 Productivity gains

The scope for *productivity gains* in agricultural businesses through e-commerce is centred around reducing the costs of inputs, transportation and use of agents to sell farm products.

For inputs, farmers and businesses will now be able to compare prices between districts and between companies throughout New Zealand, and perhaps overseas. This has implications for rural servicing companies and the types of services they offer farmers.

The Dairy Board, dairy companies and meat companies are all using (or hope to use) e-commerce (and their size) to extract further price concessions out of input suppliers. By gaining further concessions on input prices, agri-businesses hope to be able to improve efficiency to combat falling revenues on the sales side of the business.

One aspect of agricultural businesses that will be greatly improved is the transfer of information from Board to farmer, and the reduction in transaction costs that will occur from easier communications with farmers. R&D, annual reports, industry news etc. will all be cheaper to disseminate to farmers. E-commerce allows for the development of a whole range of services that will improve the efficiency of communication between farmer and Board and/or co-operative.

There is also scope for improved productivity in selling agricultural product. For example, those growing wool now have a choice about where they sell their products and what distribution channel they use. Farmers can store wool on the farm or use brokers. They may soon be able to sell directly to overseas buyers. E-commerce does improve buyer-seller contact, particularly in the wool business, that in turn could improve the quality of product sold, with a corresponding impact on price. In dairy industry marketing, the Board and processor may be able to respond more quickly to changes in market demand and improve logistics at the margin.

To maintain profitability, producers need to achieve *productivity gains* of between 2% and 3% per year, because of falling agricultural commodity prices. E-commerce productivity gains will add to this, probably in the form of a one off step up.

#### 4.1.2 Ability to maintain margins

Despite the ability to reduce input costs, for the majority of New Zealand agri-businesses the e-commerce revolution will *erode margins*. Most of the benefits of e-commerce are likely to accrue to buyers or consumers of agricultural products. Price discovery and product information are now far more easily obtained by buyers. Even small buyers, who buy infrequently could buy, say, dairy products through an internet exchange market, much more cheaply than before. Buyers, instead of going to the NZDB for product, might be able to use internet exchanges to access product and product information. Even specialised goods can now be bundled up and sold as commodities as a result of e-commerce.

There are two ways in which agri-businesses may be able to avoid or at least slow the erosion of margins. Firstly, through increased ability to trace product in e-commerce (with all the

accompanying product information). Consumers are demanding traceability, therefore, there may be scope to add a price premium to niche traceable agricultural products.

Secondly, margin erosion may be slowed by the size of the marketer, particularly in the dairy industry, where New Zealand is a major world trader. Size could allow New Zealand exporters to tailor e-commerce arrangements to their own needs.

However, even large New Zealand exporters may not be able to resist the pull of buyer dominated exchanges. In a buyer dominated exchange, sellers are selling very close to marginal costs. They have little ability to set prices. There is a very real possibility that meat companies will be forced into these types of arrangements in sheepmeat and beef in the major quota controlled markets. The United States and European Union are the most lucrative markets for meat and this is where buyer controlled exchanges are starting to develop. Supermarkets and large agricultural companies are prime candidates for setting up these types of markets.

Meat company size (relative to dairy companies), and a reluctance to introduce an open-ended e-commerce trading system, such as the one developed by Woolpro, suggest a reactive rather than proactive approach to the development of e-commerce (see section 3.2).

The ability to *maintain margins* in a buyer controlled market is non-existent. Even the development of new products, particularly easily copied products, will not safeguard margins, since others will quickly mimic the innovator's actions, bidding away any premiums.

#### 4.1.3 Market power

Despite some scepticism about the NZ Dairy Board's ability to exercise *market power*, the Board believes that it has been able to price discriminate. The advent of e-commerce, the Board believes, will erode significant amounts of that market power. Particularly vulnerable are consumer products that are likely to migrate from being high value specialised goods to the commodity category.

Intermediaries are most commonly used in agriculture in lesser developed nations to improve the efficiency of the arrangements made. Usually there are reasons for the opaque nature of the arrangement. An intermediary can add value by:

- Securing the right contacts.
- Guiding the meat company, wool seller or Dairy Board through unfamiliar bureaucracy.
- Acting as an agent in markets that are only serviced when excess volumes are produced in New Zealand.

In this case, both buyer and seller want to retain the opaqueness of the price. E-commerce is likely to limit opportunities for such "co-operation".

#### 4.1.4 New business opportunities

Lower entry barriers will also allow new entrants into the market. This has the potential to increase innovation and responsiveness to market signals in agriculture. Whether this enhances *new business opportunities* or competes away returns to farmers, is a matter of strong debate.

E-commerce has the potential to transfer wealth from sellers (in New Zealand) to buyers and consumers (overseas). This will have a detrimental impact on the *growth potential* of agricultural industries. Since agriculture is such an important part of the economy it will also have a negative impact on GDP. E-commerce will impact most heavily on dairy, meat products wool sold as a disposal product.

The scope for growth in agricultural markets is limited by a whole range of factors not the least of which are quotas and non tariff barriers. E-commerce in a buyer dominated market puts

pressure on the price of product. If margins are low then it presents sellers with limited scope to investigate and test market product in new markets. E-commerce has the potential to limit *industry growth*.

## **4.2 Role of government**

Given the above likely market effect, can the Government help to insulate the New Zealand agricultural industry from the adverse effects, and encourage the positive effects of e-commerce?

There is clearly nothing the Government can do (or should do) to delay the spread of business-to-business e-commerce. Consequently, the key issue is whether Government action could help channel responses to the new threat in such a way that the New Zealand industry tailors the internet market to its advantage.

At the moment e-commerce is resembling a land grab. To gain e-commerce advantages companies are setting up partnerships, merging, acquiring other companies and trying to achieve critical mass as fast as possible. No-one can tell what will be the successful characteristics of the gold rush winners.

The Government may be able to assist in three ways:

- Keep the regulatory environment for agricultural exporters under review to ensure that there are no artificial barriers to New Zealand's ability to respond and to lead market development.
- Review the legal framework affecting e-commerce. Is the current New Zealand legal framework creating the best possible environment for the development of e-commerce in New Zealand?
- Help co-ordinate activities of various agricultural exporters where the transactions costs of private co-operation are prohibitively high. In particular, the Government may play a useful role in disseminating information and helping industry participants learn from each other.

Overall, there is little doubt that the development of e-commerce trade in agriculture will have major consequences for our agricultural exports. The Government needs to stay informed of the developments as they unfold.

**Table 3: Economic evaluation of new e-commerce market structures**

	<b>Pure exchange</b>	<b>Buyer dominated exchange</b>	<b>Seller dominated exchange</b>	<b>Use of intermediaries</b>
<b>Productivity gains</b>	Improved productivity. Cheaper inputs and cheaper communication with farmers	Improved productivity.	NA	No change
<b>Ability to maintain margins</b>	In most cases margins are squeezed. Vertical integration and traceability may halt margin loss.	No ability to maintain margins.	NA	No change
<b>Barriers to entry</b>	Increases scope for new entrants. This may erode profits and improve innovation.	Barriers to entry are completely removed.	NA	No change
<b>Market power</b>	Greatly diminished.	No scope to use market power.	NA	No change
<b>New business opportunities</b>	May develop in niche markets	Unlikely to develop.	NA	No change
<b>Industry growth/demand potential</b>	E-commerce will depress prices. Scope for growth diminished. Some new wool markets may develop.	Little scope for growth as price declines.	NA	No change

Source: NZ Institute of Economic Research

## 5. BIBLIOGRAPHY

- Abbott, P., (1998). Competition Policy and Agricultural Trade, OECD Workshop on Emerging Trade Issues in Agriculture. *Directorate for Food, Agriculture and Fisheries Trade Directorate*. COM/AGR/CA/TD/TC/WS (98) 106.
- Benson, M., (2000). Entrepreneurs Bet the Farm On Agricultural Dot-Com. *The Wall Street Journal*. February 2 2000.
- Business Week* (2000)., B2B: The Hottest Net Bet Yet? January 17<sup>th</sup> 2000.
- Chapman Tripp* (2000)., E-commerce – why you should do business on the internet & the minefields to negotiate. May 9<sup>th</sup> 2000.
- Coase, R., (1937)., The Nature of the Firm. *Economica* 4, pp305-14.
- Crowe, D., (2000)., Trade Wins. *The Australian Financial Review Magazine*, p26. May 2000.
- Cyert, R.M. & March, J.G., (1963). *A Behavioral Theory of the Firm*, Englewood Cliffs, NJ, Prentice-Hall.
- Deloitte Touche Tohmatsu*, (2000), Deloitte e-Business Survey: Insights and Issues facing New Zealand Business.
- Earl, P., (1995). *Microeconomics for Business and Marketing*. Edward Elgar.
- The Economist*, (1999)., A Survey of Business and the Internet. June 26<sup>th</sup> 1999.
- The Economist*, (2000a)., Internet Economics: a thinkers guide. April 1<sup>st</sup> 2000.
- The Economist*, (2000b)., Seller beware. March 4<sup>th</sup> 2000.
- The Economist*, (2000c)., Agriculture and Technology, March 25<sup>th</sup> 2000.
- Evans, P. & Wurster, T., (1999)., Getting Real about Virtual Commerce. *Harvard Business Review*. November-December, 1999.
- Forrester Research, (1999)., Survey: Business and the Internet, *Economist*, p14 June 26<sup>th</sup> 1999.
- Hamel, G. & Sampler, J., (1998). The e-Corporation. *Fortune*, December 7<sup>th</sup> 1998 p45.
- Henig, P., (2000)., Fish or Cut Bait: When verticals go horizontal. *Red Herring*. Redherring.com.
- Hill, P., (1991). Market Places. *The New Palgrave: The World of Economics*. Edited by Eatwell J., Milgate M. & Newman P. Macmillan Press.
- Hollands, M. (2000). Australia: Smart money turns to vertical markets. *Reuters*, Business Briefing May 2<sup>nd</sup> 2000.
- Jensen, M.C. & Meckling, W.H. (1976)., Theory of the firm: managerial behaviour, agency ownership structure. *Journal of Financial Economics*, 3 305-60 (330).
- Kay, J., (2000). Mechanics of the Market. *FT.com* May 16<sup>th</sup> 2000.
- Kaplan, S. & Sawhney, M. (2000). E-commerce Hubs: Towards a Taxonomy of Business Models. *Harvard Business Review* May 2000.
- Kraus, S., Wilkenfeld, J., and Zlotkin, G., (1995). Multiagent negotiations under time constraints. *Artificial Intelligence Journal* Vol 75(2) pp 297-345.
- Ministry of Commerce*, (2000). Electronic commerce: Strategic Importance, Key Issues & Way Forward. Discussion Paper.

National Office for the Information Economy (NOIE), (1999)., E-Commerce – beyond 2000. Department of Communications, Information Technology and the Arts, Canberra, Australia.

O'Brien, C., (2000)., The B2B revolution. *The Charlotte Observer*. May 21<sup>st</sup> 2000.

Schonfeld, E., (1998). Schwab puts it on line. *Fortune* p 56 December 7<sup>th</sup> .

Solow, R., (1987)., *The New York Times Book Review*, July 12 1987 p36.

Vulkan, N., (1999). Economic Implications of Agent Technology and E-commerce. *The Economic Journal* Feb 1999 ppF67-F90.

Whitford, D., (2000). Drop and Give Me 50: Internet Boot Camp. *Fortune*, March 20<sup>th</sup> 2000 p81.

Williamson, O., (1985)., Economic Institutions of Capitalism.

Zwart, A., (2000)., Development of Agricultural Structures, Forthcoming *NZARES Conference*. June 30<sup>th</sup> July 1<sup>st</sup> Blenheim 2000.

Web pages

<http://www.Agex.com>

<http://www.dcita.gov.au>

<http://www.deloitte.co.nz/>

<http://www.farm.com>

<http://www.forrester.com>

<http://www.ft.com>

<http://www.gartnergroup.com>

<http://www.nasdaq.com>

<http://www.netmarketmakers.com>

<http://www.priceline.com>

<http://www.redherring.com>

<http://www.reidfarmers.co.nz>

<http://www.siebel.com>

<http://www.theagzone.com>

<http://www.wrightsons.co.nz>

<http://www.rooster.com>