



The agritech sector represents businesses that provide technology and services to agriculture. Its value to the New Zealand economy comes through three channels:

- *the agritech sector generates direct revenue and export earnings in its own right*
- *its products and services facilitate ‘best practice’ farm management techniques*
- *the sector allows additional value to be extracted from farm products by meeting consumer preferences*

The agritech sector represents businesses that provide technology and services to agriculture. This includes products for pasture management, livestock farming, improved genetics and animal health. The emphasis is on efficient production and improving farm management techniques.

The industry body representing the sector, New Zealand Agritech Incorporated, estimate direct revenue generated by the sector domestically and internationally at \$3 billion, including export revenues of over \$500 million. However, it is clear that the benefit extends far beyond the companies directly involved in the sector.

Table 1: Agritech sector exports by destination

\$million (f.o.b.)	2002	2003	2004
Australia	139.5	140.6	150.7
China	36.1	47.2	120.3
United States	71.0	66.1	70.5
Canada	26.5	28.6	45.2
Indonesia	41.2	34.2	42.5
United Kingdom	16.5	16.8	20.2
Netherlands	9.7	10.7	14.7
Japan	10.9	10.2	11.6
South Africa	5.1	8.1	9.5
Germany	7.5	8.0	8.8
Malaysia	5.3	5.5	7.3
Denmark	8.0	5.3	6.0
Chile	3.6	3.7	5.3
Mexico	6.7	3.8	5.2
Ireland	5.2	5.3	4.5
Fiji	5.6	3.5	4.1
Vietnam	1.0	8.2	3.8
France	3.2	4.7	3.5
New Caledonia	2.4	2.3	2.7
Papua New Guinea	2.9	1.7	2.5
Rest of world	38.3	36.6	38.8
Merchandise Exports	446.1	451.0	577.8

Source: Statistics New Zealand

Agriculture sector growth has outstripped the wider-economy

Agriculture continues to be an important part of the New Zealand economy.

Agriculture’s direct contribution to GDP oscillates between 5 and 6 percent depending on seasonal conditions. This may seem light, considering that agriculture is often tagged as the backbone of the New Zealand economy. But agriculture also forms the base of a great deal of other economic activity and generates the lion’s share of foreign currency earnings. Taking account of primary processing, the sector’s contribution to the New Zealand economy increases to around 10 percent of GDP. Including on-farm production, the input supply sectors and downstream processing, transport and marketing sectors, agriculture’s contribution approaches 17 percent of GDP.

Contrary to common perception agriculture has grown in importance since the close of the 1980’s - a decade which marked significant change in the rural environment. In 1990-91 the total agricultural sector, including associated activities, contributed 13½ percent to GDP. By 2002-03 the sector’s contribution to GDP had grown to 17 percent¹. That improvement is in part the result of improved farm management techniques. It is also partly the result of improvements in downstream processing and marketing. For example, in 1986-87 around 72 percent of lamb was exported as carcasses, whereas today around 95 percent of sheepmeat is exported as further processed (added value) product.

The focus is on efficiency

There have been significant improvements in farm productivity during the two-decades since the New Zealand government embarked on a

¹ Based on Meat and Wool New Zealand Economic Service estimates

program of deregulation of the New Zealand economy, which included the virtual elimination of all subsidies to agricultural producers.

During this period, New Zealand farm businesses have had to become more efficient, without the safety net afforded by government support. Indeed, it was expected that in a market environment, New Zealand's dependence on agriculture would decline. But that has not been the case. Instead, the sector has learnt how to produce products at lower cost. But equally, the quality of those products has improved to meet consumer preferences.

On-farm productivity gains have come through such advances as:

- » farm consolidation, which has resulted in increased average farm size;
- » improved genetics and performance based stock selection;
- » alternative land use (dairy conversions, horticulture, forestry) and taking marginal land out of production;
- » improved pasture management techniques through the cultivation of better cultivars (seeds, grasses, legumes, herbs), fertiliser application, nitrogen fixation, optimal soil nutrients, subdivision, electric fencing, irrigation, fertilizer application and satellite mapping;
- » advances in animal husbandry, including pregnancy scanning, worm and parasite control and optimising ruminant processes to maximise feed conversion efficiency;
- » stock traceability;
- » reducing negative externalities; for example minimising run-off to protect waterways and minimising ruminant greenhouse emissions;
- » education/training.

Table 2: Key productivity measures for the New Zealand pastoral sector

Productivity Comparison	1990-91	2004-05e	% chg
Lambing %age (ewe)	101.6	123.0	+21%
Av lamb weight	14.4	17.1	+19%
Lamb sold kg/ewe	9.8	15.8	+62%
Wool kg/head	5.3	5.8	+9%
Av steer weight (kg)	297	318	+7%
Milksolids (kg per cow)	260	340	+30%

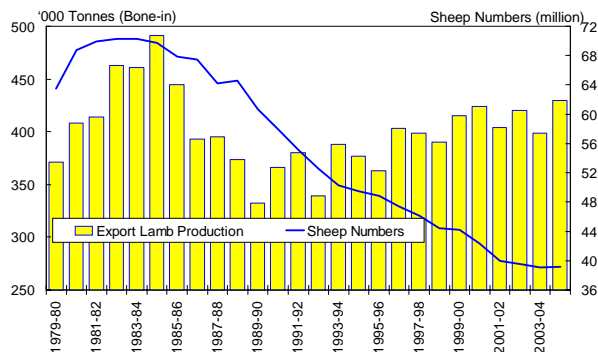
Source: Meat and Wool New Zealand Economic Service, Dexcel

These activities, which are closely associated with the agritech sector, have allowed significant increases in farm productivity. This has been characterised by lamb production which has trended up during the past 15 years, despite an ongoing reduction in the sheep flock.

The agriculture sector has recorded annual growth averaging more than three percent since the start of

the 1990's. This has been achieved despite a decline in the rural workforce.

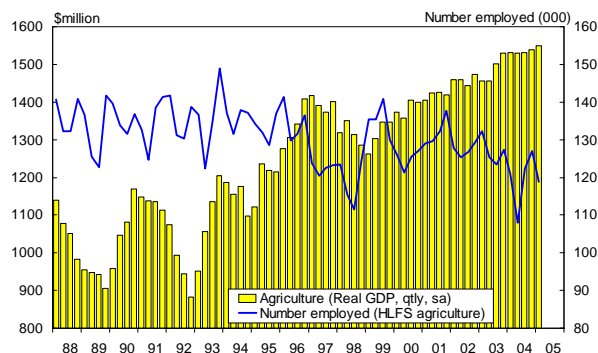
Sheep Numbers and Export Lamb Production



Source: Meat and Wool New Zealand Economic Service

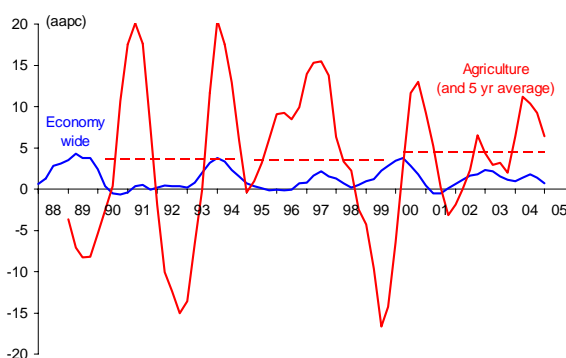
Measures of labour productivity for the sector are strongly influenced by seasonal conditions. Nevertheless, a comparison of growth and labour market data indicate that the sector has achieved better labour productivity growth than the wider economy. This is consistent with the sector having increased its contribution to GDP from a declining workforce.

Agriculture Valued Added and Numbers Employed



Source: Statistics New Zealand

Agriculture Sector Labour Productivity



Sources: Statistics New Zealand, ANZ

There are issues for the sector surrounding the ability of unskilled, skilled and seasonal labour that need

addressing. There are also issues surrounding weak rural telecommunications networks which are preventing the uptake of R&D. A political hot potato, public access to farmland could also present an unwelcome risk to farm business operations. But the broad message is that - in common with the wider economy - changes since deregulation in the 1980's mean that New Zealand's agriculture sector is now better able to respond to market signals. It is also in a better position to respond to adverse climatic and external events.

Adding value – moving away from the commodity game

Raising productivity is one avenue for pushing New Zealand up the OECD ladder. The other is improving the price received for exports relative to imports; that is addressing New Zealand's terms of trade. There are two avenues through which this can be achieved:

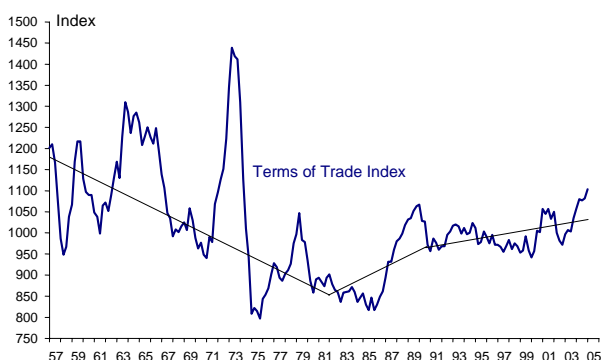
- » **lift returns for agricultural products;**
- » **diversify out of agricultural products to the industrial, telecommunications and service sectors .**

Our observation is that a lift in New Zealand's terms of trade is being delivered through the first of these channels.

Overseas trade data indicates that New Zealand's merchandise terms of trade have improved by more than 10 percent over the past two years. Part of this improvement is undoubtedly cyclical, but an underlying structural improvement in New Zealand's terms of trade is also apparent.

This is consistent with improvements in marketing and an emphasis on value-added which have contributed to better offshore returns for New Zealand's still predominately agricultural exports.

New Zealand's Terms of Trade

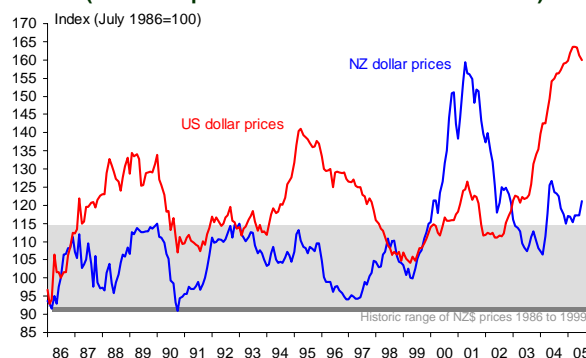


Source: Statistics New Zealand

The trade data is partly a reflection of commodity prices which are presently receiving strong cyclical support, but which also appear to have moved to a higher plane. Agricultural products increasingly have

intrinsic values associated with animal health and husbandry practices, New Zealand's clean green image and food traceability - qualities which New Zealand's agriculture sector continue to emphasise. In addition, population growth, rising affluence in Asia, urbanisation and 'westernisation' of diets are helping underpin demand for agricultural products.

**ANZ Commodity Price Index
(US dollar prices and converted to NZ dollars)**



Source: ANZ

In contrast, manufactured goods have become the "new commodities" courtesy of globalisation and excess capacity in the manufacturing arena. This has been characterised by massive increases in capacity in China in particular, which have resulted in excess global capacity.

Biological constraints mean that advances in productivity in the agriculture sector have not matched those in the manufacturing sector. But equally, some of the applications of technology to pastoral production are not as easily transferable as in the manufacturing sector. Looking forward, this is long-term positive for New Zealand's terms of trade and indicates New Zealand agriculture has every opportunity to maintain its importance to the New Zealand economy as a source of export revenue.

Reese Manufacturing – NZ is recognised overseas for its pasture based primary technology

Reese Manufacturing is a Palmerston North manufacturer of agricultural machinery who undertake their own R&D, some in collaboration with Massey University. Three observations stand out:

- high land prices are encouraging on-farm capital investment, with a focus on improving efficiency, particularly where the cost of land is making expansion prohibitive;
- it is important for firms to have a strong domestic base;
- New Zealand has a recognised standing overseas for its pasture based primary technology.

This is within the context of a fiercely competitive global food business, driven by consumer issues, including food safety, in which agri-business must identify and satisfy the demanding specification of consumers in diverse markets at least cost and maximum reliability.

ANCARE - Value added is more than just *more processing*.

In twenty years, Ancare has become one of the leading suppliers of animal health products to the New Zealand market, and a growing force internationally. This success, in the face of strong competition from major international pharmaceutical companies, has been due to the development of many innovative products and an emphasis on partnership with its customers.

Managing Director, Colin Harvey, believes that *added value is not just added processing*. For New Zealand, it is about 'know how' and niche marketing. This means that the sector has to be able to understand what is driving consumer demand and what outputs it is trying to generate.

As such, the influence of the agritech sector extends beyond the farm gate as New Zealand moves away from the commodity game. Productivity increases have occurred at processing plants and returns enhanced through the development of export markets. This has allowed the sector to produce agricultural products at lower cost, while at the same time responding to consumer preferences so that greater value can be extracted from those same products. The key is not only improving margins, but keeping abreast of changes and ensuring New Zealand continues to be recognised for its best practice pasture-based farming practices.

Improving performance

New Zealand is at the forefront of green, sustainable, low-cost farming systems. This has come as much through the sector's willingness and ability to take-on new technology as comparative advantage in natural resources. It is a two-way process. Adding value is the key, not only to improving margins, but also keeping abreast of trends.

However, New Zealand has not been alone in lifting its game. Research by *AgResearch* has revealed that New Zealand has lost its edge as the world's cheapest producer of milk to Chile and Argentina. The research indicates that New Zealand milk production costs decreased by 12 percent between 1996 and 2002. But this was more than matched by some of our major competitors, albeit from a higher initial cost-base. While partly exchange-rate related,

this reflects cheaper land that is as good as New Zealand's, more abundant and cheaper labour, good market access and access to exported New Zealand farming skills and technology.

Research into beef genome, part of an international network:

New Zealand's involvement in global beef genome research reflects the need to be part of international networks. New Zealand contributed US\$1 million to the \$US53 million project undertaken by the US National Institutes of Health and follows research on the human genome. The understanding that New Zealand will be in a good position to capitalise on the knowledge generated by the sequencing of the bovine genome recognises that we have the necessary infrastructure and expertise to leverage off the information that it will provide. While the sequencing itself is occurring in the United States, a lot of research will come from it. The nation's involvement places New Zealand at the forefront of the technology, while helping build relationships with like parties.

Expected benefits from the sequencing of the bovine genome include the ability to identify genes that control growth efficiency, muscle development and milk composition. Many of the benefits will derive from subsequent research derived from the sequence, not the sequence itself. In effect, New Zealand's technology sector will apply the science from which the agriculture sector stands to benefit.

An example of the overlap of the agri-tech and bio-tech sectors, more traditional agri-science will be the avenue to verify many of the results of bovine and pastoral genomics in the field.

New Zealand maintains a competitive advantage in world markets as an agricultural producer, but the sector must continue to focus on producing products at low cost, while at the same time responding to consumer preferences so that increasing value can be extracted from those same products. A key to maintaining that competitive advantage is through New Zealand's recognised standing as a pasture based primary producer.

In a paper published last year, New Zealand's *Ministry of Research, Science and Technology (MoRST)* acknowledge that global connectedness – where firms of any nation can access the resources of other nations through investment – means that comparative advantage in resources is less important in many industries than the technology and skills to process them effectively or efficiently.² This means that interaction amongst firms and with research

² Julian Williams, *The Impact of R&D on Economic Growth*, Ministry of Research, Science and Technology June 2004.

providers is needed if they are to keep pace with and adapt to changes in technology.

In the report, the Ministry emphasises the need to collaborate in research and commercialisation opportunities, since knowledge is diffused throughout the innovation system in a complex way. The Ministry also present a role for government to supply the R&D for society that firms will not. This occurs where firms cannot appropriate all the benefits from the R&D undertaken, particularly where they struggle to exclude other firms from subsequently using R&D outcomes.

But there are wider issues for the industry, which has to work within an increasingly demanding environmental framework. The industry must work to minimise compliance issues that could act as barriers to productivity. Equally, New Zealand's sustainable farming practices and clean, green image are a point of competitive advantage.

[New Zealand R&D Expenditure](#)

Statistics New Zealand's latest R&D survey reveals that expenditure on research and development totalled \$1.6 billion in 2004, equating to 1.1 percent of GDP, unchanged from 1.1 percent of GDP at the time of the previous R&D survey undertaken in 2002. This is lower than the OECD average of 2¼ percent of GDP and is mainly accounted for by a lower contribution by business than many countries that make up the OECD. Public R&D expenditure is broadly comparable to other OECD countries.

Reasons for low private R&D expenditure include zero spending in New Zealand in areas such as pharmaceuticals, defence and space exploration. Contributing to this, the structure of New Zealand industry may mean that individually, many businesses are unlikely to have the resources to perform their own R&D. This is particularly true for farm businesses. Small companies may lack the skills and processes to generate commercial returns from R&D expenditure and face hurdles raising credit on uncertain revenue streams. This contrasts with R&D in other developed countries which is strongly concentrated in large multi-national companies.

Nevertheless, farm businesses rely heavily on R&D. Moreover, New Zealand farmers have a history of innovation. But as the Ministry of Research, Science and Technology note, *it is not necessary for farmers to invest directly in R&D as it is conventionally defined, in order to take up new technology. It is necessary for them to have a certain existing level of technological capability to take on further developments.* Indeed, a highly competitive deregulated environment means that New Zealand farm businesses have been observed to be more

responsive to changes in technology than other parts of the world³. As a result, the sector enjoys an 'early mover' advantage in terms of uptake from the results of R&D.

Table 3: Research and Development Expenditure

Sector \$million	2002	2004	%
Primary sector	14	19	33
Primary processing	30	28	-7
Manufacturing	164	210	28
Science and Technical	184	204	11
Other Service sectors	128	188	46
Total private sector	521	648	25
Government	460	498	8
Universities	436	455	4
Total R&D expenditure	1,416	1,601	13
R&D as % of GDP	1.1	1.1	

Source: Statistics New Zealand

[New Zealand Agritech Incorporated](#)

The society's mission is to encourage and foster the adoption and growth of new agricultural technologies in New Zealand and internationally.

The society represents businesses that provide the technology and ideas that drive productivity growth in New Zealand's pastoral industries. In addition, these businesses form a significant industry in their own right.

However, many of these are small firms that lack the resources and ability to specialise of larger firms. Consequently, an industry challenge (and opportunity) is to capture critical mass among a group of small firms to address collective needs. This extends to the development of international distribution networks for goods and services through co-operative marketing promotions in offshore markets. Targeted international trade shows provide a channel for establishing overseas contacts and building distribution networks. They also provide a mechanism for transferring knowledge and capability among the sector.

[Conclusion](#)

New Zealand's agritech sector has been at the forefront of technological developments which have allowed significant improvements in farm productivity during the past two decades. The sector is also closely aligned with improvements in marketing and an emphasis on value added

³ Based on observations by *Meat and Wool New Zealand* research and development.

which have contributed better offshore returns for New Zealand's still predominately agricultural exports.

It is estimated that the direct revenue generated by the agritech sector domestically and internationally is around \$3 billion (2 percent of GDP), including export revenues of over \$500 million. However, it is clear that the benefit extends far beyond the companies directly involved in the sector.

The sector's products and services facilitate 'best practice' farm management techniques, while advancing New Zealand's reputation for innovation and quality. Indeed, New Zealand has a proven reputation in agri-research and New Zealand farmers are quick to take up new technology providing an 'uptake advantage'. This has placed New Zealand agriculture in a strong position to leverage of the outputs of the agritech sector – from farm-gate to

plate – while also building the capability to use foreign based R&D.

Associated practices have also allowed additional value to be extracted from farm products, by identifying and meeting consumer preferences. This extends to creating value from characteristics distinguished other than by consumption - qualities associated with good animal health and husbandry practices, New Zealand's clean green image and food traceability.

However, many agritech companies lack the resources and ability to specialise of larger firms. In this respect, New Zealand Agritech Inc. is dedicated to capturing critical mass to address collective needs. For example, targeted international trade shows which provide a channel for members to establish overseas contacts and build distribution networks.

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