Animal industries into the 21st century: a wool perspective

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ABSTRACT

The major challenges facing the sheep industry are improving animal performance, minimising disease, reducing labour, and being attuned to consumers' long term needs. Solutions will involve new technology in sheep breeding, biological disease control and novel approaches to reducing the labour associated with sheep. Environmental, health and welfare issues are shaping up to be major consumer issues by the 21st century and production techniques will come under closer scrutiny in future.

INTRODUCTION

With recent world economic and political events, wool supply exceeding demand, large wool stock piles and changing consumer preferences, the 21st century seems a long way off.

The viability of sheep and wool industry will be determined in part by how well it copes with threats that are likely to increase in importance. These are:

- Competition from new high-performance synthetic fibres;
- The relative costs and returns for sheep and wool production;
- Environmental and animal welfare issues associated with sheep and wool production.

These topics will be discussed with particular reference to the role that new animal production technology may play in ensuring a viable sheep and wool industry into the 21st century.

THE WORLD SUPPLY OF WOOL AND COMPETING FIBRES

In New Zealand wool production has been decreasing in recent years. Table 1 shows that, in contrast, world wool production has been growing steadily largely due to good growing seasons in Australia, rising prices for fine wool and subsidised sheep production in EEC countries. World wool production is expected to peak globally at just under 3,500 mkg in 1990/91, when Australian production plateaus.

TABLE 1 World wool production (Mkg greasy)

	1984/85	1989/90	Change (%)
Australia	814	1100	+35
New Zealand	373	306	-18
EEC*	99	115	+16
UK	56	70	+25
Other	1694	1793	+6
Total	3036	3384	+11

* France, West Germany, Greece, Irish Republic, Italy, Portugal, Spain.
Source: Anon (June 1990).

Even with global wool production increasing steadily in recent years, wool's share of the world's textile market continues to fall. Currently, it is about 5% of the textile fibre market and is expected to decrease to about 3% by the year 2000 and continue to decline. Wool prices relative to synthetic fibres have increased as costs of synthetic fibres have declined. This trend is likely to continue, but may be limited as new, higher performance and higher price synthetic fibres reach the market. Wool has carved out a solid market niche at the top end of the market. This is helped

by increasing affluence, the back to nature movement and the continued research and promotion efforts.

TABLE 2 Changes in the wool price/synthetic price ratio in 20 years.

	1970	1980	1990	Average
Carpet	1.1	1.8	1.6	1.5
Apparel	1.7	2.7	3.8	2.7

Source: Anon (April 1990).

LIFESTYLE TRENDS

Apparel Wools

Historically, a large proportion of our wool was used in apparel. Prior to the 1960's large quantities of our strong crossbred wools (30-36 microns) were used in heavyweight outerwear, knitwear and blankets (Carnaby, 1981). As the living standards and lifestyle of Western European consumers changed, with heated homes, offices and cars, there was less need for heavy clothing. Today, very little wool stronger than 28 microns is used in apparel. Fabric weights have halved in the last 30 years with the trend continuing towards lighter and softer garments. Typical fabric weights are now 200 gm/m^2 compared with 350 gm/m^2 in the 1960's.

Most apparel manufacturers now require 24 micron wools and finer. Demand for wools finer than 21 microns is increasing. This move towards finer and lighter apparel is expected to continue as consumers dress more for comfort and aesthetics, than warmth. This trend will probably continue to see demand for very fine wools and other fibres. Synthetic fibre manufacturers are already producing micro fibres of 5-10 microns to meet demand for light, soft handling products.

Carpet Wools

Fortunately for New Zealand, the improved living standards in Western Europe have brought about an increased demand for carpet, both in the home and in the office. This has resulted in an increased demand for fibres in carpet manufacture which has largely offset the move away from stronger wools in apparel manufacture.

Wool carpet was traditionally woven, but the introduction of tufting for synthetic fibres soon forced wool to follow suit if it was to remain competitive. Today most of New Zealand wool is used in tufted construction. This process requires long sound wools free from fault and as near to synthetic fibre processing characteristics as possible. Fortunately, this favours New Zealand wool, but it has also allowed for a more direct comparison with synthetic fibres in terms of fibre properties and processing efficiency. In this comparison, wool is often at a disadvantage in that it usually does not have the tensile strength, colour and bulk of synthetic fibre. It also often contains impurities which make processing more difficult.

One of the strengths of the New Zealand wool clip is the large predictable volume of uniform wool. This is also a weakness in that the clip does not contain sufficient variety to meet the specific needs of some manufacturers and products.

Some examples of wool types in short supply are:

1. High bulk wools for carpets and wool-fill products.
2. Wools with improved fibre strength and colour.
3. Super fine wools, 10-15 microns for light weight and soft handle.
4. Fine lustrous wools for suitings and knitwear.

One of the major challenges will be combining wool and meat traits in a dual purpose animal. For example, can we envisage a Romney type sheep growing an 18 micron fleece in Southland? Do we have the technology and the courage to embark on a programme to develop designer sheep?

THE CONSUMER, THE ENVIRONMENT AND ANIMAL WELFARE

Environmental, health and animal welfare issues will

increasingly dominate consumer's buying decisions. This is especially likely with products that are discretionary, relatively expensive, and usually sold to better educated and informed consumers. Wool and most other New Zealand animal products fall into this category.

Processors and marketers of animal products will increasingly demand detailed product information to determine health issues for both their employees and consumers. The increasing interest in organically grown products is a case in point. Wool has always been considered a natural and healthy product and has been actively marketed on these attributes, yet we are seeing consumer groups, regulatory authorities and synthetic fibre manufacturers publically questioning the environmental impact of wool production and subsequent manufacture.

Production practices that we accept as good farm management, such as chemical weed control, chemical fertilisers and husbandry practices such as drenching for internal parasites, dipping and docking, are likely to become increasingly important issues to consumers. The concern about environmental pollution from manufacturing processes continues to gain momentum and has already implicated wool. Some of these problems are directly related to farm management. As governments and regulatory authorities address these issues (as they are currently doing in EEC countries), wool producers will be required to change some practices.

As a natural fibre, wool has benefited from consumers increasing environmental awareness. But as a result of carefully formulated public relations programmes in many industrialised markets, there now appears to be a more sympathetic attitude to both synthetic and man made fibres. Natural fibres are no longer the sole beneficiaries of the increase in environmental consciousness.

One of the challenges for scientists is to develop production systems and animal products that meet the real and perceived needs of our future customers. For example, new solutions are urgently required for fly control that do not rely on broad spectrum chemicals. In the longer term the sheep industry may have to defend itself on its use of natural resources, relative to the food and fibre produced.

THE FUTURE SHEEP FARM

The typical sheep farm will likely continue to be the family unit of about 500 hectares. This is about the same size as today's property, which has changed little in recent years. New Zealand sheep farmers have made major gains in farm productivity by increasing both stock numbers and stock managed per labour unit.

TABLE 3 The change in stock units per labour unit in the last 20 years.

	1968/69	1988/89	Increase
Sheep su	1,041	1,576	+ 51%
Total su	1,360	2,009	+ 48%

Source: NZMWBES.

Table 3 shows the increase in the last 20 years has been approximately 50% in sheep numbers per farm/labour unit. This increase probably underestimates the real reduction in labour, as an increasing number of rural women and some men have sought work off the farm. This trend is likely to continue as real prices continue to decline, but there are physical limits to the number of sheep a person can handle. Unless the labour requirements associated with sheep can be reduced, then the number of sheep a person can handle is probably near the maximum on most farms.

As the cost price squeeze continues, the sheep farmer has a limited range of options to further improve efficiency. These include: reducing inputs; increasing stock numbers; improving stock performance; increasing farm size.

In recent years, there have been major reductions in farm expenditure, particularly fertiliser and maintenance. Further cost reduction is not a realistic option on most farms. Increasing farm size is not a possibility for most. The most likely options are increasing stock numbers (although many farmers feel that they are near their limit, particularly with sheep) and/or improving stock performance. This last is probably the most attractive, as the only requirements are dedication, and marginally more labour and some increased costs.

Table 4 shows that relatively little, if any, improvement has been made in the national flock over the last 25 years. As most of the increases in output have come from increased stock numbers per hectare and per labour unit, this has probably blocked expression of genetic changes in sheep productivity.

TABLE 4 National averages of sheep performance in 5-year periods.

	1965/69	1970/74	1975/79	1980/84	1985/89
Lambing %	97.9	92.6	94.6	99.7	99.0
Wool/Head	5.59	5.27	5.41	5.30	5.24

Source: NZMWBES.

Table 5 is based on sorting farms into three groups on gross farm revenue per stock unit. This analysis highlights the importance of sheep performance on gross revenue and net farm profit before tax. This suggests that major emphasis should be placed on improving stock performance as the best way of improving farm profit. The added bonus is that it will require only marginally higher labour and farm expenditure.

TABLE 5 1986/87 Averages of physical and financial performance of sheep farms ranked according to their gross revenue per stock unit.

	Gross Revenue per Stock Unit			
	Low	Medium	High	% Difference between M & H
Percentage of Farms	15%	70%	15%	
Area (ha)	369	350	342	-2.3
Stock Units	3889	3794	3806	+0.3
Stock Units/ha	10.6	10.8	11.1	
Wool Sold Kg/hd	3.16	4.37	5.13	+17.4
Lambing %	72.2	95.6	112.1	+17.3
Gross Revenue $/ha	180.00	313.00	452.70	+44.7
Total Exp. $/ha	196.22	233.89	283.45	+21.2
Farm Profit $/ha (before tax)	-16.74	79.11	169.25	+113.9

Source: NZMWBES (1989).

This type of information suggests that there is considerable scope for increases in performance and that scientists may have to take a closer interest in ensuring that their messages get taken up and applied by producers.

Those working in animal production science and technology will need to have two major underlying goals directing their work:

1. Improving the efficiency of sheep and wool production.

2. Developing production systems and products that meet the real and perceived needs of the consumer.

The sheep farms of the future will likely become more product specific. They will not just be producing lamb or wool, but will be aiming at a particular type, grade or weight range with a particular market in mind. The product will be fully specified in processing or product terms which will provide clearer market signals and allow the producer to better tailor his production.

As suggested previously, in the future most sheep farmers are likely to concentrate on improving sheep performance as the best way to increase farm profit. Major interest will focus on genetic improvement, improved nutrition from pasture, disease control and reducing labour-intensive sheep work.

Although existing animal breeding and selection technologies are available, they are not being widely accepted or used by sheep breeders. Before technologies such as artificial insemination and embryo transfer can be effectively used, the industry needs much better identification of superior genetic material, and lower cost, do-it-yourself reproduction technology. Only then will the sheep industry be able to realise the genetic gains that are available. There are already a number of commercial producers achieving 200% lambing and 8 kgs of wool per sheep stock unit. This is double the national average production levels and shows the potential available with existing technology.

On many farms sheep performance is being severely limited by a wide range of animal health issues. Problems such as facial eczema, parasitic resitance, flystrike, Johnnes disease, rye grass staggers and dagginess all reduce productivity, add to labour re-

quirements and effect product quality. A worrying feature is that most of these diseases appear to be getting worse and are certainly adding to total labour requirements. In finding an answer to these and associated disease problems, scientists need to be aware of how the final consumer may view the disease control method and what effect it may have on the wider environment or animal ethics issues.

We can all think of examples in the past where short term solutions have left long term problems. We should also not overlook the possibility that what we consider to be good animal husbandry practice may not be acceptable to consumers in the future who are becoming increasingly conscious of animal welfare issues.

The new biotechnologies have the potential to control disease and improve animal productivity or product quality in a dramatic way. However, the first breakthroughs are likely to involve simple organisms and plants rather than livestock directly. An example is the major gains that could be made if sheep can get an enhanced supply of essential amino acids past the rumen. Biotechnology offers the chance of genetically engineering pasture plants to increase the levels of essential amino acids. Another, probably more difficult, route is to manipulate the rumen bacteria. These same approaches also have the potential to reduce animal disease problems such as facial excema, internal/external parasites, dags and rye grass staggers; all very important sheep diseases.

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