



**Will wool growing be a viable business in 2029?
A review of price and productivity trends.**

**Report Prepared for
Australian Wool Innovation
and Land and Water Australia**

by

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Summary

The key points that relate to industry investment are:

- Meeting declining prices through productivity gains is likely to be relatively easy for most wool producing businesses if they focus on implementing key technology. This appears not to be currently occurring due to a combination of the lack of a dynamic culture, where new technology is often perceived as a threat rather than an opportunity, and the low levels of education and lack of business focus. These factors when combined, mean that a large proportion of the industry does not understand the determinants of successful and profitable wool production businesses.
- The easiest gains are likely to come from current technology while implementing genetic improvement programs which focus on fibre diameter reduction rather than increased fleece weight. Fibre diameter reduction results in a higher quality product, enabling producers to move between price grades and avoid declining real prices.
- There is an opportunity to invest to achieve productivity gains across a broad front (genetics, pasture, productivity, labour productivity) rather than rely on one area. This is likely to result in incremental gains with relatively low risk compared to relying on large gains from one or two technological developments. Quantum leaps in technology are the exception rather than the norm, though when they do occur the benefits can be spectacular eg. sub and super.
- There are major structural issues in the industry, primarily related to labour and enterprise size, which are likely to impede productivity gains but if they can be overcome there is the potential for substantial gains. If they are not overcome further declines in the relative profitability of specialist wool producers is likely to be inevitable.
- Gains that improve per head (genetic) and/or per hectare productivity should be the priority. Cost cutting per se is likely to yield little or no gain unless it focuses on improved labour productivity.

Introduction

All commodity producers suffer from declining terms of trade. This situation has been occurring since the industrial revolution, which provided the catalyst for specialisation across a range of sectors in the economy. Efficiency gains in agriculture have been a trigger for the industrialisation and subsequent urbanisation that is a feature of modern economies.

There is no reason to consider that this trend is about to change. It is inexorable. It occurs because productivity gains enable the commodity to be produced for a lower cost and over time, efficient markets reflect the lower cost of production in the price they pay.

In a market where producers are striving to earn higher profits than their competitors, producers improve productivity which in turn leads to further reduction in prices. This is a catch 22 situation but is not new. The industry has been managing to achieve substantial productivity gains since sheep were first introduced to Australia. Some of the most dramatic have come through technologies such as fencing, prior to which we needed one labour unit per 300 sheep, mechanical shearing, mechanisation (incl tractors, motor bikes, wool presses), ‘sub and super’ and exotic perennial pastures.

Australian wool producers can stand aside and refuse to be part of the treadmill of productivity gains and theory would have it that in doing so they should be able to prevent further declines in the real value of wool. Such an approach may be achievable if the Australian wool industry did not have competitors, either wool producers in other countries or producers of competing fibres such as cotton or synthetics. Those competitors also seek efficiency gains that drive down prices over time. If the wool industry chooses to stand aside and ignore this trend it will do so at its own peril. It will become the domain of history text books and zoos for rare and endangered species.

This paper discusses the decline in real wool prices over time and how well that decline has been matched by producers achieving efficiency gains. In addition, it considers the decline in cost of production that is likely to be required for wool production to remain viable and competitive with other industries that require similar resources as wool. Also the possible means of achieving such a reduction are presented and discussed.

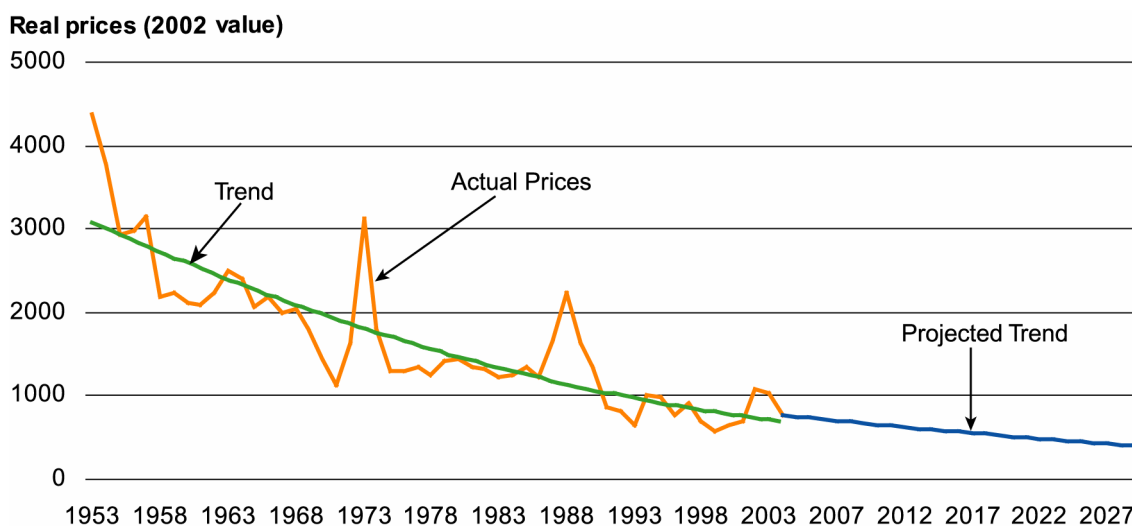
Real price

The starting point for an analysis of declining terms of trade is price. The price trend over time must be matched or exceeded by a lowering of cost per unit of production in order for a business to maintain its profitability.

Graph 1 shows the price trend for 21 micron wool since 1953. The raw data for 21 micron and trends for 16, 19 and 23 are shown in Appendix I. This starting point is selected because it came after the extreme prices of the early 1950's and coincided with the introduction of synthetics as a competitor fibre. These figures are then extrapolated until 2029 using the following assumptions:

- Historical ABARE CPI data is used to adjust to 2002 prices.
- Projected prices are based on 3% per annum inflation and results are expressed in 2002 dollars.
- Price spikes have been excluded from historical data because they are a reflection primarily of supply shocks and therefore do not reflect underlying demand.
- All prices are expressed as cents per clean kilogram.
- The decline is logarithmic which is consistent with real price trends for most commodities.

Graph 1: Real price and trend, 21 micron wool



Source: Independent Commodity Services

The prices for superfine wool, in this case represented by 16 micron wool, are only available as far back as 1985 so the average premium for 16 micron over 19 micron from that time was

used to provide longer term data. Despite its extreme volatility, there is no evidence of a declining trend in the size of the 16 micron premium during that time. However the extreme premiums for fine wool are likely to continue to encourage an increase in production through genetic change, as well as through the adoption of new technology such as in shed testing which allows identification, and separate selling of fine wool that has, until recently, not been identified. The projected change in prices over the next 25 years, in both percentages and absolute dollars are shown in Table 1.

Table 1: Projected change in wool prices to 2029

Fibre Diameter	2004 Price *	Projected Price 2029	Total Change		Per Annum Change	
			¢	%	¢	%
16	2,036	970	-1,066¢	-52%	-42.6¢	-2.1%
19	1,038	680	-358¢	-35%	-14.3¢	-1.4%
21	753	406	-346¢	-46%	-13.9¢	-1.8%
23	658	332	-326¢	-50%	-13.0¢	-2.0%

* based on trend, not on actual price for 2004

The projections for 21 and 23 micron are quite robust given the long term price trends and their close association with synthetics.

The 16 micron projections need to be treated with caution because of the relatively short period and low volumes on which the data are based.

The trend for 19 micron wool is lower than that for 21 and 23 micron due to the fundamental change in the market that occurred in the early 1980's, primarily due to virtually complete adoption of fibre diameter measurements that enabled processors to reliably extract the full inherent value from finer wool. The change in premiums for 19 over 21 micron wool as a consequence are shown in Appendix I. This increase in premiums due to change in technology has resulted in a slower rate of price decrease for 19 micron compared to that of medium and broad wool.

Based on these projections, wool producers will need to lower their cost of production by 1.4-2.1% per annum to match the declining prices. This is equivalent to a reduction of 12-15 ¢/kg clean per annum for 19-23 micron wool and a reduction of 43 ¢/kg clean for 16 micron wool.

To match these trends, Australian wool producers need to improve productivity. To achieve this there are two options. The first is to reduce their cost of production to at least match the decline in price. The second is to increase the value of the product to increase the price received, with the obvious method being to reduce the fibre diameter of the clip which is the single largest determinant of price. In reality, both options are available to wool producers and both offer substantial scope to match or exceed the declining price. Reducing fibre diameter offers wool producers a substantial competitive advantage over producers of other broadacre commodities such as beef, wheat, canola and sheep meat which only provides limited opportunities to differentiate their product in order to receive a premium price.

Price is only one factor that changes over time. The cost of inputs including those purchased, land and labour also vary. When these changes are combined with changes in price, the change in terms of trade can be measured.

Productivity Gains

Declining terms of trade need to be met by productivity gains for producers to maintain long term viability. Failing to match the declining terms of trade will result in resources being diverted to other industries which, in the case of wool, are likely to include cropping, beef or lamb production. Comparative productivity gains for the major broadacre industries in Australia are shown in Table 2. Sheep businesses are categorised as being either wool or lamb producers.

Table 2: Productivity of terms of trade for southern Australia broadacre industries (1978-2002)

	Total Factor[#] Productivity	Terms of Trade	Difference
Specialist Sheep (wool)	0.8%	-2.1%*	-1.3%
Specialist Sheep (lamb)	1.4%	-2.1%*	-0.9%
Specialist southern beef	1.3%	-1.5%	-0.2%
Sheep – crops	2.5%	-2.5%	0%
Specialist crops	3.3%	-2.6%	+0.6%

Source: Productivity in Australian Livestock Industries 1977/78 to 2001/02, ABARE April 2004

* Separate data for wool and lamb specialists not available

[#] Total factor productivity is a measure of total output relative to total input

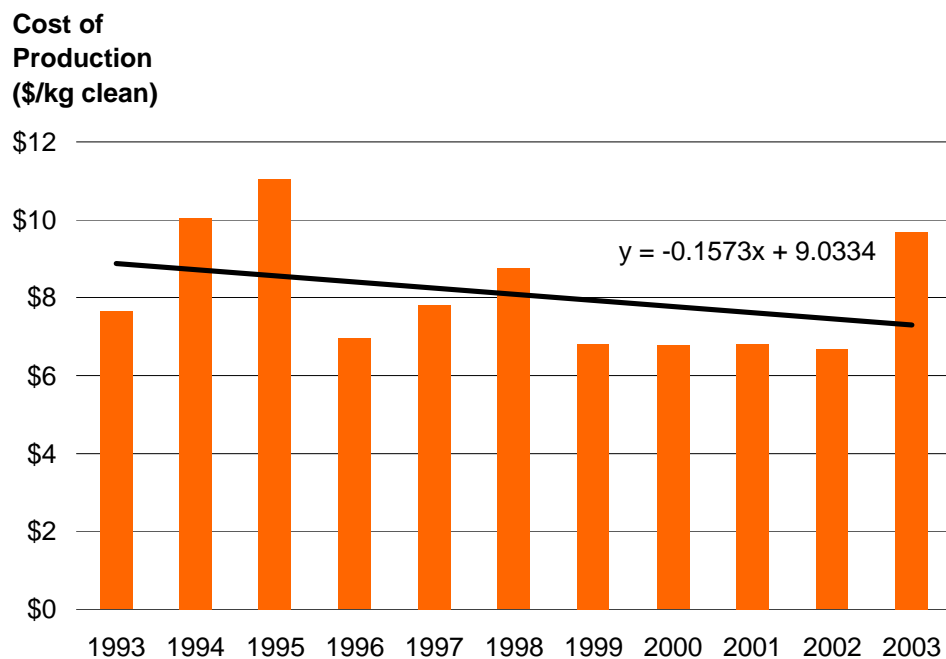
It is apparent from Table 2 that the specialist sheep (wool) category has had the lowest rate of productivity gain of all the sectors that are potential competitors for resources to produce wool. Wool also has had the largest difference between terms of trade and total factor productivity. Specialist cropping was the only enterprise where productivity gains exceeded the decline in terms of trade. As a consequence resources have been diverted from wool production into other enterprises, particularly into cropping. If the gap between terms of trade and productivity of sheep enterprises is not at least eliminated, but preferably reversed over the medium to long term, the resources devoted to sheep production will continue to decline.

Cost of Production

Cost of production trends for a sample of farms is shown in Graph 2. Drawn from Holmes Sackett & Associates data and the Victorian Farm Monitor Project the sample represents data for 100 to 200 farms each year except 1993 (44 farms).

This sample is as long a time series as is available in Australia on the cost of producing wool however is inadequate to provide robust long term trends that compare with the price series. It is also a biased sample in that those producers inclined to participate in measuring and monitoring farm performance are the more business orientated producers. Comparison of NSW data with ABARE data shows the average of Holmes Sackett & Associates participants (the majority of the data in Graph 2) is equivalent to the top 20% in ABARE.

Graph 2: Cost of production trend



Source: Holmes Sackett & Associates - Farm Study Monitor

Graph 2 shows an annual average decline of 1.9% from 1993 to 2003. Note that this trend includes the effect of the 2002/03 drought which resulted in a substantial increase in cost of production. If the drought was considered more severe than a one in ten year event, then it would have a disproportionate effect on the cost of production trend. In terms of its effect on individual farm businesses, we consider it to be closer to a one in ten than a one in a hundred year event.

The extent of the decline in cost of production is sufficient to match or exceed the declining price trends shown in Table 1. This indicates that this group of wool producers have on average achieved sufficient productivity gains as measured by cost of production to match the declining price. This result does not take into account any increase in wool value as a result of decreasing fibre diameter. At least part of the decision could be attributed to improved sheep meat prices.

The above figures show cost of production for all fibre diameter categories which provides a broad perspective but does not provide any indication of differences between wool of different qualities. Also the cost of production figures are based on the average of all farms regardless of

the quantity of wool produced. If production is skewed, for example by a small number of large growers, using farm averages rather than the average cost of production per actual kilogram produced may lead to incorrect conclusions.

Cost curves for fine, medium and broad wool are shown in Graphs 3-5. Each cost curve is based on farms with at least three years data since 1997/98. For each farm the cost of production and the quantity of product produced has been averaged over the number of years for which information is available. Therefore, the data represents a medium term picture of performance rather than a one year picture which can influence the results positively or negatively. The effect of the most recent drought is included in the data.

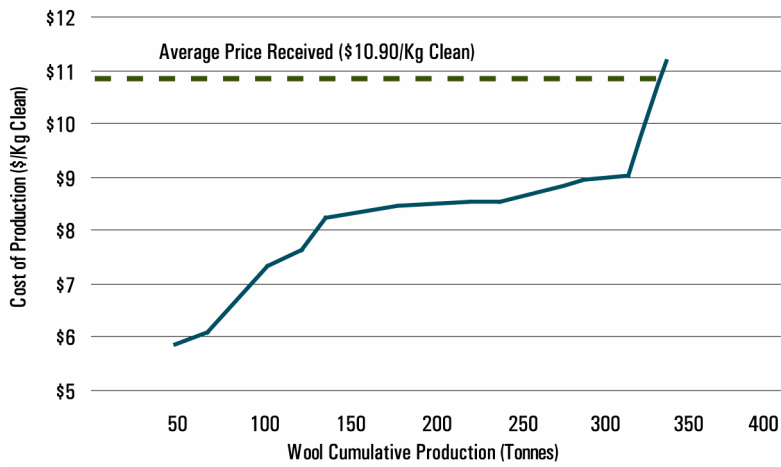
The results are then pooled according to the average cost of production and the average amount of wool produced from that enterprise and they are ranked in Graphs 3-5.

As you read along the horizontal axis, the production is cumulative, that is the right hand end of the graph shows the total annual average production of the commodity in the dataset.

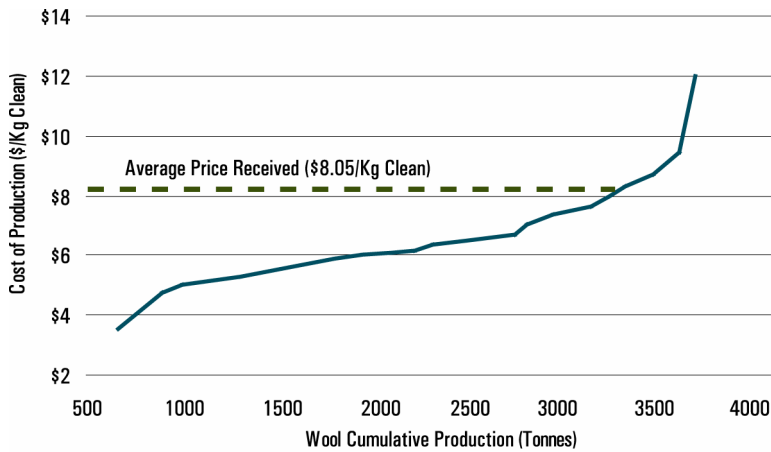
Remember that the farm businesses that are represented in this group are not a random sample, so the cost curves are not representative of the whole Australian industry. The sample is biased toward the better and lower cost producers.

On each cost curve we have included the average price of the respective commodity over the same time frame as the data in the curve.

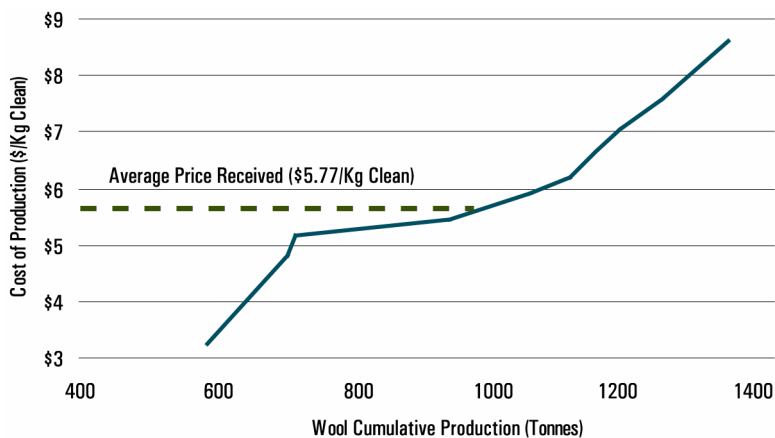
Graph 3: The majority of fine wool (< 19 micron) is produced for a cost that is below the average price over the same period



Graph 4: Approximately 90% of the production for medium wool (19-21 micron) costs less than the average price



Graph 5: Approximately 70% of the production for broad wool (>21 micron) costs less than the average price



These graphs show that the majority of fine wool (less than 19 micron) produced by our better producers is produced for a cost that is below the average price over the same period. This is in contrast to broad wool (greater than 21 micron) where approximately 70% of the production costs are less than the average price. These figures would have only benefited slightly from the recent rise in prices for medium and broad wool because the data is taken back to 1997/98. However, it does indicate the serious squeeze that the less efficient medium and broad wool producers have been under. All of these graphs show the extent of the variation in cost of production between businesses. Low cost producers of 21 and 23 micron wool have a cost of production less than \$5 per clean kilogram while other less efficient producers have a cost of production of \$8-10 per clean kilogram.

Substantial productivity gains could be achieved if the high cost producers adopted the appropriate management practices of the low cost producers. The advantage of this approach is that the change does not require any new technology from R&D. The disadvantage is that these opportunities have always been available yet a significant proportion of the producers have, for whatever reason, chosen not to implement them.

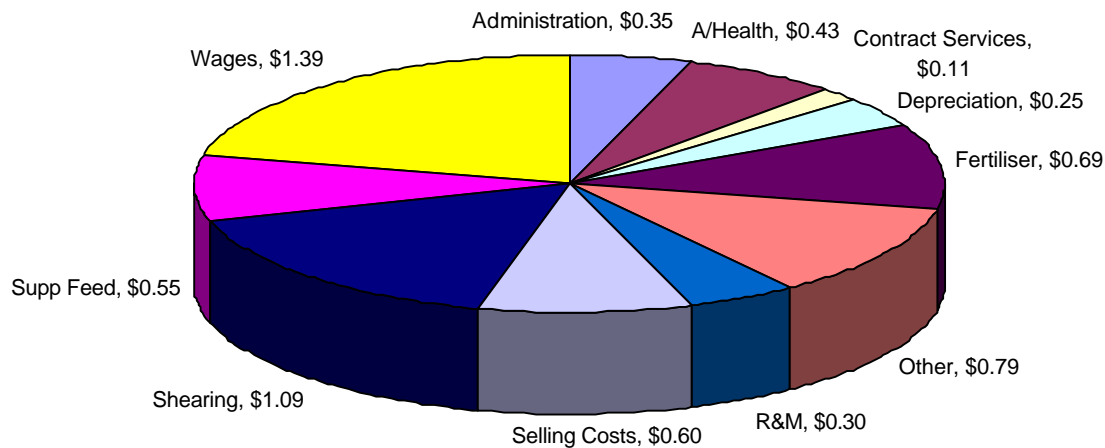
Changing Cost of Production

Cost of production is a ratio with total production on the numerator and total kilograms produced on the denominator. Therefore cost of production can be altered by increasing production providing any associated costs increases are of a smaller proportion. Alternatively cost of production can be reduced by reducing costs whilst maintaining production. Both of these options are discussed below. All cost of production data are before financing costs and do not make any allowance for the cost of capital in business (land, stock, plant).

Cost Reduction

The factors that make up the cost of production are important when determining where to direct priorities to lower production costs. Graph 6 shows the components of the cost of producing a kilogram of wool.

Graph 6: Components of the cost of producing a kilogram of wool (1999-2003)



**5 Year (1999-2003) all micron categories
Average Cost of Production \$6.55/kg clean
Source: Holmes Sackett & Associates**

For many flocks the greatest potential for reducing production costs in the business will be via a reduction in the labour cost, principally wages with shearing, fertiliser and selling costs are the next most important categories. Any reduction in these costs, when measured per DSE, is only likely to be achieved through increased production to spread the overhead component of the costs over more kilograms of wool rather than by cutting absolute costs per se. In most agricultural businesses, there is little room remaining for cuts in costs with the exception of labour.

Increase Production

As most costs in wool producing businesses are already at a low level, which has been an imperative for survival over the last ten years in particular, it is likely to be easier for farm businesses to lower their cost of production by increasing production without a commensurate increase in costs. The sources of increased production can be divided into two categories, those that can be achieved by implementing existing technology and those that will rely on as yet

unknown technology. It is not the objective of this paper to identify the technologies that will provide the technology gain – that is the role of research. Rather the discussion will focus on the cost centres and productivity of the business in order to provide an indication of the potential areas for improvement and the extent of the gains required.

To look at the impact of possible productivity changes, data for an ‘average’ specialist wool production business was extracted from the Holmes Sackett & Associates data. The characteristics of that average business are shown below in Table 3. The detailed information is shown in Appendix II.

Table 3: Average sheep specialist wool production business

Stocking Rate (DSE/Ha)	10
Enterprise Size (Annual Ave DSE's)	15,000
Farm Size (Ha)	1,456
Wool/Ha (Clean Kg)	29
Total Wool (Clean Kg)	41,796
Fibre Diameter (Micron)	20.1
Wool/DSE (Clean Kg)	2.8
INCOME/DSE	\$25.94
DIRECT EXPENSES/DSE	\$8.48
GROSS MARGIN/DSE	\$17.46
OVERHEAD EXPENSES/DSE	\$10.68
TOTAL EXPENSES/DSE	\$19.16
PROFIT*/DSE	\$6.78
Return on Assets	4.6%

* before interest & tax

Four scenarios, which could be implemented in order to improve productivity, are then presented. All cases assume a 1.5% per annum decrease in real wool prices over the next 25 years. Also it is assumed the real value of the land is maintained and all costs remain the same in real terms.

Scenario 1: Do Nothing

This scenario assumes no productivity gains are made so the decline in price over time gradually erodes profitability. Prices are assumed to decline at 1.5% per annum from a current price of \$8.09/clean kilogram. Real price is projected to be \$5.06/clean kilogram in 2029. Production per head and per hectare remain constant. Expenses remain constant in real terms.

	2004	DO NOTHING
Income	\$389,100	\$243,188
Direct expenses	\$127,200	\$127,200
Gross margin	\$261,200	\$115,988
Overhead expenses	\$160,200	\$160,200
Profit	\$101,700	-\$44,212
Return on assets	4.6%	-2.0%

Scenario 2: Increase Fleece Weight

This scenario assumes the implementation of a genetic improvement program focussing on increasing fleece weight while all other traits (liveweight, fibre diameter and fertility) remain constant. Income from sheep trading is assumed to remain constant in real terms which is likely to be optimistic. Price is assumed to decline by 1.5% per annum to \$5.06/clean kilogram in 2029. Costs are assumed to remain constant in real terms so the declining price needs to be matched by increasing wool production.

	2004	2029	Total Change	Change per annum
Price	\$8.09	\$5.06	-38%	-1.5%
Required wool income	\$338,100	\$338,100	-	-
Clean kg required	41,796	66,874	+60%	+2.4%
Clean wool/ha	29	46	+60%	+2.4%
Stocking rate (DSE/Ha)	10	10	-	-
Wool/DSE	2.8	4.6	+65%	+2.5%

Achieving a 2.4% per annum increase in fleece weight is beyond the limits of an efficient genetic improvement program if that program relies on within flock selection. Such a rate of gain would be achievable for most flocks if between flock selection was used to capture the wide genetic differences between bloodlines. It would be unlikely to be achievable for those flocks that currently have high fleece weight because they are reliant primarily within flock

gain rather than both between and within flock gain. A realistic rate of gain if selection is primarily for increased fleece weight (3% micron premiums) is 1% per annum.

Scenario 3: Reduce Fibre Diameter

This scenario focuses on reducing fibre diameter at the maximum possible rate by within flock selection whilst all other traits (fleece weight, staple strength, liveweight, fertility, etc) are held constant. By reducing fibre diameter (increasing quality) the real price of the wool produced can be held constant. Based on declining price trends, to achieve a price of \$8.09 in 2029, fibre diameter would have to be reduced to 17.6 micron, a reduction of 2.5 micron or 0.1 micron per annum.

	2004	2029	Total Change	Change per annum
Price	\$8.09	\$8.09	-	-
Clean wool required	41,796	41,796	-	-
Fibre diameter	20.1	17.6	-2.5 μ	-0.1 μ

A within flock genetic improvement program which aims to maximise the reduction in fibre diameter without any adverse effects on other traits can reduce fibre diameter by 0.15 - 2 μ per annum or approximately double the rate of genetic gain required in this scenario to maintain productivity. Therefore, genetic gain at the potential rate of 0.15 - 2 μ per annum would result in an improvement in terms of trade for wool growing businesses. All of the above assumes within flock selection and no use of between flock selection which would provide scope for more rapid reduction in fibre diameter though this may result in a reduction in clean fleece weight. The extent of any weight reduction would depend on current fibre/fleece weight relative to other bloodlines. One of the major risks in reducing fibre diameter is the increasing importance of staple strength on price.

Scenario 4: Increase Stocking Rate

This scenario assumes that all the productivity gains required to match declining prices are achieved by increase per hectare production via increased stocking rates. All overhead inputs are held constant, but the variable costs associated with running the sheep (health, shearing, supplementary feed, etc) are increased proportionally.

	2004	2029	Total Change	Change per annum
Stocking rate (DSE/ha)	10	16	+60%	-
Total DSE's	15,000	23,357	+56%	
Total wool (clean kg)	41,796	56,552	+35%*	+1.5%

* **Note:** balance of additional income is from sheep trading profit

The current average stocking rate of 10DSE/hectare applies to 630mm rainfall environment with a six month growing season.

Predicted optimum stocking rates for southern temperate grazing systems are:

Model	Predicted Stocking Rate (DSE/ha)
French-Schulz	15.2
PPP	11 - 14 (Olsen P 10) 13 – 16 (Olsen P 20)

Both models of stocking rate predict that a substantial increase over the current 10DSE/ha is achievable, with the required 16DSE/ha to match declining prices being near the upper end of the estimates.

Such increases in stocking rate could be achieved through a combination of improved utilisation of existing pastures (from current 30-40% to 40-50%) and by increasing pasture production through improved soil fertility and more productive pasture species.

In reality, businesses will apply a combination of factors in order to achieve productivity gains rather than relying on improving one factor. Incremental change across a range of parameters is more feasible than a large quantum change in one parameter.

If a number of parameters are improved over time, it is likely to be quite achievable for productivity improvements to exceed the likely decline in real prices.

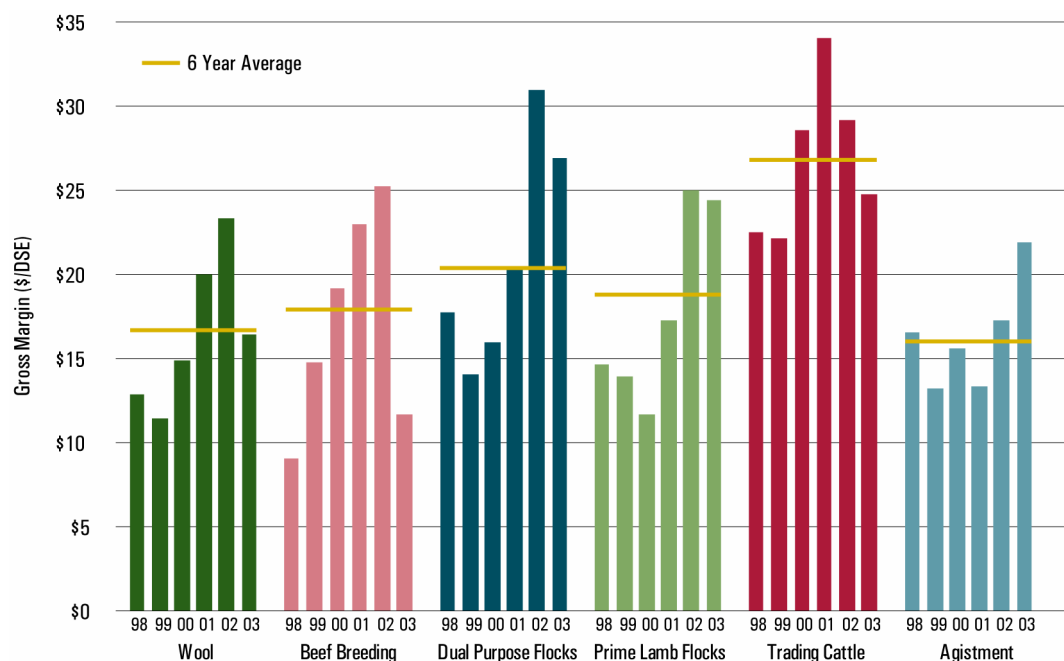
In fact, gains of the order of 2-4% per annum should be possible for many businesses if the focus is on implementing currently known technology without any benefit from new technology. Genetic improvement and stocking are two obvious areas for improvement. Such a situation would help negate some of the low productivity gains of specialist wool farms in comparison to other broadacre industries that compete with wool production for resources.

Effect of Sheep Meat Prices

The last few years have brought increased emphasis on the meat component of sheep enterprises. The effect of the recent high sheep prices and subsequent profitability (Graph 7) have been to:

- Encourage flocks to increase the proportion of ewes in the flock at the expense of wethers.
- Increase lamb production, either by use of terminal sires or growing out merino lambs.

Graph 7: Gross margin for wool, dual purpose and prime lamb flocks (1998-2003)



The small national flock is likely to continue to favour returns for ewe dominant flocks and from prime lamb production.

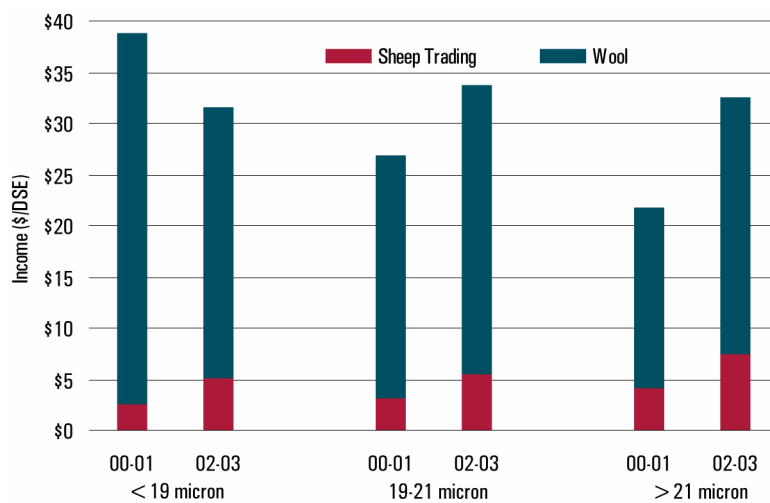
The implications for the wool industry include:

- The high proportion of merino ewes joined to terminal sires (approximately 48%) means that the national ewe flock is no longer self replacing. This is likely to correct itself as the shortage of merinos increases their price relative to lambs for meat production.
- High sheep meat prices reduce the cost of production of wool. This will be good while it lasts but the risk is that producers will take their focus off long term issues of productivity improvements. At this stage, there is no compelling evidence to support any assertion that mutton prices have halted their long term downward trend. Rather the high prices have been due to a combination of low sheep numbers, live export demand and the low value of the Australian dollar. It is not expected these will last until 2029.

- The prospects for lamb are less clear with the product undergoing fundamental change in the last ten years with less fat and greater market opportunities. How long an advantage of lamb production over wool production will continue is unclear but while it does, resources will continue to be directed into greater sheep meat production.

Will wool become a by product of meat in Australian sheep production systems? No. Analysis of data from 2002 and 2003 years when sheep prices were high shows that wool still dominates income though the contribution from sheep trading has increased (Graph 8).

Graph 8: The effect of high sheep meat prices on income sources in wool flocks



Other Constraints

The scenarios mentioned assume an ideal world where there are no other constraints to achieving productivity gains. This is extremely unlikely to be the reality. Possible areas of major constraint that will need to be overcome include:

- **Enterprise size and labour**

The average specialist wool producer has the following characteristics for the four years to 2002:

Flock size (head)	3,447
Total wool (bales)	90
Profit	-\$23,716
Return on Assets	-0.6%
Off farm income	\$22,025
Labour (weeks)	88
Age operator	57

Source: ABARE Farm Survey 2002, ABARE Productivity in Australian Livestock Industries 1978-2002

The above figures show that lack of scale amongst specialist wool producers and their poor profitability will likely be a major impediment to productivity gains that require additional capital to be invested in the business. Allowing for off farm income, the business is approximately break even. When combined with the average operator age of 57, it does not provide a good environment for rapid business change. The greatest scope for the average specialist business to improve productivity is to reduce the labour input to the business. A business of approximately 3,500 sheep should only require 0.6-0.7 labour units, including shearing, if it was operating efficiently. This compares to the current two labour units for the average specialist sheep producer.

This is a major structural problem in the industry and despite the scope it offers, easy and quick productivity gains will be hard to achieve.

Whilst the average flock is so small, it is constrained by the management expertise it can afford (either employed or owner operator). In a flock of 3,400 sheep much of the time is spent doing manual work rather than managing and the small flock size constrains the level of management that can be employed. In comparison a flock of say 50,000 DSE can afford to employ and adequately reward a very competent manager as well as a lower skilled staff to carry out the manual tasks. This structural problem is likely to remain a major impediment to productivity gains.

Small flocks will increasingly rely on off farm income to meet living expenses hence producers are likely to diverge into 'professional' and 'lifestyle'.

The other potential impediment to productivity gains is the unfavourable wages and salaries paid in agriculture compared to other industries. A survey in 2003 showed that management positions and menial positions in agriculture are generally at the lower end of the salary spectrum compared to other industries (see Appendix III).

- **Geographic and environmental**

Wool production is currently undertaken throughout a range of geographic regions. The proportion of sheep in the three major regions is as follows, high rainfall 33%, sheep cereal

55% and pastoral zones 12%. This does not represent value of the clip which would be biased toward the high rainfall zone.

If productivity gain for wool continues to lag behind crop production, there will be a diversion of resources away from wool to crops. This will occur to the extent that cropping profitability can continue to improve with fewer sheep. With current technology a pasture phase is likely to be required to overcome issues such as herbicide resistance, declining soil structure and soil carbon.

In the high rainfall and pastoral zone, cropping is constrained so wool production needs to remain competitive with other grazing enterprises, particularly beef and lamb production. Wool has lagged behind both of these and if it continues to do so, resources will be diverted from wool production. If new technology allows for further expansion of cropping in the high rainfall zone, as raised beds have done, productivity gains for wool enterprises will need to at least match those of crops. If cropping continues at around 3.0% per annum, such gains should be easily matched by wool enterprises. Technology will not be the limitation rather it will be the skills and attitude of those running the wool businesses.

The amenity value for a proportion of the high rainfall zone may result in more rapid price rises than would occur for other agricultural land. This will not influence the cost of producing wool but rather reduce the return on assets for a wool enterprise in those areas. This reduction in profitability would apply to all enterprises so enterprise choice will be determined by factors such as relative profitability (determined by productivity gains) and personal preference.

Environmental considerations will inevitably become more important, however, there are very few if any major incompatibilities between wool production systems and meeting environmental objectives. The possible exception is the requirement to manage 10-30% of the land area as timber and/or native pasture with low inputs in order to maintain biodiversity within the landscape.

Appendix I

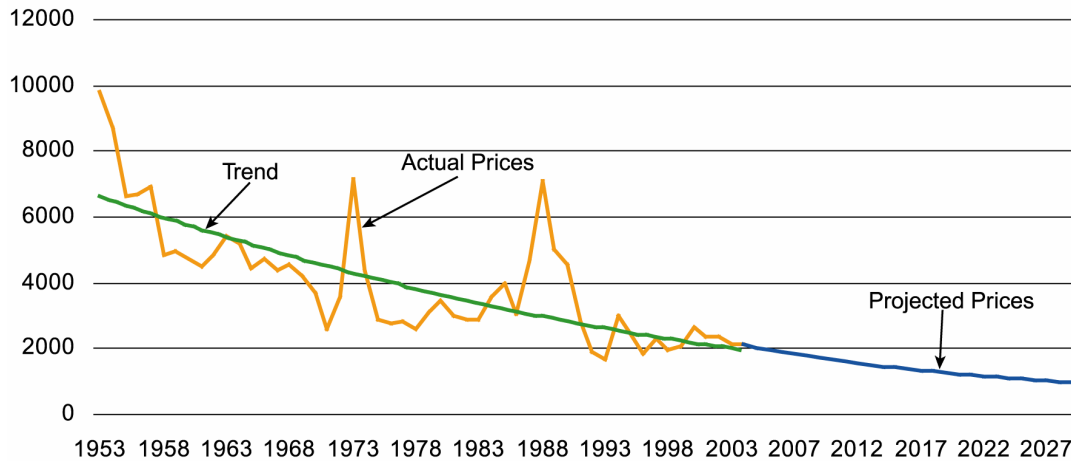
Table 4: Real and nominal prices (21 micron)

Date	Nominal	Real
1953	353	4371
1954	316	3785
1955	256	2921
1956	273	2983
1957	298	3157
1958	210	2186
1959	215	2226
1960	210	2124
1961	210	2085
1962	225	2232
1963	255	2512
1964	250	2404
1965	223	2062
1966	244	2188
1967	229	1997
1968	240	2032
1969	219	1807
1970	183	1453
1971	151	1130
1972	235	1645
1973	478	3123
1974	315	1795
1975	265	1307
1976	302	1307
1977	355	1351
1978	355	1251

Date	Nominal	Real
1979	439	1421
1980	491	1438
1981	501	1350
1982	543	1311
1983	558	1224
1984	595	1239
1985	685	1352
1986	674	1227
1987	1000	1663
1988	1434	2228
1989	1136	1644
1990	998	1343
1991	673	866
1992	635	807
1993	520	651
1994	812	999
1995	835	984
1996	666	761
1997	801	911
1998	610	690
1999	521	581
2000	596	640
2001	679	695
2002	1069	1070
2003	1040	1040

Graph 9: Real price and trend, 16 micron wool

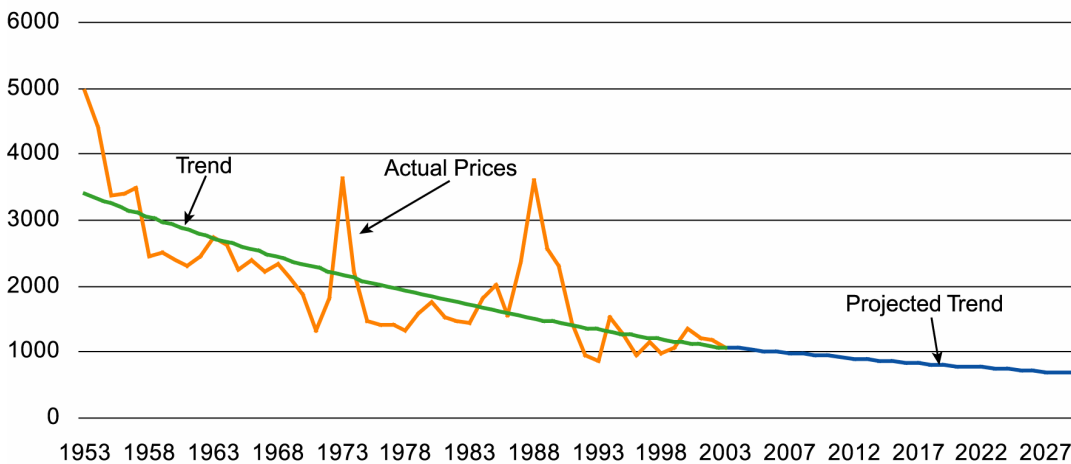
Real prices (2002 value)



Source: Independent Commodity Services

Graph 10: Real price and trend, 19 micron wool

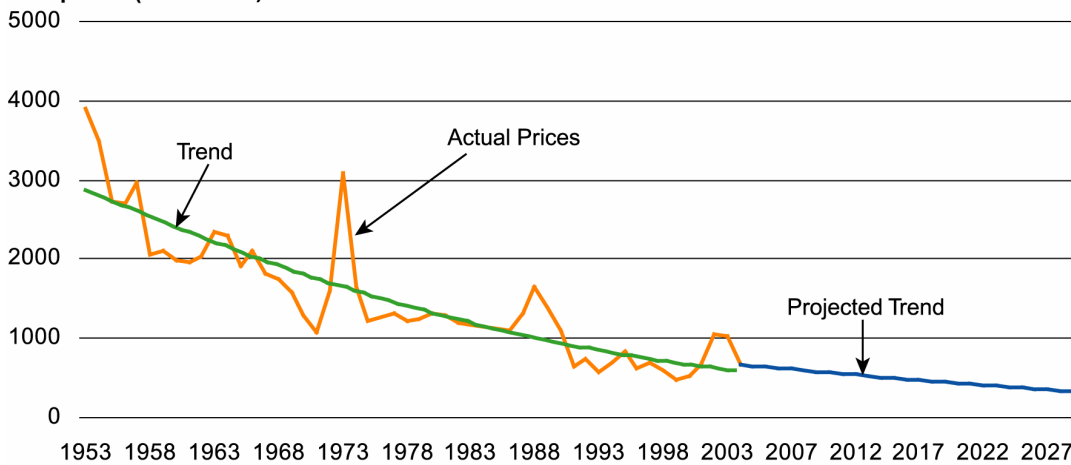
Real prices (2002 value)



Source: Independent Commodity Services

Graph 11: Real price and trend, 23 micron wool

Real prices (2002 value)



Source: Independent Commodity Services

Graph 12: Change in premiums for 19 and 21 micron wool



Source: Independent Commodity Services

Appendix II**Table 5: Average flock performance of specialist sheep producers (1998- 2002)**

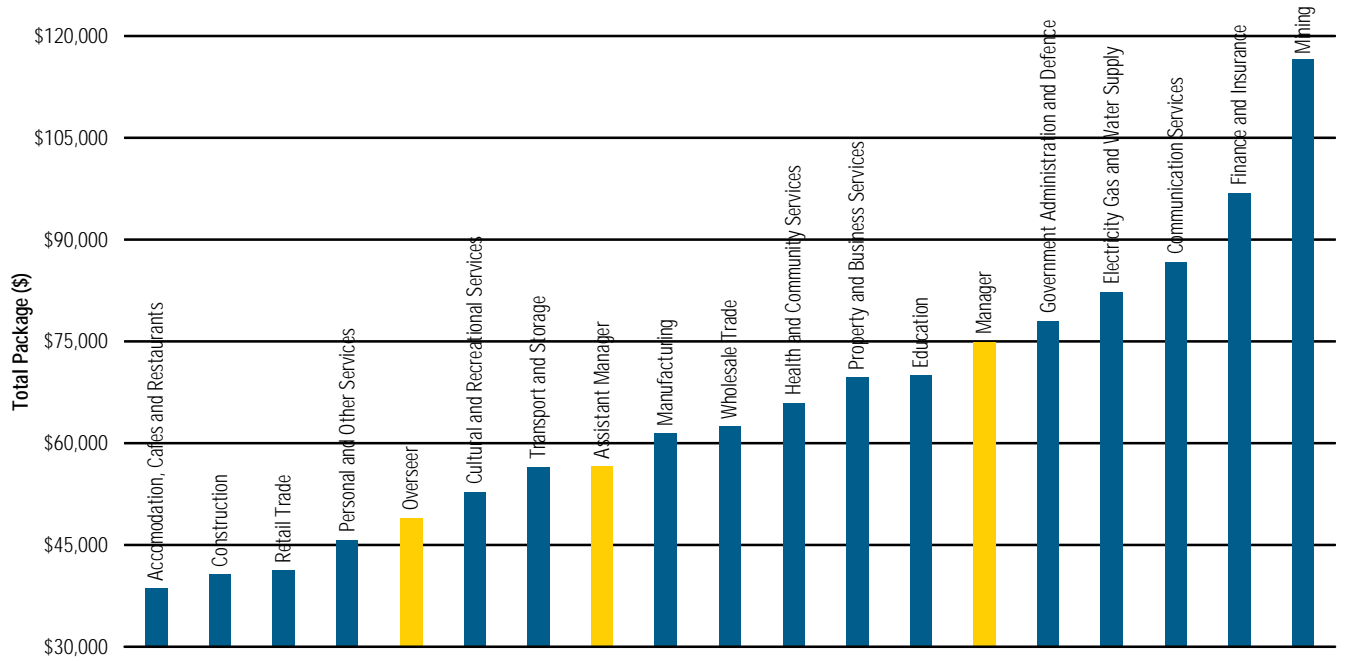
Sheep Trading	\$3.38
Wool	\$22.54
Hedged Position	\$0.02
INCOME/DSE	\$25.94
A/Health & Breeding	\$1.44
Contract Services	\$0.21
Freight	\$0.31
Insurance	\$0.03
Materials	\$0.13
Selling Costs: Wool	\$1.66
Selling Costs: Stock	\$0.27
Shear & Crutching	\$3.35
Supplementary Feed	\$1.08
ENTERPRISE EXPENSES/DSE	\$8.48
GROSS MARGIN/DSE	\$17.46
Administration	\$0.87
Chemicals	\$0.23
Contract Services	\$0.14
Depreciation	\$0.78
Electricity & Gas	\$0.14
Fertiliser	\$1.91
Fuel & Lubricants	\$0.43
Insurance	\$0.27
Irrigation	\$0.02
Landcare	\$0.10
Lime/Gypsum	\$0.24
Materials	\$0.15
M/Vehicle Expenses	\$0.34
Rates & Rents	\$0.55
R & M General	\$0.77
Seed	\$0.17
Wages	\$1.11
Wages (Owner)	\$2.47
OVERHEAD EXPENSES/DSE	\$10.68
TOTAL EXPENSES/DSE	\$19.16
NET PROFIT/DSE	\$6.78

Table 6: Average flock key performance indicators of specialist sheep producers (1998- 2002)

Cost Production/Kg Clean Wool	\$5.79
Price Received/Kg Clean Wool	\$8.02
Price as % of Micron Indicator	95%
Kg Clean/Adult Shorn	3.7
Average Adult Fibre Diameter (micron)	20.1
% Income from Wool	86%
Kg Clean Wool/Ha	28.7
% DSE's as Wethers	38%
DSE/Labour Unit	6,496
Enterprise Size (Annual Ave DSE's)	15,009
Fertility	78%
Month of Lambing	8
Ewes joined	4,106
Average Annual Stocking Rate (DSE/Ha)	10.3
% Sheep DSE's	88%

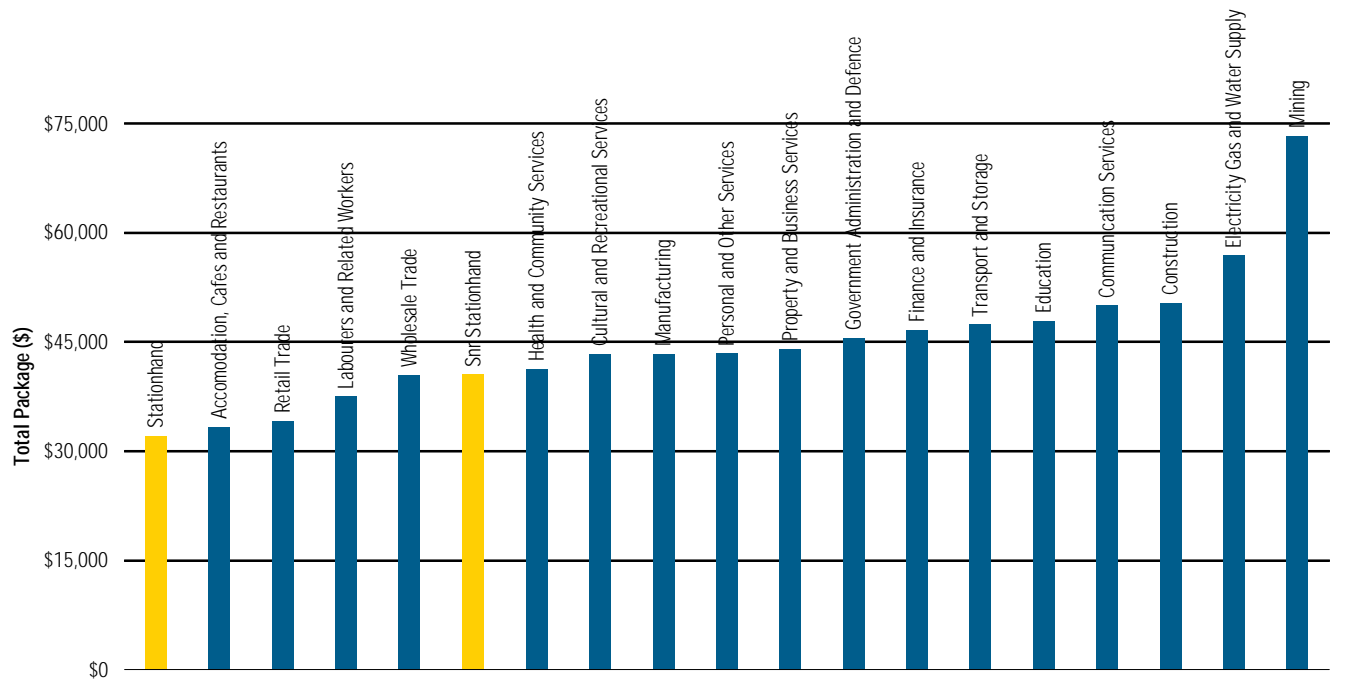
Appendix III

Graph 13: Agricultural managerial positions rank in the middle to lower sections compared to other industries



Source: AgInsights Salary Report 2003, Holmes Sackett & Associates

Graph 14: The salary package value for senior stationhands and stationhands compare poorly to other industries



Source: AgInsights Salary Report 2003, Holmes Sackett & Associates