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Sheep and wool industries need to improve their performance

By Rob Kelly, Manager, Sheep Industries, and Tim Marshall, Manager, Meat Industry Liaison, South Perth

Today in Western Australia, sheep are run at slightly higher stocking rates, are achieving greater lambing percentages (up 10 per cent) and higher wool cuts per animal (up 0.6 kg greasy) than in the 1960s. When all components of production are considered, the productivity of sheep farms has increased by 2.7 per cent per year over the past 35 years.

However, costs of production, relative to prices received, have increased at a far greater rate (4.3 per cent per year), so that in real terms there has been a decline of 1.6 per cent per year in profitability.

The challenge of the next decade is to achieve substantially greater rates of improvement than for past years if the sheep and wool industries are to maintain their significant place in Western Australian agriculture.

The markets for wool, lamb, mutton and live sheep are placing increasing emphasis on quality, and payment of premiums for the better quality product. The 'cleverness' of both scientists and farmers to develop and implement strategies for production of a quality product with greater cost effectiveness of production will go a long way to ensuring the survival and prosperity of the State's sheep and wool industries.

In 1990-91, Western Australia had about 36.5 million sheep.

By Rob Kelly (left) and Mr Peter England, wool grower from South Australia and chairman of the Wool Research and Development Corporation's On-farm Research Committee.

The sheep pictured are genetically identical, but born to different ewes.

They were bred at the Department of Agriculture's Great Southern Agricultural Research Institute at Katanning, to investigate how differences in nutrition affect wool production.
Figure 1. Lamb marking percentages, 1961 to 1991.

Figure 2. Greasy fleece weights, 1961 to 1991.

Figure 3. Live sheep exports, 1961 to 1991.

Figure 4. Pasture area and sheep numbers, 1961 to 1991.

Figure 5. Lamb marking percentages, after corrections, in 1934, 1964 and 1989.

Figure 6. Changes in weight, fertility and fecundity of two-tooth ewes in the 1970s and 1980s.
Figure 7. Changes in weight, fertility and fecundity of adult ewes in the 1970s and 1980s.

Western Australian producers have progressively reduced fat cover on lambs, enabling the industry to tap into Asian markets seeking the leaner product.

Photo: Western Australian Meat Marketing Corporation

### The past 30 years

From 1960-61 to 1990-91, lamb marking percentages ranged from 56.6 per cent (1972-73 drought) to 78.0 per cent (1989-1990), with an average of 68.4 per cent (see Figure 1).

Greasy fleece weight per adult sheep has fluctuated from 4.6 kg (four years in the 1960s and 1970s) to 5.9 kg (1989-1990), with an average of 5.0 kg (see Figure 2).

Lamb slaughterings have ranged from 900,000 to 1.9 million, mutton slaughterings from 1.1 to 4.2 million and live sheep exports from less than 200,000 in the early 1960s to 3.4 million in the mid 1980s (see Figure 3).

These changes in production per head have been achieved along with:

- an increase in the area under pasture from 3.1 million hectares in 1960-61 to more than 7 million in the late 1980s (see Figure 4);

- an increase in the State flock from 17.2 to 30 million up to 38.4 million in 1989-1990 (see Figure 4);

- changes in stocking rate from 5.5 sheep per pasture hectare (1960-61) to 4.0 sheep per pasture hectare in 1978-79, then an increase to 6.1 sheep per pasture hectare in 1990-91; and

- a continued predominance of the Merino breed in the State’s flock.

In the past seven years, lamb marking percentages and wool production have been substantially above the average of 68 per cent and 5 kg respectively for the past three decades. Overall, the State flock is now producing 10 more lambs per 100 ewes joined, and 0.6 kg more greasy wool per adult sheep than it was in the early 1960s. Although records are limited, about 20 more lambs per 100 ewes are born today than in the 1930s (see Figure 5).

Possible reasons for the changes in lambing performances can be determined from detailed on-farm studies conducted by Department of Agriculture and University of Western Australia researchers from the early 1970s. These on-farm studies covered 34 two-tooth flocks and 76 flocks of older (adult) ewes.

**Fertility (ewes lambing per ewe joined)**

Fertility was markedly higher in the flocks studied in the past five years than those studied in the early 1970s. In the early 1970s, average percentages of ewes lambing were 71 per cent for two-tooth and 72 per cent for adult sheep (see Figures 6 and 7). The corresponding values recorded in the mid to late 1980s were 86 per cent for two-tooths and 93 per cent for adult sheep.
Farmers are now using many of these strategies to achieve higher lambing performances. Higher levels of fecundity are the result of heavier live weights of ewes at joining, since the relationship between ewe weight at joining and percentage of lambs born per ewe lambing has not changed over the past 20 years. Grazing of lupin stubbles to increase the number of eggs produced by ewes at joining would also contribute to increased lambing performances in some flocks.

Fertility can be improved by:
- Higher live weights of ewes at joining.
- Using teaser wethers for flocks joined before mid January. Teasing results in shorter joining periods and a more concentrated lambing.
- Improved preparation of rams over the two months before joining.
- Higher ram percentages for maiden than older ewes.
- Increased resistance to clover disease in ewes, and improved clover varieties with low oestrogen levels.

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Causes of these changes
The detailed on-farm studies suggest that improvements in both lamb and wool production have come about through higher sheep live weights. In the 1980s flocks, two-tooth ewes were 5 kg heavier and adult ewes 10 kg heavier than flocks studied in the 1970s. The higher live weights have been achieved at higher stocking rates.

Improvement in fertility can also be attributed to the improved performance at particular live weights. Low fertility was identified as the major source of reproductive wastage in the 1970s work, and research in Western Australia has since been conducted into a range of causes.

Australia could soon have two broad groups of wool growers — specialist fibre producers and minimal management growers.
Maintenance of ewe live weight over the dry feed period will result in greater wool production, improved staple strength, and increased lamb survival and growth (see Kelly and Ralph 1990).

Wool occupies just over 4 per cent of the world textile fibre market and its status as the premium textile fibre is under threat.

If we consider the changes observed in fertility and fecundity of Western Australian Merino flocks, for each kilogram increase in live weight at joining there will be an average increase of at least one lamb born per 100 ewes joined for two-tooth, and at least two more lambs for older ewe flocks.

**Implications of increased performance**

**Lambing**

Farmers often comment that they would like all ewes to have single lambs. The data from the on-farm studies demonstrate that this is not possible if enough replacement animals are to be produced. The percentage of lambs that are twins is close to zero at an 80 per cent lamb drop, and increases to a maximum of about 20 per cent for two-tooth ewes at 100 per cent lamb drop, and to 65 per cent for adult ewes with a 140 per cent lamb drop (see Figures 8 and 9).

Therefore, to achieve an 'all single' lambing, ewes would have to be managed to produce a lamb drop below 80 per cent. Such a strategy is seriously flawed because it will yield lamb marking percentages of less than 60 per cent, which means there will not be enough young ewes in a self-replacing ewe flock. It is also highly likely that wool quality would deteriorate.

Twin lambs are a significant part of the total lamb drop in the State's ewe flocks, and management needs to take this into account.

**Wool**

Quality has a major impact on the value of a fleece. In the studies reported here, changes in such characteristics as fibre diameter and strength over the three decades were not recorded. Nevertheless, other research has shown that higher reproductive rates decrease fibre diameter and staple strength in breeding ewes unless management is adjusted to take into account the extra feed needed for the higher-producing flock.

Maintenance of ewe live weight over the dry feed period will result in greater wool production, improved staple strength, and increased lamb survival and growth (see Kelly and Ralph 1990).
Research and challenges for the 1990s

Wool
The greatest challenges to the sheep industry lie in wool production. No longer can wool be regarded as a fine and strong fibre in comparison with synthetic fibres. In fact, in comparison with synthetics, wool is now a relatively broad and weak fibre. The status of wool as the premium textile fibre, able to command significant price premiums above other textile fibres, is under threat.

Coupled with changes in the textile industry, recent changes to the selling system mean that wool growers must become increasingly astute in the marketing of wool. This is already happening in some areas, with greater demands for market information, increased use of additional measurement, and targeting the production of wool to meet specific market requirements.

In future, there could be two broad groupings of wool growers – specialist fibre producers and minimal management growers.

Specialist fibre producers would be those growers with exceptional skills, resources and management strategies that are capable of producing the premium quality fibre demanded by the wool textile industry at that time. This will involve manipulation of the major characteristics of the fibre from year to year, targeting production to meet specific market requirements and full description of their wool at sale.

Minimal management growers will produce average to good quality fibre depending on the season, but without the management inputs necessary to manipulate fibre quality to any marked extent. They are likely to be farmers that derive most of their income from farming activities other than wool.

Research in the Department of Agriculture's Wool Program focuses on development and implementation of the science and technology that will increase the profitability of wool production and processing. The program aims to exploit the 'cleverness' and 'uniqueness' of researchers, advisers and wool growers so that the wool industry enhances its competitiveness, quality and profitability. This will help to ensure that it is a sustainable and major contributor to the economy and community of Western Australia.

Two important programs for the next 10 years are:

The development and implementation of strategies for improved efficiency and sustainability of wool production to meet market needs for premium quality wool.

This will be achieved by:

• developing technologies to enable manipulation of wool quality, and in particular reducing mean fibre diameter by 2 microns, for wools of less than 22 microns, with maintenance or increased production per hectare; and

• increasing cost effectiveness of production by 20 per cent.

Developing and testing strategies to improve the processing performance of Western Australian wools to increase hauteur (fibre length in the top) and reduce fibre wastage.

This will be achieved by:

• an increase of 10 Newtons per kilotex (N/ktex) in the mean staple strength, particularly in flocks which now have mean strengths of less than 30 N/ktex;

• a reduction of 30 percentage points in staple mid-breaks from flocks with levels currently greater than 60 per cent; and

• a reduction of vegetable matter contamination to below 1 per cent in autumn-shorn wools.

Other work will be directed towards increasing the efficiency of use of feed, reducing the impact of diseases, and processing and value adding to Western Australian wool.

Value adding
Greater emphasis will be placed on the relationships between production and the use of wool.

The Department is establishing links with wool growers and organisations who are processing their own wool, so that specialist requirements compatible with value adding can be achieved.

A review is presently being undertaken with the help of the Australian Wool Corporation, CSIRO, the International Wool Secretariat and Curtin University's Wool Technology Unit, to identify opportunities for research to improve the processing performance of Western Australian Merino wools.
The Department of Agriculture, CSIRO Divisions of Animal Production and Wool Technology, the Universities of Western Australia, New South Wales, and Armidale, and the Wool Research and Development Corporation, are jointly involved in the new Cooperative Research Centre for Premium Quality Wool. This centre will become a major focus for research and training in the wool industry in Australia.

As part of a national initiative, a fellmongering industry is being developed in Western Australia. Departmental research has shown that fellmongered wool has advantages over conventionally shorn wool, and markets have been identified for part-processed sheepskin pelts. The continued development of this industry should provide an opportunity for considerable value adding and increase overall returns to producers.

Prime lamb
Western Australia has always been a significant exporter of lamb, initially to the United Kingdom, then during the 1970s to the Middle East, and in more recent years to a wide variety of markets around the world. The type of lamb produced has changed in line with varying market requirements from predominantly fat score 4 or 5 lambs in the 1960s, to a leaner, lighter lamb in the 1970s.

Per capita consumption of lamb in Western Australia is the lowest of any State and has been declining in recent years. Future consumer preferences are likely to be for a higher proportion of large, lean carcases which provide the opportunity for the production of new, more versatile cuts. Research and development will provide producers with the tools to meet the changing consumer requirements as a means of increasing market share.

Mutton
Mutton production is a by-product of the wool industry and numbers slaughtered vary widely from year to year in relation to wool prices and seasonal conditions. The Western Australian industry is characterised by low carcase weights, high carcase rejection rates and consequent high processing costs.

Mutton faces strong competition from a range of other meats on world markets. Means of reducing processing costs through lowering rejection rates and increasing carcase weights at slaughter will be developed to improve the profitability of the industry.

Further reading