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In this edition...

	PAGE
Lamb boom continues in Japan	1
Pedigree assignment by electronic matching of lambs and dams	3
Does vitamin E improve growth rate?	4
Finishing pastoral lambs in the northern agricultural region	5
Outlook for Australian lamb	7
Australian Sheep Industry CRC update	7
The wool-meat balance - getting it right	8
Management options to improve the reproductive performances of Merino ewes	9
New DNA test muscles up meat production	10
Summer drenching - the latest advice for WA	10

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Lamb boom continues in Japan

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Japan's enthusiasm for lamb continued to grow during 2005, with Australian exports building on the strong gains made in 2004. Lamb in Japan is gradually finding its way onto retail shelves and menus in both speciality lamb and mainstream restaurants. Japanese consumers and trade are coming to recognise the good taste and value of Australian lamb, with total consumption expected to increase further in 2006. Japan is increasingly becoming a significant market for Australian lamb, with the percentage of Australia's production dedicated to supplying the Japanese market continuing to grow.

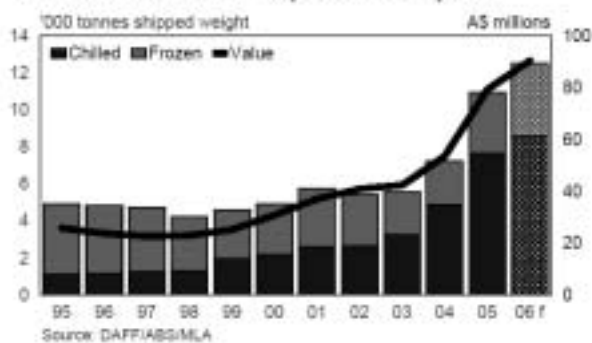
Key findings

- Japan is Australia's second largest export market for lamb – in both volume and value.
- Australian exports of lamb to Japan in 2005 totalled 18,330 tonnes carcass weight equivalent, representing 11% of total lamb exports for the year.
- In value terms, lamb exports during 2005 totalled A\$79 million, representing 10% of Australian lamb exports for the year.
- Exports to Japan have increased across all major cut categories; however, the largest increases were in exports of shoulder cuts, now making up 68% of Australian lamb exported to Japan.
- 70% of Australian lamb exported to Japan in 2005 was chilled.
- 68% of Australian lamb exported to Japan during 2005 was in a boneless form, significantly higher than for any other export market.
- Despite being Australia's second largest destination for lamb exports, consumption of lamb in Japan on a per capita basis remains low.

- The consumption of lamb in Japan has continued to extend past the traditional sheepmeat consuming area of the northern island of Japan (Hokkaido), to the main island of Japan, including Tokyo.
- Australia holds an estimated 50% of the total lamb market in Japan – up from 38% in 2000.
- Demand for lamb in Japan continues to grow, with total consumption increasing 31% in 2005.



Australian Lamb Exports to Japan



Supply to Japan continues to grow

Japanese demand for Australian lamb continued to build in 2005, with Japan establishing itself as the second largest lamb export market behind the US in both value and volume of production for Australian lamb exports. Exports to Japan made up 11% of total lamb exports by weight and comprised 10% of total Australian lamb export values.

Although consumption of lamb is still low relative to other protein sources, lamb is increasingly visible in Japan at both retail and food service. With Genghis Khan (lamb specialty/lamb barbecue) restaurants now common in Tokyo, where previously they were limited to the northern island of Japan (Hokkaido), a larger pool of consumers are now being offered lamb as a dining option.

Similarly, at retail, lamb is increasingly available at mainstream (rather than specialty) supermarkets. A shortage of protein in Japan, combined with consumer concerns over BSE and avian influenza, has provided the Australian lamb industry with the opportunity to introduce lamb to both Japanese consumers and trade – the majority of whom were unfamiliar with the product.

Lamb supplies to Japan from Australia and New Zealand (making up 99% of total lamb supply to Japan) have increased for the fourth consecutive year in 2005, with the demand expected to continue to grow in 2006.

Australian lamb exports to Japan

Australian exports of lamb to Japan have more than doubled over the past three years, with 18,330 tonnes carcass weight equivalent (10,928 tonnes shipped weight) exported in 2005 – an increase of 51% in shipped weight terms compared with 2004. In value terms, exports of Australian lamb to Japan increased 48% in 2005, to total A\$79 million. In 2000, exports of Australian lamb to Japan totalled only A\$31 million.

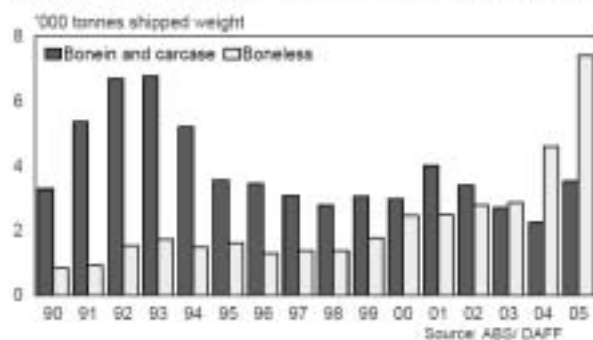
The increase in Australian lamb exports to Japan has been driven by the growth in demand for chilled lamb. In 2005, approximately 70% of Australian lamb destined for Japan was in the chilled form.

Exports of boneless lamb continued to be the strong area for growth in 2005, with exports of boneless product reaching a massive 7,401 tonnes shipped weight in 2005. Although the majority of this product is boneless shoulders, increasingly boneless loin cuts are being supplied to the Japanese market. Shipments of bone-in product also increased in 2005, mainly in the form of racks.

Boneless product has been popular at Genghis Khan restaurants, due to the ease of eating with chopsticks. However, Genghis Khan restaurants are increasingly featuring a range of cuts in addition to the traditional shoulder. Lamb racks and boneless loin cuts are becoming more common in these restaurants, and are being sold at a price premium to boneless shoulders.



Australian Lamb Exports to Japan - boneless vs bonein



Competition in the market

New Zealand is the only other significant supplier of lamb to the Japanese market. Domestic production is negligible at an estimated 200 tonnes carcass weight equivalent in 2005. The combined exports from Iceland, Chile and Norway make up only 1% of imports. New Zealand lamb exports to Japan have traditionally been greater than Australian lamb exports to Japan, however, the pace of growth in Australian lamb exports to Japan has seen Australia surpass New Zealand – albeit by only 1% - as the largest supplier of lamb to the Japanese market. In 2005, Australia held 50% of the Japanese lamb market, compared with 49% held by New Zealand.

Australian lamb exports to Japan have been spurred on by a number of changes in demand, but also favourable conditions for supply. Australia has proven a greater capability to supply Japan with the type of lamb they demand the most – boneless chilled lamb. With larger volumes of larger lambs Australia has had the ability to cost effectively bone out lamb shoulders and loin cuts. Also, regular shipments of chilled beef destined for Japan (97% of Japan's chilled beef needs were supplied by Australia in 2005) has allowed lamb exporters to consolidate lamb shipments with beef shipments, to regularly supply Japan with chilled lamb.

Consumption of lamb in Japan

Total consumption of lamb in Japan grew in 2005, as supplies from Australia and New Zealand increased. However, lamb consumption still remains low on a per capita basis compared with other protein sources, such as beef, pork and chicken.

Table 1. Meat consumption in Japan in 2005 (boneless weight) – estimate only

	Total consumption	Per capita consumption
Lamb	18,000 tonnes	144 grams
Beef	810,000 tonnes	6.3 kg
Pork	1,690,000 tonnes	13.kg
Chicken	1,660,000 tonnes	12.5 kg

What do Japanese consumers think of lamb?

Lamb has become a hot topic in Japan, particularly amongst the consumer media, including cooking and health magazines. Japanese consumers are aware of Australia as a key supplier of lamb, with 37% of respondents to a recent AC Nielsen tracking survey listing Australia as a supplier of lamb to Japan. Similarly, 38% of respondents listed New Zealand as a supplier of lamb to the Japanese market. Interestingly, 7% of respondents listed the US as a lamb supplier, despite no imports of US lamb in the past two years.

According to recent AC Nielsen tracking surveys, 18% of respondents have consumed lamb in the home over the past 12 months, 7% buy lamb regularly for home consumption, and an additional 33% would consider purchasing lamb. Given the number of consumers that would consider purchasing lamb, it is clear there are still opportunities to further develop the retail sector for lamb in Japan.

The good taste, healthy image and reasonable prices have all been cited as the most common reasons for purchasing lamb. With retail prices for beef increasing significantly over the past two years, lamb offers consumers an affordable alternative. Lamb shoulder, suitable for barbecue cooking, retails at similar prices to pork for barbecue cooking, and is significantly below the price of beef for barbecue cooking.

The fact that lamb is still hard to find in Japanese retail stores (Australian lamb is available in 1700 outlets versus 9000 outlets stocking Australian beef), was cited as the most common reason for not purchasing Australian lamb, followed by perceptions of bad taste (despite most consumers having not tried the product), and a perception that lamb is difficult to cook.

Outlook for lamb exports to Japan

Japan is expected to become an increasingly important destination for Australian lamb. It is likely Australian lamb will have the opportunity to establish itself as a small but relevant part of the Japanese diet, as supplies of proteins are expected to continue to be tight for at least the next 12 months. Exports of lamb to Japan are expected to grow a further 30% in 2006, to total 23,740 tonnes carcass weight equivalent (14,200 tonnes shipped weight).

Australian exports of lamb to Japan are free of tariffs and quotas, allowing demand from the market to be without distortions and making lamb an attractive product for the trade to promote. The absence of a tariff also makes lamb a price competitive product compared with beef and pork, both of which incur a tariff. With consumption of lamb still low compared with other protein sources, it is likely that Japan will increasingly be an important destination for Australian lamb.

Unit measures – what do they mean?

Boneless volumes are converted to a *carcass weight equivalent* to allow a consistent unit of measure. Using carcass weight allows you to understand the impact of production and value adding changes in each market.

The *shipped weight* is the weight of the product loaded into a container. Depending on the market, this will include a mixture of carcass, bone in and boneless product.

The *boneless weight* is the amount the product would weigh if the bones were removed from the carcass and the bone in product. This represents the amount of meat that can actually be consumed and allows comparisons with other protein sources.

Pedigree assignment by electronic matching of lambs and dams

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Determining the pedigree in sheep flocks is an expensive and time consuming process. It is often achieved through tagging and recording during lambing or occasionally DNA matching at a later date. The result is that there is a relatively low proportion of animals in Merino breeding flocks that have full pedigrees. This has important implications for deriving the full benefits from genetic evaluation and the estimation of genetic trends in studs.

A method is proposed that could lead to a substantial

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increase in the number of animals with full pedigrees. This method could be most useful in situations where full pedigrees are currently not possible rather than as a replacement method for mothering up or DNA fingerprinting.

The new method is designed to calculate a pedigree to a reasonably high level of accuracy through a fairly inexpensive and low labour input methodology. Using a walk-over-weighing system, the order of movement of ewes and lambs can be used to make a prediction as to which lamb belongs to which ewe.

The walk-over-weighing system captures the tag number of the ewes and lambs as they pass through a radio-frequency identification (RFID) panel or portal reader on the way to food, water or between paddocks. All animals have a RFID tag and the reader simply captures the identity of each animal as it passes in a time-ordered list.

A list of the identities of all ewes and lambs is supplied so that each animal on the walk-through list has a code for either ewe (E) or lamb (L). The walk-through records are then examined to determine which lamb and ewe combinations appear in the data. The result is a matrix of frequency counts for each ewe/lamb combination. Data optimisation procedures are used to trim random associations while maximising the informative data.

An initial trial to establish proof of concept that ewes and lambs could be associated by their proximity on sequential reading of RFID tags at a single point was established at the Centre Plus stud, Tullamore NSW in August 2005.

A group of 64 lambs and 52 ewes, which had been mothered up at birth by the usual practice, was recorded over a period of about 4 weeks after they had been drifted from their lambing paddock when the lambs were 5-10 days old. A total of 17,313 IDs were recorded and the data were 'scored' for the association of each ewe with a lamb either 1 or 2 in front or behind. The best results were obtained with a ewe and 1 following lamb.

From the observed data, the following results were obtained:

- 54/64 animals were allocated to their correct dam with 100% certainty.
- 1/64 animal was allocated to an incorrect dam with certainty. The 'correct' ewe for this lamb had no records at all so that the apparently incorrect allocation may have been a case of lamb fostering.
- Of the remaining 9 lambs, 6 were allocated to their correct dam with at least 50% certainty, but at least 1 other dam was a potential parent. The other 3 lambs were allocated to an incorrect dam but the correct dam was still rated as a potential parent but with low accuracy.
- The average accuracy of correct dam assignment across all lambs peaked at 89%, with 81% of lambs having 100% correct assignment.

Advantages of the method:

- High accuracy with low labour input.
- Modest cost – tags can be reused and/or they become the permanent identification of the animals for their lifetime.
- Timing is not critical for pedigree identification.
- Simple algorithm for matching.
- Simultaneously generates a lamb survival record for ewes that can be used for selection on reproduction rate.
- Possible to combine the technique with other measures such as lamb growth rate, mothering ability and correlation of these characteristics with subsequent performance.

The technique will be validated by working with a number of studs currently using DNA testing or mothering up so that there is further confirmation of the accuracy of the technique. We will test length of time and age period for recording association between dam and progeny, and impact of group size on accuracy.

Does vitamin E improve growth rate?

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Having enough vitamin E is important for quality lamb meat production. Lambs deficient in vitamin E are susceptible to White Muscle Disease that causes lameness and death. Furthermore, meat from deficient lambs appears darker, goes brown quickly and has a short shelf life in the supermarket.

Dry paddock feed contains almost no vitamin E, so vitamin E deficiency is common in WA lambs during the summer autumn period. Supplementing sheep with vitamin E during this period can prevent White Muscle Disease and improve the shelf life of lamb meat.

Previous work

Farmers often report that vitamin E supplementation improves the growth rate of lambs finished in feedlots during the autumn period. This has always been a bit puzzling because previous work done by Julia Fry showed that vitamin E deficiency causes no growth check unless the animals show symptoms of White Muscle Disease.

Many lambs in fact have very low vitamin E levels during summer but will not get the disease. Julia's work was done with Merino lambs in a maintenance feeding situation in the days when wool was the major source of income from a sheep enterprise.

So could the result be different with fast growing crossbred lambs finished in a feedlot? Obviously a positive effect would help justify the cost of supplementing rations with vitamin E.

New research

We had a chance to answer this question in the meat colour experiment reported in the last edition of the *Ovine Observer*. For this experiment we fed 2 groups of lambs the same barley, lupin and hay pelleted diet that contained 11 MJ/kg of metabolisable energy (ME) and 17% crude protein. Vitamin E was added to the diet at the rate of 250ppm for the vitamin E group and no vitamin E was added to the control group. Beforehand the lambs had been fed lupin grain on a dry ryegrass pasture at Toodyay.

Figure 1. Blood concentrations of vitamin E

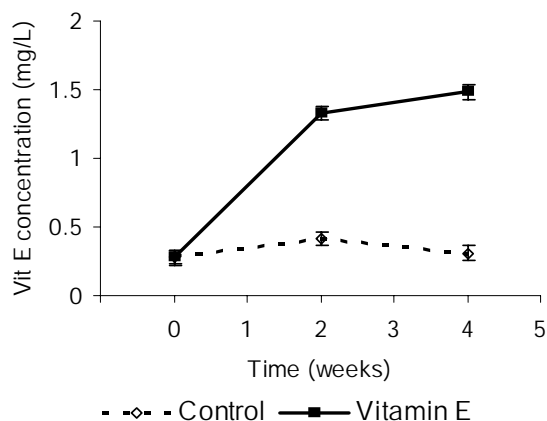
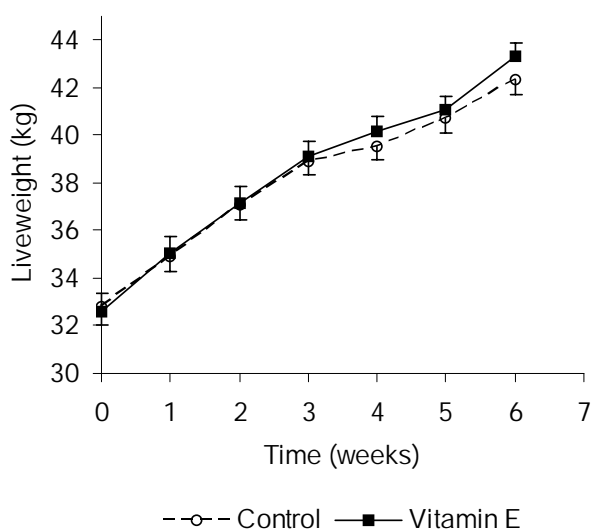


Figure 2. Liveweight change



Blood results

Figure 1 shows that vitamin E supplementation dramatically increased blood vitamin E concentration above the threshold level of 1 mg/L required to prevent White Muscle Disease. For the control lambs the blood

concentrations of vitamin E were the same at the finish as they were at the start and below the threshold level.

Liveweight results

Try as we might we could not find any significant difference between supplemented and non supplemented lambs for liveweight or carcass weight. So while the recommendation stands to add vitamin E to prevent White Muscle disease and improve meat colour, we did not find any additional benefit to growth rate, in otherwise healthy lambs fed for 4 weeks.

Finishing pastoral lambs in the northern agricultural region

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One of the challenges for pastoral producers is to identify market opportunities for their lambs that will provide producers with a positive economic return and maintain the productivity of their business. One such opportunity is to send lambs into the agricultural regions for growing out and finishing. Sending lambs into the agricultural region can be done through direct sale, agistment, or on a profit share basis.

This article examines the issues and benefits of one such arrangement between a pastoral station, producing Dorper lambs, and a grower in the northern agricultural region, near Mingenew.

Background

Two hundred and eighty one Dorper lambs were purchased from Barnong Station, owned by Rob and Kathryn Mitchell, by Carl Forward at Mingenew in November 2005. The lambs were dropped from July 2005. Two different prices were paid by the purchaser reflecting different weight animals. The lambs were purchased on-station and the purchaser paid for transport to Mingenew.

After arrival, the lambs were put on stubble to allow them to adapt to the climate and environment in a more intensive system than the pastoral station. Lupins were also trail fed so that the lambs were familiar with lupins when they moved into a feedlot. Of the lambs delivered approximately 8 died and 2 had mobility problems.

Feeding

After the stubble was grazed down and the lambs adapted, they were moved into a temporary on-farm feedlot. While in the feedlot the animals were fed lupins, ad lib hay, and some mill prepared lamb finisher

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pellets. Hay and lupins were used for most of the lambs, however, the finisher pellets were fed to finish off one line of lambs.

Marketing and sales

Marketing of the lambs depended on their weights and time of year. One problem that arose was the variability in weights of the lambs delivered. This meant that lines of lambs were marketed at different times, depending on their weight and rate of growth at any one time.

For this reason, some lambs were sold on-farm, others delivered to a processor, and some through auction. Due to these marketing differences the prices received for each lot differed and this made direct comparison of each lot difficult.

The first lot of lambs sold on-farm yielded a lower price than subsequent lots because at the time of sale the market was depressed. However, these were the heaviest lambs delivered and so also had the lowest finishing cost.

A later lot of lambs that were older and fed more were marketed directly to a domestic processor. Some of the lambs were heavier than required by the processor and were discounted. These lambs were not over-conditioned, just heavier than required.

Comments by station owners

The lambs sold by Barnong were the animals that did not meet live export weights. The arrangement provided the station with an alternative to keeping the lambs on the station. Kathryn Mitchell says they would consider undertaking a similar arrangement in the future as it allowed them to manage their ewes and rams to ensure a good lambing in the following season. Also, removing the weaners, either through sale or live export, reduced the pressure on the rangelands, conserving the feed resource and giving the rangelands time to recover.

The station owners made a direct sale of the stock to the farmer. This is one of the marketing options for the station owners. In future, Kathryn said they would consider other alternatives, such as profit sharing or agistment as well as direct sale. The station owners felt that although direct sale may not be the most profitable marketing method, compared with agistment, it allowed them to focus on next year's lambs as this

year's lambs were all off the property.

Comments by producer

Carl Forward thought that for an initial trial the arrangement had worked well. There were some issues that, if the exercise was done again, could be changed.

Carl liked the direct sale/purchase arrangement between the station and himself. He thought that this reduced the risks for both and also assisted cashflow for the station as the sale was completed and sale price was known.

Several suggestions were also made by Carl Forward. He suggested that this type of arrangement would suit farmers in the agricultural regions with lupin stubbles to graze over the early part of summer. For lamb breeds such as Dorpers, with heavier finishing weights, Carl suggested that a delivery contract for heavy weight lambs be undertaken with a processor, such as WAMMCO or Hillside Meats.

This would make it worthwhile for producers growing out lambs to heavier weights and reduce the likelihood of receiving a discount for heavy weight lambs sold to domestic processors.

Concluding remarks

This demonstrates that it is possible to establish workable and profitable arrangements between pastoralists and producers in the agricultural regions. Probably the key point implicit in the comments of the producer and the station owners is that the arrangements gave them some profitable alternatives for stock that would otherwise be kept.

For the station, profit may be higher in a good year if the animals are kept on the station. But the benefits from selling early in managing breeding stock and reducing climate risk generally outweigh the reduced profit from early selling.

For the agricultural region producer, knowing the quality of the stock from the station, it may be possible to lock in a contract, with a processor, for a known value. This would enable the producer to offer a higher price for the lambs as they know what the final value is, what it costs to feed, and to plan the marketing schedule for the lambs.

For more information, contact Peter Tozer or Matthew Young at the Geraldton Office on 9956 8555.



Outlook for Australian lamb

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Prospects for the Australian prime lamb industry remain bright, as local and overseas consumers look to Australia to supply the steady growth in global demand for lamb. Seasons permitting, lamb supplies are expected to rise substantially in coming years, allowing for expansion in both domestic consumption and export volumes, but lowering prices from their recent record levels.

Demand for Australian lamb has strengthened remarkably over the past four to five years, with a sharp rise in both domestic consumer expenditure on lamb and in the value of exports.

Domestic demand for lamb is expected to remain high over coming years, due to advancements in lamb quality and marketing and dietary trends.

Demand from key export markets also shows no sign of abating. The recovery in lamb production in 2004 and 2005 was fully absorbed by export markets, lifting the share of supplies exported from 37% in 2004, to a record 45% in 2005. This reflects the strong growth in demand for Australian lamb in key export markets, particularly the US and Japan, and the increased availability of heavier export grade lambs.

Globally, lamb supplies are not keeping pace with demand growth, resulting in rising prices and an increased need for imports. Demand for lamb in Asia was further boosted in 2005 by restrictions affecting trade in beef and poultry.

Australia has been the major producer to significantly increase supplies of lamb in 2005, with production falling further in the US and Europe and only modest export growth from New Zealand.

The tight global demand/supply balance is expected to continue over the next five years, maintaining or expanding demand for Australian lamb. However, demand growth is likely to be much slower than over recent years, with strengthening competition from alternative proteins, such as beef and chicken, as disease issues recede.

After growing steadily in previous years, export demand for Australian lamb jumped sharply during 2005, with total export value up 21% to an estimated A\$778 million. With supplies finally expanding to meet the additional global demand, the volume exported rose 30% in 2005, to a record 169,820 carcase

weight equivalent (141,545 tonnes shipped weight). Growth in demand continues across a wide range of markets, including the US, Japan and China, and a range of countries in South-East Asia, Africa and the Pacific.

The global environment for Australian lamb sales was again unusually positive in 2005, with disease-related trade restrictions on other meat suppliers adding to an already tight market for meat proteins. In particular, the consumer concerns and import bans on US beef (due to BSE) and poultry from nearby Asian suppliers (due to avian influenza) have further boosted demand for Australian lamb in Japan and Taiwan.

The associated higher cost of beef and pork has also assisted to expand lamb sales elsewhere in Asia. This growth in underlying demand for Australian lamb has more than offset the record cost of the product, exacerbated by the higher A\$.

The growth in exports experienced during 2005 is expected to slow in 2006 to 4.2%, totalling 177,000 tonnes carcase weight equivalent (148,000 tonnes shipped weight). Growth during 2006 is again expected to be concentrated in trade to the US, Japan and China.

Providing lamb supplies increase as expected, lamb exports are projected to continue expanding by 4–6% per year from 2007, to reach 213,000 tonnes carcase weight equivalent (173,000 tonnes shipped weight) in 2010 – up 22% on the 2005 record. The main growth in exports is forecast to be to North America and Asia, although the falling cost of Australian lamb should also assist growth across the current wide spectrum of markets.

According to the Australian Bureau of Statistics, the value of Australian lamb exports also reached record levels in 2005, totalling A\$778 million, fuelled by strong export and domestic demand for Australian lamb.

Australian Sheep Industry CRC update

website: www.sheepcrc.org.au

Black sheep – a problem?

Deborah Maxwell, deborah.maxwell@une.edu.au

Merino breeders are divided on the problem of black sheep, usually depending on the level of pigmentation in their flock. But what is the true extent of the problem and does industry really want a test to detect the white carrier animals? The Australian Sheep Industry Cooperative Research Centre is conducting a survey to find the answers.

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Losses from pigmented Merinos go beyond the obvious contamination issue. Culling at marking results in fewer replacement animals and reduced selection pressure. And while a pigmented sheep can be grown and sold for meat, processors also discount the skin value heavily.

The consequences can be devastating for stud breeders who unknowingly introduce black pigmentation from other studs. No black sheep turn up in the first two years, but in the third year, when back-crossing occurs, then up pop the black lambs. By then the damage is done, with the ram having had up to three years to introduce his pigmented genes into the flock and the carriers can not be identified.

The Sheep CRC is getting close to a DNA test for the agouti patterns (self-colour and badger-face), but a test for Piebald would still be a few years away.

To find out more about pigmented Merinos go to the web site www.sheepcrc.org.au/pigment or call Deborah Maxwell on 02 6773 3597.

New tool keeps breeders in the loop

Deborah Maxwell, deborah.maxwell@une.edu.au

The Australian Sheep Industry CRC, has recently launched a new free downloadable software tool, Selection Assist. Selection Assist provides producers with a simple interface that allows them to easily and quickly compare a range of selection options under various production and market situations.

On an input page, the producer chooses an assessment timeframe of 5 or 10 years, their starting fibre diameter, wool market conditions, optional wool price discount (e.g for style), expected meat value, and how they would like the gross margin displayed.

The charts page allows the producer to create three alternate scenarios to compare, each has three changeable factors: whether ewes, rams or both are selected; weaning percentage; and a range of optional indexes. The charts then display the expected changes in fibre diameter, fleece weight and body weight for each scenario, as well as their gross margins.

The producer has the option of viewing more detailed information in the Production Table page and the Gross Margins page.

You can download your free program at the Sheep CRC software page www.sheepcrc.org.au/software.

Pregnancy testing poll

Heidi Hoffman, heidi.hoffman@une.edu.au

The Australian Sheep Industry CRC has an industry poll on their website. A recent poll, 'Were some of your ewes pregnancy scanned this year?' showed that voters were inclined to scan their ewes, with 34% voting no, and 66% voting yes - which was evenly split for scanning pregnancy only and scanning twins and singles.

The poll suggests that farmers believe that it is extremely important to scan pregnant ewes. Dry ewes' feed requirements are about 50% less than those of single-bearing ewes, which mean more feed for

mothers, giving them and their lambs a greater opportunity to flourish and farmers can sell their dry ewes, or mate them later on. The Sheep CRC is currently trialling systems to make selective feeding of single – and twin-bearing ewes a practical and cost-effective reality.

To have your say, on our latest poll on worm egg counting, simply go to our website at www.sheepcrc.org.au and vote.

The wool-meat balance - getting it right

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There is growing evidence that a dual purpose enterprise offers more flexibility and potential gain than a self-replacing dual-purpose flock. Wool still contributes more than 60% to the income from most Australian sheep enterprises and it is very important to focus on genetics and management for quality wool production in the Merino flock.

The sheep CRC has developed a series of tools to help set up a Merino flock for a dual-purpose wool-meat enterprise. These tools are available for free download from the Sheep CRC website www.sheepcrc.org.au/software.

Setting up an appropriate flock structure and making decisions about which ewes to mate to terminal sires depends on objective measurement of wool and meat parameters. The minimum data required to use the tools are: fibre diameter, fleece weight and body weight on individual animals.

This article summarises the tools which are available.

1. *On-Farm Fibre Measurement Calculator* (OFFM) estimates the potential benefits from knowing the fibre diameter of individual animals in the flock. Irrespective of whether fibre diameter is determined off-farm using mid-side samples or on-farm through OFDA or Laserscan, the calculator helps determine how to derive benefits from the new information. In the context of setting up an appropriate flock structure, the OFFM calculator helps assess the selection response advantages of running selected wethers and will also help to assess how ewes should be selected to give the most profitable result in terms of wool production.
2. *Wether Calculator*. Based on the average micron for the flock and anticipated meat value, the calculator shows the optimal number of wethers for the enterprise. This proportion does not take account of the potential role of mature wethers in helping to manage parasite problems. If parasite management is a major issue, it may be advisable to increase the number of wethers.
3. *Merino versus Terminal Sire Flock Model*. Based on the number of ewes, reproductive performance and mortality rates, the calculator

helps determine the percentage of ewes that can be mated to terminal sires while still retaining sufficient Merino ewe hoggets for a stable self-replacing Merino flock.

4. *Simultaneous Assortment.* The next step is to select the ewes and determine which animals are mated to Merino rams and which ones are joined to terminal sires. The Simultaneous Assortment program uses data on fibre diameter, fleece weight and body weight for each animal to determine whether the best financial outcome is to mate the ewe to a Merino or terminal sire. The resulting selection list allows final drafting of the two mating groups to optimize the return from both wool and meat across the flock.
5. *Ram selection.* Rams for the self-replacing Merino flock should be selected primarily on wool characteristics whereas terminal sires should be selected for muscling and growth. A further addition to the decision support programs available on the CRC website will be a Ram Value Calculator to help rank rams in terms of their long term value for a particular flock.

Management options to improve the reproductive performances of Merino ewes

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The Australian sheep flock has been reduced by almost 60% since 1990, due to industry adjustments caused by long term declines in the demand for raw wool, drought and strong prices for mutton and lamb that have increased slaughtering numbers.

In order to meet the current and future worldwide market demands for sheep meat and wool, there is a need to increase the number of breeding ewes in the Australian flock. To do this, marking and weaning percentages in Australia need to be improved, as predictions are that there will be a considerable shortfall of prime lambs and wool for export markets over the next few years.

We were contracted by AWI to identify key management strategies that will improve marking and weaning percentages of Merino ewes in Australia and to prioritise them as a guide for directing future investments in research on issues affecting sheep reproduction by both AWI and MLA.

Research review

The first part of our contract was to undertake a review of articles and papers that reported on research associated with many issues related to reproduction in sheep in Australia. All of the recent research in Australia has been related to the fundamental science of reproduction.

Identifying current projects and researchers

The second part of the contract involved the listing of current projects investigating issues related to the

reproductive performances in sheep. A series of questions were circulated to scientists and academics involved in sheep reproduction research in Australia in order to develop a list of current activities.

A list of the current sheep reproduction research activities for each State and for each institution was prepared. A workshop was then held in Sydney with the scientists where they proposed a number of management strategies that they thought had the potential to improve the marking and weaning percentages of ewes. The scientists also identified gaps in the current knowledge of sheep reproduction and made suggestions on priorities for future research.

Key management strategies

At the workshop the following management strategies were listed as having a high priority for future research. It was also concluded that the economic implications of the related strategies should be examined.

- i. Minimise the stress of ewes around the time of implantation to maximise embryo survival.
- ii. Join ewes for a late winter/spring lambing.
- iii. Targeted feeding of ewes
 - For mating.
 - To maintain condition score profiles during pregnancy so as to optimise the conditions for the development of the foetus and for foetal programming.
 - For twin-bearing ewes to maximise the survival of the lambs.
- iv. Improve the maternal behaviour and rearing ability of ewes.
- v. Set up suitable paddocks to optimise lambing performance.
- vi. Control predators in lambing paddocks and surrounding areas well before lambing commences.

Areas of research need

At the workshop we also listed a number of specific topics that were considered needed more research to be done to improve marking percentages. These were:

- i. Embryos. There is a need to assess the timing of embryo losses and the level of losses. If embryo mortality is still a significant problem in Australian flocks, we need to develop strategies to minimise this mortality.
- ii. Foetuses. There is a need to develop strategies to improve the viability of foetuses and to optimise the environment for effective foetal programming.
- iii. Lamb survival. There is a need to develop strategies to maximise the survival of newborn lambs. As the mothering ability of ewes has a major influence on the chances of lamb survival, research is required to develop methods to enhance the maternal behaviour and mothering ability of ewes, especially Merinos.

- iv. Genotype of ewes. There is a need to determine the influence of genotype on the various reproductive parameters. Genotype x environment interactions need to be evaluated.

At the end of the workshop it was concluded that a number of other management issues that influence the reproductive performances of sheep also needed to be examined. These included stocking rates, times of lambing and targeted feeding. In addition, there is a need to develop on-farm management packages with the potential to improve the marking/weaning percentages of ewes in a range of different environments and circumstances.

Since we submitted the report of our contract to AWI, they have asked a number of groups throughout Australia to now look at the economic implications of using the management strategies listed at the workshop. The outcomes of these analyses will then be used to guide the decisions about what further research on sheep reproduction AWI and MLA will fund.

We are hoping that DAFWA can get funds to examine some of the issues of importance to sheep producers in Western Australia.

New DNA test muscles up meat production

Dr Mike Tate

Catapult, Dunedin, New Zealand

A new gene test is promising farmers more saleable sheep meat for no extra work. Dunedin agri-technology company Catapult has developed a DNA test MyoMAX® to identify those sheep with leaner and meatier carcasses. By analysing a blood sample the test reveals rams or ewes with the gene for leaner and meatier carcasses.

In simple terms a ram carrying a single copy of the gene can be expected to produce progeny with 5% more leg and rump muscle but with 7% less fat, the effect will be up to double that in a ram carrying a double copy of the gene. The MyoMax effect can be passed on to lambs by either the ram, ewe or both parents.

The first MyoMAX® rams (single copy carriers) and MyoMAX^{GOLD}® (double copy carriers) rams will be available across many breeds at two-tooth sales later this year opening the gate for farmers to breed the production-boosting trait into flocks and immediately increase their farm gate returns.

Under the current weight and grade payment system, the benefits from using MyoMAX® come from increased dressing percentage and reduced fat. The benefits will be even greater where better carcass conformation and muscle yield are paid for directly under a yield based payment system.

The discovery of MyoMAX® builds on a decade of research, but specific isolation and validation of the gene started in earnest five years ago. We have long been aware of sheep, primarily of Texel origin, with increased muscling particularly in the rump area and the detailed records generated with CT and progeny

tests allowed us to focus in on the genes responsible.

Validation of the MyoMAX® effect involved screening 20-30,000 sheep from breeders throughout the country for presence of the gene. The process also involved double checking the performance of the gene as it moved from controlled research to the commercial farming environment. It confirmed that presence of the meat-plus gene does not compromise production traits such as growth rate and lamb survival. Equally important there are no negative effects on meat tenderness and colour.

MyoMAX® is the fifth predictive genetic test released by Catapult, a company owned 75% by Meat and Wool New Zealand and 25% by AgResearch.

Other DNA-products released to date are LoinMAX® a gene test identifying rams with a meatier loin muscle; Inverdale® a prolificacy gene test; Shepherd®, a fully integrated DNA based parentage system that provides breeding values and selection indices; and i-SCAN® a predictive DNA test identifying sheep with microphthalmia, a genetic eye disorder.

For more information contact: Dr Mike Tate (NZ) 03 477 5920.

Summer drenching - the latest advice for WA

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Resistance of sheep worms to drenches is continuing to worsen and there is no doubt that summer drenching is one of the major contributors to this problem in Western Australia.

A recent summary of faecal worm egg count (WEC) monitoring throughout southern WA has highlighted that it might not be necessary to summer drench every mob of mature sheep. By avoiding this treatment in these animals the worsening of drench resistance can be slowed.

This work was carried out on DAFWA's worm demonstration farms and the current WA sites in Australian Wool Innovation Ltd's Integrated Parasite Management of Sheep Project. Up to 38 properties have been involved in the monitoring activities at various times since 2001, with locations ranging from Northampton, Eneabba and Moora in the north to Albany, Jerramungup and Esperance in the south.

During each property visit, between 10 and 20 fresh faecal samples were collected off the ground in the paddock in which each mob of sheep was running. These samples were used to measure a mean WEC for each mob. Other details, including treatments, paddock history and any other management activities that had occurred on the property since the last visit were also recorded.

To assess the need for summer drenching, the mean WEC in November or December 2001, 2002, 2003 or 2004 of mobs with no known treatment within 60 days prior to the WEC, was examined. An arbitrary cut-off

figure of 200 eggs per gram was suggested as low enough to consider avoiding a summer drench.

Weaner sheep

Only 4 out of 42 mobs of weaner sheep (born in the year of measurement) had mean WEC below 200 epg. Furthermore, in excess of 60 percent of the weaner mobs had mean WEC greater than 500 epg (a level where the worm burden was likely to be significantly affecting the production of the weaners). This included examples of early and late born lambs and mobs of early born lambs that had been given an earlier weaning drench.

Therefore the monitoring of WEC suggested the need to continue to treat weaner sheep with a single, fully effective summer drench in WA.

Mature sheep

No summer-drenched mobs at any of the sites in WA in any of the years of this work required a second summer drench. Therefore, if it is thought that a second summer drench may be necessary, WECs should be checked first to make sure that such a treatment would be worthwhile.

In mature ewes (older than 2.5 years) 65, 78, 77 and 87 percent of the mobs had mean WEC below 200 epg during November or December 2001, 2002, 2003 or 2004 respectively.

Therefore monitoring of WEC in mature sheep highlighted the generally low egg output from these animals at the time of the traditional first summer drench. It is strongly suggested that a broad-spectrum summer drench could be avoided in these sheep.

Barber's pole worm

None of the monitored properties had significant levels of barber's pole worm and so it was not possible to evaluate the effects of avoiding summer treatments on the control of this worm. Therefore it is strongly recommended to maintain current barber's pole worm control practices if this worm is present on a property. If in doubt, seek local advice from a veterinarian or qualified sheep worm adviser.

On going work

Work and further analysis is ongoing to investigate more detailed recommendations to help avoid a summer drench. This includes monitoring changes in the worm burden of non-summer drenched sheep during the summer and autumn and any potential production costs of avoiding a summer drench. Early results have not found any major detrimental effects on liveweight or wool production during the summer-autumn.

One major risk from avoiding summer drenching is excessive worm contamination of pastures from the following autumn onwards. The monitoring research has shown that more than half of the non-summer drenched mobs exhibited WEC rises during the summer-autumn, and it is not yet possible to explain this finding. Previous research also showed excessive worm contamination of paddocks leading to late winter or spring worm problems in weaner sheep. Therefore mobs that are not summer drenched should be monitored visually during the summer-autumn and WECs checked again no later than the first week of April. A treatment is recommended if this result is above 200 epg and/or based on other considerations, such as the time of lambing of mature ewes.

Additional pre-lambing drenches may also be required in some years and extra WECs are important if the sheep or seasonal conditions are poor and after atypical seasonal events such as summer rain and/or early breaks.

As always, it is also important to include non-chemical approaches, such as the breeding of worm-resistant sheep, as key parts of an overall effective and sustainable sheep worm control program. Biosecurity strategies to reduce the risk of introducing worms more resistant than those currently on a property are also critical.

Key Recommendations

- Continue to treat weaner sheep with a single, fully effective summer drench in WA.
- A broad-spectrum summer drench could be avoided in mature sheep as mature sheep generally have a low egg output at the time of the traditional first summer drench.
- Maintain current barber's pole worm control practices if this worm is present on a property.
- Mobs that are not summer drenched should be monitored visually during the summer-autumn and WECs checked again no later than the first week of April.

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