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Sheep Updates 2007 - part 2

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**CONCURRENT SESSIONS**

**FINISHING LAMB & BEEF**

**Precision Feedlot Lamb**

*Ian McFarland, DAFWA, Narrogin*

**ABSTRACT**

Radio frequency identification technology highlighted enormous variations in the performance and profitability of individual lambs and groups of lambs from different sources finished in a commercial feedlot. Purchase price, liveweight of lambs entering the feedlot and average growth rate were key factors influencing the profitability of lambs for the Q-lamb alliance.

**AIMS**

To determine the performance and net returns of lambs finished in a commercial feedlot.

**METHOD**

Three groups of lambs were monitored using radio frequency identification (RFID) technology in a commercial feedlot. The target market for these lambs was Q lamb, which has a specification of 17-24 kg carcase weight and 6-15 mm tissue depth. All lambs were fed Macco 707 pellets. Group 1 consisted of 184 cross bred mixed sex lambs from 4 different sources and entered the feedlot in January 2007. Group 2 consisted of 262 Merino cross Samm Merino wethers bred on the property and entered the feedlot in February 2007. Group 3 consisted of 174 Merino and crossbred mixed sex lambs purchased directly off farm from two sources in September 2006.

All lambs were given an RFID ear tag on entry into the feedlot and liveweights were monitored on a weekly basis. All costs incurred were recorded, except for the cost of feed, which was calculated using the assumption that lambs consumed 3.5% of average liveweight [i.e. feed cost = average liveweight x 0.035 x feed cost/tonne x days in feedlot]. Profit was determined from gross income [hot carcase weight x sale price ($/kg)] + skin value] minus variable costs. Variable costs included: purchase price (or store price value); feed cost ($330/tonne); levies (2% gross value + Q lamb levy); freight ($1.95/lamb); drench/vaccination/Vitamin E ($0.71/lamb); NLIS tag ($0.12/lamb) + labour ($0.05/hd x days in).

**RESULTS**

The average profit per lamb was $2.82, $3.00 and $9.26 for Groups 1, 2 and 3 respectively (Table 1). Between 10 and 20% of lambs within each group returned a negative profit, and on average there was a $25/lamb difference in the profitability of the top and bottom 10% of lambs within each group. There were large differences in the performance of lambs from different sources in Group 1. The most profitable source (1a) returned $3.96 per lamb whereas the least profitable (1d) had an average loss of $2.72. As expected, there were multiple factors that had an affect on profit including purchase price, price received, entry weight, average growth rate, dressing percentage and sale price (achieving market specification).

**Table 1:** Production data and estimated profitability of different groups of lambs finished to Q-lamb specifications in a commercial feedlot.

<table>
<thead>
<tr>
<th>Group</th>
<th>Purchase $/kg LW</th>
<th>WT in kg</th>
<th>WT out kg</th>
<th>Days in</th>
<th>Growth rate g/hd/d</th>
<th>Fat depth mm</th>
<th>Carcase weight kg</th>
<th>Profit $/hd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.13</td>
<td>38.3</td>
<td>50.1</td>
<td>30</td>
<td>390</td>
<td>8.9</td>
<td>21.1</td>
<td>2.82</td>
</tr>
<tr>
<td>1a</td>
<td>1.17</td>
<td>39.8</td>
<td>51.2</td>
<td>22</td>
<td>518</td>
<td>8.5</td>
<td>21.9</td>
<td>3.96</td>
</tr>
<tr>
<td>1b</td>
<td>1.19</td>
<td>37.1</td>
<td>51.2</td>
<td>32</td>
<td>441</td>
<td>8.6</td>
<td>20.9</td>
<td>1.23</td>
</tr>
<tr>
<td>1c</td>
<td>1.15</td>
<td>40.5</td>
<td>50.6</td>
<td>28</td>
<td>361</td>
<td>8.6</td>
<td>20.9</td>
<td>-1.37</td>
</tr>
<tr>
<td>1d</td>
<td>1.23</td>
<td>34.6</td>
<td>48.8</td>
<td>41</td>
<td>346</td>
<td>9.2</td>
<td>20.5</td>
<td>-2.72</td>
</tr>
<tr>
<td>2</td>
<td>1.00</td>
<td>42.2</td>
<td>48.5</td>
<td>30</td>
<td>210</td>
<td>9.8</td>
<td>21.3</td>
<td>3.00</td>
</tr>
<tr>
<td>3</td>
<td>0.90</td>
<td>34.3</td>
<td>45.6</td>
<td>33</td>
<td>336</td>
<td>-</td>
<td>20.0</td>
<td>9.26</td>
</tr>
</tbody>
</table>
Lambs from source 1a were more profitable than 1d due to their lower purchase price ($1.17 vs. $1.22 per kg LW) and fewer days in the feedlot (22 vs. 41 days) because they were heavier at entry (39.8 vs. 34.6 kg) and grew significantly faster (518 vs. 346 g/day). However, the overriding importance of purchase price in comparison to entry weight is illustrated by Group 3, which was the most profitable of all groups despite an entry weight significantly less than the Q-lamb alliance recommendations of 38 kg (R. Crabb pers. Comm.). A simple spreadsheet was developed to provide an insight into the relative impact on net profit, if single factors are changed (Table 2).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Actual change</th>
<th>% change in variable</th>
<th>Impact on net profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase price</td>
<td>20c decrease ($1.20 to $1.00 c/kg lw)</td>
<td>17% change</td>
<td>273% increase</td>
</tr>
<tr>
<td>Price received</td>
<td>20c increase ($3.20 to $3.40/kg hc)</td>
<td>6% change</td>
<td>140% increase</td>
</tr>
<tr>
<td>Growth rate</td>
<td>100 g/hd/d increase (300 to 400 g/hd)</td>
<td>33% change</td>
<td>111% increase</td>
</tr>
<tr>
<td>Freight</td>
<td>$1.50 increase ($1.50 to $3.00 per head)</td>
<td>100% change</td>
<td>54% decrease</td>
</tr>
<tr>
<td>LWt in (kg)</td>
<td>4 kg decrease (38 to 34 kg)</td>
<td>11% change (results in 57% increase in days in)</td>
<td>51% decrease</td>
</tr>
<tr>
<td>Dressing %</td>
<td>2% increase (44 to 46%)</td>
<td>5% change</td>
<td>101% increase</td>
</tr>
<tr>
<td>Feed cost ($/tonne)</td>
<td>$80 decrease ($330 to $250/tonne)</td>
<td>24% change</td>
<td>97% increase</td>
</tr>
<tr>
<td>Skin price</td>
<td>$1.50 increase ($1.50 to $3.00)</td>
<td>100% change</td>
<td>53% increase</td>
</tr>
</tbody>
</table>

CONCLUSION

This work highlights that there is considerable variation in the performance and profitability of individual lambs and groups of lambs finished in a commercial feedlot, and that multiple factors need to be considered to make a profit from feedlotting lambs given current prices. It also demonstrates that average lamb growth rates exceeding 350g/day are achievable under commercial conditions, but further work is required to assist in the early identification of lambs which will not perform in the feedlot.

KEY WORDS

Feedlot profit, lamb growth rate, Q-lamb

ACKNOWLEDGMENTS

Peter Trefort for providing his feedlot for this work. Rob Shepherd and Claire Coffey for assistance in collecting and analysing data and the Sheep CRC for assistance in funding the trial work.

Paper reviewed by: Andrew Thompson
Feeding sheep under high heat load did not decrease intake of feedlot rations

Catherine Stockman, DAFWA and Murdoch University
Anne Barnes, Murdoch University
David Pethick, Murdoch University

ABSTRACT

The physiological responses of sheep fed feedlot rations while exposed to hot conditions were investigated. Initial studies examined the climatic conditions within a Western Australian feedlot during summer and the core temperature response of cross bred wethers and ewes to these conditions. Temperatures within the feedlot reached a daily mean maximum of 35°C dry bulb, and core temperature of ewes and wethers was significantly increased (p< 0.05). Following this, a climate room study was conducted using nine cross bred ewes and nine cross bred wethers. Ewes and wethers were implanted with internal temperature loggers and housed in climate rooms for sixteen days. Mean day time temperatures and humidity of the climate rooms ranged from mild heat in heat period 1 (29˚C dry bulb and 36% humidity) to extreme heat in heat period 2 (38˚C dry bulb and 50% humidity) with varying respite from these temperatures at night. Feed intake did not significantly decrease during the study, in spite of an increase in mean daily core temperature, respiratory rate and panting score (p< 0.01).

AIMS

The Australian lamb industry has undergone major changes in recent years with lamb carcasses changing to meet consumers demand for a heavier and leaner carcass (ABARE 2006). This has caused a move towards the use of crossbreeds with later maturing characteristics (ABARE 2006). Feedlotting enables prime lambs to be finished independently of pasture availability and therefore allows a more consistent supply of lambs throughout the year. Excessive heat load of livestock in a feedlot production system has been well researched within the cattle industry (Hahn 1999; Brown – Brandl et al. 2005) but little work has been done on the response of sheep to this type of production system. The aims of these studies were to determine the environmental conditions in a partly sheltered feedlot located in the Western Australian wheat belt and determine the core temperature of cross bred ewes and wethers being finished in this feedlot. More intensive studies aimed to test the physiological responses of prime feedlot lambs to increased heat load when fed a feedlot ration.

METHOD

Feedlot study

Three cross bred ewes (35.2 kg ± 0.93) and three cross bred wethers (36.0 kg ± 1.26) were surgically implanted with core temperature loggers (Maximum Dallas). Normal core temperature was determined while sheep were in thermoneutral conditions indoors, before being taken to the feedlot. Climate conditions were monitored in the feedlot from day 1 to 25 during February and March, while sheep were in the feedlot. Climatic conditions within the feedlot were monitored during the study using temperature data loggers (T-TEC Datalogger, South Australia) and a weather station (Onset computers, USA). While in the feedlot, sheep had access to shaded areas and were fed pellets (CP 14.8%, ME 11.1 MJ/kg DM) and hay ad libitum and had water available ad libitum.

Climate room study

Nine cross bred ewes and nine cross bred wethers (25.9 kg ± 0.9) were surgically implanted with core temperature loggers (Maximum Dallas) and then randomly assigned to individual pens in climate controlled rooms (CCR). Sheep were exposed to prevailing thermoneutral temperatures for 4 days; followed by 8 days of increasing day-time temperature and thermoneutral temperatures at night. This was followed by increased day-time and night-time temperature (d 13 to 16) (Figure 2). While in the rooms sheep were fed a standard feedlot pellet at 5% body weight (CP 14.8%, ME 11.1 MJ/kg DM) to which they were previously adapted. Water was available ad libitum. Measurements were taken of physiological variables (Table 1).

RESULTS
Feedlot study

Dry bulb temperatures in the feedlot reached a mean daily maximum of 35 ± 0.5°C and a mean daily minimum of 16 ± 0.8°C, with low humidity. Dry bulb temperature was combined with relative humidity to give the wet bulb temperature shown in Figure 1. Core temperatures of ewes and wethers reached a mean daily maximum of 40.0 ± 0.04°C and 40.2 ± 0.03°C respectively while in the feedlot, which were significantly elevated above normal (39 and 39.5°C for ewes and wethers respectively) (p< 0.05).

Climate room study

Mean physiological variables of wethers and ewes are shown in Table 1. There was no significant difference in physiological variables between ewes and wethers. The significant rise in core temperature, respiratory rate and panting score indicate that the wethers and ewes were heat stressed. In spite of this, sheep were able to maintain feed intake.

Table 1. Means ± SEM for physiological variables measured on cross-bred sheep in climate controlled rooms pre-heat (d 1 to 4) compared to d 12 during heat period 1 and d 16 during heat period 2a

<table>
<thead>
<tr>
<th>Physiological variables</th>
<th>Pre - heat</th>
<th>Day 12</th>
<th>Day 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed intake (% of body weight)</td>
<td>97.3 ± 1.53a</td>
<td>99.5 ± 0.46a</td>
<td>91.2 ± 4.97a</td>
</tr>
<tr>
<td>Water intake (% body weight)</td>
<td>12.7 ± 0.33a</td>
<td>13.8 ± 0.81a</td>
<td>18.1 ± 1.27a</td>
</tr>
<tr>
<td>Core temperature (°C)</td>
<td>39.5 ± 0.04a</td>
<td>39.9 ± 0.41b</td>
<td>40.4 ± 0.06c</td>
</tr>
<tr>
<td>Respiratory rate (breaths/min)</td>
<td>75 ± 2.1a</td>
<td>192 ± 15.7b</td>
<td>220 ± 10.2b</td>
</tr>
<tr>
<td>Panting</td>
<td>none</td>
<td>mild</td>
<td>open-mouthed</td>
</tr>
</tbody>
</table>

aWithin rows, means with different subscripts differ significantly (p< 0.05)

CONCLUSION

Cross-bred ewes and wethers were able to maintain feed intake of feedlot rations despite showing signs of heat stress. This differs from studies where cattle have drastically decreased feed intake in response to high environmental temperatures. However, there was a minority of sheep that did decrease intake in response to heat load, and this between-animal variation in response needs to be considered in feedlot management of heat stress in order to improve welfare and profitability.

KEY WORDS
Sheep, Heat load, Physiology, Feed intake

ACKNOWLEDGMENTS

Thank you to Andrew and Les Marshall from Duntarning, Pingelly for use of their feedlot in this study and the Sheep CRC for funding of this research.

Paper reviewed by: Dr Anne Barnes (Murdoch University)

REFERENCES

ABARE (Australian Bureau of agricultural and resource economics). 2006. Meat and Livestock Australia, Australian lamb 06.1: Sydney, Australia
Taking the stress out of finishing lambs and cattle – EasyFeed solutions

Jenny Davis\textsuperscript{a}, Brett Thomson\textsuperscript{a} and Ron Leng\textsuperscript{b}

\textsuperscript{a}Milne AgriGroup, Welshpool WA
\textsuperscript{b}Emeritus Professor, University of New England, Armidale, NSW

ABSTRACT

Milne Feeds have developed feeds high in protein and energy that produce cost-effective, high live weight gains in lambs and beef cattle. These feeds have been developed using innovative processing techniques that prevent acidosis in sheep or cattle by neutralizing the acid produced in the rumen. These feeds can be offered \textit{ad libitum} from Day 1, as there is no need to adapt the rumen microbes. This allows the animals to start putting on weight immediately. The whole feeding process is easy as there is only one feed and no complicated introductory steps. The innovative processing techniques have the added benefit of increasing the durability of the pellets and reducing fines.

AIMS

To develop feeds that are safe for sheep and cattle whilst supplying sufficient energy and protein to produce high liveweight gains. These feeds should be able to be introduced \textit{ad libitum} from Day 1 without causing acidosis or metabolic discomfort to the animals. It should not matter if the animals are "empty" when started on the feed. The feeds should stand-alone and not require any additional roughage to be fed with them.

METHOD

\textit{Sheep:} Trial 1 was conducted at Curtin University of Technology, Northam Campus and involved mixed sex, 10 months-old Merino lambs. Two ration formulations were compared in a randomized block design (2 treatments by three replications by 14 -15 animals per replicate). The treatments were 1) EasyOne, and 2) Lamb Finisher (LF). The second sheep trial was conducted at Narrogin Agricultural College and involved seven-month-old first cross lambs. Three ration formulations were compared in a randomized block design (3 treatments by three replications by 25 -26 animals per replicate). The treatments were 1) EasyOne; 2) Lamb Finisher\textsubscript{1} (LF\textsubscript{1}); 3) Lamb Finisher\textsubscript{2} (LF\textsubscript{2}). In both trials the lambs were kept outdoors in small feedlot pens each with a self-feeder and troughed water. Pens were checked daily and water troughs cleaned as required.

In both trials EasyOne lambs were given ad libitum access to it from Day 1 with no additional roughage supplied. Lambs on the traditional Lamb Finisher diets were slowly adapted to diets over a two-week period.

\textit{Cattle:} A 69-day trial using 12-month-old Angus and Murray Grey steers fed two treatments, replicated three times with 6 animals per replicate was conducted at Narrogin Agricultural College. The steers were kept in small feedlot pens (approximately 0.3 ha). The treatments were 1) EasyBeef, and 2) BeefEater 250. The animals on the EasyBeef treatment were given ad libitum access to their feed from Day 1. Steers on BeefEater 250 were adapted to the diet using EasyBeef. A small bale of hay was fed every second day to the steers on BeefEater 250 to ensure adequate fibre intake.

RESULTS

The Merino lambs used in the trial at Curtin were those remaining after the faster growing animals had been drafted off for sale. Live weight over time of the lambs in Trial 1 is shown in Figure 1. The response of lambs to the traditional grain based Lamb Finisher is typical of what happens when lambs are first introduced to a high grain ration. The lambs lose weight until their rumen adapts to the lactic acid produced as a result of the breakdown of starch. In comparison, lambs fed the EasyOne formulations require no adaptation period and start putting on weight from day 1. There was a significant difference in average daily gain (ADG) between the lambs fed EasyOne (281 g/d) and those fed Lamb Finisher (196 g/d).
Results of Trial 2 are given in Table 1. Lambs fed EasyOne had a significantly higher live weight gain than lambs fed Lamb Finisher.

Table 1. Effect of diet on live weight (Lwt), average daily gain (ADG), intake, feed conversion ratio (FCR), dressing % (DP%), fat score and hot standard carcass weight (HSCW) of crossbred lambs fed one of three diets.

<table>
<thead>
<tr>
<th>Diet</th>
<th>Initial Lwt</th>
<th>Final Lwt</th>
<th>ADG (g/d)</th>
<th>Intake (kg/d)</th>
<th>FCR</th>
<th>DP%</th>
<th>Fat Score</th>
<th>HSCW kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF1</td>
<td>42.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>49.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>246&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.63&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>44.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.12&lt;sup&gt;a&lt;/sup&gt;</td>
<td>22.1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>LF2</td>
<td>42.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>51.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>288&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.55&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>43.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.18&lt;sup&gt;a&lt;/sup&gt;</td>
<td>22.3&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>EasyOne</td>
<td>42.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>51.4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>317&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.57&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>42.8&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.99&lt;sup&gt;a&lt;/sup&gt;</td>
<td>22.0&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*Within columns, means followed by different letters are significantly different (P<0.05)

Results from the cattle trial are given in Table 2. There were no significant differences (P > 0.05) in the production data measured. This demonstrates that EasyBeef is able to produce live weight gains equivalent to a high grain ration without the problems of adaptation or acidosis.

Table 2. Live weight, ADG, feed intake, FCR, HSCW, fat and DP% of steers fed one of two diets.

<table>
<thead>
<tr>
<th>Diet</th>
<th>Initial Lwt</th>
<th>Final Lwt</th>
<th>ADG (kg/d)</th>
<th>Intake (kg/d)</th>
<th>FCR</th>
<th>HSCW</th>
<th>Fat (mm)</th>
<th>DP %</th>
</tr>
</thead>
<tbody>
<tr>
<td>BeefEater</td>
<td>372</td>
<td>514</td>
<td>2.08</td>
<td>9.50</td>
<td>4.58</td>
<td>253</td>
<td>9</td>
<td>49.3</td>
</tr>
<tr>
<td>EasyBeef</td>
<td>374</td>
<td>521</td>
<td>2.16</td>
<td>9.89</td>
<td>4.62</td>
<td>261</td>
<td>8</td>
<td>50.1</td>
</tr>
</tbody>
</table>

CONCLUSION

Through innovative processing techniques it is now possible to give cattle and sheep immediate access to a high energy feed without the risk of acidosis. The feeds are formulated to provide cost effective live weight gains for finishing lambs and cattle.

KEY WORDS

Lambs, beef, “rumen safe”, high energy feed, feedlot

ACKNOWLEDGMENTS

Cutin University of Technology (Muresk Campus) and Narrogin Agricultural College for running these trials and Dr Gaye Krebs for statistical analysis.

Paper reviewed by: Dr Gaye Krebs
DAFWA algorithm selects Western Australian fine tip wool from auction.

Sara Pieruzzini, DAFWA

ABSTRACT

Shearing in autumn in a Mediterranean environment has been shown to produce wool with finer tips resulting in improved next-to-skin comfort of knitted wool fabrics. This experiment investigated the effectiveness of a selection algorithm developed by DAFWA for preparing commercial size batches of Western Australian fine tip (WAFT) wool out of auction. Five batches of wool of varying average fibre diameter (17.5, 19.5 and 21.5 µm) and hauteur measurements (62, 68 mm) were assembled from auction using the DAFWA selection algorithm. Each batch was processed through to top by Italian processor Zegna Baruffa. Fine ends were measured from top using OFDA 4000. Results indicate that the DAFWA selection algorithm was successful in selecting fine tip wool with all batches achieving a fine tip effect of between 0.5µm and 1.3µm.

AIM

Fine tip wool occurs when the fibre diameter of the fibre ends is less than the fibre diameter in the middle of the fibre. It is measured using wool top. The greater the difference the larger the fine tip effect. This phenomenon leads to less fibre breakages in processing due to the middle of the fibre being stronger (Naylor and Stanton, 1997), and is expected to produce improved consumer comfort due to the fineness of the fibre ends resting on the consumers’ skin (Naylor and Stanton, 1997).

Fine tip wool is more commonly found from Western Australian sheep which have been shorn in autumn. Western Australia has a marked Mediterranean climate with a long dry summer/autumn period which offers low levels of feed and a winter/spring period which offers higher levels of feed. In response to changes in the availability of feed during the year, the fibre diameter of wool fibre changes along its length, decreasing in autumn.

DAFWA researchers have developed a selection algorithm which selects wool lots from the Australian Wool Exchange pre-auction catalogue which exhibit fine tip properties. The algorithm also selects on other properties which contribute to comfort against the skin.

The aim of this experiment was to investigate the effectiveness of the selection algorithm developed by DAFWA to select batches of Western Australian fine tip wool out of auction.

METHOD

The experiment assembled out of Fremantle auction, five wool batches with fine tip effect (5 bales each batch, a total of 25 bales) of varying fibre diameter (17.5µm, 19.5µm, 21.5µm) and hauteur measurements (62mm, 68mm), as required by Zegna Baruffa (Table 1). Using the DAFWA selection algorithm, the five wool batches were selected for fine tip and other specifications which contribute to comfort against the skin. The five wool batches were purchased at auction in Fremantle. All bales were dumped, packed and air freighted to Zegna Baruffa, Vallemosso, Italy.

Table 1: Target measurements for fine tip wool batches and actual volume delivered to Zegna Baruffa

<table>
<thead>
<tr>
<th>Batch label</th>
<th>Target mean fibre diameter (µm)</th>
<th>Target Hauteur (mm)</th>
<th>Actual number of bales (and weight kg clean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAWA01</td>
<td>17.5</td>
<td>68</td>
<td>5 (4,560 kg)</td>
</tr>
<tr>
<td>DAWA02</td>
<td>17.5</td>
<td>62</td>
<td>5 (4,153 kg)</td>
</tr>
<tr>
<td>DAWA03</td>
<td>19.5</td>
<td>68</td>
<td>5 (5,808 kg)</td>
</tr>
<tr>
<td>DAWA04</td>
<td>19.5</td>
<td>62</td>
<td>5 (5,227 kg)</td>
</tr>
<tr>
<td>DAWA05</td>
<td>21.5</td>
<td>68</td>
<td>5 (6,178 kg)</td>
</tr>
</tbody>
</table>

Zegna Baruffa processed the 5 raw wool batches into 5 top batches. Zegna Baruffa sent to DAFWA approximately 2 kg of top from each batch. DAFWA measured the top samples using OFDA 4000 quantifying the actual difference in tops between the mean fibre diameter and the fibre end diameter.
RESULTS

The mean fibre diameter, fibre end diameter and calculated fine tip effect for each batch are detailed in Table 2. The results indicate that the DAFWA selection algorithm was successful in selecting fine tip wool for all five batches, achieving a fine tip effect of between 0.5µm and 1.3µm. This suggests that DAFWA algorithm used to identify the fine tip batches of wool using the AWEX catalogue is reasonably accurate.

Table 2: Fine ends effect for the five tops of fine ends wool processed by Zegna Baruffa

<table>
<thead>
<tr>
<th>Batch label</th>
<th>Actual Mean Fibre diameter (µm)</th>
<th>Actual Fibre end diameter (µm)</th>
<th>Fine tip effect (mean FD – fibre end FD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAWA01</td>
<td>18.2</td>
<td>17.4</td>
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<td>20.4</td>
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<td>0.7</td>
</tr>
<tr>
<td>DAWA04</td>
<td>20.3</td>
<td>19.0</td>
<td>1.3</td>
</tr>
<tr>
<td>DAWA05</td>
<td>21.9</td>
<td>20.6</td>
<td>1.3</td>
</tr>
</tbody>
</table>

However, this conclusion is based on the measurements conducted on five batches of wool selected out of a single auction. DAFWA researchers believe the selection algorithm needs to be tested on a larger number of wool batches over a series of auctions. This will enable DAFWA researchers to make better conclusions on the consistency and accuracy of the selection algorithm.

It should also be noted that the actual mean fibre diameters of the five processed batches differed from the target fibre diameters (compare column 1 of Table 1 and Table 2). More research needs to be undertaken to understand why this difference occurred and how it is possible to reduce it.

CONCLUSION

The results show that DAFWA selection algorithm was successful in assembling fine tip processing batches. However, further trials and research need to be undertaken to test the algorithm for consistency and for its ability to match wool tops specification in terms of mean fibre diameter.

KEY WORDS

Fine tip selection algorithm, Fine tip wool, DAFWA, skin comfort

ACKNOWLEDGMENTS

The results and information included in this article have been provided thanks to the work of DAFWA wool team researchers, Associate Professor John Stanton, Melanie Dowling, John Beilby, Emma Barsden, Kimbal Curtis, Dr Mark Dolling, Dr Greg Sawyer, who have actively participated to the 'Soft products developed from fine-tip wool with Zegna Baruffa' project together with Zegna Baruffa, funded by Australian Wool Innovation. I would like to say thanks to DAFWA researchers, Zegna Baruffa and Australian Wool Innovation for their cooperation and support.

Paper reviewed by: Emma Barsden

REFERENCES

Why is adoption of forward contracts by Western Australian wool producers so limited?

Elizabeth Jackson, Curtin University of Technology
Mohammed Quaddus, Curtin University of Technology
Nazrul Islam, Department of Agriculture and Food Western Australia
John Stanton, Department of Agriculture and Food Western Australia, Curtin University of Technology

ABSTRACT
A telephone survey of 305 Western Australian wool producers revealed the factors that limit farmers’ adoption of forward contracts for the sale of wool. Analysis of farmers’ responses indicates that the farmers’ perceptions of risk and uncertainty of forward contracts limits the use of these contracts. Based on these results some policy implications for the Australian wool industry are discussed.

AIMS
Market analyses and farm management literature point to likely low growth rates in the demand for wool and warn of price volatility (Lowe 2005; Perry, Bailey & Delforce 2005; Kingwell 2000). Despite this warning, the highly volatile auction system remains the most commonly used method of selling wool. Although the auction system can be an unstable method of price discovery for producers, nonetheless 85 per cent of wool producers use this system of selling (Bolt 2004). This paper seeks to understand why Australian wool producers have been so slow to adopt forward contracts, an alternative to the auction system.

METHOD
The behavioural model for this study was developed using a two-step qualitative/quantitative research process. The qualitative stage involved conducting focus groups in Northampton, Merredin, Kojonup and Esperance. The data from this exercise was combined with concepts drawn from the theories of planned behaviour and diffusion of innovations to build a behavioural model. The focus group data showed that factors internal and external to the farm business were likely to have significant influences on their adoption of forward contracts. These factors were included in the model and their impact on producers’ adoption behaviour was tested.

Examples of internal factors included the producer’s commitment to producing wool and secondly, the producer’s dependence on wool to earn a living. Factors external to the farm business mainly considered the current selling and marketing structures of Australia’s wool industry. The dominance of the auction system was hypothesized to be the main factor suppressing adoption behaviour.

Other factors tested in the model included:
(i) the perceived usefulness of forward contracts (including relative advantage, compatibility, complexity, application to the farm business and risk),
(ii) the subjective norms associated with using forward contracts to sell raw wool (including family opinions, dominance of the auction system, opinions of peers and the influence of advisory services) and
(iii) the perceived behavioural control surrounding the use of forward contracts (including the support from advisory services).

This model was then tested using data gathered from a telephone survey of 305 Western Australian wool producers. Structural equation modelling that combined regression analysis and path analysis was used to estimate the fit of the model to the data set.

RESULTS
A structural model should have an $R^2$ of at least 0.1 to be considered acceptable (Falk and Miller 1992). Our model displayed an $R^2$ goodness-of-fit of 0.51.

One key finding from the model, contrary to the initial indications of focus group discussions, is that the current selling and marketing structure of the Australian wool industry, including the dominance of the auction system, is not a limiting factor to the adoption of forward contracts for the sale of raw wool. Similarly, some other factors internal to the farm business, such as past experiences with selling wool,
level of dependence on wool to earn a living and commitment to producing wool, also were found to not limit the adoption of forward contracts.

The main factor limiting the adoption of forward contracts was identified as the wool producers’ perceptions of risk and uncertainty surrounding the use of this method of selling wool. Farmers’ perceptions of risk and uncertainty (Abadi Ghadim et al. 2005) and their perceptions and attitudes in general (Pannell et al. 2006; Kingwell & Cook (in press)) are known to be important influences on farmers’ adoption decisions. Why farmers perceive forward selling as being subject to risk and uncertainty needs to be the subject of further research. To effectively promote forward selling as a preferred selling method first requires that farmers’ reticence to use this selling method should be understood.

CONCLUSION

The main factor limiting wool producers’ adoption of forward contracts for the sale of wool is the wool producers’ perceptions of the risk and uncertainty associated with these contracts. The policy implications of this research are that before forward selling can be effectively promoted it is first necessary to understand why farmers have these perceptions. Hence, some further research is required to provide that understanding. Information and extension initiatives that explain and demonstrate the benefits of forward contracts may be necessary if farmers’ perceptions of the riskiness and uncertainty surrounding these contracts are to be altered.

KEY WORDS

Wool, forward contracts, auction, focus groups, structural equation modelling.

ACKNOWLEDGMENTS

This study is based on the collaborative research project “Behavioural determinants of the adoption of forward contracts by Australian wool producers” between the Graduate School of Business, Curtin University of Technology and WoolDesk, the Department of Agriculture and Food Western Australia (DAFWA). The project has been jointly funded by the Australian Research Council and DAFWA. The financial support of The Australian Wool Education trust is also gratefully acknowledged. We also wish to thank the two reviewers of this paper for their supportive advice.

Paper reviewed by: Dr Ross Kingwell (DAFWA), Associate Professor Des Klass (Graduate School of Business, Curtin University of Technology)

REFERENCES

Genetic programs and the imposition of contract supply conditions on wool fibre diameter

John Stanton, DAFWA and Curtin University of Technology
Melanie Dowling, DAFWA

ABSTRACT

Wool producers desiring to enter into long term forward contracts may need to stabilise the wool measurements in their annual clip so that they remain within the contract specifications. There is evidence of differences in stability between genetic sources, and this might be used to improve the stability of the flock mean fibre diameter (FD).

AIMS

The uptake of forward contracts by wool growers is seen as a necessary step if wool growers are to participate in supply chain management. Currently wool growers have severe reservations about entering into forward contracts. A major reason expressed by wool growers is that they would not be able to deliver raw wool to the contract specifications either consistently or reliably. They might be successful in a single year if the production system is predictable, and/or some pre-shearing testing of the wool has been undertaken, but they feel they cannot enter into a long term contract because of season effects.

This paper looks at two issues that relate to this debate:
1. Is their wool mean FD result stable between years?
2. Can genetic selection be used to improve the stability of the mean FD?

METHOD

Stability of production in a region

Analysis of the supply profile was undertaken using the Wooldesk archive of all auction sale lots for Australia over a number of years. The analysis utilised the AWEX wool selling area W09 to choose lots from the Great Southern Region of WA. Adult merino fleece sale lots from November of each year from 2002 to 2005 were used in this analysis. November results were selected to correspond with the wool auction sale dates for the Katanning Ewe Productivity Trial flocks reported below. Contract specifications used in this analysis were for sale lots with a FD between 19 and 20 µm.

Stability of production by genetics

Analysis of wool FD stability was conducted on the results from the Katanning Ewe Productivity Trial (EPT) between 2003 and 2006. Results from 6 different genetic sources were used, including pure Merino, Finn and Dohne F1 crosses. All sheep were run in a single flock for the trial. Changes in mean FD relative to the 2003 mean FD for each flock in each year were analysed.

RESULTS

Figure 1 shows the cumulative frequency distribution of FD in auction sale lots from the Great Southern Region (W09). The percentage of the clip falling within the contract limits in each year is estimated from the intersections of the cumulative frequency distribution and the contract limits. The proportion of wool sold that falls within the contract limits is shown in Table 1. In November 2002, 21.2% of the wool from W09 fell within the contract limits. In contrast, in November 2004, between year changes are evident, so that wool growers at the 50% percentile had clips that were 1 micron finer, and had moved into contract range. So the wool from W09 that was in specification in November 2003 and met specification in November 2002 accounted for only 11.7% of the W09 wool sold in November 2003. Similarly only 3.9% of W09 wool met specification in November 2002 and November 2004.

Mean FD results for individual genetic sources from the EPT demonstrate that genetic sources respond to a different extent to seasonal conditions (Figure 2). For example, the GSARI control flock shows the largest change in FD across these years, while other Merino flocks show most stability in response to ageing and seasonal changes. The non-merino breeds were spread between these two results, implying that a change away from Merino sources would not be necessary to achieve stable mean FD. However careful selection of Merino sources is required to deliver stable mean FD.
Figure 1: Cumulative frequency distribution of fibre diameter for auction sale lots sold from the Great Southern region (W09) in Nov 2002, Nov 2003, Nov 2004 and Nov 2005.

Table 1: Percent (clean weight basis) of all Great Southern Region wool sold in each November from 2002 to 2005 that fell within the contract limits (19 to 20 µm), and percent in subsequent years from the same producers that remained within the contract limits.

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<tbody>
<tr>
<td></td>
<td>21.2</td>
<td>11.7</td>
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<td>13.9</td>
</tr>
<tr>
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<td>Nov 2005</td>
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CONCLUSION

Wool growers’ concern that they cannot enter into long term forward contracts because of difficulties in meeting the contract specifications between years has been demonstrated using a WA example. The auction analyses show that there are significant changes in wool FD between years. There is evidence that some genetic sources are more stable in FD across years. If the adoption of long term forward contracts is to improve, more stability of supply to specification is required. Wool growers may have the option of using genetics to improve stability of production.

KEY WORDS

Forward contract, wool production, stability, genetics

ACKNOWLEDGMENTS

Wool producers that participated in the Katanning Ewe Productivity Trial. The Wool Desk at DAFWA for access to the Australian wool auction database.

Paper reviewed by: Kimbal Curtis
GRAZING BEEF

Papers not available at this time