

A FEW SELECTED LINES

NEWSLETTER OF THE TRANGIE QPLU\$ PROJECT

IN THIS ISSUE...

CHANGES IN THE TRANGIE QPLU\$ SELECTION LINES IN

- CARCASS TRAITS
- WOOL STYLE TRAITS
- FEED INTAKE

RESULTING FROM 10 YEARS OF SELECTION

NEXT ISSUE...

LIFETIME RESPONSES IN

- FLEECE WEIGHT
- FIBRE DIAMETER
- GROWTH
- REPRODUCTION



We welcome your enquiries and feedback related to the Trangie QPLU\$ Project and this Newsletter. Depending on the nature of your questions/comments please contact one of the following people involved in the Project.

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• **australian wool**
innovation
• limited

Welcome to issue 7 of "A Few Selected Lines". Over the course of the Qplu\$ Project we have measured many of the production and quality traits that impact on the revenue and costs of Merino enterprises. In this issue we present a summary of the changes observed in carcass and wool style traits resulting from long-term selection for heavier fleeces of finer fibre diameter. We also report on the feed intake of adult ewes of each line. These results were presented at this year's Open Day and because many of our readers missed the event the results are presented here.

The final Qplu\$ Open Day is scheduled for Thursday 7th of June 2007. The 2004 drop ewes and rams will be on display in full wool. Please mark the date in your diary.

Has selection for fleece weight and fibre diameter changed carcass characteristics of the Qplu\$ sheep?

Given the increasing value of sheep meat to the revenue from wool enterprises in recent years, it is important to determine if our selection for fleece value has resulted in any changes in carcass traits that might influence carcass value of surplus stock.

For the past several years, as part of a Meat and Livestock Australia project, staff from Cowra and Trangie have measured the carcasses of over 1,900 two-tooth rams from the QPLU\$ selection lines. For each year of measurement the rams were fed a pelleted ration for 5 weeks prior to slaughter and were processed through commercial abattoirs. Across the range of carcass traits measured, differences between the selected and control lines of each strain were generally small but in some cases significant (see Table 1 next page).

Carcass quantity - live weight, dressing percentage and carcass weight

Differences in live weight between the selected and control lines of each strain were small and generally not significant. The exception was the Industry line for which selection was based on size and physical conformation as well as fleece weight and fibre diameter. Rams bred within the Industry line were 3 kg heavier than those of the medium wool control line. Differences between the body weights of the other selected and control lines were variable, smaller and not significant.

Carcass weights for the medium and fine wool lines were not different from that of their control lines. In contrast carcasses from the 8% broad wool line were 1.4kg lighter than the broad wool control line. The 3% medium, 8% fine and 8%



broad wool selection lines had significantly lower dressing percentages than their control lines. This resulted in part because they were leaner, as indicated by their lower GR tissue depth, but also suggests differences between the selected and control lines in the weight of non-carcass components (head, gut and skin). Given the increased wool production from all selection lines compared to the control lines, we suspect (although did not measure) that skin weight would account for some of the differences in dressing percentage between the selected and control lines of each strain.

Carcass quality – tissue depth, eye muscle area, colour and pH

Tissue depth at the GR site is an objective measure of condition score or fatness. It is the total soft tissue depth over the 12th rib, 110 mm from the spine toward the sternum. Condition score and tissue depth influence the prices paid for slaughter stock when valued as live animals

Table 1: Line averages for body weight and carcass traits of 2001-2004 drop rams.

Trait	Fine wool		Medium-Peppin					Broad wool	
	8%	C	Ind.	3%	8%	15%	C	8%	C
Pre-slaughter weight (kg)	64.2	62.1	71.2✓	68.6	68.4	67.9	68.1	77.9	78.5
Hot carcass weight (kg)	25.2	25.2	27.5	26.2	26.8	26.1	26.5	30.2✗	31.6
Dressing percentage (%)	38.9✗	40.1	38.5	38.0✗	38.6	38.2	38.6	38.6✗	39.9
Tissue depth GR site (mm)	8.1✗	9.4	8.3	8.5	8.5	8.7	9.1	8.9✗	10.5
Eye muscle area (cm ²)	13.5	14.0	15.6✓	14.3	15.4✓	14.5	14.6	15.3✗	16.1
Muscle lightness	34.2	34.6	33.2	33.8	33.5	33.4	33.8	34.4✓	33.5
Muscle redness	19.6	19.5	19.5	19.1✓	19.7	19.4	19.9	20.0	19.4
pH Loin	6.0*	5.9	6.0*	6.0*	6.0*	6.0*	5.9	5.9	5.9

✓ denotes a significant improvement compared to the Control line of that strain. ✗ denotes a significant deterioration compared to the Control line of that strain, * denotes a significant difference from the Control line of that strain (P<0.05)

or sold over the hooks. Discounts can be applied when tissue depth falls outside the optimum 6-15mm range. It is interesting to note that ram carcasses from all selection lines were slightly leaner than the controls of each strain. Although consistent across all three strains, these differences were only significant for the fine and broad wools. Recent data analyses reveal an unfavourable genetic correlation between fibre diameter and tissue depth at the GR site such that selection to reduce diameter will also lead to a steady decline in tissue depth. Although eye muscle area was reduced in selected lines of the fine and broad wool strains, rams from two of the medium wool lines (Industry and 8%) had significantly larger eye muscle areas than the medium control rams. For the Industry line rams this may have resulted from selection for body size and conformation but an increase in eye muscle area in the 8% medium wool line was unexpected particularly given the small change in carcass weight in this line.

Muscle colour influences consumer preferences for meat cuts. Consumers prefer meat that is light red in colour (ie higher muscle lightness value and lower muscle redness value). Muscle colour increases in darkness and redness as an animal ages. Differences between selected and control lines were slight and generally not significant. The exceptions were significantly improved lightness in the broad wool selected line and a significantly improved redness in the 3% medium wool line.

Muscle pH provides an indication of eating quality, tenderness and the shelf life of meat. High muscle pH can reduce tenderness and the interval that meat can be chilled before spoilage occurs. The Merino breed is noted for having higher muscle pH than other sheep breeds. Except for the broad wool selected line, rams of all selected lines had significantly higher loin pH than those of the control lines. This appears to be driven by an unfavourable genetic correlation between clean fleece weight and muscle pH. Research within the current sheep CRC is examining nutritional and genetic strategies to reduce the pH of meat derived from Merinos.

Conclusions:

- **Generally small and variable but sometimes significant changes in carcass characteristics.**
- **Any negative change found, can be easily accounted for using a selection index which includes those traits**
- **Other than for carcass weight, the changes observed are of minor commercial significance to the current slaughter value of surplus animals.**
- **In the longer term the genetic parameters estimated from the Qplu\$ and other data will be used to evaluate breeding options for improving Merino meat quality as well as fleece value.**

Changes in wool style and classer grade resulting from 10 years of selection

The style of greasy wool is used in conjunction with measured traits (mean fibre diameter, staple length, staple strength, percent mid-breaks and vegetable matter contamination), by the raw wool trade to describe and value greasy wool prior to auction. Style can have an important effect on prices particularly among the fine and superfine micron categories. Wool style is influenced by various fleece characteristics including dust penetration, crimp frequency and definition, greasy colour, staple definition and tip shape. These traits are also carefully assessed by sheep classers who generally consider stylish, well structured fleeces to be important attributes of productive Merino sheep. Because of their potential importance and because all but the Industry line were selected without considering style traits we have carefully monitored

style in every drop from 1993 to 2004. For the same reason each year we have recorded the grade to which each sheep is allocated by the classers. Each year, hogget ewe mid-side samples were either measured (dust penetration, crimp frequency) or allocated scores according to their appearance for a number of style traits ('0' or '1' score being best for any given trait).

Our regular readers may recall that in the very first issue of this newsletter (November 1998) we considered the likely impact of selection on an index of fleece weight and fibre diameter on style. Based on the genetic correlations between the traits under selection and a number of style traits estimated from the 1993 and 1994 drop ewes we concluded that most of the style

Table 2: Line averages for style traits, fleece rot and classer grade of the 2004 drop ewes.

Trait	Fine wool		Medium-Peppin					Broad wool	
	8%	C	Ind.	3%	8%	15%	C	8%	C
Dust penetration (% from tip)	45.7✓	50.2	39.2	40.3	37.2✓	41.2	40.9	43.5	44.8
Crimp freq. (n/25mm)	13.1*	14.9	9.5*	9.4*	9.7	10.5	10.1	8.5	8.5
Crimp def. (1 - 7)	3.5	3.7	3.6	3.5	3.5	3.3✓	3.6	3.4✓	3.8
Yellowness (1 - 8)	3.7✗	2.6	5.3	5.2	5.0	4.8	5.1	6.2	6.2
Staple definition (1 - 6)	3.2✓	4.1	3.1✓	3.4	3.3	2.8✓	3.6	2.9✓	3.8
Tip shape (1 - 3)	1.1	1.0	1.1	1.2	1.2	1.2	1.1	1.3	1.2
Fleece rot (0 - 8)	0	0	0.3	0.3	0.1	0.1	0.3	0.1	0.1
Classer grade JW (1 - 4)	2.5	3.0	2.7	2.7	2.4	2.9	2.8	2.2✓	3.1
Classer grade IE (1 - 4)	2.4	2.8	2.8	2.8	2.7	3.0	3.0	2.4✓	3.0

✓ denotes a significant improvement and ✗ denotes a significant deterioration compared to the Control line of that strain (P<0.05) * denotes a significant difference from the Control line of that strain (P<0.05) Note: Some of these results are slightly different to those published in the QPLU\$ OPEN DAY proceedings. The earlier estimates were based on incomplete data

traits would not deteriorate and should actually improve steadily. We can now show the line averages for a number of style traits from the final drop (2004) of Qplu\$ ewes following 10 years of selection. The results for the selected and control lines of each strain are given in Table 2.

Dust penetration

Dust penetration was expressed as a percentage of the staple length from the tip of the staple. There was evidence of reduced dust penetration in most of the selection lines regardless of strain. The depth of dust penetration was significantly reduced for the fine wool selection line and the 8% medium wool line compared to the control lines. The high dust content measured in these fleeces was the direct effect of the drought conditions experienced throughout the wool growing period.

Crimp frequency and definition

Crimp frequency (number of crimps per 25mm of staple) was measured at the tip, middle and base of the staple. Crimp definition was assessed against fleece standards that ranged from 1 (very well defined) to 7 (poorly defined). The fine wool selection line, Industry and 3% medium wool lines had significantly lower crimp frequency than their control lines. The majority of selection lines showed improvements in crimp definition compared to controls. These were significant for the 15% medium wool and the broad wool selection lines.



Yellowness

Hogget ewe fleece samples were compared to standard colour samples each year. Fleeces were allocated scores that ranged from 1 which represented bright, white wool to 8 for dull almost yellow wool. Changes in the selection lines were small and variable with the selected fine wools the only line to show a significant increase in colour compared to control sheep.

Staple definition

Staple definition was allocated a score from 1 to 6, one representing distinct fibre bundles or staples in the sample with minimal cross fibres and 6 representing fleeces with poor staple definition. The significance of staple definition in wool processing is unquantified, but there are inferences that well defined fibre bundles comb more efficiently and produce less wastage than wools with a high percentage of cross fibres. Poor crimp and staple definition are also thought to retard drying of the fleece after wetting predisposing the sheep to fleece rot. The numbers in Table 2 show that staple definition improved in all selected lines with significant improvements evident in four of the selected lines compared to the control lines.

Tip shape

Fleece samples were allocated a score of 1 to 3 for staple tip shape. One represented a flat, blocky tip and 3 indicating a more prominent staple tip. There appears to be two schools of thought on this trait. Although traditionally many sheep classers preferred flat staple tip, these days many acknowledge that productive well

structured fleeces often possess more pronounced staple tip. This should not be confused with protruding coarse fibres. Regardless differences between the selected and control lines in staple tip shape were small and non-significant in all three strains.

Fleece rot

Each sheep was allocated an average fleece rot score based on inspection of sites along the mid-line at the neck, wither, loin and rump. Scores indicated the presence and severity of fleece rot between 0 and 7 with 0 representing nil fleece rot and 7 indicating bacterial staining, crusting and/or dermatitis. The 2004 drop fleece rot scores were extremely low and differences between the selected and control lines were negligible. The very dry seasonal conditions prevailing during the growth of these fleeces did not provide sufficient challenge to detect differences between the lines. In past years (when it used to rain ed.) we had detected increases in fleece rot score in some of the selected lines. To keep that in perspective in the worst year recorded (1999 drop) fleece rot scores from the selected

lines increased by only around one score above those of the control lines.

Classer grade

The classers allocated each ewe to grades from 1 to 4, (special, double, single and cull) respectively. To avoid biasing the grades at the time of classing the classers knew the strain but not the line from which each ewe was bred. With the exception of the 15% medium wool line, the classers consistently allocated sheep from the selected lines to higher grades than the control lines of each strain. For the 2004 drop, differences were significant for the broad wool strain only.

Conclusions

Among the 2004 drop ewes, there was evidence of improvements in fleece structure (staple and crimp definition), dust penetration and classer grade within the selected lines of each strain. The only significant deterioration observed was a slight (one score) increase in the greasy colour of the selected fine wool line.

Changes in feed intake

An important consideration in any investigation of the consequences of selection is the impact on feed intake. So far we have reported on the products of the selection lines (fleeces and carcasses). The preceding newsletter showed that wool production (clean fleece weight) had increased in all selected lines compared to the control lines within each strain. The ram carcass data above and the following ewe data indicates that live weights have also increased in some selected lines, namely the Industry and 3% lines (Table 1 and 3). Has this additional production resulted from increased feed intake? Results from a Sheep CRC funded research project provides some insight, which estimated feed intake of 670 non-breeding, adult ewes from the QPLU\$ lines. The averages of those estimates for each of the QPLU\$ lines are presented in Table 3.

The Industry and 3% lines produced significantly heavier ewes than the medium wool control line. Differences in ewe weight between other selected and control lines were smaller and not significant. Despite differences in body weight and wool production, neither the estimates of dry matter intake per head nor per unit body weight identified any significant variation in feed intake between lines within strains. There were significant strain effects however, with ewes of the fine strain consuming significantly less per head than the medium and broad wool ewes. There were no differences between strains in feed intake per unit body weight. On that basis it is reasonable to assume that within strains the selected lines are producing heavier fleeces of finer fibre diameter for the same amount of pasture consumed as the control lines.

Table 3: Line averages for body weight and feed intake of 1997 – 2001 drop ewes.

Trait	Fine wool		Medium-Peppin				Broad wool		
	8%	C	Ind.	3%	8%	15%	C	8%	C
Live weight (kg)	61.5	62.3	68.5✓	68.5✓	66.7	66.8	65.6	74.2	75.8
Intake (kg DM/day)	2.12	2.09	2.43	2.18	2.29	2.38	2.23	2.34	2.53
Intake per kg LW (g/kg/day)	35.6	34.3	36.1	32.6	34.7	36.2	34.8	32.7	34.2

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✗ denotes a significant deterioration compared to the Control line of that strain (P<0.05)



*We wish everyone a safe
and Merry Christmas and
a rain filled New Year*

The information contained in this publication is based on knowledge and understanding at the time of writing (22/11/06). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.