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A FEW SELECTED LINES

NEWSLETTER OF THE TRANGIE QPLU$ PROJECT

IN THIS ISSUE...

WE COMPARE:

NEXT ISSUE...

WE PULL ALL OF THIS TOGETHER AND COMPARE

TRANGIE QPLU$ MERINOS

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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Welcome to Issue 8 of "A Few Selected Lines". In this issue we present summaries of some of the results presented at the final Qplu$ Open Day held in June at Trangie Agricultural Research Centre. The focus for this year's event was on the performance of the adult ewes.

The open day was attended by 120 ram breeders, wool growers, sheep classers and Merino breeding advisors from NSW, South Australia, Victoria and Queensland. There was an air of renewed enthusiasm among attendees on the back of steadily increasing wool prices, soil moisture and farm dam levels. Although the sheep display was smaller than planned due to the very welcome but untimely rain, the sheep were presented in outstanding condition and as usual attracted numerous favourable comments

from the audience. Congratulations to Tom Snelgar, Tom Patterson and Dave Mula for an excellent job in managing the flock in what was another difficult year.

Improvements in adult and hogget fleece weight and fibre diameter

In past issues of AFSL we have reported the improvements achieved in clean fleece weight and mean fibre diameter in successive drops of hoggets bred within the QPLU$ selection lines. While this approach has provided a reliable early indication of the genetic progress of the lines during the 10 years of selection, it is the effect of our selection on the lifetime performance of these ewes that will have the biggest impact on the QPLU$ wool clip and the relative profitability of each of the selection lines. Here we present a comparison of the changes in the various QPLU$ lines resulting from the selection imposed as expressed by the final drop of selected hogget ewes (2004 drop) with those of later drops of adult ewes. Because we are still collecting data on the lifetime production of the 2004 drop ewes, to preview adult response to selection, Table 1 presents the changes observed in the adult fleeces of the 2003 drop ewes compared to the changes in the hogget fleeces of the 2004 drop. The estimates differ slightly from those presented in this year's field day proceedings because they include only 2003 drop adult ewe data and for both age groups full pedigree details have been included in the analyses. These are currently our most accurate estimates of improvements in both age groups of the selected lines.

Table 1: 2004 drop hogget (h) and 2003 drop adult (a) ewe fleece weight and fibre diameter

		Fine wool		Medium wool					Broad wool	
Trait		8%MP	C	Ind.	3%MP	8%MP	15%MP	C	8%MP	C
Clean fleece weight (kg)	h	+0.7	3.5	+0.5	+0.7	+0.6	+0.04	4.4	+0.6	5.0
	a	+1.0	3.6	+0.9	+1.1	+0.9	+0.1	4.9	+1.0	5.4
Mean fibre diameter (µm)	h	-1.7	19.8	-0.9	-0.5	-1.9	-3.2	20.8	-2.6	23.9
	a	-1.4	20.3	-1.1	-0.5	-2.0	-3.6	22.0	-2.4	25.2

The improvements observed in fleece weight and fibre diameter of both age groups are closely aligned with the breeding objectives of each selection line. Among the medium wools, compared to the unselected control line, the high fleece weight, maintain diameter line (3%MP) showed the largest increase in fleece weight (+0.7 and +1.1 kg) for hoggets and adults respectively and the smallest reduction in fibre diameter (-0.5μm) for both age groups. At the other extreme, the fine diameter, maintain fleece weight line (15%MP) recorded the largest reduction in fibre diameter (-3.2 and -3.6μm) for hoggets and adults respectively and the smallest increase in fleece weight (+0.04 and +0.1kg). Improvements in fleece weight and fibre diameter in the equal emphasis line (8%MP) were intermediate at +0.6kg and -1.9μm and +0.9 and -2.0μm for hogget and adult ewes respectively.

Increases in fleece weight in the 8%MP lines of the fine and broad wool strains were almost identical to those observed in the medium wool 8%MP line, whereas responses in fibre diameter varied across the three strains with reductions in fibre diameter least in the fine wools and greatest in the broad wools. The Industry selected line which imposed selection on wool style and physical conformation as well as fleece weight and fibre diameter also achieved substantial improvements in both traits in both age groups.

Across all lines and strains, compared to the control lines of each age group, the increases in fleece weight of the adult ewes were larger than those observed in the hoggets. Except for the 15%MP line, the fleece weight advantage of the adults of each line over and above that of the hoggets was substantial (0.3 - 0.4kg) and represents an added bonus for lifetime improvements resulting from selection imposed on hoggets.

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Changes in other important wool quality traits

To gain a clear picture of the effects on other traits of long-term selection for fleece weight and fibre diameter, all selected QPLU$ lines other than the Industry line were selected only on breeding values for these two traits. There was no additional culling on visually assessed traits. Although the Industry line was also selected on breeding values for fleece weight and fibre diameter, John Williams had discretion to cull ewes and rams that he considered off-type or of unacceptable physical conformation and fleece quality

During the course of the 10 years of selection we have carefully monitored the hogget fleeces of each drop to determine if other wool characteristics were changing as a result of selection. These have been regularly reported in AFSL and at QPLU$ open days. This year, with financial support from AWI, we were able to report on a number of other wool quality traits from a random sample of 100 breeding ewes from each selection line. A summary of the results together with those for the 2004 drop hoggets follows.

Table 2: Hogget (h) and adult (a) ewe staple length and strength, yield and fibre diameter variability traits

		Fine wool		Medium wool					Broad wool	
Trait		**8%**	**C**	**Ind.**	**3%**	**8%**	**15%**	**C**	**8%**	**C**
Length (mm)	**h**	103	98	105	108	106	101	103	121✓	115
	a	97✓	93	102	102	100	95×	101	111	111
Strength (N/ktex)	**h**	31.1✓	26.3	32.4	35.8	32.1	30.4	33.5	30.4	27.7
	a	33.0✓	28.2	29.8✓	30.5✓	24.8	24.9	25.7	30.2	29.9
Yield (%)	**h**	62.2✓	59.2	63.0	64.1	65.5	62.5	63.8	67.7✓	65.1
	a	66.2✓	61.1	66.3	68.2✓	68.6✓	65.1	65.5	70.2✓	67.3
SDFD (um)	**h**	3.6	3.8	4.3	4.3	4.2	4.1	4.4	4.7✓	5.2
	a	4.0	4.0	4.5✓	4.7	4.4✓	4.1✓	4.8	4.8✓	5.2
CVFD (%)	**h**	19.5	19.2	21.3	21.2	21.2	21.5	21.6	21.2	21.9
	a	20.6×	19.6	21.4	22.0	21.9	21.9	22.0	21.0	20.4

✓ denotes a significant improvement compared to the control line of the relevant strain (P<0.05), × denotes a significant deterioration compared to the control line of the relevant strain (P<0.05)

Fibre characteristics

The selection line means for staple length, staple strength, yield and fibre diameter variability for each age group of ewes are presented in Table 2. Although increases in staple length were evident in the hogget fleeces of the higher fleece weight lines, these largely disappeared in fleeces produced by the breeding ewes. The exception was the selected fine wool adults, which produced wool 4mm longer than their control line. Adults from the finest medium wool line (15%MP) produced wool 6mm shorter than the medium controls.

Staple strength generally increased in the selected lines of each strain. The increases tended to be larger in the breeding ewes than in the hoggets of each line. Yield also increased in selected ewes of both age groups, and again, increases were larger in the adults. The changes in standard deviation of fibre diameter mirrored the decline in mean diameter in both age groups of all selected lines other than the fine wool adults. These ewes showed no change in SDFD but a 1.4μm reduction in mean diameter (Table 1). As a consequence, this was the only age group of any line to show a significant increase in the coefficient of variation of fibre diameter (CVFD).

Fleece characteristics and classer grade

The selection line means for the style traits and classer grade for each age group of ewes are presented in Table 3. Staple and crimp definition, showed consistent improvements in most selected lines particularly in the adult ewe fleeces. Staple tip shape also changed in response to selection in the fine wool hoggets and broad wool adults but not the medium wool lines. Other than for the finest medium wool line (15%MP), crimp frequency tended to decline in all other selected lines. The reduction was significant in both age groups of the fine 8%MP line.

Table 3 Line averages for style traits and classer grade of the 2004 drop (h) mixed age (a) ewes

		Fine wool		Medium wool					Broad wool	
Trait		**8%**	**C**	**Ind.**	**3%**	**8%**	**15%**	**C**	**8%**	**C**
Staple definition (1 - 6)	**h**	3.2✓	4.1	3.1✓	3.4	3.3	2.8✓	3.6	2.9✓	3.8
	a	3.1✓	3.4	3.3✓	3.5	3.3✓	2.9✓	3.7	3.5✓	3.8
Crimp definition (1 - 6)	**h**	3.5	3.7	3.6	3.5	3.5	3.3	3.6	3.4✓	3.8
	a	3.0	3.0	3.3✓	3.4✓	3.2✓	3.0✓	3.6	3.2✓	3.6
Tip shape (1 - 3)	**h**	1.7#	1.2	1.2	1.2	1.2	1.3	1.2	1.5	1.4
	a	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.4#	1.2
Crimp frequency (n/25mm)	**h**	13.0#	14.9	9.5	9.5	9.7	10.6	10.1	8.4	8.5
	a	13.2#	15.7	10.1	9.6	9.8	10.7#	10.0	8.5	8.7
Greasy colour (1 - 8)	**h**	3.7✗	2.6	5.3	5.2	5.0	4.8	5.1	6.2	6.2
	a	2.7✗	2.0	4.3	4.1	4.4✗	4.4✗	4.0	4.6	4.9
Dust penetration (% from tip)	**h**	44.0✓	49.0	41.2	40.5	38.0✓	39.1	41.0	43.8	43.7
	a	45.8✓	53.5	38.4	38.1	36.2✓	39.3	38.7	40.1	42.0
Classer grade (1 – 4)	**h**	2.5	3.0	2.7	2.7	2.4	2.9	2.8	2.2✓	3.1
	a	2.0✓	2.9	2.0✓	2.0✓	2.1	2.3	2.4	1.8✓	2.8

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

The depth of dust penetration either did not change or was reduced in both age groups of selected ewes. Reductions in dust were significant in both age groups of the fine and medium wool 8% lines. Three selected lines suffered slight increases in yellowness compared to their controls. These were in the range of shades of white for the fine wool strain and cream for the medium wool lines. Because this type of discolouration of raw wool is poorly correlated with colour after scouring, we are currently preparing to measure whiteness in scoured samples to determine if there is likely to be any effect on the end use of wool top manufactured from these lines. Other than for hoggets of the 15%MP line, the selected lines consistently achieved better average classer grades than the controls of each strain. Although improved grades were evident in both age groups, the improvements were larger among the breeding ewes.

Changes in adult body weight and reproduction

To fully evaluate the impact of selection on the QPLU$ flock's production, we have also monitored the mature body weight and reproduction of the ewes of each selection line. Table 4 presents line averages for body weight and weaning percentage and its components for breeding ewes born between 1999 and 2002.

All selected medium wool lines produced heavier ewes than the medium wool control line. For three of these lines the increases in body weight were significant. The largest increase (4.5kg) was observed in the Industry line for which selection was imposed on size and physical conformation as well as breeding values for fleece weight and fibre diameter. Although there was no direct selection for body weight or size we also observed increases of 4.0 kg and 2.9 kg in the 3% and 8% medium wool lines respectively.

The genetic correlations between adult body weight and clean fleece weight and fibre diameter indicate that selection to increase fleece weight should lead to steady increases in body

weight which would be countered to some extent by selection for finer wool. While this may help explain the pattern of response observed in the medium wool lines, the fine and broad wool 8% lines showed negligible differences in body weight despite similar responses in fleece weight and fibre diameter to those observed in the 8% medium wools (Table 1).

Table 4 Line averages for body weight and components of reproduction in adult 1999-2002 drop ewes

	Fine wool		Medium wool					Broad wool	
Trait	**8%**	**C**	**Ind.**	**3%**	**8%**	**15%**	**C**	**8%**	**C**
Ewe body weight (kg)	55.6	55.7	62.2✓	61.7✓	60.6✓	59.7	57.7	68.4	67.9
Lambs weaned of ewes joined (%)	70×	84	102	95	91×	104	100	82×	96
Ewes lambing of ewes joined (%)	74	74	85	85	85	88	85	73	77
Ewes twinning of ewes joined (%)	33	36	50	50	46	50	47	43	48
Lambs born of ewes joined (%)	108	110	137	136	132	138	134	119	129
Lambs surviving of lambs born (%)	66×	78	75	72	70×	76	76	71	76

✓ denotes a significant improvement compared to the control line of the relevant strain (P<0.05) × denotes a significant deterioration compared to the control line of the relevant strain (P<0.05

Selection line means for weaning percentage indicate significant reductions in lambs weaned per ewe joined for the 8% lines compared to the unselected control lines of each strain. All other differences between lines were not significant. There was also a five percent reduction in weaning percentage in the 3% line. In contrast, the Industry and 15%MP lines weaned slightly more lambs per ewe joined than the medium control ewes.

Further examination of the data revealed that the decline in weaning percentages arose primarily from reductions in lamb survival rather than reduced conception and twinning rates in these lines. The exception was for the 8%MP broad wool line, which also gave birth to 10% fewer lambs than their controls due to small but cumulative deficits in conception (4%) and twinning (5%) rates. The 8%MP fine wools also produced 3% fewer twins.

Given that the genetic correlation between fleece weight and weaning percentage is -0.26, in the absence of additional selection for reproduction, some decline in weaning percentage should be expected in the high fleece weight lines. Because the estimates in Table 4 are based on ewe performance under drought conditions (2002 – 2006), it is uncertain how well they represent the true differences between the lines. Although all lines were offered the same nutrition during lambing, it is possible that the high fleece weight ewes suffered greater nutritional stress in late pregnancy and early lactation than the less productive controls. It is interesting to note that, although there was no direct selection for reproduction in any of the lines, the Industry line ewes suffered no decline in weaning percentage despite producing 0.9kg more wool than the medium wool controls.

We will continue to monitor these lines for another two years to compare their production of wool and lambs under more favourable pasture conditions.

The Take Home Messages

In the selected versus the control lines of each strain we measured:

- **Large permanent improvements in lifetime fleece weight and/or fibre diameter in all selected lines**
- **No change or improvements in most fibre characteristics in both age groups**
- **No change or improvements in most fleece characteristics and classer grade.**
- **No change or increases in adult ewe body weight**
- **No change or reductions in lamb survival and weaning percentage in three selected lines**

Trangie QPLU$ Merino publications are available on the NSW DPI website: www.dpi.nsw.gov.au/ or one of the contacts below will be able to help you source the information you require. Contacts: Pat Taylor, Ph: 0263 913 916, Email: pat.taylor@dpi.nsw.gov.au
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