

## Targeted extension to improve genetic gain by region is now possible

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Merino breeders can improve their flock's rate of genetic progress through the national genetic evaluation MERINOSELECT (Brown *et al.*, 2007). The service reports Australian Sheep Breeding Values (ASBVs) for individual traits and standard selection indexes created to match different production system breeding objectives. Current MERINOSELECT indexes focus on improving production traits of either mostly wool (Fibre Production: FP+), wool and meat (Merino Production: MP+) or mostly meat (Dual Purpose: DP+). Breeding program, location and wool type all contribute to a breeders' choice of index. Extension activities aimed at improving rates of genetic gain are conducted by Sheep Genetics across all production regions (Collison *et al.*, 2018). The current blanket approach to extension across all regions on genetic gain has had little review on impact. This study investigates differences in the rate of genetic gain and how well the standard indexes fit with breeding objectives across the Merino sheep producing regions of Australia and New Zealand.

Annual rate of gain in each of the three indexes was calculated for MERINOSELECT flocks by regressing average index merit on year of birth for the six recent cohorts (2013 to 2018). Realised rate of gain (RRG) was then the estimate of the linear regression slope in index units per year. Flocks were then aggregated to calculate average RRG for the following regions: NSW\_NORTH (including 3 QLD flocks), NSW\_NT (Northern Tablelands), NSW\_SOUTH, NSW\_RIV (Riverina), NZ (New Zealand), SA\_NORTH (Mid North and Eyre Peninsula), SA\_SE (South East), Tasmania (TAS), Victoria (VIC), and Western Australia (WA). Potential rates of gain were predicted from selection index theory based on breeding programs designs representative of MERINOSELECT flocks, and RRG in each region was then expressed as a proportion of potential gain (PPG). To assess how well breeding programs fit with the three indexes, we calculated index consistency (ICON) by flock, and aggregated by region. Index consistency is a correlation statistic measuring how well the realised economic contribution to genetic gain for each trait matches the predicted economic contribution.

Region	Flocks	FP+			MP+			DP+		
		RRG	PPG	ICON	RRG	PPG	ICON	RRG	PPG	ICON
NSW_NORTH	25	1.1	35	10	1.9	59	83	2.1	58	70
NSW_NT	19	1.3	41	-3	2.4	76	83	2.7	76	70
NSW_RIV	12	0.3	10	17	0.7	23	63	0.9	26	51
NSW_SOUTH	18	1.5	46	28	2.3	71	83	2.4	67	71
NZ	28	0.8	26	-8	1.8	57	77	2.6	72	76
SA_NORTH	19	1.0	31	5	1.2	38	56	1.1	30	32
SA_SE	16	0.7	22	3	1.2	36	69	1.3	37	64
TAS	6	2.3	71	19	3.4	106	85	3.3	92	62
VIC	19	0.9	29	3	1.7	53	77	1.9	54	60
WA	35	1.1	33	5	1.9	58	76	2.3	63	66

**Table 1: Realised rate of gain (RRG, index units per year), realised gain as a percentage of predicted gain (PPG, %), and index consistency (ICON, %) for MERINOSELECT indexes by region**

The RRG for all three indexes ranged by two points or more from the regions making the least to the most gain per year. The NSW Riverina region had both the lowest RRG and PPG. The low ranking of a large Merino production region such as Riverina can provide future extension direction. The messages extended will be dependent on further analysis of the components that impact RRG. Including the suitability of the available indexes to the regions breeding objectives, which ICON indicates may be mismatched as it is best index is MP+ at only 63%. Across all regions, the FP+ index had the lowest index consistency across flocks because a lower fibre diameter premium has made breeding objectives with more emphasis on fleece weight and bodyweight more attractive. Extension activities could be more effective by targeting the areas with lower rates of genetic gain. The next steps is a more in depth look at differences in key factors impacting genetic gain within regions. This would then enable future extension strategies to be more targeted at addressing the key issues.

### References

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