Merino Lifetime Productivity – NSW Stud Trust Project Phase 1 – Overview of MLP Sheep Classing Results

Introduction

Sheep classing was a key part of the Merino Lifetime Productivity (MLP) Project, which compared different selection approaches for both individual and flock lifetime performance. It helped to show how classers meet site-specific breeding objectives and contribute to genetic improvement.

This document provides an overview and **observational analysis** of MLP classing results. It examines how effective different visual classing methods (AMSEA, Professional Classer, and Wells Classer Trial) are at selecting for measured lifetime performance at the "phenotypic" or raw-data level.

The observed classing results from the MLP project should be interpreted with care, as they are based on animals selected within their own drop and flock – or in the case of the Wells Classer Trial – within sire group. This means the findings reflect how well visual classing works in that specific context, but do not assess its effectiveness as a tool for selecting sheep across the five sites or the two age groups.

When reviewing the MLP Project results from the AMSEA and Professional Classer assessments, it is important to recognise that each site and drop contained greater genetic diversity than is usually present in typical commercial or ram breeding flocks. This increased diversity may have elevated the project's classing outcomes.

AGBU's independent genetic analysis will examine how classer grades relate to traits like wool yield, reproduction, carcase quality, and animal welfare, aiming to identify heritable factors that contribute to long-term genetic improvement. In contrast to the observational classing results, this analysis uses analytical methods to account for the diverse genetics present at each site.

This observational analysis of classing results was funded by the NSW Stud Merino Trust. Phase two of this project explores the comparative costs of visual, measured, and genomics for commercial growers and the ram breeder.

Results Snapshot

Overall, the outcomes from the examination of the MLP Project classing results show that classing is a useful, practical tool for improving flocks when done at the right age, focused on traits that can be assessed visually, and for important conformation traits not covered by measurement-based approaches.

For commercial growers who do not currently class but wish to lift wool production, classing offers a cost-effective pathway to improvement.

For ram breeders, classing combined with breeding values is recommended when aiming for traits that are hard to see and where traits are antagonistic.

Recommended steps for breeders based on these classing results.

1. **Define your business breeding objective** – clarify desired traits and production outcomes.
2. **Determine the best way to assess each important trait** – decide which traits can be reliably assessed visually, and which require measurement and further genetic evaluation.
3. **Select a classer aligned with your breeding objective** – ensure their selection emphasis matches your goals.

This report **does not include** observations from an additional approach undertaken at each site from the second assessment onwards. After the standard AMSEA Grade was recorded with no data provided, classers were given access to measured performance information (e.g., lambing results, breeding values, or index values) and asked to re-class the ewes. This second classification was recorded separately as "Selection Grade". At some sites, a similar two-step process was also implemented for the Professional Grade.

These "classing plus performance" outcomes will not be reported here at the phenotypic level; instead, they will be incorporated and evaluated within the broader MLP genetic analyses.

MLP Classing Protocols

Ewes at the five MLP sites were classed each year by at least two methods: AMSEA Grade and Professional Classer Grade, both based on the site's breeding goals.

At some sites, the Wells Classer Trial was added, classing ewes within sire progeny groups (hidden-identity) into fixed-grade proportions based on the sire entrants' breeding objective. This method recognised the MLP's deliberately diverse sire pool, which was needed for R&D purposes, and saw sires entered with varying wool types, trait diversity, and breeding philosophies, often bred with objectives that differed from the site's breeding objective. Such a high level of diversity is rarely seen in commercial settings, which is why the Wells Classing method was added to the project. By accommodating sire-specific goals, the Wells Trial aimed to test whether within-sire progeny classing could improve lifetime productivity predictions when sire and site objectives diverged.

AMSEA Grade Protocol

The Australian Merino Sire Evaluation Association (AMSEA) Grade was conducted by a classer engaged via the site. This approach reflects commercial flock selection (retaining 70% and culling 30%).

Method:

- Sheep randomly presented, **no performance data** is provided.
- Classing decisions made to the site's breeding objective.
- **Three grades**:
  - Tops (25%), Flock (50%), Culls (25%).

Professional Class Protocol

Conducted by an experienced stud-classer who had been selected by the site from a list of classers approved by the MLP Projects Industry Steering Committee. Mirroring a classing approach that might be undertaken in a stud flock situation.

Method:

- Sheep are randomly presented with **no measured performance data** provided.
- Classing decisions made to the site's breeding objective.
- **Five grades**:
  - **Tops** – top ~1% (elite, equivalent to ET donor or sire selection)
  - **Studs** – top 2–10% (special stud ewe selection)
  - **Seconds** – top 10–70% (retained flock ewes)
  - **Sales** – bottom 10–30% (sale ewe line)
  - **Culls** – bottom ~10% (removed from breeding flock)

Wells Classer Trial Protocol

Conducted at three sites as an MLP Add-On Project. In the trial, progeny were presented in their sire groups (with sire identity hidden) to two experienced classers. Classers were informed of each entrant's nominated breeding objective and asked to allocate fixed proportions of the sire's progeny into four grades.

Method:

- The classers were informed of the sires breeding objective (provided by sire entrant)
- Some background information provided: birth/rearing type, and sheep type.
- A **fixed proportion** (percentage) of animals in each grade:
  - Tops (10%), Seconds (25%), Sales (30%), Culls (35%).
- Conducted at set ages (e.g. Post Weaning/Yearling, Hogget, and final Adult stage at 5 to 6 year old).

Across all classing approaches, some classers occasionally didn't follow the required splits, making certain comparisons and observations difficult.

The Site Breeding Objectives

The Site breeding objectives were determined each by the local Site Breeder Committee. There were differences regarding the emphasis on fleece weight, fibre diameter, carcase and wool quality traits to suit local conditions.

Site Breeding Objectives
Balmoral Site: The goal is to select sheep that are productive and well grown, with sound conformation and carrying heavy fine wool fleeces of good character, colour and nourishment suitable for the western Victorian environment.
Pingelly: The sheep are to be easy care based on, and because of, good conformation and constitution. Medium to large frame. Bright white stylish wool free from colour and water faults. Wool cut to be sufficient to balance wool production with body size to ensure both add real value to the bottom line.
MerinoLink: Selection is based on the animal performing well for growth (meeting minimum body weight suitable for joining at 18 months of age) and being structurally sound with good wool quality traits, including long soft handling wool and increasing fleece weight.
Macquarie: To breed a highly commercially viable flock of sheep suitable for the climate and pasture conditions of the western slopes and plains of NSW. Sheep should not require high management inputs but be highly productive (fleece weight) relative to a medium wool type and have good carcase and fertility characteristics that make ewes suitable as 1st cross or prime lamb dams. In addition to soundness, the production emphasis is equally on increasing fleece weight, carcase and fertility while maintaining fibre diameter.
New England: The aim is to breed and select sheep that have productive fleeces for the superfine type (14 -17.5µm) and are structurally sound and capable of performing under the New England's climatic, pastoral and environmental conditions. Sheep should be well grown, have sound conformation, and wool of excellent white colour, well defined character and be free of fleece rot.

Site-by-Site List of Classers

Site & Drop Year	Professional Classer	AMSEA Classer	Wells Classer Trial
Balmoral 2015	Bill Walker	David Whyte	Bill Walker & Chris Bowman
Balmoral 2016	Bill Walker	David Whyte	No

Site & Drop Year	Professional Classer	AMSEA Classer	Wells Classer Trial
Macquarie 2017	Chris Bowman	Allan Casey	Bill Walker & Chris Bowman
Macquarie 2018	Chris Bowman	Greg Sawyer	Bill Walker & Chris Bowman
New England 2017	Andrew Calvert (A3 by Angus Carter)	Angus Carter	No
New England 2018	Andrew Calvert (A2 by Angus Carter)	Angus Carter	No
MerinoLink 2016	Craig Wilson	Ben Patrick / Jim Meckiff	No
MerinoLink 2017	Craig Wilson	Ben Patrick / Jim Meckiff	Bill Walker & Nathan King (A5 by Chris Bowman)
Pingelly 2016	Nathan King	Preston Clark / Mitch Crosby	No
Pingelly 2017	Nathan King	Preston Clark / Mitch Crosby	No

About the MLP Classing Results Reports

Ten MLP Classer Reports were used to generate the observations, which summarise annual ewe classing outcomes, methods, and lifetime performance trends for each site and drop. Each report details the site's breeding objective, classing process, key selection emphases, and grade repeatability, along with environmental or management factors (e.g. drought, shearing date changes, disease, classer changes) that may have influenced results.

Data is presented at the drop level and, where relevant, sire group level, including lifetime averages for wool, body, reproduction traits, and visual scores.

Site-specific seasonal, health, and operational factors clearly influence each drop's results and will be adjusted for in the Animal Genetics and Breeding Unit (AGBU) genetic analysis. That analysis will estimate genetic correlations between classer grades and lifetime wool, reproduction, carcase, and welfare traits, identifying which aspects of visual classing are heritable and transferable.

Classing Results Observations

When interpreting MLP classing data, it is essential to recognise that outcomes are shaped by more than the visual assessment process itself. Key influencing factors included:

- Site-specific management practices
- Widely differing environmental conditions
- Extreme variation in sire genetics at each site
- Genetic diversity within the foundation ewe base
- Differences between classers
- Changes in animal performance across ages

Because animals were selected within their own drop and flock or, in the Wells Classer Trial, within sire group, the results reflect how well visual classing works **in that specific context**. They do not assess effectiveness for selecting sheep across different flocks or age groups. Therefore, results should not be extended beyond **within-drop and within-flock comparisons**.

The following observations have been **generalised across all sites and drops of the MLP Project**. While some classing outcomes occasionally differed from these findings, the conclusions presented here reflect the overall trends observed.

For reference, "early" age in these observations refers to **post-weaning (5 to 10 months), yearling (10 to 15 months), or hogget (15 to 22 months)**.

Observations

Best Timing for Early Classing

- Assessments at post-weaning or yearling can consistently identify low-performing animals.
- Later early-age classing at **late hogget age (18-22 months)** generally provides **better overall selection for lifetime performance**.

Wool Length Matters

- Wool length at the time of classing influences visual assessment accuracy.
- Classing in **longer wool growth (10–12 months)** improves **consistency and accuracy**.

Traits Targeted by Classers

- Higher grades at early age were associated with:
    - Better clean fleece weight
    - Longer staple length
    - Stronger staple strength
    - Higher body weight
    - Superior wool character and colour
    - Good structural soundness, including feet/legs
    - Higher values in wool-focused indexes (e.g., Merino Production Plus)
- Experienced classers reliably assessed differences in these economically important traits.

Antagonistic Trait Relationships

- Top-graded ewes often showed moderately higher wrinkle and fibre diameter - traits that are unfavourably correlated with increased fleece weight.
- Highlighting the importance of selection systems that can **account for antagonisms** to optimise outcomes.

Limits of Visual Classing for Certain Breeding Objectives

- Classing was less effective when breeding objectives include traits **not easily assessed visually** or expressed later in life, such as:
    - Fibre diameter
    - Worm resistance

- Eye muscle depth
- Fat depth
- Reproduction performance

- The New England breeding objective aligned with Fibre Production Plus index (prioritising reduced fibre diameter and improved worm resistance) – results show that visual classing was less effective in identifying top performers. The results aligned more closely with the Merino Production Plus index (emphasising increased wool cut, growth, and some pressure to reduce micron).
    - *Measurement and breeding values gain importance when objectives emphasise traits **not assessable visually***.

Repeatability

- Grade stability was observed across annual and lifetime assessments.
    - Between assessments, 85% to 95% of animals stayed the same grade or changed by one grade between the first and second, and second and third assessment grades.
    - 50% remained in the same grade for Professional Classing (five-way class)
    - 55–60% remained in the same grade for AMSEA (three-way class)
        - *Noting that higher repeatability is expected with fewer grades*.
- Grade change is likely caused by a range of factors:
    - Site-specific management practices
    - Widely differing environmental conditions
    - Extreme variation in sire genetics at each site
    - Genetic diversity within the foundation ewe base
    - Differences between classers
    - Changes in animal performance across ages

Value of Annual Adult Ewe Classing

- As ewes age, body weight differences become less emphasised, and greater focus is shifted to selecting for wool quality traits.
- Later-age downgrades often occur in high-reproduction ewes (classed after weaning/pre-joining), except when classed early in pregnancy. Providing reproduction history to classers could improve lifetime selection at the ram breeder level.

Outliers

- Some top-indexing animals had poor conformation, some visually top-graded animals had low index values.
    - Combining visual and objective measures is usually the best selection approach.

Wells Classer Trial

- A high-level review of the Wells Classer Trial results suggests that it did not demonstrate a consistent advantage compared to AMSEA Grade and Professional Classer Grading (using classing across the entire drop). However, further investigation and analysis of these findings is suggested.

Discussion and Conclusions

The observational analysis of the MLP Project classing results confirms that visual sheep classing remains a practical tool for flock improvement. However, the data highlights distinct strengths and limitations that differ depending on whether the objective is commercial wool production or genetic gain within a stud.

Overall, the results demonstrate that visual classing is valuable when focused on traits that can be assessed physically (such as wool cut, wool character, body conformation, and structural soundness), when conducted at the optimal age (hogget), and when a breeding program includes traits that are not fully captured in current index systems or measurements.

Strengths and Opportunities

For Commercial Growers

- **Cost-Effective Improvement:** For growers who do not currently class, the results indicate that visual classing offers a cost-effective pathway to lift wool production. The analysis shows that higher-grade ewes consistently display superior wool cut, staple length, and tensile strength compared to lower-grade ewes.

For Commercial Growers and Ram Breeders

- **Assessment Timing:** Timing is a critical factor for success. While post-weaning classing can identify obvious culls, the MLP results show that hogget classing (18–22 months) with 10–12 months of wool growth delivers superior accuracy for predicting lifetime productivity. Long wool is essential for revealing important traits that short wool may mask.
- **Structural Soundness:** Visual classing remains the primary method for managing conformation traits, particularly feet and leg structure, which are generally not yet covered by measurement-based approaches.
- **Real-Time Assessment:** A key strength of the classer is the ability to be "one assessment ahead" of measured performance. While objective data (ASBVs or fleece measurements) often reflect the previous shearing or are yet to be recorded (or aggregate data from multiple assessments), the classer evaluates the animal's current phenotypic expression, providing an immediate check on wool cut, quality, structure, and maturity.
- **Wool Quality Improvement:** Classers successfully selected for wool character, and colour - traits that maintain the style and processing quality of the clip but are not fully captured by standard index selection.

Weaknesses and Limitations

For Commercial Growers

- **The Reproduction "Blind Spot":** A limitation identified in the project is the unintentional downgrading of highly reproductive animals. As ewes age, classing tends to penalise those with a history of high reproduction (e.g., rearing twins) because they present with lower body condition and impacted wool quality. Without pregnancy or rearing data, visual selection alone may inadvertently reduce flock fertility by culling efficient mothers.

For Ram Breeders

- **Genetic Antagonisms:** The results highlighted trade-offs in visual selection. High-grade ewes selected for fleece weight and visual appeal often displayed moderately higher breech wrinkle, and a higher fibre diameter. This confirms a genetic antagonism: selecting for heavier fleeces visually can inadvertently increase susceptibility to welfare issues and lower wool value unless balanced with objective measurements.
- **Sire Grouping (Wells Trial):** The Wells Classer Trial, which assessed classing within sire progeny groups for specific breeding goals, indicates this method offers no clear benefit over the AMSEA Grade or Professional Class approaches, though further study is needed.

Conclusions

For **commercial growers**, the message is practical: employing a professional classer at the hogget stage is a sound investment for improving wool cut and structure. However, for those classing later in life to protect flock reproduction, growers should consider providing classers with reproductive history (e.g., wet/dry data) to prevent culling high-performing mothers based solely on visual condition.

For **ram breeders**, a "combined approach" is often more important. The presence of outliers - top indexing animals with poor conformation and top visual animals with poor indexes - demonstrates that relying on a single method carries risk. Ram breeders should utilise classing for real-time performance assessment and to manage structure and wool style, while relying on Breeding Values (ASBVs) to drive gains in "hard-to-see" traits like worm resistance and reproduction, and to manage the antagonism between fleece weight, fibre diameter, and wrinkle.

The following outlines the recommended steps for breeders based on these classing results.

1. **Define your business breeding objective** – clarify desired traits and production outcomes.
2. **Determine the best way to assess each important trait** – decide which traits can be reliably assessed visually, and which require measurement and further genetic evaluation.
3. **Select a classer aligned with your breeding objective** – ensure their selection emphasis matches your goals.

Acknowledgements

We wish to thank and acknowledge all sheep classers involved in the assessment and classing of ewes throughout the MLP Project. Their willingness to have results documented and publicly reported each year has provided the industry with a unique, transparent record of classing outcomes and their relationship to measured lifetime performance.

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Disclaimer

The classer results are based on raw data, which has not been adjusted for factors that may improve its accuracy (I.e., birth date, birth type and rear type). Results should only be used as a general aid and are not a substitute for specific advice. To the extent permitted by law, AWI excludes all liability for loss or damage arising from the use of the information in this publication. Note that no statistical analysis was performed across the 10 drops, and the findings are based on extensive observations of the outcomes.

Appendix: Classer Reports