

# final report

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## **Further Development of Ramping Up Genetic Gain (RUGG) tools for Sheep Genetics**

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## Executive summary

Changes to the Ramping Up Genetic Gain (RUGG) Report system have been implemented providing functionality:

1. Allow users to choose the index for analysis.
2. Display a 'star rating' to allow easy 'at a glance' comparison of the individual flock against the analysis.
3. Display additional information in the report including genotypes-per-year and average index of external sires.

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# 1 Background

The Ramping Up Genetic Gain (RUGG) reports have been developed through collaboration between Sheep Genetics, AGBU and NSW DPI to assist Sheep Genetics clients to benchmark their breeding program performance and identify areas of improvement in data recording.

This project covers the fees and expenses to contract Hutchinson Software to link recently developed technical outputs for the RUGG reports to the Sheep Genetics website and interface. This will allow the additional development to be implemented onto the RUGG reports and provide an improved service to both Sheep Genetics clients. As well as providing an easy to interpret report for all service providers, which will provide greater consistency in the messaging out in industry when it comes to breeding program design, data recording and use of ASBVs.

## 2 Project objectives

### 2.1 Deliverables

The specific deliverables of this project are:

- To enhance the RUGG report to contain additional columns for the number of genotypes per year and the average index of the external sires used per year
- To give users the ability to select a standard analysis index for the RUGG report to be built on when they are accessing the reports through the SG website via their user login
- To provide the ability for service providers to gain access to the RUGG reports of flocks that have assigned them access to the reports via the website login.
- For the RUGG reports to display context using a 5-star system for the following areas of data quality/genetic gain that is reported; average sire and dam age, average full pedigree, average pedigree known, index accuracy, average index, index gain, male and female selection efficiency and effective progeny average
- To provide the above in a way that can be easily executed and delivered through the current Sheep Genetics website and in a way that can be maintained by SG Staff

## 3 Methodology

The software improvements were implemented as modifications to the RUGG web page AngularJS Javascript code (front-end) and to the Sheep Genetics web API C# code (backend server).

Together with code to implement the specifications the supporting Javascript libraries and frameworks have been upgraded to the most current available versions to improve performance and reduce risks of security flaws.

## 4 Conclusions/recommendations

### 4.1 Conclusions

The implementation of new functionality for the RUGG report was completed allowing users to select the index for use in the analysis and displaying star ratings for easy comparison of the individual flock against the overall analysis.

### 4.2 Recommendations

The RUGG user interface software and other components of the Sheep Genetics website (Dashboard and Tools area) have been implemented using the Angular v1 (AngularJS) JavaScript framework which was the framework of choice at the time of implementation. Several years later this framework is no longer being developed and is long-term-support (updates for security flaws) (See <https://docs.angularjs.org/misc/version-support-status>).

I recommend that no new development be done using AngularJS and that consideration be given to reimplementing RUGG using a modern and supported framework such as Angular v7+, React, or Vue.js. Any modern Javascript front-end framework can be used with Sheep Genetics API.

## 5 Appendix

### 5.1 Screenshots

#### 5.1.1 RUGG starting page

The screenshot displays the Sheep Genetics website interface. At the top, there is a navigation bar with 'SHEEP GENETICS' on the left, a search bar with a 'SEARCH' button on the right, and 'SG HOME' and 'Tools' in the center. Below the navigation bar, the main heading is 'RAMping Up Genetic Gain'. The content area contains several paragraphs of text explaining the purpose of the RUGG reports and providing context information. A search bar is present with the placeholder text 'Flock Search for flock name or ID'. Below the search bar, there is a list of report categories: 'Pedigree Analysis', 'Flock Performance', 'Data Summaries', 'Sire Summaries', and 'Reproduction', each with a dropdown arrow. At the bottom of the page, there are logos for 'mla MEAT & LIVESTOCK AUSTRALIA', 'AWI Australian Wool Innovation Limited', 'LAMBPLAN ASBV', and 'WINDSORLEY ASBV'. On the far right, there are links for 'About us', 'Contact us', 'Terms of use', and 'Privacy policy'.

## 5.1.2 Analysis in progress with the index chosen

SHEEP GENETICS

SEARCH

SG HOME
Tools

### RAMping Up Genetic Gain

**RAMping Up Genetic Gain** reports aim to provide breeders with better information on the variables that impact the rate of genetic gain of their flock. These variables include the amount and quality of pedigree, the quality of the data and how effectively this data is used. By considering the individual components of the breeders equation and balancing them breeders are able to maximise genetic gain.

The RAMping Up Genetic Gain reports help evaluate your flock's breeders equation. RAMping Up Genetic Gain reports are a tool breeders can use to summarise data from their flock into these components that influence genetic gain.

The context information supplied below each report section provides a benchmark of how your flock is performing relative to the rest of the analysis for factors impacting genetic gain. Context information includes:

- **Flock Average** - the five year average of the flock the report is based on for the component in question
- **Analysis Average** - the five year analysis average for the component in question
- **Rating** - a five-star rating of how your flock compares to the rest of the analysis for that component of genetic gain. For example a five-star rating means that your flock is in the top 20% of the analysis for that component. A one-star rating means your flock is in the bottom 80% for that component.

Flock

Select Analysis MERINOSELECT - MERINO

Select Index Fibre Production Index

Select Site ▼

Building Report ■■■■■■■■■■

Please wait, the analysis can take several minutes... Started at 29/11/2019, 10:30:38 am


Pedigree Analysis ▼

Flock Performance ▼


Data Summaries ▼

Sire Summaries ▼


Reproduction ▼




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### 5.1.3 Analysis report showing star ratings

SHEEP GENETICS

SEARCH

SG HOME    Search home
Tools

## RAMping Up Genetic Gain

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Flock

Select Analysis LAMBPLAN - SAMM

Select Index MWP+

Select Site .

#### Pedigree Analysis

##### Pedigree Counts and Generation Interval

Year	Count	M:F	Average sire age	Average female age
2014	144	71:73	2.7	2.8
2015	36	29:7	2.5	3.3

[Your Flock Generation Interval Compared To The Analysis](#) +

	Average of Flock	Average of Analysis	Rating
Average sire age	2.6	3.1	★★★★★
Average dam age	3.1	3.7	★★★★☆

##### Pedigree Breakdown

■ Full pedigree   
 ■ Sire pedigree   
 ■ Dam pedigree   
 ■ Syndicate pedigree   
 ■ No pedigree

Year	Full	Sire	Dam	Syndicate	None
2014	100.0	0.0	0.0	0.0	0.0
2015	100.0	0.0	0.0	0.0	0.0

[Your Flock Pedigree Recording Compared To The Analysis](#) +

	Average of Flock	Average of Analysis	Rating
Full Pedigree	100.0	91.7	★★★★★
Depth of Pedigree Known	94.6	77.7	★★★★★

[Help for pedigree analysis](#)

#### Flock Performance

##### Flock Performant

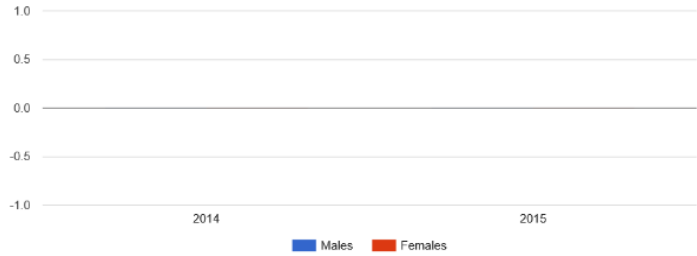
Year	Percentage Recorded (for traits in index)							Overall Accuracy
	yfd	wwt	ywt	bwt	nlw	yemd	yfat	
2014	12.5%	97.2%	30.6%	62.5%	94.4%	30.6%	30.6%	49.1
2015	66.7%	97.2%	66.7%	0.0%	0.0%	66.7%	66.7%	52.8

2014	12.5%	97.2%	30.0%	62.5%	94.4%	30.0%	30.0%	95.1
2015	66.7%	97.2%	66.7%	0.0%	0.0%	66.7%	66.7%	52.8

[Your Flock Index Accuracy Compared To The Analysis](#) +

	Average of Flock	Average of Analysis	Rating
<b>Index Accuracy</b>	51.0	48.0	★★★★☆

Selection Efficiency



Year	Index gain	Male selection efficiency	Female selection efficiency	Average Index of external sires
2014	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	140.7

[Your Flock Selection Efficiency And Gain Compared To The Analysis](#) +

	Average of Flock	Average of Analysis	Rating
<b>Index Gain</b>	8.9	1.6	N/A
<b>Male Selection Efficiency</b>	0.0	10.0	N/A
<b>Female Selection Efficiency</b>	0.0	8.2	N/A

[Help for flock performance](#)

Data Summaries

[Your Flock Recording Statistics Compared To The Analysis](#) +

	Average of Flock	Rating
<b>Recorded %</b>	99.7	★★★★★
<b>Effective Progeny Average</b>	57.2	★★★★☆

Data Summaries

2014

Trait	Count	Contemporary Groups	Recorded	Effective progeny	Percent linkage	Age variation	BT variation
yfd	18	1	12.5%	48%	0.0	100.0%	100.0%
wwt	140	4	97.2%	51%	0.0	100.0%	100.0%
ywt	44	2	30.6%	48%	0.0	100.0%	100.0%
bwt	90	4	62.5%	51%	0.0	0.0%	96.7%
nlw	136	2	94.4%	68%	0.0	100.0%	100.0%
yemd	44	2	30.6%	48%	0.0	100.0%	100.0%
yfat	44	2	30.6%	48%	0.0	100.0%	100.0%

2015

Trait	Count	Contemporary Groups	Recorded	Effective progeny	Percent linkage	Age variation	BT variation
yfd	24	2	66.7%	62%	100.0	95.8%	95.8%
wwt	35	2	97.2%	66%	100.0	100.0%	80.0%
ywt	24	2	66.7%	62%	100.0	95.8%	95.8%
ygfw	24	2	66.7%	62%	100.0	95.8%	95.8%
yfat	24	2	66.7%	62%	100.0	95.8%	95.8%
yemd	24	2	66.7%	62%	100.0	95.8%	95.8%

[Help for data summaries](#)

Sire Summaries

[Sire Summaries](#)



Sire Summaries

First year	ID	Progeny	Prog:Flocks	2014	2015	2016	2017	2018	2019
2014	480028-2012-120007	<a href="#">480028-2012-120007</a>	46 : 1	46					
2014	480028-2012-120029	<a href="#">480028-2012-120029</a>	14 : 1	13					
2014	480028-2011-110007	<a href="#">480028-2011-110007</a>	280 : 1	84					
2015	480082-2012-121143	<a href="#">480082-2012-121143</a>	66 : 2		19				
2015	480082-2013-131075	<a href="#">480082-2013-131075</a>	40 : 2		7				
2015	480082-2013-131041	<a href="#">480082-2013-131041</a>	27 : 2		4				
2015	480082-2013-131156	<a href="#">480082-2013-131156</a>	47 : 2		2				
2015	480082-2013-131129	<a href="#">480082-2013-131129</a>	101 : 2		4				

[Help for sire summaries](#)

Reproduction

Reproduction Data Summary

ID	2014	2015	2016	2017	2018	2019
No. preg scanned	0	0	0	0	0	0
No. of dams	194	0	0	0	0	0
Yearling NLB:NLW	N:N	N:N	.	.	.	.
Fertility %	64.9	100.0	0.0	0.0	0.0	0.0
No. of yearling dams	0	0	0	0	0	0
Adult NLB:NLW	Y:Y	N:N	.	.	.	.

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