final report

Project code: L.GEN.1901

Prepared by: Chris Hutchinson
                         Hutchinson Software Pty Ltd

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

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

5.1.2   Analysis in progress with the index chosen

5.1.3 Analysis report showing star ratings

| 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 |

	Your Flock Index Accuracy Compared To The Analysis ✚		
	Average of Flock	**Average of Analysis**	**Rating**
Index Accuracy	51.0	48.0	★★★★☆

Selection Efficiency
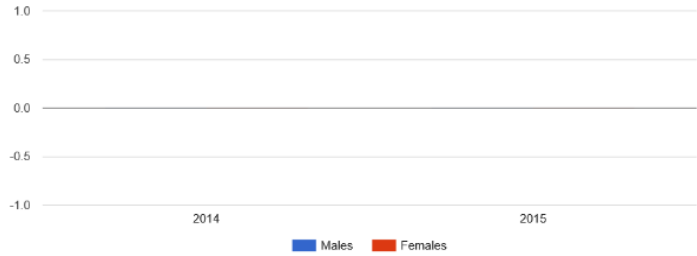
Males ■ Females ■

⟳ 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**
Index Gain	8.9	1.6	N/A
Male Selection Efficiency	0.0	10.0	N/A
Female Selection Efficiency	0.0	8.2	N/A

Help for flock performance ⌄

Data Summaries ⌄

	Your Flock Recording Statistics Compared To The Analysis ✚	
	Average of Flock	**Rating**
Recorded %	99.7	★★★★★
Effective Progeny Average	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	480028-2012-120007	46 : 1	46					
2014	480028-2012-120029	480028-2012-120029	14 : 1	13					
2014	480028-2011-110007	480028-2011-110007	280 : 1	84					
2015	480082-2012-121143	480082-2012-121143	66 : 2		19				
2015	480082-2013-131075	480082-2013-131075	40 : 2		7				
2015	480082-2013-131041	480082-2013-131041	27 : 2		4				
2015	480082-2013-131156	480082-2013-131156	47 : 2		2				
2015	480082-2013-131129	480082-2013-131129	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	.	.	.	.

Help for reproduction ⌄