final report

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Feed intake measurement of cattle in the Tullimba R&D Feedlot

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Executive Summary

This report covers the 290 Angus steers from RV14,15 and 16 that had feed intake and weight gain recorded on them in UNE's Tullimba feedlot. All data has been delivered to BreedPlan. Each trial is summarised below:

RV14: 104 Angus steers that began feed intake testing at Tullimba on 21/09/2015. They finished in the feedlot on 6/12/2015 (77 days). To date cattle have generally performed well and have averaged around 13 kg/day feed intake for the 77 days. Trial average weight gain has been 1.54 kg/day weight gain (range 0.97 - 2.20 kg/day) during the 70 day test period after adaptation to the feeders. Retrieval of valid daily feed intake data will allow robust estimates of RFI and EBVs. Feed intake and live weight data from manual weighing is being reported to the breeder groups fortnightly and have been supplied to BreedPlan via Jim Cook.

RV15: 105 Angus steers that began feed intake testing at Tullimba on 06/01/2016. They finished in the feedlot on 23/03/2016 (74 days). To date cattle have generally performed well and have averaged around 13.3 kg/day feed intake for the 74 days. Trial average weight gain has been 1.61 kg/day weight gain (range 0.8 - 2.15 kg/day) during the 74 day test period after adaptation to the feeders. Retrieval of valid daily feed intake data will allow robust estimates of RFI and EBVs. Feed intake and live weight data from manual weighing is being reported to the breeder groups fortnightly and have been supplied to BreedPlan via Jim Cook.

RV16: 81 Angus steers that began feed intake testing at Tullimba on 08/03/2016. They finished in the feedlot on 16/05/2016 (70 days). To date cattle have generally performed well and have averaged around 14.6 kg/day feed intake for the 70 days. Trial average weight gain has been 1.73 kg/day weight gain (range 0.81 - 2.17 kg/day) during the 70 day test period after adaptation to the feeders. Retrieval of valid daily feed intake data will allow robust estimates of RFI and EBVs. Feed intake and live weight data from manual weighing is being reported to the breeder groups fortnightly and have been supplied to BreedPlan via Jim Cook.

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1 Background

1.1 Background regarding NFI testing

Feed is the largest recurring input cost in beef cattle production systems. Residual feed intake (RFI, also called ‘ net feed intake ’ or NFI in Australia) is a measure of feed use efficiency and can be used to help manage the utilisation of feed on farm and in the feedlot. Net feed intake is calculated as the difference between the actual feed intake by an animal over a test period minus that expected or predicted based on its size and growth rate (Herd et al. 2003a). An animal with a lower feed intake than expected is considered more efficient. Selective breeding for low-RFI animals offers the potential to produce progeny that will eat less with no compromise in size or growth performance (Archer et al. 1999). There has been shown to be genetic variation for NFI with moderate Heritability in growing cattle being reported (Arthur and Herd 2012). However, the opportunity to improve profitability in the feedlot through animal breeding for lower RFI is dependent not only on the existence of genetic variation in RFI, but also on the magnitude of genetic associations with other key production traits. For feedlot cattle, these traits include growth rate, feed conversion ratio (FCR), and carcass and meat quality traits, many with tight market specifications and penalties for non- compliance. Genetic merit of cattle for breeding purposes is described by estimated breeding values (EBV; BREEDPLAN 2010), with trial RFI-EBV first becoming available in Australia in 2002 in the Angus breed (Angus Society of Australia 2002), and BREEDPLAN RFI-EBV becoming available at the end of 2013 for Angus cattle (Herd et al. 2014).

To Gain the information regarding NFI standards for the collection of good data have been described. In general the amount of time required to collect stable data is the biggest influence on NFI testing. The length of a RFI test and the amount of data collected needs to be optimized to reduce the cost of testing animals. The current recommendation to the Australian industry for a 70-d RFI test is based on the results reported by Archer et al. (1997). They showed that for British breed cattle tested for RFI, with feed intake recorded daily and animal BW measured weekly, that while 35 d was adequate to measure feed intake, 70 d was required to accurately measure growth and RFI. Archer and Bergh (2000) analyzed data from centralized tests in South Africa for young bulls from five breeds and four biological types to conclude that while a test of between 42 and 56 d was sufficient for measurement of growth rate, feed intake required 56 to 70 d to measure accurately, and RFI required around 70 to 84 d. Some work has began to examine the test length utilising the data that has been collected in this and previous trials to see if there are any alternatives to the 70 day test period.

2 Project Objectives

1. To measure and report on the feed intake of Angus Beef Information Nucleus (BIN) Livestock at UNE Tullimba Feedlot Research Facility including provision of Reports containing data

2. To collect and store the data from this Project as well as other data generated by GrowSafe and other recording equipment. This data will be stored in a database accessible by UNE researchers subject to Clause 8.9 of the Agreement.

3 Methodology

Number and sex of cattle fed:

Cohort 1	104 Angus steers
Cohort 2	105 Angus steers
Cohort 3	81 Angus steers

Date of exit to from the feedlot:

Cohort1	6/12/2015
Cohort 2	23/03/2016
Cohort 3	16/05/2016

Payment is based on $2/head/day for trial periods (7+70 days) in feeders.

4 Results

4.1 Cohort 1 (RV14)

Feedlot pens 7,14

Head count 104 – 6 removed not drinking = 98

First full feed date = 21/09/2015

Last full feed date = 6/12/2015

Number of full feed days = 77

Trial First full feed date = 28/09/2015

Trial Last full feed date = 6/12/2015

Trial Start Wt Date = 28/09/2015

Trial End Wt Date = 6/12/2015

Number of Trial days = 70

Valid Feed Intake days:	64	Pen 7
	65	Pen 14

Note. The number of valid Feed Intake days is less than the days of the trial due to power outages (storms), rain days and equipment issues.

Average Feed Intake (g) = 13,692	(10,912 – 16,321)
Average Start Weight (kg) (Fitted) = 532	(443 - 638)
Average End Weight (kg) (Fitted) = 638	(548 - 739)
Average of ADG (kg) = 1.54	(0.97 - 2.20)

The table below summarises the completed cohort.

Breed	Number	$	Start feeders	End test	Days on feeders
Angus	98	$15,092	21/09/2015	6/12/2015	77

4.2 Cohort 2 (RV15)

Feedlot pens 7,14

Head count 106 – 1 removed –not performing = 105
First full feed date = 06/01/2016
Last full feed date = 23/03/2016
Number of full feed days = 74

Trial First full feed date = 06/01/2016
Trial Last full feed date = 23/03/2016

Trial Start Wt Date = 06/01/2016
Trial End Wt Date = 23/03/2016
Number of Trial days = 74

Valid Feed Intake days:	68	Pen 7
	69	Pen 15

Note. The number of valid Feed Intake days is less than the days of the trial due to power outages (storms), rain days and equipment issues.

The table below summarises the data that has been recorded for the completed cohort.

	Trial Start Wt (fitted) (kg)	Trial End Wt (fitted) (kg)	Wt Gain (kg)	ADG (kg)	Avg Daily FI (g)
MIN	420	500	54	0.73	5671
AVERAGE	**486.5**	**605**	**118.5**	**1.605**	**13342.5**
MAX	582	694.5	159	2.145	17872

The table below summarises the completed cohort.

Breed	Number	$	Start feeders	End test	Days on feeders
Angus	105	$15,540	06/01/2016	23/03/2016	74

4.3 Cohort 3 (RV16)

Feedlot pens 7,14

Head count 81
First full feed date = 01/03/2016
Last full feed date = 16/05/2016
Number of full feed days = 77

Trial First full feed date = 08/03/2016
Trial Last full feed date = 16/05/2016

Trial Start Wt Date = 08/03/2016
Trial End Wt Date = 16/05/2016
Number of Trial days = 74

Valid Feed Intake days:	65	Pen 4
	68	Pen 5
	66	Pen 6

Note. The number of valid Feed Intake days is less than the days of the trial due to power outages (storms), rain days and equipment issues.

The table below summarises the data that has been recorded for the completed cohort.

	Trial Start Wt (fitted) (kg)	Trial End Wt (fitted) (kg)	Wt Gain (kg)	ADG (kg)	Avg Daily FI (g)
MIN	445	545	56	0.81	11825
AVERAGE	**523**	**642**	**120**	**1.73**	**14637**
MAX	610	747	150	2.17	17368

The table below summarises the completed cohort.

Breed	Number	$	Start feeders	End test	Days on feeders
Angus	81	$12,474	08/03/2016	16/05/2016	77

5 Discussion

The project proceeded as planned though anticipated completion dates were later due to delays in feeder availability and Angus Society supply of cattle. Please note that there has been a slight decrepency between planned numbers of animals an the final numbers due to managment factors prior to entry at the feedlot (i.e. sickness, injury and environemental factors (drought)).

6 Key Messages

The Growsafe facility at Tullimba is a valuable industry resource for RFI testing. The data collected from the project is underpinning the NFI EBV that can be utilised by breeders to select for feed efficiency.

To be maintained, the facilty needs a regular flow of cattle though it to help fund any repairs and maintenance and for future upgrading of the facility.

7 Conclusions/Recommendations

It is key that the beef cattle industry makes as much use of the raw data collected and stored for genetics R&D as possible.

The main limitation of the project thus far is the lack of investment in human capacity to analyse some of the novel data that has been recorded as part of this project. Small investment in personnel time would increase the value of this data to industry.

8 Bibliography

Angus Society of Australia. (2002) Trial BREEDPLAN EBVs for net feed intake (NFI). The Angus Society of Australia, Armidale, Australia.

Archer J.A., Arthur P.F., Herd R.M., Parnell P.F., Pitchford W.S. (1997) Optimum postweaning test for measurement of growth rate, feed intake, and feed ef fi ciency in British breed cattle. J. Anim. Sci. 75, 2024 – 2032.

Archer, J. A., P. F. Arthur, R. M. Herd, E. C. Richardson, and D. A. Burton. (1999a) Potential for reducing the length of net feed intake test by weighing cattle more frequently. Pages 247–249. In, Proc. 13th Conf. Assoc. Advmt. Anim. Breed. Genet., Mandurah, Australia.

Archer, J. A., and L. Bergh. (2000) Duration of performance tests for growth rate, feed intake and feed efficiency in four biological types of beef cattle. Livest. Prod. Sci. 6547–55.

Arthur P.F., Herd R.M. (2012) Genetic improvement of feed efficiency. In ‘ Feed efficiency in the beef industry ’ . (Ed. R Hill) pp. 93 – 103. (John Wiley & Sons, Inc., Cambridge, MA)

BREEDPLAN (2010) BREEDPLAN EBVs – ‘ The traits explained ’ . (ABRI, University of New England, Armidale, NSW)

Herd R.M., Archer J.A., Arthur P.F. (2003a) Reducing the cost of beef production through genetic improvement in residual feed intake, Opportunity and challenges to application. J. Anim. Sci. 81, E9 – E17.

Herd R.M., Arthur P.F. (2012) LessonsfromtheAustralianexperience.In ‘ Feed efficiency in the beef industry ’. (Ed. R Hill) pp. 93 – 103. (John Wiley & Sons, Inc., Cambridge, MA)