

Comparison of accelerated calf rearing programs

Final Report



Prepared by Lesley Irvine, Mark Freeman & Thomas Snare, TIA
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Your Levy at Work



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Introduction

Accelerated calf rearing programs aim to increase pre-weaning calf growth rates by providing additional energy and protein, either by supplementing the normal fresh milk diet with milk powder or by providing increased levels of fresh milk. The importance of achieving target weights at mating and calving are well known. Heifers that reach target weights have improved conception rates, milk production and longevity. Increasing pre-weaning calf growth rates means either calves should be heavier at weaning or reach weaning point earlier (depending on the method used to determine weaning point). This can assist in achieving target weights at both mating and calving.

In addition, research conducted prior to this project has suggested pre-weaning growth rates account for up to 25% of the variation in first lactation milk production. That is, if you have faster pre-weaning growth rates, you achieve increased first lactation milk production. This increased production is believed to be due to the 'switching-on' of certain genes during the pre-weaning period.

Due to the current interest in accelerated calf rearing and the potential to improve milk production on Tasmanian dairy farms, a research trial was conducted at TIA's Dairy Research Facility (TDRF) to compare three accelerated calf rearing programs. This research was supported by a DairyTas Small Grant.

Methodology

Heifer calves born to the milking herd at TDRF, were allocated to one of four treatment groups. The groups were balanced for age, birth weight and breed (Friesian or FriesianxJersey). Each treatment group included twenty calves. All calves were fed colostrum in their first 24 hours and had ad lib access to calf pellets and water throughout the trial.

The four treatment groups were:

1. Control – calves fed 4 litres of colostrum/fresh milk per day.
2. Ad lib – calves provided with access to as much colostrum/fresh milk as they wished to drink.
3. Fortified milk for four weeks – calves were fed 4 litres of colostrum/fresh milk with 300 grams of milk powder added (75 grams/litre) per day for their first four weeks. After four weeks, the milk was no longer fortified and they fed 4 litres of fresh milk per day until weaning.
4. Fortified milk until weaning – calves were fed 4 litres of colostrum/fresh milk with 300 grams of milk powder added (75 grams/litre) per day until weaning.

Calves were reared on DeLaval C150 Automatic Calf Feeders. Daily milk and pellet intakes were recorded.

Calves were weighed at birth and then on a weekly basis. They were weaned based on weight – 90 kg for cross-breds and 100 kg for Friesians.

Results

The results are summarised in Table 1 with key parameters displayed in Figures 1, 2 and 3.

Table 1 Comparison of accelerated calf rearing programs

	Control	Ad lib	Fortified for 4 weeks	Fortified until weaning
Milk	4 litres	As much as they wanted	4 litres + 300 grams milk powder until 4 weeks of age, then fed same milk as control & ad lib	4 litres + 300 grams milk powder
Pellets	Ad lib	Ad lib	Ad lib	Ad lib
Water	Ad lib	Ad lib	Ad lib	Ad lib
Hay/straw	None	None	None	None
Birthweight (kg)	30.4	30.6	31.0	30.7
Days to double birthweight	56	42	50	48
Days to reach weaning weight	90	80	86	80
Consumption				
Milk (L/calf)	341	508	325	303
Pellets (kg/calf)	46.9	17.7	36.6	30.2
Costs (per calf)¹				
Milk	\$70	\$115	\$102	\$143
Pellets	\$33	\$12	\$26	\$21
Labour	\$40	\$36	\$39	\$36
Total cost	\$143	\$163	\$167	\$200

¹ Costs were based on the system used at TDRF. Each farm would have different cost and your farm costs should be used in any calculations done to determine the cost:benefit to your farm.

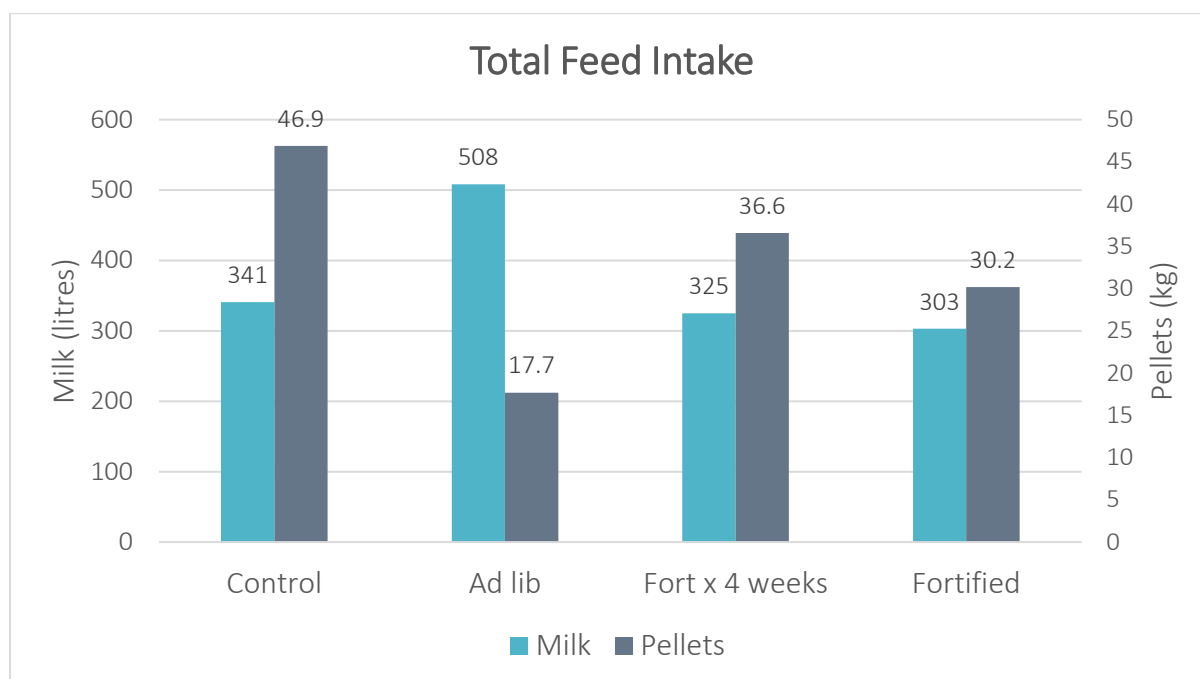


Figure 1 Total feed intake: milk (litres) and pellets (kg)

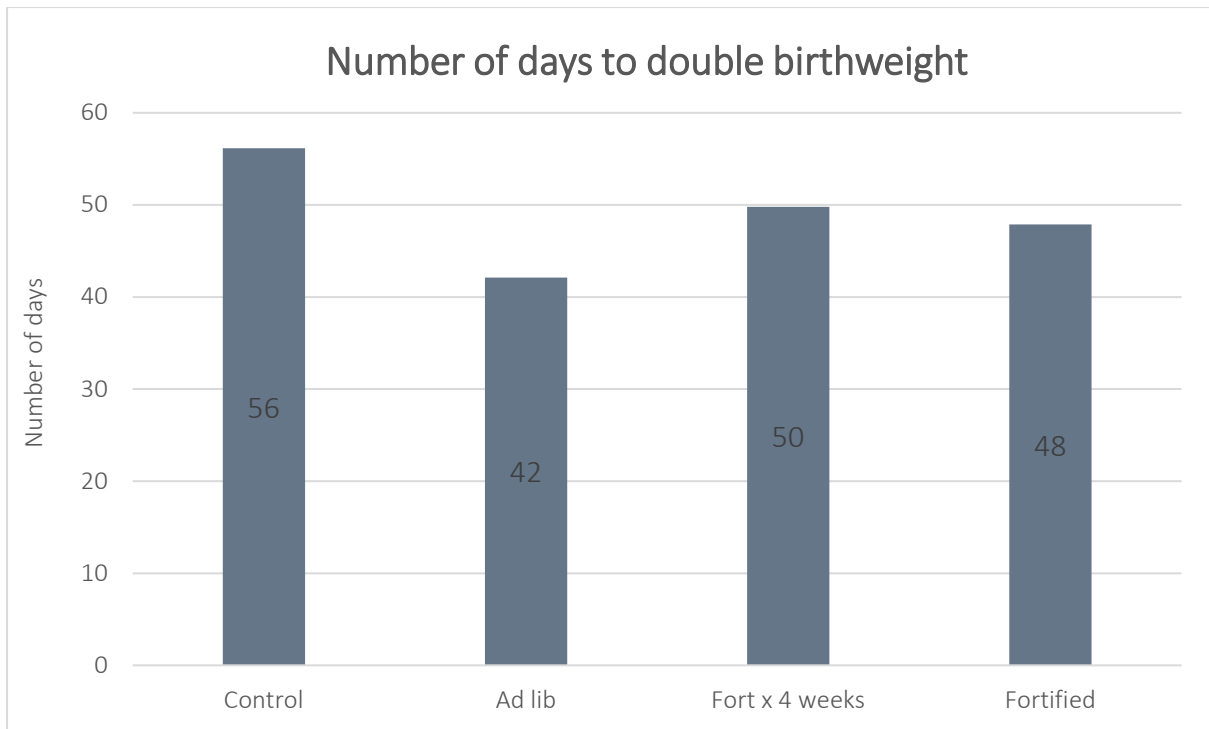


Figure 2 Number of days taken to double birthweight

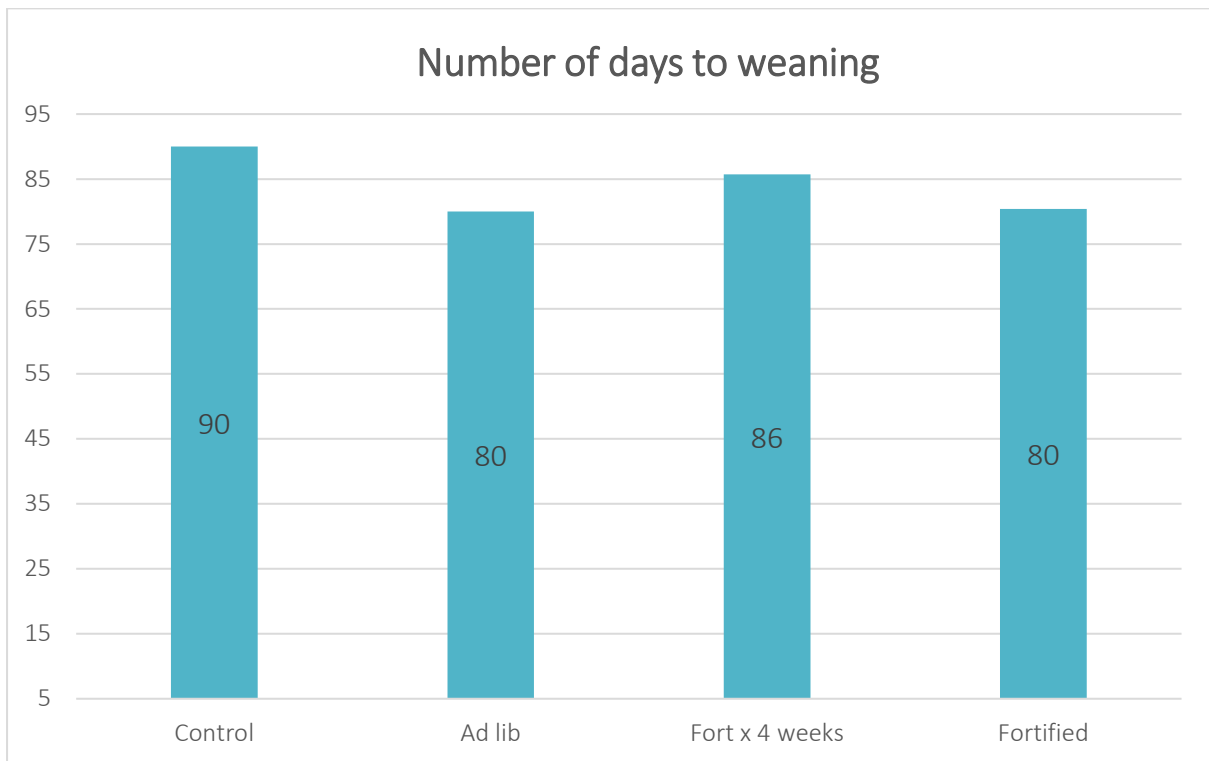


Figure 3 Number of days taken to reach weaning point (90 kg cross-breds; 100 kg Friesians)

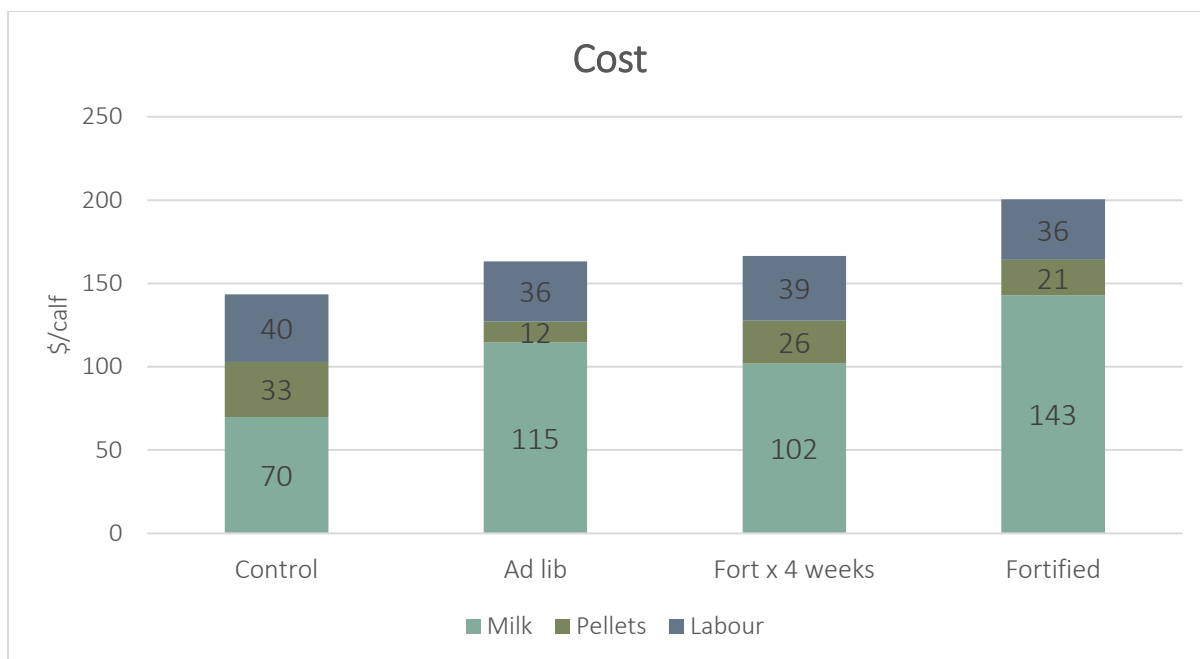


Figure 4 Cost of the different calf rearing programs (based on TDRF costs including milk, pellets and labour)

Discussion

This project demonstrated it is possible to achieve higher pre-weaning calf growth rates by increasing milk feeding rates. Calves in the AD LIB treatment, doubled their birthweight in the shortest period of time (42 days compared to 56 days for the CONTROL treatment) and reached their target weaning weight equal fastest with the FORTIFIED TO WEANING treatment at 80 days (compared to 90 days for the CONTROL treatment).

In this project, there was no cost benefit advantage for increasing pre-weaning growth rates. The benefit obtained by being able to wean the calves earlier was outweighed by the additional cost of the milk to achieve this goal. The cost of each treatment was more than the CONTROL groups, in attaining the target weaning weights. The most expensive treatment was the FORTIFIED TO WEANING group, which cost on average \$200 per calf to achieve the target weaning weight (compared to \$143 per calf for the CONTROL group). It is important to note that costs will vary from farm to farm depending on the value of the milk fed to the calves, the cost of labour, and weaning strategy imposed.

As explained in the introduction, it is possible that increasing pre-weaning growth rates could lead to improved milk production through more heifers reaching their target weights and/or a potential epigenetic effect.

No calf health issues that were related to the feeding treatments were experienced in this project, but it is important to carefully monitor calf health if using accelerated calf rearing programs as issues such as scouring and/or bloating can occur. As the amount of milk powder included in the milk increases, these risks to calf health also increases.

Communication

Information about this project was communicated to the Tasmanian dairy industry through the following mediums:

- Update and summary of results in Tassie Dairy News and the weekly TIA Dairy Research Facility report.
- Presentation of results at the TIA Dairy Open Day held at Elliott.
- Presentation of results at the Dairy On PAR Calf Roadshow event in Smithton, Burnie, Deloraine and Branxholm (copy of presentation is included as an appendix)
- Interviews with local media (newspaper and radio).

Information about the project and results has also been provided to Dairy Australia.

Acknowledgements

The project team would like to acknowledge the funding provided by DairyTas to conduct this research and the support provided by their TIA colleagues: Benjamin Noble, Bradley Millhouse, Karin Brodie, Nathan Bakker, Oliver Radford and Richard Rawnsley.

Appendix 1 – Accelerated calf rearing presentation used during Dairy On PAR Calf Roadshow



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Feeding Calves

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Traditional calf rearing



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- Calf nurses 6-8 times per day for 5-10 minutes
- Consumes 16-24% bodyweight of milk
- Enough energy supplied to grow at 0.7kg to >1.4kg/day



‘Typical’ Tasmanian calf rearing system

- Calf fed 1 or 2 times daily
- Consumes 10% bodyweight of milk
- Enough energy supplied to grow at 0.25 kg/day
- Milk restricted to encourage intake of calf starter
- Calf starter promotes rumen development and allows for earlier weaning

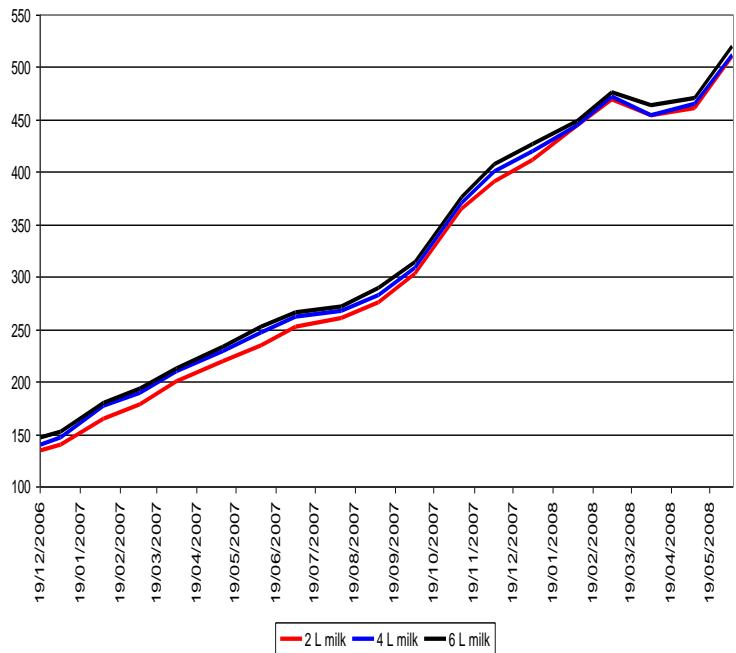
Feed more, grow faster

- Trial conducted at TDRF in 2006
- 2 L vs 4 L vs 6 L

	Days to 1 kg con	Average age at weaning	Milk consumed	Pellets consumed
2 litres	56	89	246	74
4 litres	61	87	349	69
6 litres	68	82	461	52

At point of calving

	Weight 2/7/08	GR since birth
2 litres	525	0.69
4 litres	527	0.69
6 litres	541	0.71



Feed more, grow faster

- Trial conducted at TDRF in 2006
- 2 L vs 4 L vs 6 L
- Higher volume reached weaning weight faster
- Not a large difference in weight at point of calving
- Calf starter generally cheaper than milk
- So...stayed with 4 L milk (10% bodyweight)

Research continued

- Know heavier heifers
 - Improved reproductive performance
 - Improved milk production
- Research now suggests pre-weaning growth accounts for up to 25% variation in first lactation milk production



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Accelerated Calf Rearing

Mark Freeman, Lesley Irvine & Tom Snare

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Victorian research



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- Accelerated calf rearing – fortified milk
- 4 farms, 213 calves
- Control groups fed 2 L milk, twice daily
- Treatment groups fed 2 L milk with 150 g milk powder added, twice daily

Results



	Control	Fortified milk
Weight (week 8)	74.6 kg	80.3 kg
Weight gain during trial	35.1 kg	40.0 kg
Average daily weight gain	711 g	816 g
Calves that doubled birthweight in 8 weeks	27%	53%
Feed cost per calf	\$33.97	\$93.27
Feed cost per kg lwt gain	\$0.95/kg	\$2.37/kg

Most of difference in average daily weight gain occurred in first 4 weeks

Tasmanian research



- Conducted in 2016 with funding from DairyTas
- Building on Victorian research

The programs

Group 1: Control
• 4 litres milk

Group 2: Ad lib
• As much milk as they wanted to drink

Group 3: Fortified milk for 4 weeks

- 4 litres of milk with 300 g milk powder (75 g/L) added.
- When calves were 4 weeks of age, fortification stopped and they received straight milk until weaning

Group 4: Fortified milk until weaning

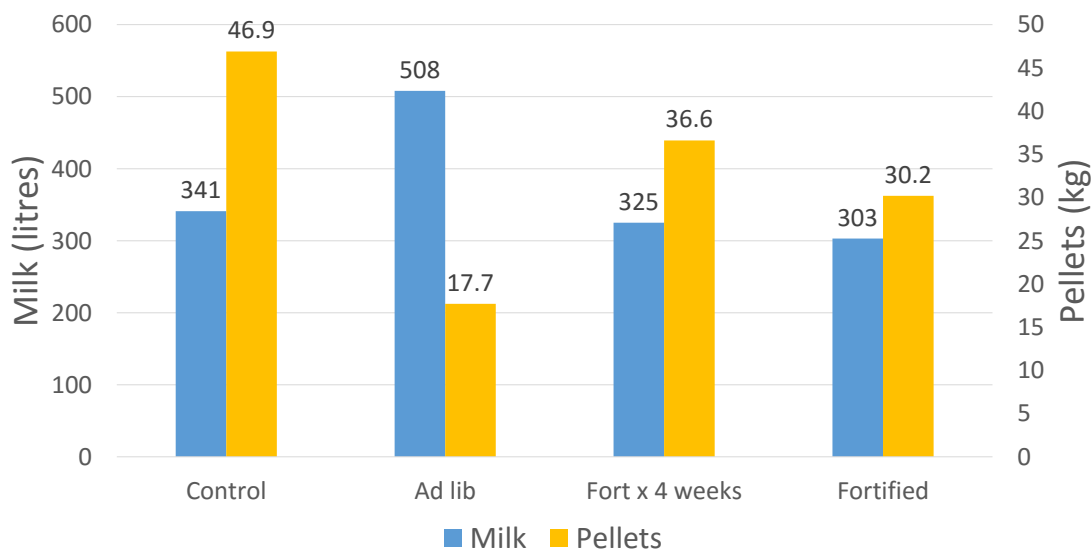
- 4 litres of milk with 300 g milk powder (75 g/L) added

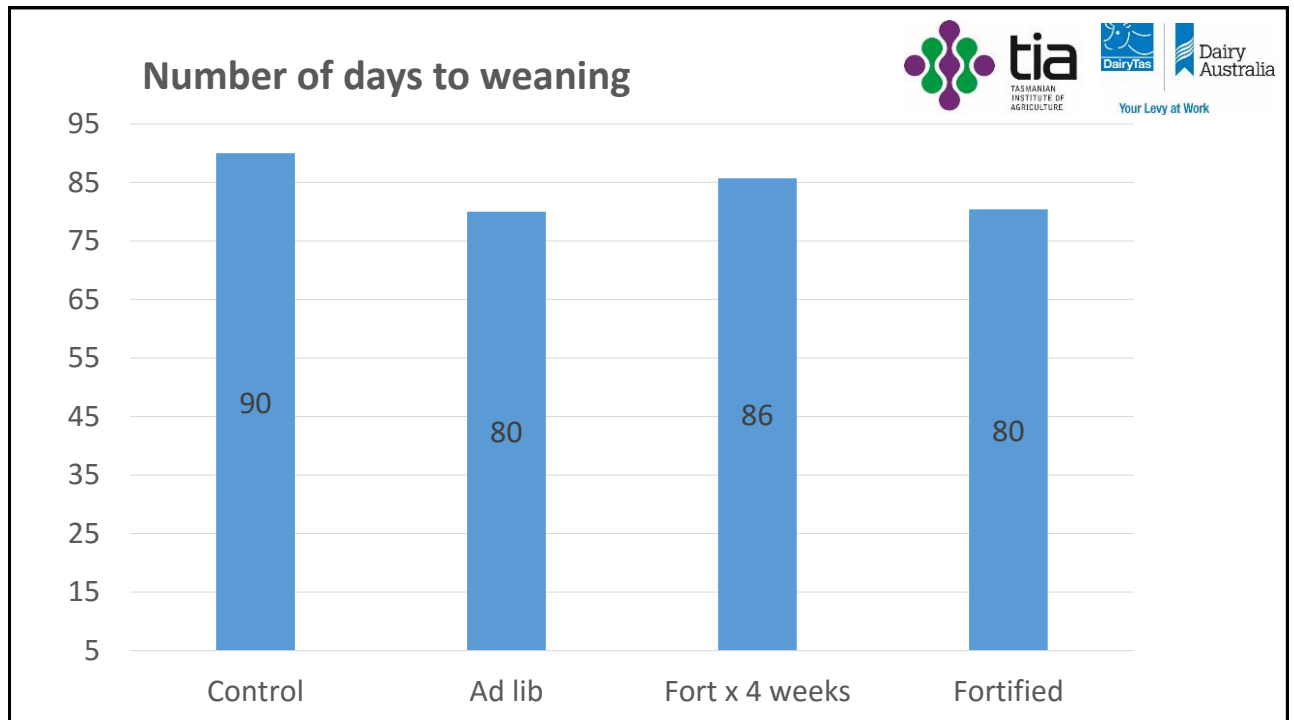
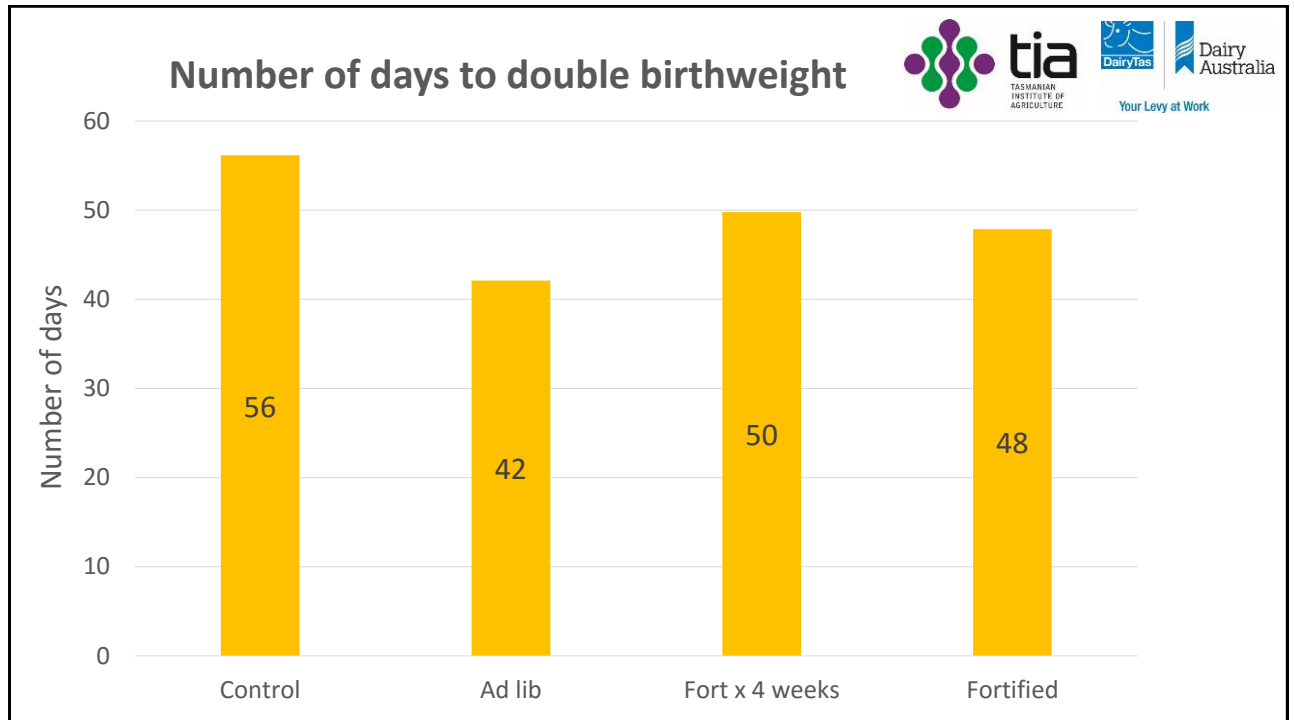
All calves:

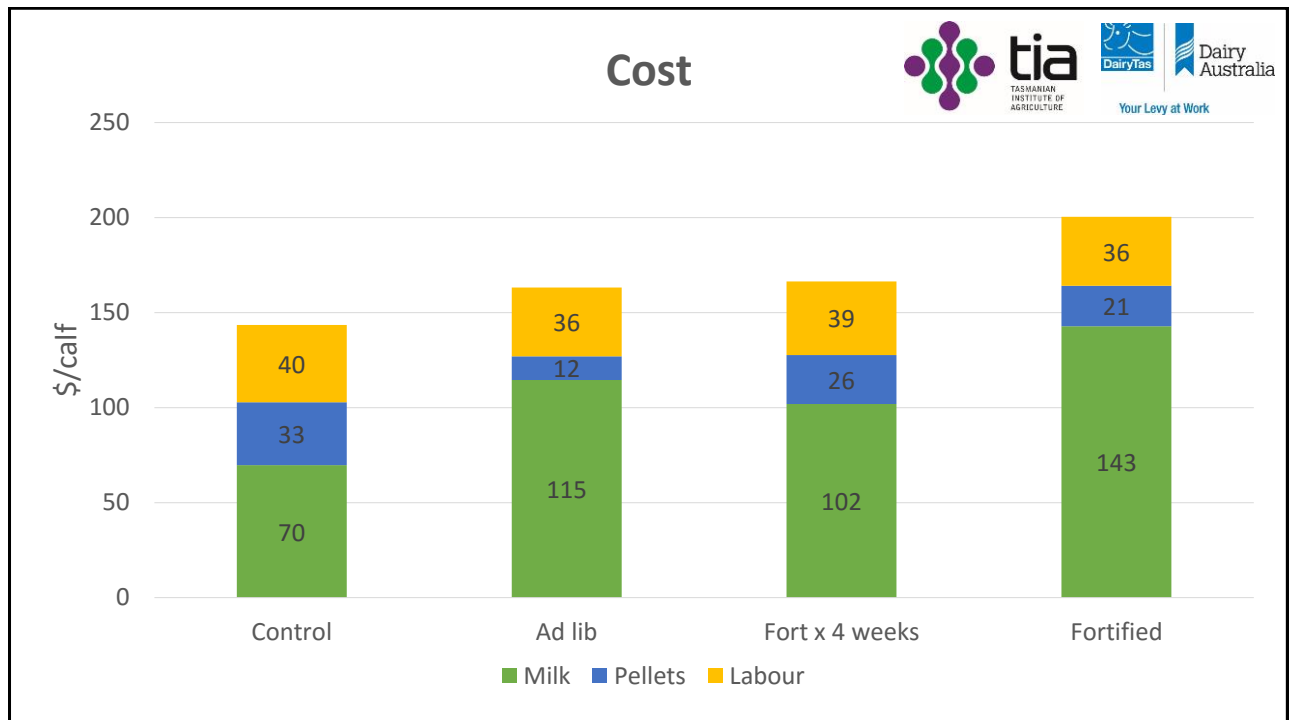
- Fed colostrum in first 24 hours
- Reared on DeLeval Automatic Calf Feeders – daily record of intake
- Ad lib access to pellets and water
- 20 calves per group
- Weighed weekly
- Weaned at 90 kg (xbred), 100 kg (F)



Total Feed Intake






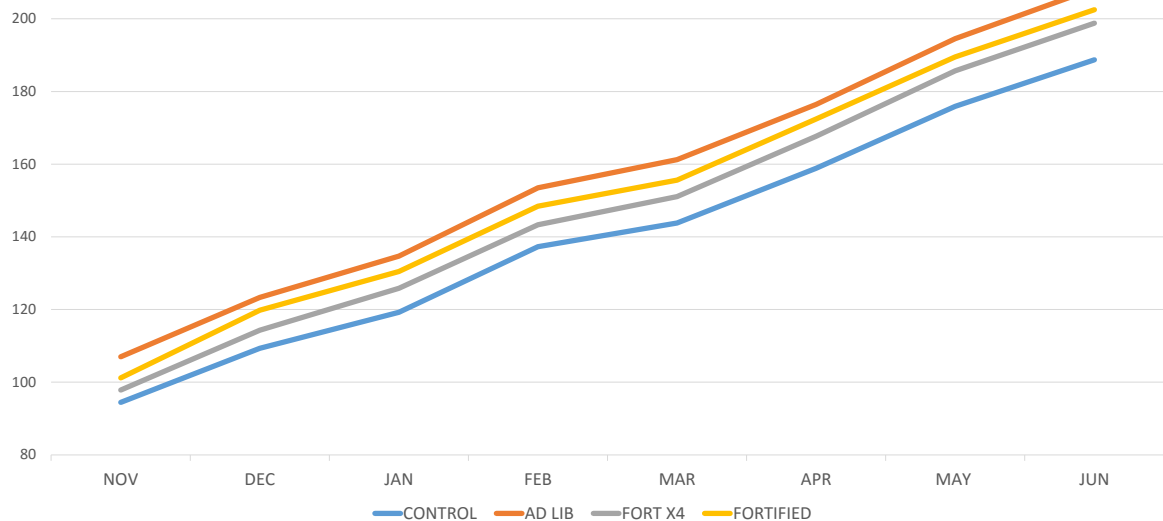


Accelerated rearing – is it worth it?

- Based just on cost – perhaps not (need to do own figures for labour cost saving)
- Calves will be life-time monitored
 - Monthly weights
 - In-calf rates
 - Once in the milking herd
 - Daily milk production
 - Daily weights



Post weaning weights



If considering accelerated rearing

Advantages

- Faster daily growth
- May be less susceptible to disease
- Epigenetic effects may increase lifetime milk production,
- Reach puberty earlier and have improved fertility

Disadvantages

- Cost
- Higher risk of disease?
- Need to monitor and control individual calf milk intake
- Some calves may have loose stools

Acknowledgements

- DairyTas for providing funding through the Small Grants program
- Nathan Bakker for assistance with weekly weighing
- Karin Brodie, Oliver Radford, Brad Millhouse and Ben Noble