Bayer Symposium
Beef Week 2015

Guest speakers:
Dr Gabriel Bó, Dr Sophia Edwards, Dr Ian Braithwaite, Kara Knudsen.
Dr Bó will give cattle producers an insight into practical advanced reproduction and nutrition in beef herds.

Dr. Gabriel Bó, is currently President and Director of Research and Post-graduate training of the Instituto de Reproducción Animal Córdoba (IRAC) and Professor of Obstetrics and Biotechnology of Reproduction at the Veterinary School of the Instituto de Ciencias Basicas y Aplicadas, Universidad Nacional de Villa Maria in Cordoba, Argentina. Dr. Bó received his veterinary degree from the Universidad Nacional de Rosario in 1985 and his M.V.Sc. (1991) and Ph.D. (1995) degrees from the University of Saskatchewan. Dr. Bó has been working on applied research and his main interests are follicular development, superovulation, recipient management, estrus synchronization, and embryo development and freezing. He is not only involved with research and teaching, he also practices embryo transfer and provides fixed-time artificial insemination services to producers in the Central and North part of Argentina (through the company Biogen Argentina SA). In 2008 Dr Bo obtained the “Taurus Award” in recognition of his scientific and academic contribution to the field of Bovine Reproduction and the IETS Distinguished Service Award in 2015, for his outstanding leadership and service to the Society and the Embryo Transfer Industry. Dr Bo is Past-President of the International Embryo Transfer Society (IETS) (Elected President twice in 2004 and 2011). He is also founding member and Pro-Secretary of the Argentine Embryo Technology Society (SATE) and he has also been President of the Argentine Chamber of Reproductive Biotechnology and Artificial Insemination (CABIA). Dr. Bó has lectured in short-courses on advanced reproductive technologies in many countries around the world. He has directed the First Course of Specialization in Bovine Reproduction given to practitioners from Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, Mexico, Paraguay, Perú, Uruguay, Panama and Venezuela, with more than 400 graduates since 2005. He has been an invited speaker several conferences around the world, including the International Embryo Transfer Society (IETS), International Congress of Animal Reproduction (ICAR) and the World Buiatrics Congress. He is the Program Chair of the International Symposium on Animal Reproduction, a scientific event oriented mainly towards bovine reproduction that has been held in Cordoba, Argentina every two years since 1993, and which has more than 1000 registrants from all around Latin America. Finally, he has published more than 100 manuscripts in referred journals and book chapters, more than 160 invited reviews and more than 410 abstracts in conference proceedings at venues around the world.
Currently, the world’s economy requires efficient management practices to increase the profitability of beef cattle operations. Several management practices like good record keeping, pregnancy diagnosis, bull breeding soundness examination, disease control through vaccination and diagnosis, a defined and concentrated breeding and calving season and culling on fertility cows are crucial to increase net returns. Furthermore, the proportion of cows showing oestrus during the first 21 days of the breeding season can vary from 20 to 87% and has been identified as one of the major causes of losses of profitability in pasture managed beef cattle around the world. Body condition score at calving and days postpartum are the major factors affecting the number of cows cycling at the beginning of the breeding season (Baruselli et al., 2004; Bó et al., 2007; Swecker 2015). With the use of good nutritional management combined with progesterone-based treatments that induce cyclicity, more than 50% of cows could become pregnant in the first cycle of the breeding season, and 70 to 80% could be pregnant after two cycles (Bó et al., 2012; Menchaca et al., 2013). Furthermore, fertility in successive cycles and the overall pregnancy rates at the end of the breeding season have been shown to improve in cows that were well managed and on an increasing plane of nutrition (Bó et al., 2007). As a result a greater number of cows would be calving at the beginning of the calving season and their calves will be older and heavier at weaning.

Besides the increased weaning weight, a calf crop that is uniform in size and age facilitates the implementation of routine activities like vaccination, de-worming, weaning, feeding, selection of the replacement heifers and most importantly, marketing at an optimum price.

These management practices can be implemented with the use of genetically superior bulls through fixed-time artificial insemination (FTAI) with fresh or frozen semen or even with natural service (Bó et al., 2012). Furthermore, FTAI is one of the best alternatives to introduce Bos taurus genetics into Bos indicus herds in tropical environments (Bó et al., 2007). The impact of implementing FTAI programs has proven to be equally efficient in various types of beef operations and examples will be shown during this presentation.

One example is the program implemented in “Estancia El Mangrullo” (Lavalle, Santiago del Estero, Argentina), located in the semiarid region of Argentina, with rainfalls of 600 mm per year from November-December to May-June (Summer through Fall). Animals are all zebu-derived and a cross-breeding program with Bonsmara (Bos taurus adapted breed) has been implemented with the use of semen and embryos. A FTAI program implemented in heifers and suckled cows resulted in pregnancy rates of 35 to 50%, with an overall pregnancy rate of 45.5% (2193/4816). The main aspect of applying this system was its effect on calving distribution as shown in Figure 1. The progression of calvings throughout the calving season was compared between years using Kaplan Meier’s method. Survival curves across years differed significantly (P<0.01). In Year 1 (no FTAI), calvings were distributed over 6 months with a large number of cows calving from December to March (late calvers). This was changed with the limited use of FTAI in Year 2. However, with a more aggressive FTAI program in Year 3, calvings began earlier, with a large proportion of heifers calving in September (i.e. 30 d prior to the cows) and a higher percentage of mature cows calving earlier in the breeding season (October onwards).
This improvement in the calving pattern has been also shown after the application of FTAI programs in large scale beef operations with Bos indicus cattle in Brazil. Specific details of these studies have been reported elsewhere (Bo et al., 2007), but as an example, in one study involving 5,579 suckled Nelore cows that were FTAI early in the postpartum period (i.e. 35 to 45 d postpartum) pregnancy per AI (P/AI) was 50.5% (2817/5579) and the overall pregnancy rate after two cycles of re-breeding with bulls was 80.7% (4390/5579). As in the previous example, the use of a progesterone-based FTAI program at the beginning of the breeding season increased the number of calvings early in the calving season and tightened the calving pattern. Apart from the effect of FTAI on the calving distribution; these studies have also shown an impact of FTAI on weaning weights, with improvements ranging between 29 to 35 kg compared to calves obtained by natural breeding (Bó et al., 2007). This difference in weaning weight was due to improved genetics (about 10 kg) but the remaining 20 kg was due to the fact that the calves produced in the herd induced to cycle with a progesterone-based FTAI program were older at the time of weaning.

More recently, an experiment was performed to evaluate the effect of treatment with a progesterone-based treatment on pregnancy rates in suckled cows in anoestrus on natural service (Huguenine et al., 2013). The work was performed in a facility located south of the province of San Luis, Argentina. Cows (n = 204 Angus and Angus x Simmental crosses) had more than 50-80 days postpartum, 95% of them in post-partum anoestrus and an average body condition score of 1.8±0.3 (scale 1-5). The cows were distributed randomly to receive a progesterone-based treatment (similar to the treatment known in Australia as BoSynch™ 2) or did not receive any treatment. All cows were exposed to bulls (5%) for 90 days. Pregnancy diagnosis was performed by ultrasonography to determine when the cows conceive during the breeding season. The body condition of the animals was maintained throughout the experiment (day 43 = 1.8±0.3; day 71 = 1.9±0.3; day 120 = 2±0.3). Pregnancy rates after the first week was higher (P<0.05) the cows induced to cycle with the progesterone-based protocol (43.5%) than those not treated (19.4%). Furthermore, pregnancy rates after 30 days of the breeding season were (56.7% and 44.6%, respectively). It was concluded that the induction of cyclicity using a progesterone-based treatment, similar to the BoSynch™ 2, improves the pregnancy rate in the first days of a natural service in beef cows in post-partum anoestrus.
Another program worth mentioning is that applied in Australia through the Angus Sire Benchmarking Program. This program was conducted during several years and the results of the spring of 2011 have been recently published (Bó and Dent, 2014). In 2011 the program was performed on five different farms and involved 1708 suckled cows and 622 heifers (420 yearling heifers and 102, 21-month-old heifers). The two treatments used were a GnRH-based (ProSynch™ Plus) and an oestradiol-based (BoSynch™ 3), all with progesterone-releasing devices. The ProSynch™ plus program consisted in insertion of a progesterone-releasing device (Cue-Mate, Bioniche Animal Health, Australasia) and the intramuscular (i.m.) administration of 100 µg gonadorelin (GnRH; Ovurelin, Bayer Animal Health, Australia) on Day 0, PGF (500 µg cloprostenol i.m., Ovuprost, Bayer), eCG (Pregnecol, Bioniche; 400 IU i.m. in cows and 300 IU i.m. in heifers) and Cue-Mate removal on Day 7, and a second GnRH with FTAI on Day 9 (51 to 56 h after Cue-Mate removal). The BoSynch™ 3 program consisted in insertion of a Cue-Mate device plus oestradiol benzoate (ODB; Bomerol, Bayer; 2 mg i.m. in cows and 1 mg i.m. in heifers) on Day 0, Cue-Mate removal, PGF and eCG on Day 8 and GnRH with FTAI on Day 10 (52 to 56 h after Cue-Mate removal). The overall P/AI was 52.5% and was influenced by farm (range: 48.3% to 64.1%; P<0.01), category (54.6% in cows and 46.6% in heifers; P<0.01) and sire used for FTAI (range: 25.0% to 78.0%; P<0.01). Furthermore, pregnancy rates to AI were 54.7% in animals treated with the BoSynch™ 3 program and 50.9% for those treated with the ProSynch™ plus treatment (P<0.08). It was concluded that both protocols are suitable for FTAI in beef cows and heifers, although there was a slightly higher pregnancy rate using the Bosynch™ 3 protocol. Studies were also performed in Australia to evaluate alternative treatments for FTAI in Brahman cows and heifers (Butler et al., 2011) that will be covered in other presentations in this workshop.

In conclusion, achieving a tight calving pattern with a high percentage of cows calving at the beginning of the season is one of best management strategies to improve the profitability of a beef operation. The combined use of appropriate nutritional management (Swecker 2015) and protocols based on progesterone releasing devices have the advantage of inducing cyclicity in the cows in postpartum anoestrus (Baruselli et al., 2004) and increasing the number of cows pregnant at the beginning of the breeding season through artificial insemination (Bó et al., 2012; Menchaca et al., 2013) or natural breeding (Huguenine et al., 2013). Furthermore, these treatments have increased the fertility in successive cycles and the overall pregnancy rates at the end of the breeding season.

These treatments are practical and easy to perform by the farm staff. However, it is very important to recognize that the success of these programs also depend on other management factors such as health management, availability of qualified personnel and facilities.

References


Why to AI! The beef producer’s decision to engage in artificial reproduction.

Dr Sophia Edwards, Reproduction technical specialist, Vetoquinol (Bioniche Animal Health Aust/Asia).

Sophia is the technical specialist for reproduction at Vetoquinol (Bioniche Animal Health Aust/Asia). Sophia completed her PhD and postdoctoral research fellowship at the School of Veterinary Science working with increasing the adoption of AI in northern Australian beef herds, where she has published many papers on Fixed-Time artificial insemination in Bos indicus heifers. Growing up on a stud and commercial beef cattle enterprise in NSW, it is not uncommon to find Sophia in the field. Sophia is actively involved and has a high interest in the economic benefits and the practical aspects of using artificial reproduction in beef cattle herds. Sophia can be found facilitating large fixed time artificial insemination programs in north western QLD, to smaller intensive programs in southern NSW.

Why to AI! The beef producer’s decision to engage in artificial reproduction.

Dr Sophia Edwards

Technical Specialist for Reproduction - Bioniche/Vetoquinol Australia and New Zealand

Introduction:
In the perfect world, Australian beef producers would get a consistent and increasing price for their cattle, in a stable market place, and every animal produced would consistently meet market specifications. There is no perfect world, but at the same time... it isn’t all doom and gloom.

Australian beef producers have a variety of issues that challenge the profitability of their business on a daily basis. Keeping up with global trends for the demand of beef requires beef producers to be entrepreneurial in their thinking. They need to utilise tools that enable them to deliver a product that the market desires whilst keeping cost of production low. At the breeder herd level, genetic improvement and genetic change are tools that can address many of the issues faced by the beef producer. Artificial reproduction is one of these tools that beef producers can cost effectively utilise to increase their genetic gain, or alter their genetics to stay abreast of industry demands. This summary highlights how and why beef producers may engage in artificial reproduction to deliver the value of genetic improvement, facilitate cross-breeding and quickly instigate genetic change.

The value of artificial reproduction for genetic improvement:
There is substantial opportunity to improve the profitability of beef herds through genetic selection. Use of high genetic merit bulls can lift the value of your herd. The practical reality of utilising bulls in your herd through natural mating is that those bulls can only mate with a 30 to 50 females per season. This limits your return on investment on purchasing a bull that was likely to have a high value due to his high genetic potential. Therefore, the subsequent reality is that most producers tend to purchase a lower value bull, thereby slowing the rate of genetic improvement in their herd and hence reducing profitability. The use of artificial breeding can solve this issue.

Artificial reproduction techniques can be utilised at the nucleus and multiplier herd levels of a beef cattle herd to produce bulls that can be then used in commercial herds (Figure 1). Artificial reproduction techniques such as fixed-time artificial insemination (FTAI) can produce multiple sires from high genetic merit bulls. As the bulls are not physically required to mate with females, there is no limit to the amount of genetically improved calves that
can be produced. That is, FTAI is a means of ‘mass producing genetically superior calves’. In an economic model, the cost of calves produced and the genetic value of sires retained and used in a beef cattle herd was evaluated. Different breeding strategies such as: natural mating with no genetic improvement, natural mating with genetic improvement and FTAI with genetic improvement were evaluated. Sires that were produced from the breeding strategy were then used in the commercial breeder herd. The cost of producing calves in the commercial herd by sires generated by FTAI was $4.35 per calf to increase the genetic value of the herd by $1275 per year. As compared to $10.27 and $46.83 for an annual genetic value increase of $237 and $0, for natural mating with genetic improvement and natural mating with no genetic improvement, respectively. Therefore, in a genetic improvement program in a northern beef herd, FTAI will increase your genetic value 5.4 times more than natural mating. However, other benefits of crossbreeding, use of multiple high genetic merit sires and value of sold progeny are not included in this model, providing far more support for the economic advantage for FTAI.

![Figure 1 - Example of how FTAI can be utilised in breeder herds for genetic improvement.](image)

**Cross-breeding with FTAI:** A beef producer may consider utilising crossbreeding for a variety of reasons. Access to a variety of markets, improve meat quality, or simply reap the benefits of hybrid vigour and improve weight gain and fertility. Use of AI is a desirable choice when a beef producer chooses to incorporate different genotypes into their herds, particularly in northern regions of Australia where cattle adapted to temperate genetics are less able to perform. Use of AI can result in multiple cross-bred progeny, whereas natural mating may be largely unsuccessful when temperate bulls are required to mate in a tropical environment. In addition, when AI is utilised, high genetic merit bulls may be used to improve the genetic value of the herd as previously discussed. Table 1 summarises the average weight and proportion of cycling heifers that were progeny from an FTAI programme that was utilised for cross-breeding and genetic improvement. With one round of FTAI on Brahman females, the resulting heifer progeny were 16 kg heavier and had 40 % more cycling with crossbreeding with Angus genetics. Although this is largely due to the effects of hybrid vigour, genetically improved pure Brahman progeny also were 8 kg heavier and had 13 % more cycling than the base commercial herd.

**Table 1 – Progeny produced by FTAI compared to non-AI progeny, near Cloncurry QLD.**

<table>
<thead>
<tr>
<th>Genotype</th>
<th>Number in Group</th>
<th>Average Weight (kg)</th>
<th>% Cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brahman X Angus</td>
<td>76</td>
<td>286</td>
<td>70</td>
</tr>
<tr>
<td>Brahman X Brahman</td>
<td>61</td>
<td>278</td>
<td>43</td>
</tr>
<tr>
<td>Brahman (Not AI Progeny)</td>
<td>307</td>
<td>270</td>
<td>30</td>
</tr>
</tbody>
</table>

**Genetic change:** The trends and markets for beef can change quicker than the ability of the beef producer to change their genetics to comply. Use of artificial breeding has the ability to not only increase the rate at which this genetic change can occur, but also introduce novel genetics into a herd. Consider the scenario that a producer may want to dramatically increase the proportion of their herd that is polled, without being detrimental to the quality of their cattle. There may be few sires that offer these traits. This issue is not limited to a trait like polledness, and could be the case for other traits such as marbling or fat cover. As the number of calves that can be produced by these unique sires is unlimited through the use of FTAI, the ability to change the genetics of the calf crop is higher than if natural mating were to be used. That is, assuming that these bulls can be purchased for natural mating in the first place.

**Conclusion:** The use of artificial breeding in beef cattle herds is a business based decision that has the ability to increase profitability. When genetic improvement, change or cross-breeding is required, artificial breeding is the tool that cost effectively and practically delivers this over a shorter duration at a lower cost than natural mating. Artificial breeding tools are not limited to what is discussed at this seminar and have the potential to be implemented in beef breeder herds in Australia as a routine management procedure.

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Ian Braithwaite is a beef production veterinarian based in Mt Isa. He services a clientele of both corporate and private clients across northern Australia. His special interest is in achieving better profitability in northern beef business’s through the introduction and fine tuning of production systems applicable to the extensive northern beef industry.

He owns a small intensive grazing enterprise on the Atherton Tablelands in North Queensland turning over 250 head a year.

**Profitability in the northern beef industry – a new business model!**

**Introduction.**

The current production business model encourages the propagation of calves at huge costs, with dubious financial flow-on effects. Due to production inefficiencies across most of northern Australia, most cattle businesses run high breeder numbers to counter the effect of low weaning percentages. High breeder numbers are a high cost and result in chronic overstocking problems (if not matched to carrying capacity), with associated flow-on effects to the business – high direct costs, lowered production, variability in cash flows, rangeland deterioration and resultant asset run down. Additionally, running a high proportion of the beef herd as breeders has ramifications for the risk management of the business especially during the dry times.

A different business model driven by profitability and not production is being proposed. Finances drive the business. Yearly financial objectives are identified and the production systems are designed to achieve these financial goals.

This talk focuses on how achievable these financial objectives are, and identifies sensitivities to the many variables within the business that make these financial goals more achievable and realistic.

**What is profitability?**

Despite many various indices currently used (ROA, ROE, GMs/LSU) the definitive profit indicator now being used is the accumulated cash flow each year or over consecutive years which reflects the bottom line of the business.

**Balancing the beef business – explaining the business triangle.**

The 3 pillars to a beef business is the ability to balance cash flow, achieve a budgeted calf crop each year and satisfy the numbers of cattle we are running within budgeted pasture constraints (carrying capacity).

1. **Cash flow**

Cull female sales play a critical role in the business cash flow. Depending on the production within the business, sale of cull females accounts for 50% -70% of operating costs. Sale females are drawn from poor performers within the herd (for example cows that fail to rear a calf or have reared a calf and failed to fall back in to the calf). Low cull cow sales are an indicator of an unbalanced business.
2. Calves
Weaners (calves) drive the production system. In a static herd (herd numbers not increasing, or decreasing) the numbers of weaners less mortalities should equal sales. There is therefore an inherent recognition that more calves drive sales, which should drive profitability.

3. Grass (carrying capacity)
Grass, in this context, is the amount of grass grown each year. Depending on rainfall, frost or fire carrying capacity will change yearly. Balancing the grass budget is about matching mouths to the available grass.

Unbalancing the business.
12 month wet cow rebreed rates drive production. Across northern Australia, 12 month rebreed rates are difficult to achieve. These wet cow rebreed rates are driven both by nutrition and genetics. This can differ significantly between different rainfall zones across northern Australia.

Consequential to low wet cow rebreed rates is the necessity to keep more cows to achieve calving budgets. This has a detrimental impact on the carrying capacity of country. ‘Over-stocked and under-utilised’ is a common colloquialism used to describe the rangelands of northern Australia. Rangeland sustainability is now also being questioned, with associated widespread woody weed infestation.

Additional cows also have huge effect on cash flow as poor performing cows are now kept and recycled within the system to achieve calf budgets. Genetically, the herd fertility suffers as progeny of poor performing cows are kept as potential breeders, again perpetuating the low wet cow rebreed rate.

As the business becomes more unbalanced, the symptoms manifested within the business are:
1. An enterprise running too many breeders.
2. A chronic overstocking problem impacting rangeland sustainability and body condition score of the breeders.
3. Cash flow variability.
4. Increased risks within the business especially during dry times.

Changing the business model.
The common business model currently adopted by the industry is a production model. This model actively encourages increasing direct costs in an effort to try and magically increase weaning percentages. (For example supplementation costs) The reality is certain country has only so much inherent energy to produce so many calves. Targeting higher than expected weaning percentages in most cases is often not cost beneficial.

The alternative model proposed, is profit driven - finances drive production and not vice versa. Annual costs within the business are identified (operational, finance, returns on equity) the production requirements (the number of weaners required every year – an indicator of sales) are identified and the production system is designed to achieve these weaning targets. The numbers of breeders required to produce the required number of weaners is sensitive to 3 factors within the business.

1. The rolling 4 year average sale price per head.
2. Production – numbers of weaners produced.

Any variable within the business that can change each of the above 3 factors, changes the number of cows that need to be run, thereby having a direct influence on the carrying capacity of the country and cash flow within the business. Fewer sales required for recovery of costs means fewer weaners required, putting less pressure on the cow herd to perform placing less pressure on the rangeland.

Barb wire theory - understanding the many business variables.
Apart from interest rates, procurements, land/soil type and rainfall, the 75 odd variables that make up the beef business are under the influence of management. We talk about identifying the 1 %'ers. This is about influencing the many variables by a small percentage to give a profound change to the sustainability and viability of the business – less cows run, resulting in more sustainable rangelands, resulting in less variability in cash flows. This talk identifies the sensitivity of some of the more important variables that influence the bottom line of the business.
The practical application behind reproduction.


Kara Knudsen completed a Nuffield scholarship in 2013, travelling to 8 countries with a focus on reproductive technologies. Kara and her husband Darcy have practiced Fixed-time Artificial Insemination for 6 years and have done up to 1200 breeders in a season. Kara understands the practical application of the technology, the benefits and some of the pitfalls. Kara recently purchased Chinchilla Vet Services and is passionate about genetics in the north Australian Beef herd.

The practical application behind artificial reproduction.

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What do you want to achieve?

It is really important to accurately assess where you are now genetically speaking, are you missing the market specifications, is there a fertility problem? Then you need to understand where you want to be, ie: moderate frame cow, high fertility, high weight gain at 200 and 400 day growth. Then go forth into the world in pursuit of the ideal genetics, genetics that are delivering what you want, ask seed-stock producers a lot of questions about how they manage their herd, what selection criteria and assessment of animals is used in their herd. What genetics you purchase now could potentially haunt you for the next 20 years.

Know your females.

Heifers

What stage are your heifers – are they pre-pubescent, are they cycling naturally, or are they so far from reaching puberty that no amount of drugs will make any difference? Know what your mature cow weight is and work on 60% of that weight for heifers, secondly it is equally important to know at what age your heifers have been reaching puberty.

Cows

Heifers represent only about 30% of your breeding herd, have lower rates and have more trouble calving. Consider using cows for FTAI to accelerate genetic improvement. To effectively utilise FTAI in cows you need to ask the following questions, are they in post-partum anoestrous? How old are the calves? What body condition are they in, what condition were they in nine months ago?

Females that are cycling naturally have a much greater rate of reproduction, so as much as possible go with what happens in nature. This can be really hard when the rain doesn't come on time and the grass is deteriorating. In tough conditions it may mean scaling back and doing a smaller program, or use the dry conditions to cull the non-performing females.

Body condition.

While a body condition score 3 is optimal, we almost never have cows in this condition, and there is no doubt the chance of females being in ideal body condition score of 3 in many parts of Australia at the present is just about impossible, think of it more as a guide! We regularly have good results from cows in 2.5 body condition provided they are in a forward plane of nutrition 6 weeks prior to AI and for 6-12 weeks after, often people forget about maintaining nutrition once they have mated, but to keep embryonic loss to a minimum nutrition is important to continue to monitor after mating.
Costs associated with improving nutrition have to be managed, we have found that sometimes it takes only small changes to increase body condition score by 0.5, which may be the difference between females staying in maintenance or moving to reproductive mode. After realising we had a deficiency in Phosphorus we have starting feeding Phosphorus and weaning on time have both been cost – effective at improving reproductive outcomes. While nutrition and body condition are by far the most important factors in reproduction, they are also the hardest to manage, particularly in the most variable climate in the world, Australia.

**Human error.**
Did you know?
Research trials in dairy herds have shown that farmers assessing body condition can have an error of +/- 0.25 of a score and are highly subjective. Training and calibration against a set of standards can improve this result. We are not likely to detect changes of weight gain or weight loss until it is significant, in our case it usually means we have lost valuable kilos before we act.

**Success with cows.**
Excellent management of calves is essential. Temporary weaning of calves between removing intra vaginal progesterone releasing device, and A.I. has worked well and improves conception rates as well as managing the calves between musters. Calves must have adequate access to feed (ideally local pasture hay), clean water (low height) and shade, in a smaller yard, rather than big cooler. If rain is likely then we do not temporarily wean the calves. This year we are considering giving 5-in-1 shot at first muster, or the mothers an annual booster shot to the mothers, to ward off any potential disease problems that may happen due to stress on calves. Taking cows away from the yards for the duration of the temporary weaning, also helps with conception rates.

Give calves and mothers time to mother up after A.I. and move off slowly, generally we have found mismothering occurs with poor stock handling techniques and rushing to get the job finished.

**First calf heifers.**
Yearling mated heifers, have to handled with extreme care if you decide to use FTAI after the birth of their first calf, our experience is they do respond well to FTAI, however the calves are difficult to manage, and there is a higher degree of mismothering. Smaller mobs are needed and more time taken to manage this class of animal.

**Did i mention nutrition?**
Again... Females must be on a forward plane of nutrition.

**Infrastructure.**
While we may all love to have a hydraulic squeeze crush under roof, and it certainly does make it a lot easier, you really only need two things to start – shade (UV light degrades semen) and quiet cattle and handlers. Provided your vet crush is safe and you can rig a few tarps together and a clean table, there is nothing else you really need to have. We have found that if we put the females through and stop them in the vet crush the preceding two times, by the time it comes to A.I. they are quiet, and less likely to break the inseminator’s arm. Try some small mobs first to test your facilities and improve facilities as needed. Holding paddocks are very useful in FTAI program. Stress free cattle and quiet temperament are very important.

**Consistency and cleanliness.**
I try to be consistent and methodical in my approach, and rule out as many variables as I can. For example: I train everyone to load the gun and handle the semen correctly, have a clean area in the shade, be methodical, follow drug protocols to the letter, and use a program best suited to your situation – in the beginning we got a program off the internet and had a go, there was really only 2 programs at the time, there are now quite a few different programs, although they follow the same method, a lot of research has been done since, and we have a small but growing band of specialists who really understand FTAI and can help.

**Bulls.**
Ultimately FTAI offers a lot of benefits, including earlier and more consistent calving patterns, and cheaper genetics. It is important to make sure that the genetics you choose to use are going to do what you expect. Bulls used in any breeding program should have Estimated Breeding Values, morphology and Bull Breeding Soundness Evaluation, in the future genomics in tropical bred cattle will be another important tool to have. Structural soundness and temperament continue to be just as important with AI sires as bulls selected for natural mating, sires used for mop-up after AI are purchased using the above criteria and must also pass an annual Bull Breeding Soundness Evaluation including morphology. Serving capacity tests are also carried out most years, this has reduced the ratio of sires:cows to 1:50 for natural mating. With AI a further reduction of bulls physically needed on the property can occur, this is very cost – effective.