Notes from each presentation and discussion

Prepared by Alice Bambling and Geoffry Fordyce

Fri 24 Nov - Sat 25 Nov 2017 (lunch to lunch)

Capella, Queensland's central highlands

Financial sponsor	*Representative*	*Phone*	*Email*
MLA	Nigel Tomkins	04 3763 2816	ntomkins@mla.com.au
Zoetis	Lee Taylor	04 2998 9980	lee.f.taylor@zoetis.com
Boehringer Ingelheim	Megan Brown	04 2879 8111	megan.brown@boehringer-ingelheim.com
Rabobank	Craig Burkhardt	04 2711 8365	craig.burkhardt@rabobank.com
Performance Feeds	Doug Pollock	04 8867 7883	doug@performancefeeds.com.au
BMP	Mick Sullivan	04 2810 4374	mick.sullivan@daf.qld.gov.au
ABBA	Brett Coombe	04 0008 4887	roxborough1@bigpond.com

Organising committee
Dave Smith (Chair), Kiri Broad, Byrony Daniels, Kylee Schooley, Lyn Coombe, Jarud Muller, Geoffry Fordyce, Michael McGowan, Nigel Tomkins

Secretariat
Jackie Kyte Conference & Event Specialist Pty Ltd - jackie@jackiekyte.com.au; 04 0956-4729

Main messages

- Calf loss is a major problem in all areas across northern Australia, with each calf lost reducing business income by >$400.
- The pathways to calf loss are complex, but if approached in a systematic manner, there are solutions available.
- The main risk factors for calf wastage are related to nutrition and the environment. Therefore, body condition and nutrition of the cow during pregnancy and early lactation have a profound effect on calf viability and milk delivery through many pathways.
- Dystocia, which is most prevalent in calving two-year-olds and affected by genetics and nutrition has a big impact on calf survival.
- Any factor reducing colostrum intake in the first 8 hours of life or milk intake in the first days of life threatens calf survival.
- Infectious disease can be a problem, especially in more intensive systems. Solutions are available for the most significant of these diseases, which need accurate diagnosis to ensure correct controls are applied.
- Effective predator control requires a sound understanding of fauna ecology. There is not a clear answer for excess calf wastage in many situations, and research to explore solutions will be as complex as the problems themselves.
- Many risk factors for calf wastage in northern Australia have been identified, as have potential solutions that control the feed base, lactation, health & stress and breeding.
- Every management option has strengths and weakness, and must be considered holistically
- Data to define the problems and professional advice are needed to uncover causes of calf loss and determine solutions in specific situations.
- Solutions for excess calf wastage require an analysis to identify critical control points in the pathways to loss, otherwise ineffective strategies may be applied.
- The pathway to consistent low calf loss can be tortuous and difficult, though rewarding, and require constant vigilance of all possible risk factors.

Definitions of several scientific terms used

Dystocia	Calving difficulties
Foetal aging	The foetus is aged during pregnancy diagnosis to indicate calving patterns
Mitochondria	Part of a cell that generates energy
Natal	At time of birth
Neonatal	In the first weeks after birth
PI	Persistently infected. This refers to pestivirus carrier
Prenatal	Before birth

Objective

Create awareness within the beef producer and RD&E communities of recent advances in Australian and international calf loss research, offer practical advice on ameliorating loss, and discuss the issues with well-known national and international practitioners in the field of calf loss minimisation and beef herd productivity.

Background

Calf loss in beef breeding herds is a global problem causing reduced live weight production and lower profitability from cattle ownership, and is also associated with diminished welfare of both people and animals. The incidence in south-east Asia averages 20-30%. In the northern forest of Australia, median loss averages 15-20% over vast areas. Large studies in recent times have shown the major risk factors to be very different to that which cause calf loss in intensive or temperate-region cattle systems, and are primarily nutritional and environmental, with infectious diseases being an irregular primary cause. Interventions that improve milk delivery to neonatal calves and prevent primary infectious diseases are expected to reduce rates of loss. This symposium will bring together many specialists to discuss the opportunities available to manage cows for low reproductive wastage and high productivity, the consequences of which will be better returns for time and money invested by both smallholders and large-scale producers in the tropics.

Program (Contents)

Chair: *Geoff Murrell*
geoff.murrell@parawaypastoral.com

Geoff has worked on and managed large north Australian beef enterprises. He is General Manager Northern Australia Operations, Paraway Pastoral Company Ltd.

Registration

Group:	Private beef business	Pastoral Co	Agribusiness	RD&E	Organising
Number:	87	8	20	24	2
Percentage:	62%	6%	14%	17%	1%

All participants paid $100, which covered their participation including all meals and entertainment. Registrants were primarily from Queensland and the NT.

Proceedings

There are several sources of information from this symposium:

The symposium booklet
It contains more information on the speakers, a list of recent papers relevant to the topic, and two recent reviews.
It is available Dave Smith: dave.smith@daf.qld.gov.au

These notes
Alice Bambling (DAF, Charters Towers) and Geoffry Fordyce (QAAFI, UQ) took extensive notes during the symposium and compiled them. These can be used alone, or enhanced by accessing audio recordings and or the power point slides.

Power point slides
The slides of all speakers were copied and will be available in pdf format from the Future Beef web site.

Audio recordings
Audio recordings were made of each presentation and discussion. These will also available be from the Future Beef web site.

The prevalence of calf loss across northern Australia

Dr Kieren McCosker
kieren.mccosker@nt.gov.au

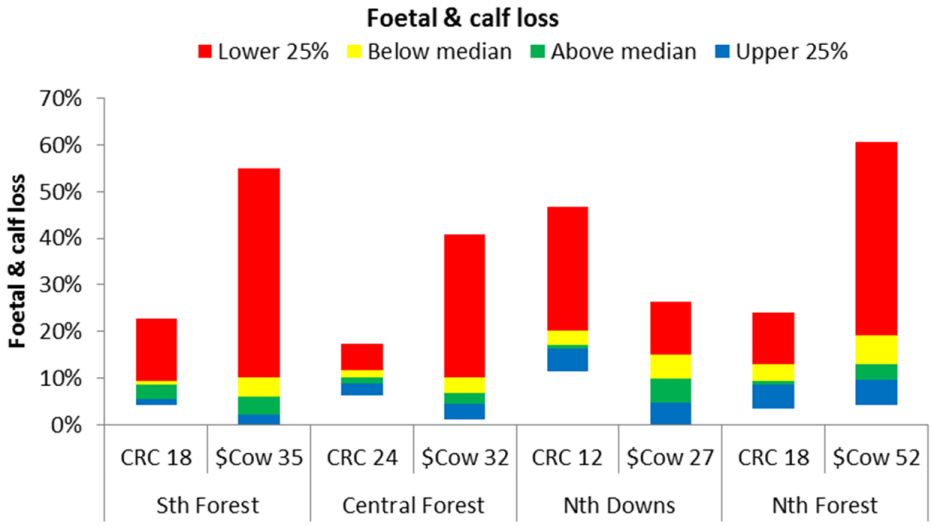
Based in Katherine (NT) as a Beef Production Scientist, Kieren did a PhD in the Cash Cow project. Kieren has research interests across all aspects of beef production systems.

Cash Cow project

- Large northern Australian study monitoring 78,000 cows over 2-4 years
- Used foetal ageing and lactation to define pregnancy and subsequent calf rearing or loss
- Calculated attainable performance as the cut-off for 25% of mobs within country type

Summary of relevant results

- Northern Forest: 8%-32% calf loss (average 18%)
- First lactation cows
    - Some mobs exceeded 25% calf loss in all country types.
    - Half the mobs had >10% loss in central and southern forest and northern downs
    - Half the mobs had >15% loss in northern forest
- 2nd lactation cows
    - Lower incidence of calf loss than for first lactation cows.
    - Up to 20% loss was observed.
    - 10% or more loss in 50% of mobs across all regions.
- Mature & aged cows
    - 5% loss is attainable
    - 7% loss or higher is typical for Central Forest and Northern Downs.
- Cow mortality
    - Almost all cow deaths associated with loss
    - Not included in results cited above
- Overall
    - Country type and cow-age class was strongly associated with calf loss
    - How did the difference in management impact calf loss? Year to year variation was much higher than that observed between properties (property a compared to b)



The incidence of calf wastage in two large north Australian studies: CRC (2002-11) and Cash Cow (2008-2012).

The makings of a strong week-old calf

Dr Tom Kasari
tom.kasari@agrivetsolutions.com

Dr Tom has considerable research experience in the health and physiology of newborn calves. He currently works for the US Department of Agriculture as a veterinary epidemiologist.

USA experience

- Causes/pathway for beef calf mortality is very complex
- US data for 2007
    - Prenatal loss – fail to become pregnant plus gestation losses prior to calving – 7.5% in cows and 16.8% in heifers
    - Natal loss – calf delivered and lost mostly from stillbirth or dystocia anoxia – 3.2% in cows and 6.5% in heifers
    - Neonatal loss – first 28 days of life mostly dystocia-related effects or weather-related – 2.4% in cows and heifers
    - 1.2% calf loss between neonatal period and weaning
    - Weaned calf crop = 85%, Cow=86%, Heifer 73%
- Key message – Thin cow begets weak calf – nutrition in the last trimester is critical
- Cows below a body condition score of 3 to 3.5 (5-point scoring system) at calving may produce a weak low-vitality calf due to lack of nutrition. To gain one body condition score, which equates to 12-14% of body weight, a live weight increase of about 60 kg is needed. This takes a long time to gain, and not achievable in the last trimester of pregnancy.
- Kroker and Cummins in 1979 (Australia) reported that cows with on a very low level of nutrition compared to cows on a high plane of nutrition prior to calving had:
    - more still births
    - calving time was doubled
    - calves take much longer to stand after calving – increase from about ½ hour to 4 hours
    - cows take longer to stand after birth
    - time to first suckling increased from about 1.5 hrs to 5 hours
    - calves that did survive dystocia and are from low-nutrition cows are 2.4 times more likely to die within 45 days of birth
- Ball in 1974 (USA) reported:
    - Low late-pregnancy protein intake increases the incidence of weak calves from negligible to 10%
    - Poor plane of nutrition reduces brown fat deposition. Brown fat is full of mitochondria, which can generate a lot of energy for the new born calf. Brown fat is full of mitochondria, which can generate a lot of energy. Brown fat induces ability for heat generation (shivering) and cold tolerance. Note: *Bos indicus* typically has negligible brown fat so are more prone to the effects of low temperatures. Note: comfort zone is 10-27 degrees in *Bos indicus* cattle which is higher than for *Bos taurus.*
- Vermorel 1989 (UK) reported:
    - Dystocia can severely disrupt ability of newborn calves to control body temperature
- Specific vitamin and mineral deficiencies, where they occur, can result in stillbirths, blindness, slow growth
- Colostrum contains antibodies vital for calves' survival
    - Ability of calves to absorb from colostrum will cease after 24 hours if it hasn't suckled, making the first 24 hours to suckle critical.
    - Calves need >100 g of colostrum or 8% of body weight within 2-6 hours of birth
    - Colostrum deprived calves are more susceptible to heat and cold stress, and a range of infectious diseases up to 6-7 weeks of age.

Herd discussion

- Time for calving intervention from first appearance of membranes or calf: 1 hour for heifers, double that time for cows. Use genetic measures and natural selection to select cows that don't have calving issues. This solution has made a huge difference in the USA.
- The biggest problems are in heifers calving at 2 years. Low nutrition in heifers restricts growth of the pelvis and increases the risk of dystocia.
- Problem in the Brigalow belt: monoculture with buffel pasture that's being chewed down by time of calving and the early rain is creating feed that can have as much as 6% oxalate. This chemical binds calcium and causes problems including dystocia.
- If dead calves are stuck in the pelvis, need to intervene within 12 hours or will start losing cows. This requires twice daily calving checks, especially in heifers calving as 2-year-olds.
- If a calving cow cannot stand it is mostly due to damage to nerves on the inside of the pelvis. Such cows have limited chances of recovery - euthanasia should be strongly considered in these cases.
- Joining at 2 year old rather than 15 months may reduce calving difficulties
- What tests or measures where undertaken to determine comfort zone ranges in cattle? Some anecdotal, some was in a controlled environment and some were experimental observations. Temperature and humidity effects where recorded. Highlighted the differences between *Bos taurus* and *Bos indicus* cattle.
- Fat cow in poor nutrition – does not mean there will be fewer problems with dystocia. If heifers are in adequate body condition, eliminates most environmental effects
- Cattle exposed to Akabane virus during pregnancy can suffer from dystocia because of deformed calves.

Hydration in newborn calves in the tropics

Jarud Muller
Jarud.Muller@daf.qld.gov.au

Jarud is a DAF (Qld govt) scientist based at Charters Towers. He has a keen interest in beef cattle reproduction and has conducted some innovative research on calf survival.

Recent research

- 2/3rds of calf mortality occurs within first week after birth
- Calf mortality is most commonly associated with
    - Poor nutrition of cows
    - Handling animals around calving period
    - Environmental stress
- At full hydration a calf is 74% water, at 60% they die. Calf milk uptake and hydration is critical to their ability to survive
- Soon after birth calves need at least 2 litres es of milk a day per day to survive. Under hot conditions up to 6 litres is needed.
- Cow nutrition and body condition is key to milk production.
- Recent research with mature, good-temperament Brahman cows in condition 3-4 (moderate-forward) showed that half achieve high milk delivery to calves from the first day of birth, with the other half apparently taking about 3 days to commence full lactation. Calves from dams with delayed lactation have increased risk of dehydration and disease due to poor colostrum intake.

What calf loss costs

Dan Lynch
danlynch@bigpond.com

Dan and his family have beef breeding operations in the NT's Top End and Qld's Gulf area where, through a 'rest and rotation' strategy, he has increased cow annual live weight production from 9 to 29 kg/ha. He has advocated strongly for calf wastage research over many years.

Private business experience in the Katherine region and Queensland's gulf country

- Katherine region
  - calf loss was as high as 24% (PTIC to weaning)
  - profit loss = $67K-$104K annually in a 2,000-cow herd @ $476/calf lost
  - halving loss increased the ratio of calf weight weaned per cow live weight to 44.6%
- NW Qld
  - PTIC to weaning losses 6.9% - 14%
  - ratio of calf weight weaned per cow live weight is 56%-60%
- Interventions to reduce losses by 10% in the NT, would increases profit by $18.5M/year.
- Key management decisions
  - Cows in 3.5 body condition score and higher
  - Adequate pasture and good quality
  - Align calving period with peak nutritional availability
  - Supplement with P in deficient areas
  - Remove cows that fail to rear calves from confirmed pregnancy
  - Calving cows in paddocks with shade to reduce heat stress
  - Predation control
  - Reducing the distance to water and therefore the distance cattle need to walk
- What we don't know and need research to define
  - At what stages is loss occurring in commercial situations and what are the causes?
  - What is the cost-benefit due to reduced calf mortality of: feeding P, aligning calving to expected good nutrition, providing shade in open country, reducing grazing radius, predator control?

Herd discussion

- Body condition at calving is the most important factor in keeping calf loss low.
- Genetic selection to increase kg weaned per ha: 63-day joining periods; cows not weaning a calf are culled; bulls selected on fertility data. Selecting for fertility has seen a large drop in calf loss.
- Lee Allen: No demonstrable relationship in southern Australia between dog populations, their control, and calf loss.
- Does a dog bite make calves weak or are they weak because they are bitten? Dead calves are mostly the weaker calves.
- Herd segregation on expected calving period enables more targeted and flexible management and marketing and is more profitable. A major benefit is the ability to manage body condition of cattle for cow and calf survival and cow re-conception. Segregation is enhanced by adjusting stock numbers to available feed around each water.
- Research on semi-arid landscapes in southern Australia shows it is more profitable to leave dingoes control roos than bait them and have an influx of kangaroos that strip the feed. BUT, the scenario in the tropical tallgrass regions is different as there are limited roo populations and plenty of grass, so need better principles for making dog control decisions there.
- It is only partially understood why dingoes target calves at certain times.
- Baiting kills about 50% of dingoes, mostly the older dogs. Young dogs then become abundant in the area and may play with calves which is generally where you see more deaths – to be proven.
- Maybe mixing older with younger cows can reduce losses in the latter?

Managing infectious diseases and non-infectious causes in calf loss

Prof Michael McGowan
m.mcgowan@uq.edu.au

Michael is Professor of Livestock Medicine, University of Queensland. He created and led the Cash Cow project and leads on-going calf wastage research in northern Australia.

Review of research and recommendations for northern Australia

- Key steps in controlling calf wastage
  - Determine if there is a problem by measuring production and performance of cows
  - Determine major causes and contributing factors and implement management to control each. Example: Picture of a calf with much of its brain missing due to Akabane infection during pregnancy was shown. (The virus is spread by midges in wetter years). There was a vaccine available once but not now.
  - Assess impact at a business level
- Large number of issues associated with calf loss
  - Nutrition, management, environment factors are major and consistent
  - Factors affecting cow survival (eg, low feed, low BCS, P deficient) also cause calf loss
- Managing calf wastage
  - Planning is vital, and foetal ageing is a key component strategy to identify cattle with different needs and segregate them for optimal management
  - Use a full system approach, eg, when you implement good management and reduce overall calf wastage there will be more mouths to feed – more calves, more cows surviving, must adjust stocking rates accordingly.
  - There are four main management targets: feed base, lactation, health & stress, breeding
- Managing the feed base
  - Stock country to long term carrying capacity, ie, utilise 25% of pasture growth
  - Manage pastures and provide supplements according to the nutritional needs of heifer/cow at different stages of the breeding cycle.
  - Ensure pasture availability during the early dry season is >2 tonne/ha
  - Target dry matter digestibility of >55% and crude protein >7% during the dry season
  - Limit grazing distance from water to <2.5 km where possible
  - Achievable weaner production of cows, ie, kg calf weaned per cow retained, is very similar to yearling growth in a paddock. This creates realistic targets from feed available.
- Managing lactation
  - Make decisions on when to wean calves based on condition of cows, not calf weight. Frost impacts on feed quality & will affect weaning times; eg, if wean before, then can achieve cow condition recovery and calf growth before frosts.
  - Further considerations for lactation management:
    - Lactating cows need 2x more energy and 3x more protein than dry cows.
    - Calves need 10% of their body weight in milk in the first 2 weeks of life
  - Controlled mating ensures calving close to the time when the likelihood of significant improvement in seasonal pasture quality and quantity is high. Segregation according to expected calving time and condition enables targeted management and selection.
  - Ensure the right females get the right nutritional supplement.
  - 1st lactation cows are metabolically challenged because they are still growing, growing a foetus and lactating. They are less capable of drawing on phosphorus reserves. Segregate heifers until weaning of first calf to ensure they get the supplement/treatment they require.

- Manage health and stress
    - 9% higher losses in first-lactation cows mustered a month before or after calving than if left alone.
    - Adding pregnant cows to pregnant heifer mobs may reduce losses
    - Good management can prevent outbreaks of infectious diseases at critical stages. Immunity assessment can reduce need for vaccination.
    - pestivirus outbreaks: 1/10 cow mobs and 1/3 heifer mobs each year in northern Australia
    - Vibrio outbreaks: 1/10-12 heifer mobs each year across northern AustrPestivirus: Use biosecurity protocols to check imported cattle, especially pregnant cows, to avoid introducing PIs.
    - Use shade, ridges and timber for protection against environmental extremes
    - Conduct castration and dehorning when calves are young as the wound is smaller, surgery is less stressful, it heals better.
    - Beware of clostridial bugs, eg, tetanus, as the bugs are universally present as normal inhabitants of the gut of cattle.
    - Heifers need to be 85% of mature weight at calving to ensure they have grown a big enough pelvis to enable normal unassisted delivery of calf. Yearlings especially need to keep growing – just because they are fat at foetal ageing, does not mean they can tolerate low-nutrition conditions through to calving.
    - Predators may or may not be a problem, and baiting may or may not be the answer if the predator is a problem. A complex issue needing more research.
- Managing breeding
    - Cull cows that fail to rear a pregnancy to weaning.
    - Use fertile bulls, ie, they have passed a full BBSE including morphology.
    - Genetic selection for calving ease, polledness, adaption, good udders and teats and freedom from heritable diseases such as Pompes.
- Main messages
    - There are no silver bullets
    - Every management option has strengths and weakness, and must be considered holistically
    - Solutions need to be situation-specific
    - Manage the 4 main areas that drive the system (feed-base, lactation, cattle health and stress and breeding) – research shows that those who do achieve consistent low calf wastage
    - Though we have ideas for many specific interventions, the evidence for their impact is still not available

Discussion with the panel of Day 1 speakers

- Akabane virus causes abortion (empties), dummy calves, deformities that cause dystocia. Weak calves may attract predators.
- Udder size has no correlation to the amount of milk that a cow is able to produce
- Dystocia and nutrition: Dr Vivien Perry has looked at the impacts of limiting energy and protein during critical stages of gestation and the impacts on foetal growth and beyond. If there is very good nutrition in the first half of the pregnancy you will enable the heifer to grow to support the calf. If there is poor nutrition in the first half of pregnancy, the placenta may enlarge to compensate, and if this is followed by good nutrition in the second half of pregnancy, calf growth over-compensates, which results in it being too large for the heifer that hasn't been able to grow enough; dystocia is the frequent result. The foetus's most rapid growth is always in the last trimester of pregnancy.
- Pelvic size has not been related to dystocia except at the extremes. Therefore measurement in pregnant heifers aims to cull those with very small pelvises only.
- It is unknown if delay in start to full lactation is repeatable and therefore if it is worth identifying and culling these animals. The hormonal basis is partially understood.
- Pestivirus is contracted by direct contact (even over the fence) with a PI, which is a carri–r animal - every tissue and excretion in their body is loaded with this virus. PIs are created when naïve cows infected early in pregnancy do not abort the foetus. Many can appear completely normal.
- Pestivirus mostly mutates to a lethal form within the first 2 years of life in a PI. This results in mucosal disease which presents as ulcers in the mouth, diarrhoea, and ultimately general debility and death.
- Vibrio is a venereal disease, ie, spread by mating by carrier bulls and females that have the bacterium in their reproductive tract.
- It is unknown whether there is any effect on cows' defence against dingoes when the property uses working dogs for mustering.
- Even though each body score increase is associated with an extra litre of milk per day, there is no economic way to increase weight of a cow during lactation with the intent to improve milk quality and quantity.
- Body condition needs to be at least moderate at time of preg testing to prevent low re-conception rates during pregnancy and loss of calves. This is because body condition is very difficult to recover during late pregnancy and lactation as the amount of weight gain needed to increase body condition score by one unit is near 60 kg.
- Conception to birth losses of 5% is good, birth to weaning loss of 5% is good. If calf wastage is <10%, you are doing well. Economics of reducing losses further need to be investigated.
- Vaccination against diseases that can cause disease in young calves (Rota and corno virus, E.coli, and Clostridial infections) prior to calving will get good antibody levels in cows for high-quality colostrum. Colostrum production begins 6-7 weeks before calving, so booster shots need to be at least 2 months prior to calving.
- Trisolphen is a local anaesthetic and antiseptic approved for use after castration. There is no evidence it reduces pain associated with dehorning in 7-month-old calves – however maybe effective in younger calves.
- If cows calve well above their climatic comfort zone, this is OK as long as feed, water, and shelter are available to overcome the problems associated with the heat.
- Providing calves access to clean water from the day of birth could save many, especially under hot conditions. Dairy calves can be taught to drink from a bucket from as early as 1 day of age.
- Blood scours in calves needs professional diagnosis before implementing treatment. It has multiple causes and a lot of money can be wasted treating the wrong cause.

Causes and management of calf loss in north America

Dr Frank Garry
Franklyn.Garry@ColoState.edu

Dr Frank has studied neonatal calf survival in the USA. He is currently at Colorado State University where Johne's Disease control, causes of mortality in adult cattle, livestock worker education, and calf health management are his primary research interests.

Introduction

- Cattle are cattle. The situation and problems in the USA are similar to Australia. Solutions and principles for these solutions will be applicable in both countries.
- Need to question everything you do and why, and seek evidence that what you do works.
- Think 'investment' rather than 'cost.

The USA situation

- 7% of cattle are *Bos indicus* or *Bos indicus*-infused.
- 20% are continental breeds and the balance British or crossbreds.
- Most cattle are hand-fed at some stage of the year, mainly because of extreme cold conditions.
- 60% of herds have <50 cattle and make up 25% of the national herd.
- Only herds with >200 cows have beef as their primary income source.
- Most calving occurs in Feb-Mar.

Calf wastage

- Just as in Australia, low-input systems have up to 30% loss, but these are uncommon. This is how nature programs balance.
- Pregnancy rates typically 93-96%
- Total calf deaths in USA average 3.6% (31.3% in first 24 hours, 1/3 in first 3 weeks, the rest after that). Therefore calf mortality management needs to focus on newborn calves.
- Deaths at <2 days old, typically non-infectious, are associated with physiological derangements usually caused by calving issues and or environmental extremes. A big focus to deal with this is calving management.
- Deaths at 3 days or greater are mostly due to infection. Physiological problems may set up these infections.

The first days and weeks

- The big mystery is not why calves die, but how they actually come to life as an independent being immediately after birth! And it's at this point they are most vulnerable.
- Poor adaptation to life outside the uterus and delayed intake of colostrum (rich in antibodies – technically known as IgG or immunoglobulins) is reflected in calf lethargy, low hydration, low oxygen status, and low body temperatures because of compromised ability to thermoregulate.
- If calves survive the first few days, scours is a major issue. Viruses, protozoa and or bacteria damage the microvilli where nutrient exchange in the gut occurs. This damage cause scours and dehydration and it's the fluid loss that is the number one killer of calves in the US.
- If these bugs (virus, protozoa, bacteria) get past the gut, they get septicaemia, which is an even bigger threat to the calf.
- Good diagnostics are critical for defining treatment that will work in specific situations.

From week 3 to weaning

- Respiratory disease is the main calf problem from 3 weeks to weaning. Also called bovine respiratory disease (BRD), it is mainly associated with BRSV and Mycoplasma infections. The bugs are normally present, but when they have effect, the outcome is explosive.
- BVD (= pestivirus) is not a problem if controlled and this is usually by vaccination.

Managing calf wastage

- Need systematic programs to control calf loss.
- Ensure feed intake increases in late pregnancy and early lactation. Controlling mating, calving and weaning times is a major contributor to enabling this.
- Other management to plan includes BBSE, PD, vaccinations, calving management, culling, etc
- When analysing cow performance, pregnancy rate by itself is quite uninformative. Need to use foetal ageing and break down when pregnancies occurred into 3-week intervals (equivalent to oestrus cycle length) for each age, paddock, or breed.
- Even under the best conditions, only 2/3rds of cows conceive per cycle, so need 3 cycles or 9 weeks before can get 95% pregnant. Cows that do not conceive within this 9-week window will struggle to continually get back into calf. Early-pregnant cows have high productivity, use feed efficiently and are cost-efficient. For late-pregnants, check market options – sell as PTIC.
- This system is dependent on a high percentage cycling into mating, which is usually achievable under US conditions.
- Patterns of conception can be used to diagnose problems.
- All management needs to be carefully integrated to maximise effect; if any element of a program slips, it may affect the ability of other elements to have their desired impact.
- In managing disease, need to always have resistance at a high level and challenge by infectious agents at a low level. An example of this in intensive temperate systems is to divide cows up once they start to calve; after 2 weeks of calving take out any cows that haven't calved yet, move to a new paddock and keep doing so every two weeks until everything has calved. This ensures that the pathogens calves shed do not infect newborn calves, ie, reduce challenge.
- Einstein: 'We can' solve the problems of today with the same level of thinking that created them.'

Herd discussion

- Vaccinate cows 60 days prior to calving, ie, 7-8 months pregnant, when they can produce high levels of antibodies which are then then secreted into colostrum for the calf. This is enhanced by having cows in good body condition with high protein and energy levels, which also enhances quality and quantity of milk produced.
- Pelvimetry:
    - Measuring pelvic inside cross-sectional area using a device that measures height and width
    - Typically do when the yearling heifer is at 65-70% mature body weight, ie, at the same stage when you should mate them.
    - If breed for a large pelvis, the progeny will also have wide pelvises, and this is self-defeating, ie, it cannot work. This is especially so for bulls.
    - Can use for defining females with very low pelvic area.
- For bulls, using calving ease EBVs rather than pelvimetry is the best approach.
- Only about 40-50% of cows in the US are strictly limited to a 60-day mating. Many extend and late pregnant animals are sold to those who want them.
- *Lepto hardjo* is a work place health and safety issue in Australia. In Cash Cow outbreaks of *Lepto pomona* were surprisingly uncommon but when they did occur calf wastage was increased.

Reducing calf loss through management in Indonesia

Dr Dahlanuddin
dahlan.unram@gmail.com

Dahlan is highly-respected for his leadership in improving beef systems in Indonesia. His work has resulted in major transformations to cow productivity in eastern Indonesia.

Bali cattle in Indonesia

- *Bos javanicus* – deer-like cattle.
- Mature cow live weight typically about 250 kg
- Bulls much bigger than cows
- Usually red. But when bulls reach puberty they turn black. If castrated they come back red again.
- Many years ago, most cattle grazed freely, but this has mostly been discontinued.
- Most common production system is the cut and carry system, where feed is carried to cattle which are mostly tethered or penned.
- Peak calving is traditionally in the early dry season, creating a situation with limited feed and water when it is needed most.
- A lot of calving occurs with poor sanitation
- Usually no weaning management in traditional management

Calf wastage

- Typically around 20%, and regional averages range from 8% to 48%, the latter being in Timor.
- Most losses occur in the first 2 months of life
- Most calf deaths are associated with diarrhoea
- Many other causes identified, including low birth weight

Integrated village management system (IMVS)

- Key components
    - Control mating so calving occurs when good feed is available
    - Improve nutrition of the cow in late pregnancy and early lactation. Grow *Sesbania* (a forage tree legume) on the rice bunds (walls around rice padis) and feed cattle the leaves.
    - Wean calves at about 6 months of age
    - Improve sanitation for cows and calves
- Calf mortality reduced from 20% to 7.6% through improved practices.
- Body condition of cows is closer to 4 (forward) than 3 (moderate) in these systems and milk production is 2 kg/day instead of 1 kg/day.
- Average calf weight at weaning is increased from 70 kg to 90 kg and this advantage is maintained for at least a year.
- The system has its effect through improved cow nutrition and by improving the environment

Herd discussion

- Reduced mortality in calves by applying the IVMS is associated with a dramatic decrease in the incidence of scours.
- The uptake of this system by thousands of farmers is enhanced by the high price paid for cattle in Indonesia, currently about $4.50/kg live.
- Access to bulls for mating is achieved by one farmer having a bull in a collective that may typically have 50-100 cattle. Villagers take their cow to the bull when it comes on heat and this operates very efficiently.

Defining the level of calf loss within your herd

Dr Kieren McCosker
kieren.mccosker@nt.gov.au

Based in Katherine (NT) as a Beef Production Scientist, Kieren did a PhD in the Cash Cow project. Kieren has research interests across all aspects of beef production systems.

Records

- To make management decisions, need evidence of specific problems. Perceptions are often very inaccurate.
- Performance and production data highlight issues constraining the business and inform where increased attention should be focused.
- Base data can be as simple as cows pregnant, how many calves should be present, and how many cows should be lactating.
- If cows die, then usually this is associated with a calf loss.
- A livestock inventory is the key to business measurements. This includes numbers present at a fixed point each year, plus transactions. A host of performance and production measures can be calculated from a basic livestock inventory matched with a diary.
- Performance can be measured at a mob level using crush side tallies on structured sheets, eg, number of each stage of pregnancy by lactation status and condition.
- More sophisticated analyses can be achieved by recording data using the individual animal data recording systems which are increasingly electronically-based. These systems are increasing in capacity and complexity.

Problem identification

- Data by itself is a waste unless it can be analysed, interpreted and used in adaptive management.
- Theories about specific causative agents are often a waste of time as the issue is generally complex. Need evidence/data/samples with professional advice for appropriate selection of interventions.
- Intervention may be needed well back in the pathway to calf loss. For example, poor lactation management causes low-condition cows which may have slow birth and less milk leading to a weak calf that is at high risk of mortality; in addition, this pathway may lead to death of the cow which will almost certainly cause loss of the calf. In this case, intervention should be at the lactation management level which is a critical control point, not later to fix poor basic management as that creates more cost and limited benefit.
- When considering likely risk factors for calf mortality, these have been well mapped for northern Australia in recent reviews (eg, Cashcow project).

Herd discussion

- About half of the Cash Cow participants who were not previously using PD subsequently adopted it.
- In continuously-mated herds, main PD is at the second round.

What can we do about calf loss?

Kylie Schooley
schooley@bigpond.com

Kylie's family has a beef business in SE Queensland (Cheltenham). She is a cattle vet with a practice in Chinchilla.

Solving a significant problem in the family beef business

- In unravelling the causes of calf loss, a holistic approach must be used, and beware of the long lag effects on cattle and the business of causative agents and of recovery from the problem.
- Two holy grails, both of which have financial and social impacts:
    - Improve land condition
    - Improve animal welfare
- Tools: Objective measures / Personal observation x Planning / Evidence/science
- The focus of all planning was kg of live weight produced per ha by the business
- Involvement with research over recent times has been extremely beneficial. For example, Lindsay Hogan (an ecologist) conducted intensive behavioural observations of suckling which have contributed to our understanding of calf management.
- Science tests intuition and produces facts = evidence.

Solving chronic calf wastage

- Through recording and analysis, recognised a 13% calf wastage in 2006 caused by BVDV (pestivirus). A vaccination program reduced loss quickly to 5%.
- Subsequently purchased a high-weight EBV bull which caused 26% calf loss in heifers and 13% heifer mortality = catastrophe. In response, implemented a raft of changes including: purchased low-weight EBV bulls for yearling mating, shortened mating to improve calving monitoring efficiency, sorted nutrition management.
- Despite this, loss remained at 15-20%. Pregnant fat heifers were still being grazed on the property's poorest pastures as it was perceived they were in least need.
- So also implemented selection of bulls on calving ease EBVs, and maintaining even growth of pregnant yearlings to calving and then keep on good nutrition till weaning.
- This finally achieved a very low calf loss. However, exactly which parts of the program have had the most impact is not known, only that together all elements achieve the desired outcome of low calf mortality.
- The message: consult and use available science appropriately to solve problems.

Discussion with the full panel of speakers

- If want to solve a problem in a complex situation, must collect the correct data to explain the problem and define the remedial options. Targeted management will usually be effective.
- Non-suckling syndrome or weak calf syndrome
    - These calves can survive if poddied.
    - The problem is not consistently repeatable for cows.
    - Need to rule out known causes such as viral diseases like BVD (pestivirus)
    - Some possibility that under genetic control, but have not confirmed. This means there is no test available for this condition.
    - Prolonged delivery can cause cerebral anoxia (lack of oxygen), and may be one cause; ie, there are multiple pathways to the syndrome.
    - Low diet calcium from eating high-oxalate pastures (especially buffel shoot) may cause prolonged calving
    - In the USA, pre-calving protein deficiency has been related to weak calves at birth. The protein is needed to prepare the calf for life outside the uterus.
- Fat heifers
    - Usually target condition score 3.5 for heifers
    - If score 4-5 (prime-fat), predisposes the heifer to dystocia because of physical obstruction (channel fat) and reduced uterine tone limiting contractility at calving.
    - A 'Jenny Craig' paddock is not recommended as it may exacerbate the problem.
    - One solution is to force heifers to exercise by making them walk a distance to water, even up hills.
- Breed and mature size issues
    - Breeding for bigger cattle may have contributed to some calf wastage because these cattle require more pasture to maintain themselves - need to adjust stocking rate. If so, need a holistic genetic solution which may include reducing mature cow size.
    - Some environments are tough enough to cause stunting of cows, which does not appear to significantly limit their capacity to rear steers with high-growth capacity.
    - Large cows have high maintenance requirements and may reduce business efficiency. In USA, live weight production is often greater from small-medium mature size cows.
    - Always select breeding and management to suit the environment, which is variable itself.
- Calf loss investigations
    - Often are complex and most often need on-site, professional, systematic, and prolonged investigation to unravel the problems which are the basis for defining alterations to management to fix the problems.
    - Simple post-mortems conducted under instruction by a veterinarian, with appropriate sampling, can contribute massively to diagnosis.
    - Most often a fundamental requirement is to get available pasture quality and quantity right which fixes a huge number of problems including calf wastage.
    - Attention is always needed on the causal pathway to calf loss, which may be complex, but it is necessary to produce the right solutions.
- First-lactation cows v mature cows
    - In the USA where nutrition is often good, most mature cows are very likely to be cycling within 60 days of calving and conceive quickly once mated.
    - First-lactation cows take longer. In that situation, heifers are typically mated 20 days earlier to give them time to recover cyclicity after calving and be ready for mating as lactating cows.
    - Early calving females can be given more attention before calving of older cows commence.

    - This could be enhanced by weaning of very young calves from first-lactation cows under difficult nutritional conditions.
    - Note: in The USA, expect 5-10% of females calving at two years of age need assisted delivery.
    - In northern Australia, these outcomes are almost impossible to achieve in most situations. Professional advice should be sought on suitable management.
- Handling effects
    - Excessive intervention is always a threat especially if the cows are not habituated to handling.
    - A cow sees a handler as a threat/predator, and their response can increase the possibility of them losing a calf.
    - In the USA it is routine to training cows to handling and avoid the problems associated with handling.
- Multiple vaccines
    - Small amount of evidence to suggest there is advantage in administering vaccines individually to give the animal time to develop immunity to each one. However this is often not feasible and it is much better to give multiple vaccines than to not vaccinate.
    - Killed vaccines very unlikely to affect the quality of a bull's semen.
      Wherever possible live vaccines (3-day and tick fever) should not be given at same time and not with any killed vaccine.
    - Tick fever ('blood') and 7 in 1 administered together are unlikely to adversely affect the immune response so long as the 7 in 1 vaccination is the booster to the original given at branding time. Giving these two shots together for the first time does have some potential for the tick fever vaccination to reduce the priming response to 7 in 1 vaccine.
- Pestigard in pregnant cows
    - The vaccine will not affect the foetus
    - A good immune response will be achieved that increases antibody in colostrum providing protection for the calf for at least 12 weeks. This is important in intensive systems.
- Vibrio: persistence of infection after mating to a carrier bull in some cows may result in abortions and still births. This may partially explain the Cash Cow result of widespread vibrio infection being associated with foetal and calf loss rather than with embryo loss which has been the general opinion till now.