

# DAIRY CALF HEALTH ASSESSMENT EXPLANATORY NOTES

## Background

**Rearing heifers is one of the largest costs to dairy production, it accounts for approximately 25% of total cost of dairy production<sup>1</sup>. The largest cost associated with rearing heifers is nutrition/feed, which accounts for approximately 50% of the total cost<sup>1</sup>. The level of mortality and morbidity in replacement heifers has the potential to significantly impact the overall heifer replacement costs. Dairy Australia estimated the typical cost to rear a heifer calf to 24 months of age (excluding labour) was ~\$1,190 - \$1,718<sup>2</sup>.**

Australian studies have shown that heifer liveweight has impacts on subsequent production, reproductive performance and longevity. It has been shown that 10% of Friesian heifers reared did not calve at 2 years of age; 19% of Friesian heifers that did calve as 2 year olds did not calve as 3 year olds; and only 55% of heifers entering the milking herd completed their 4th lactation.<sup>1</sup>

A general rule of thumb is that a calf should double its birth weight by weaning at ~8 weeks of age, by achieving this they are more likely to produce more milk (some reports indicate as much as 20% of first lactation milk yield is determined by pre-weaning growth)<sup>1</sup>.

The most common issue encountered in a calf shed is neonatal calf diarrhoea (NCD) followed by respiratory disease. Reports indicate that the majority of NCD occurs in the first 21 days of life. Izzo (2011) showed that most outbreaks involve multiple

pathogens with Rotavirus and Cryptosporidium being the most frequently identified, followed by *Salmonella* spp, Coronavirus and *E. coli*<sup>3</sup>.

Abuleo (2019) conducted a survey of Australian dairy producers and found that the level of mortality due to NCD was 17.9% and for respiratory disease was 6%. He also concluded that only 24.5% of producers met <10% mortality rate. In this survey it was found that the vast majority of producers self-diagnose, with 72% of producers making their own diagnosis, and fewer than 26% get a veterinary diagnosis. This paper indicated that *Cryptosporidium* was most often diagnosed followed by *Salmonella*, then rotavirus<sup>4</sup>.

This audit covers all aspects of calf rearing including critical aspects of colostrum management, nutrition, environmental conditions and dam pre calving treatments. Time of weaning will depend on the farm and will be based on the following factors: size, age, liveweight, convenience and grain/concentrate consumption. The aim when calf rearing is to ensure calves are healthy and have adequate average liveweight gain to achieve mating at 14-15 months and first calving at 24 months. Heifers that reach mating and calving liveweight and height for age targets are more likely to cycle, conceive, calve without delay and have good milk production in first lactation and will rejoin at next mating. If growth rates are poor, heifers are likely to have delayed onset of puberty, which in turn will result in delay of age at first breeding and increasing age at conception and first calving.

### References:

1. Parkinson TJ, Vermunt JJ, Malmo J, Laven R. Disease of Cattle in Australasia 2nd ed. Massey University Trust. 2010.
2. Dairy Australia, Benefits of well-grown heifers. 2021
3. Izzo et al (2011) Australian Veterinary Journal Volume 89, No 5, May 2011 Prevalence of major enteric pathogens in Australian dairy calves with diarrhoea.
4. Abuleo et al (2019) J. Dairy Sci. 102:8352-8366 An investigation of dairy calf management practices, colostrum quality, failure of transfer of passive immunity, and occurrence of enteropathogens among Australian dairy farms
5. Dairy Australia. Rearing Healthy Calves 2nd Ed. 2020

## Key areas of assessment: calf health and welfare

### Calving site or calving pad

The aim for this site is hygiene, ideally this area should not have manure build up, should be away from effluent run off and should be large enough to calve all cows. Producers should also have a backup paddock identified in case of high level of contamination, or excessive water/wetness.

### Pick up

**Timeframes:** Ideally calves should be collected at a minimum twice a day to ensure colostrum feed is provided as soon after birth as possible.

If not possible to collect twice per date, producers can consider feeding first colostrum feed in paddock.

Leaving calf to suckle from dam does not ensure successful transfer of immunity.

**Trailer hygiene:** Inspect the calf trailer. Is it clean and dry? It is used for other purposes? If yes what? How is it cleaned, disinfected?

**Naval care:** Does the farm use any form of naval care? Naval dipping/spraying with iodine or other disinfectant is considered best practice.

**Colostrum:** Quality - Brix >22%; Quantity - 10-12% BWT in 2 feeds; Quickly - first fed within 6 hours of birth

**Volume and timing:** How much does each calf receive, time since birth, at each feed of colostrum.

### Colostrum management:

**Harvesting colostrum:** Colostrum quality begins to decline in the udder after birth, ideally fresh cows should be collected twice a day to ensure colostrum quality is maintained. Discuss how the collection equipment is used, cleaned and stored.

**Handling and storage:** How is the colostrum managed after collection - fed immediately, refrigerated, frozen, pasteurised etc. Also consider how the colostrum is thawed after freezing.

**Pre calving cow treatments:** Discuss pre-calving cow care, including vaccination - what, timing; transition nutrition.

## Calf assessments

Ask producer about previous history of health issues (scouring, respiratory disease).

### Inspect the calves - noting demeanour (see appendix):











- Are they bright, alert and responsive (BAR)?
- Are they active and interested in what is happening?
- Are their coats clean, shiny, covered in scour?

### Take note of any health issues:

- Signs of respiratory disease
- Nasal discharge - clear or mucopurulent
- Ocular discharge - are eyes weeping, appear red/inflamed
- Coughing - take the time to stop and listen for coughing, sneezing, and observe respiratory rate and effort of calves
- Is lung ultrasound conducted

### Signs of scouring

- Observe calves for scouring, scour staining and also in pens for scour contamination
- Observe calves for tucked up appearance, dehydration and general illness
- Assess faecal consistency and conduct score - Normal = 0, Soft = 1, Runny = 2, Liquid = 3. Aim for <15% morbidity in young calves, and 1-2% in older calves.

Score	Characteristics		
0	Normal faeces, with the consistency of pudding. Meconium (first faeces of the calf).		
1	Semiformed or pasty, similar to yogurt.		
2	Loose but enough consistency to remain on bedding. Consistency of syrup.		
3	Watery faeces that drop through bedding material.		
B	Blood is present.		
BM	Blood and mucus present.		

Scouring score - A Practical Guide to Diagnosis - Bovine neonatal diarrhoea. MSD Animal Health

## Nutrition (post colostrum)

Download NRC Calf feeding Calculator (see appendix) this will assist in determining adequate nutrition is being given to calves and calves have adequate ADG.

- Liquid feeding – determine if Whole milk, Milk replacer, any fortification of milk.
- Hard feeding – muesli, pellets, grain, hay straw

## Environment

Environmental conditions play an important role in the expression of disease, factors include ambient temperature, hygiene, air quality, bedding condition, all these factors have an impact on calf comfort and health.

**Shed Temperature:** the thermoneutral zone for a newborn calf is between 10-25°C, within the thermoneutral zone a calf is able to maintain its body temperature without using any additional energy. If the ambient temperature increases above or decreases below this zone the calf will utilise energy to either cool or warm its body temperature, this means the calf will divert energy away from growth and immunity support in order to maintain the ideal body temperature. Cold or hot calves may have an increased risk of disease.

**Air movements:** air circulation is important for calf sheds as good ventilation reduces risk of disease and helps to maintain ideal temperature. Ideally good ventilation is created without the creation of drafts at the calf level but removes any air pollutants such as dust or ammonia.

**Air quality:** the quality of the air has a significant impact on the calf health, some pollutants cause irritation to the tracheal mucosa that may increase the susceptibility to respiratory disease. Ammonia at a level of 10ppm for 8 hours may cause harm to the lung tissue. A human can detect ammonia levels between 10-30ppm, so if you can smell ammonia, the concentration is likely too high and maybe causing damage to the calves' respiratory system.

**Observe:** the calves, assessing calf comfort. Get down to calf level and assess the temperature, drafts and any pollutants such as ammonia levels at calf level, humidity, dust, or anything of note.

**Pens:** there are various options for calf pens, individual pens, group housing, indoor/outdoor access, solid barriers between pens. Calves housed in single pens should be able to see neighbouring calves. Calves should be grouped according to size and age to reduce competition and help management.

**Stocking rate:** Australian Animal Welfare Standards and Guidelines for Cattle indicates minimum floor space for newborn calves 1.5-2m<sup>2</sup> in group pens and if individually housed a minimum area of 2.0m<sup>2</sup> should be provided and calves housed in single pens should be able to see neighbouring calves.

As the calves grow the area should be increased to 2.5m<sup>2</sup>.

**Bedding:** bedding has a critical role in maintaining body temperature and calf comfort. Bedding should be at least 15cm deep, allowing a calf to snuggle in and should allow for good drainage.

Bedding should be clean and dry – do a 'knee test' to assess dryness, drop to your knees, if your knees remain dry, the bedding is adequate.

Different bedding substrates have pro and cons. Factors to consider- thermal properties, dust levels, will calves consume, compatibility/drainage, cost, availability.



**Drainage:** calf areas need to be dry and have good drainage this ensures calves remain dry and reduces pathogen exposure. Calf areas should also not be near effluent run off from with dairy or cow paddocks.

**Hygiene:** is a critical control point. Ideally an all in-all out systems work best to move calves in groups and to allow for cleaning between batches of calves. Many of the pathogens persist in the environment for long period, in seasonal or split calving herds a full clean out at the end of calf season allows for the shed to dry out and be disinfected.

Seek information from producer of the cleaning, disinfection procedures of the calf areas.

# APPENDIX

## Assessing Calf Demeanour

Score	0 - Clinically Normal	1 - Mild	2 - Moderate	3 - Severe	4 - Grave
					
					
<b>Demeanour</b>	Bright, alert, responsive	Dull, fairly responsive	Dull, depressed, less responsive	Dull, markedly depressed, unresponsive	Unresponsive to any stimulation
<b>Ears</b>	Alert and mobile	Slightly drooped	Drooped	Drooped and limp	Markedly drooped and limp
<b>Mobility</b>	Actively mobile and able to stand by itself	Standing up and walking independently after encouragement	Capable of standing and walking after lifting	Sternal recumbency (lying down but unable to stand)	Lateral recumbency (lying down on side and not able to stand)
<b>Interest in surroundings</b>	Interactive when approached	Interactive when approached	Slow to respond when approached	Uninterested when approached	Unresponsive when approached
<b>Suckle reflex</b>	Strong suckle reflex	Diminished suckle reflex	Weak suckle reflex	Chewing movements	Absent
<b>Feed intake</b>	Feeding well	Slow to drink and may not finish what is offered	Reduction in feed intake (not finishing what is offered)	No feed intake (not taking any of what is offered)	Absent
<b>Enophthalmos / Dehydration</b>	Clear bright eyes	Eyes slightly sunken	Eyes moderately sunken	Eyes sunken	Eyes markedly sunken

\*\* Dillane, Patrick; Krump, Lea; Sayers, Riona; Sayers, Gearoid. Determining the predictive capability of a Clinical Assessment Scoring Chart to differentiate severity of the clinical consequences of neonatal calf diarrhea relative to gold-standard blood gas analysis. 2020 <https://doi.org/10.1371/journal.pone.0230708>

## Using NRC Calculator

The **NRC Calculator** app can be downloaded from the app store.

The NRC Calculator estimates energy and protein allowable average daily gain of the dairy calf based on user inputs regarding the volume of whole milk and/or milk replacer fed, the percent solids of whole milk or milk replacer solution, whole milk protein, and fat content, milk replacer protein, fat, moisture and ash content, starter grain intake, protein content, and metabolizable energy content, calf body weight, and ambient temperature. Milk replacer, whole milk, or combined whole milk and milk replacer feeding strategies can be analyzed and two strategies can be compared side-by-side on one convenient screen. The calculator reports energy allowable average daily gain and protein allowable average daily gain for each diet thus enabling an easy assessment of the constraint to an increase in potential calf body weight gain.

### Figures to use:

**For Calf Milk Replacer (CRM)** – either use label or look up company website. Generally, CRM will contain:

- Total Solids 12%
- Fat 20%
- Protein 20-28%
- Moisture 2.5-7%

**For Whole milk** – ask the producer or use average:

- Milk Solids 12.5%
- Fat 3.7%
- Protein 3.4%

Also determine if whole milk is fortified with milk replacer and add these figures into app.



## Other Resources:

Dairy Australia. **Rearing Healthy Calves** 2nd Ed. 2020

**HERD SD - App.** Risk assessment tool for *Salmonella Dublin*.

