Using remote monitoring technologies to understand risk factors of calf mortality in northern Australian beef cattle

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Calf loss in northern Australia is one of the biggest limitations of the beef industry. It is important to understand the factors which contribute to higher mortality of calves in northern Australia (Martin *et al*. 2013). With a large proportion of calf deaths occurring in the first week after birth, and cause of death mostly unknown, it was important to look at potential risk factors around the time of birth (Burns *et al.* 2010). The objective of this study was to utilise remote sensing technologies to identify movement patterns of cows around the time of calving.

Over two calving seasons, 2018 and 2019, data was collected to investigate factors likely to affect calf loss using Global Navigation Satellite System (GNSS) collars and vaginal implant transmitters (VIT) in pregnant *Bos indicus* cows (n=29). GNSS collared cows were selected from a larger group based on their gestation stage, with twenty (n=20) cows collared in 2018 and ten (n=10) in 2019, and each collared animal fitted with a paired VIT. One collar was damaged and removed from analysis in 2018, and one collar from each trial contained corrupt data which could not be used. Two collars were not retrieved from Trial 2. Cows were monitored throughout a 60 d calving period, 30 days either side of the calving date. Geolocation and average activity (X axis) data collected from GNSS collared animals (n=29) showed the locations and activity levels of animals during the calving period. VIT were used to identify a birth event, allowing measurements to be compared between day of calving and 30 d either side of calving. Trial cows in 2018 and 2019 were in a 33 km² and 7 km² paddock, respectively. Cows in both trial years were subjected to normal commercial conditions and were provided with a mixed urea, phosphorus and trace element supplement throughout both trial periods. The trial was carried out in the Victoria River District in the Northern Territory on a commercial beef cattle property.

Table 1. Descriptive statistics for trial 1 and 2 (2018 and 2019) calving periods recorded by remote monitoring technologies in GNSS collared animals. Only animals with a confirmed calving date were included in distance and activity on day of calving.

	n	min	mean	max	SD
Trial 1, 2018					
Average distance travelled- non calving days(km/d)	18	0.43	6.55	17.83	2.79
Average distance travelled on calving date (km/d)	8	0.93	5.54	12.98	4.11
Average activity X-axis- non calving days (counts)	18	10.56	39.76	90.51	10.66
Average activity X axis on day of calving (counts)	8	25.89	35.95	46.89	5.88
Trial 2, 2019					
Average distance travelled- non calving days (km/d)	7	1.35	6.13	15.51	2.30
Average distance travelled on calving date (km/d)	7	1.35	5.00	8.52	2.80
Average activity X-axis- non calving days (counts)	7	5.43	34.24	76.03	8.84
Average activity X axis on day of calving (counts)	7	15.71	30.41	42.25	8.34

The trial herds had an average branding percentage of 70% (from total pregnant cows) over both trial years. Data from both years showed that distance travelled by cows on calving day was different to other days during the calving period($p<0.05$) and activity levels were around 15% lower on the day of calving when compared to the daily average in the 60 d calving period (Table 1). Cows in the 2018 and 2019 trials travelled an average of 5.54 ± 4.11 km/day and 5.0 ± 2.80 km/day on day of calving, respectively, which was approximately 1 km less than the daily average distance walked by animals in the 60 days around calving. There was a slight increase in both distance and activity by cows in trial 1, which may have been due to the larger paddock size, compared to that of trial 2.

The technologies used in these trials showed their potential for monitoring animals and their movements and activity around calving both remotely, and in a large-scale commercial enterprise. There is a need for further investigation into the behaviours and status of cows and calves around calving time, which may help to identify higher risk animals based on data collected with remote sensing technology.

References

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