Using wearable data for spring-time cow management and LDA diagnosis

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My journey from novice to somewhat adequate spreadsheet user

About six years after I graduated, I realised that nutrition (good or bad) was a key aspect in what I was trying or failing to achieve with my dairy clients. I started my ruminant nutrition journey with books recommended by colleagues, a Feed Right course with Dairy NZ and then got stuck into studying for the Ruminant Nutrition exam with the ANCVS. At the time Massey was also running a ruminant nutrition paper, which proved really helpful.

Trying to use this newly gained knowledge, I realised that we have very little information on what and how we are feeding our dairy cows. I've always enjoyed the individual animal medicine more than endless data analysis, but when some of my clients got on board with Smaxtec boluses and Allflex collars in 2020 and 2021 respectively, it was clear to me that this technology started to fill in some of these crucial blanks in their day-to-day management.

Initially I was only looking at this data sporadically, mostly prompted by questions from clients. I drew up treatment flow charts for cows alerted by these systems as being 'unwell' and they would present some of these cows for examination/treatment. At the end of the 2022–2023 season Allflex ran a webinar on how other veterinarians were using their data. This really inspired me to become more proactive and lead me to using the Allflex collar data at my end-of-season Repro consults. Being able to look at their transition management in spring, their pre-mating cycling rates and compare that to levels by high performance herds helped me understand potential risk factors in their system. Most of the clients that went through this data analysis were then keen to take a more pro-active approach the following spring and use the data to make real-time changes. I spend a lot of time in the winter of 2023 figuring out how to use Excel beyond my limited skills and how I could provide a service that would add benefits for my clients.

That following spring I send out weekly reports from early August until the planned start of mating. This resulted in a couple of problem-solving sessions on farm and improved performance for those herds. We again analysed the data at the end of the season and reviewed our plan for the following season. Based on farmers' feedback and outcomes, I extended my reporting period in 2024 to end of mating and increased my interaction with clients beyond just sending a report. This mainly included a follow-up phone call with the farm manager if the cows weren't performing that week or occasionally going out on farm and reviewing feed and cow management. Halfway through that spring our practice also got access to the Data Live reports. The benchmarking in the transition rumination report proved to be a valuable motivator for those farmers underperforming and it added extra information over the mating period.

Because I only have one farm with smaXtec boluses and one farm with Cow Manager ear tags I haven't been able to justify spending a lot of time on these systems and how I could offer them a similar service. It is something I want to investigate further moving forward.

When I started using this wearable data the main hurdle for me was my inexperience with the data and how I could provide a service that would be valuable for my dairy clients. It was important to me that I didn't just write reports that ended up in their junk mail, but that they would engage with.

I feel this is something we often struggle with in our profession, but the way I approached this worked well for me (and most of my clients):

- Start small; use the data in repro or animal health consults and make a plan for the next season. Use the data to monitor 'health alert' cows (diagnose cows with possible left displaced abomasum (LDA), endometritis or ketosis) and write up treatment plans for clients so they can problem solve some of these issues themselves.
- Talk to the wearable companies, ask for help and just give things a go.
- Make sure you follow up on reports if they suggest there might be a problem – timely; within 24 to 48 hours.
- Show clients the possibilities of the data from their wearables whenever possible.
- Accept that not everyone will see value in this, keep trying/improving, but don't do things for free.

This practitioner's way of performing LDA surgeries in the field

A left displaced abomasum (LDA) occurs due to a combination of:

- Extra space in the abdomen after calving due to a smaller uterus and a smaller rumen (decrease in dry matter intake around calving).
- Decreased motility of the abomasum caused by electrolyte imbalances (mainly hypocalcaemia), a negative energy balance, dietary imbalances leading to high volatile fatty acids in the abomasum and potentially other unknown factors.
- A build-up of fluid and gas in the abomasum due to the above.

In my experience, most of these LDA cases on New Zealand dairy farms occur seven to 10 days after calving, but they are often not presented for examination until 5–7 days after the onset of symptoms. The most common symptom I've seen in these animals is a decrease in dry matter intake/rumination, which doesn't resolve by treating these cows with energy supplements (e.g. propylene glycol oral drench). This often goes unnoticed by clients but has become much easier to diagnose on farms with wearable technology. Other things to look out for are low/no milk production (often rapid onset), poor gut fill, metritis that doesn't respond to therapy with injectable antibiotics and animals with high ketones (≥2mmol/l, although I have had animals with LDAs with normal ketone levels). On examination you can easily identify a 'ping' sound on the left, caudo-dorsal ribs, but I have had animals where the LDA was only sitting about halfway up the abdomen. I commonly find mastitis, ketosis, endometritis or metritis in cows with LDAs, something I now always check and treat at the same time.

Restraining these animals for surgery isn't always easy, but proper restrained does make the surgery a lot easier. When I don't have a crush that opens on the right side, I will either tie them with a halter and long rope in the race or in the yard where I can access the right flank unhindered. For nervous animals I'll often use standing sedation with Xylaket IV (0.2–0.3ml), which works very well for me. I'll give cows a shot of NSAIDs, antibiotics and a bag of Dextrose IV and then clip a large area on the right flank (from the hip bone to the last rib). I prefer using a paravertebral block for LDA surgery, but I have used L-blocks or linear blocks in the past. After a thorough chlorhexidine scrub and methylated spirits application I make an incision about 10–15cm down from the short ribs, halfway between the tuber coxae and the last rib, big enough to fit my arm through comfortably (about 20cm). In the past I used to deflate very big LDA's using a sterile 14G2" needle with the tubing from the Dextrose bag (that had been sitting in a bucket with disinfectant), but now I find it easier to move the abomasum with gas in it. I'll either go behind or under the rumen and will put my hand on top of the abomasum to push/pull it down to the right side again (balloting motion). I find adhesions between the abomasum and rumen in about 20–25% of cases; these are mostly easy enough to break down by blunt dissection using my fingers (but in severe cases you may have to open up the cow on the left side also). Once the abomasum is back on the right side, I look for the pig's ear or find the omentum near the pylorus and put a clamp on this section (so I don't lose it). If you lose the abomasum once it's back on the left side, it should be easy to find again if you follow the duodenum forward. I often close the peritoneum and muscle layers in one layer rather than two, but this does make it trickier to make sure the omentum stitched in does not stick out through the muscle layers. I suture the subcutaneous tissue separately, so I can suture the skin with minimal tension using a forward interlocking pattern.

I believe follow up care for these animals is crucial for a positive outcome. Stomach pumping with 20l of warm water and glycerol after surgery, keeping them on once-a-day milking for at least 3–5 days after surgery and giving them a daily energy drench over that time. I also get the farmer to spray the wound daily for the first 2–3 days after surgery with a tetracycline or aluminium spray to reduce the risk of wound infections.

LDA diagnosis and take aways using wearable data

Since I've had clients with wearables, I have seen a steady increase in the number of LDA cases – with most, but not all, cases I have operated on in the last three seasons coming from these farms. A big part of this has been through education of these clients; using treatment flow charts, showing what cases should be presented to a veterinarian and how urgently. We have also been sharing some of these cases on our dairy client Facebook page and have written articles about it in our newsletter. I feel that this has increased farmers awareness around symptoms that may suggest an LDA and the positive outcome of most of these cases.

Aside from increasing the amount of LDA's diagnosed, wearables have helped me gain a clearer picture of when these LDA's occur, what does and doesn't predict a good outcome and how we can potentially better care for these animals after surgery. All this has been helpful in communicating with clients around costs and likely outcomes for these cows. Luckily for me this has led to 100% of cows presented to me with uncomplicated LDA's, surviving surgery to either get back in calf or being culled (for low production) in good condition.

One of the things I've noticed looking at the rumination graphs of LDA cows' post-surgery is that, although they increase their rumination rates quickly and significantly after surgery, they often drop again for a few days about 5–7 days after surgery. This is about the time these cows will be going (back) to twice-a-day milking and when their extra energy supplementation stops. Hence, I wonder whether this extra care should be extended for longer post-op – something I'm planning to try next season.

One of the most asked questions I get from clients is whether these LDA cows will come back into milk. Unfortunately, I haven't really found a clear answer to this. Some of the things I have considered are:

- Days between occurrence and diagnosis - one animal appearing to have had issues for 19 days before surgery, presenting in poor condition, came back into milk very well and ended up having a calving interval of less than 365 days that season and subsequently producing more than her BW the following season.
- Adhesions between the abomasum and rumen (possibly due to previous abomasal ulcers?) – I've had animals with adhesions with excellent return to milk.
- Rumination recovery/feeding after surgery? – all cows have bounced back in rumination shortly after surgery and no obvious difference in rumination occurred between those that did and didn't come back into milk.
- Concurrent problems? – I operated on a cow in 2024 with ongoing mastitis issues and with chronic endometritis and ketosis who returned to good milk production and got in calf at the start of the mating period.
- Re-occurrence of the LDA after surgery – one heifer with an LDA diagnosed prior to calving in 2024, had another surgery nine days after the first. She didn't come back into milk but recovered well and went on the cull truck in excellent condition.

I believe I would need a much bigger data set to figure out whether these factors are significant, and I just found some outliers, or whether there are other things to look at. I always tell farmers that a well-conditioned cull cow in late spring is still going to pay for the cost of surgery and hence is worth more than a dead cow – which is where I believe these animals are headed without surgery. So far this has proven a useful strategy with the vast majority of cases diagnosed proceeding to surgery (>90%).