

Notes from FIV trip on Antibiotic Reduction

8-9 March 2023

Evening Presentation by James Breen

- Antibiotic reduction about disease prevention and reducing unnecessary use of antibiotics.
- Dairy sector plan – centres around control of mastitis, dry cow therapy and reduced use of injectables
- Need to educate ourselves and the industry on the metrics being used to measure antibiotic use (different methodologies available)
- Antibiotic use per animal bears no relationship to number of cows, average yield or the veterinary practice prescribing the antibiotics.
- Antibiotic use from dry cow therapy as a proportion of overall use is only the tip of the iceberg – but is being targeted as it is for preventative purposes – and there are now alternatives through selective dry cow therapy and use of teat sealers.

- Evidence suggests that if you follow a mastitis control plan you can reduce herd mastitis rate by 20% (AHDB mastitis control plan results)
- Whilst some vets want milk samples taken from high SCC cows, the focus should be on ascertaining mastitis pattern, both in mastitis occurrence and monthly milk recording somatic cell counts
- For each case of clinical mastitis, always record date and cow number – this allows trends to be established. Testing of samples not always necessary and can throw up a host of possible causes or no growths, so not always conclusive helpful.
- Supported by analysis of milk recording information we can establish if mastitis is of:
 - A) dry period origin
 - B) lactation origin and if lactation period origin, whether predominately environmental or parlour spread (contagious)

- Aim for less than 1 in 12 cows taking clinical mastitis in first month after calving.
- With computer software it is possible to chart clinical mastitis incidence by month - If there are seasonal trends it can't be contagious (parlour related).
- See Mastitis Pattern Analysis Report.

- Case study – Gleadthorpe Farm
 - 500 cow all year round calving herd – totally confined
 - Rate of new cases spikes in summer
 - Analysis of milk recorded SCCs shows that it is environmental lactational mastitis
 - Perspex sheeting on roof and no fans
 - Recommended painting out skylights, scrape/bed more often in summer and reduce stocking density in sheds (loafing area added)?
 - Took on board these suggestions and number of new cases in summer decreased.

Sutton Bonington Campus, University of Nottingham

- New dairy unit from 2003
- Old unit was on edge of village so moved to a new greenfield site across road from University
- Initially had 3 x Fullwood Merlin robots but problematic
- Replaced after 5 years with 4 x Lely A3 Astronauts (Nutrition Barn) and 3 further robots in 2017
- Current herd of 370 pedigree Holstein cows that calves all year round
- Housed continuously, very high yielding (12,000 litres +)
- Dry cows cubicle housed, close to calving cows loose housed
- Nutrition barn has 4 robots, each with their own group of cows – straw bedded group of freshly calved cows up to 20 days and 3 separate milking groups (all managed similarly).
- Try to average 52 cows per robot with output of 1,800-2,000 litres/box/day (less in fresh group).
- Sand bedded cubicles with slatted flooring over shallow slurry channel - slurry channel beneath slats has a chain operated scraper system to take slurry/sand away to settling tank. Scraper serviced every 3 months (due to sand wear).
- Feed refusals lifted every day and fed to youngstock.
- Cows footbathed with formalin solution on Mon and Fri.
- For cows needing any sort of treatment, they are separated off into treatment pen from 2:00am each morning.
- All data captured on farm using UniformAgri software.

- Herd used for Nottingham University research herd as well as being a commercial herd – closed herd (no livestock purchases).
- Whole unit under Home Office license for research, with all culls having to be signed off by vet.
- Part of Tesco milk supply chain, so all medicine records have to be recorded through the open access, AHDB Medicine Hub.
- Through Covid, restricted staff access led to increase in antibiotic use on farm:
 - 2021 30 mg - mainly due to use of injectables
 - 2022 21 mg – more normal and trying to reduce this further

Reducing antibiotics

- Areas of focus – calf health (crypto problem), environmental mastitis
- All antibiotic treatments recorded through AHDB MedicineHub.
- At drying off all cows receive internal teat sealant; cows >200,000 cells/ml at drying-off also receive antibiotic dry cow therapy

Mastitis management

- Low SCC herd (<100) with main cause of mastitis being environmental rather than contagious.
- Less than 5% chronic cases
- Low new infection rates
- New clinical cases in first 30 days after calving fluctuates - only 1 in Jan but 8 in Nov
- No real seasonal pattern
- Robot rollers and laser cleaned every day with peracetic acid
- Pasteurised colostrum fed to calves

Lameness management

- All cows mobility scored every 2 weeks on a 4 point scale from 1-4.
- Cows scoring 2 and 3 have their feet lifted by foot trimmer.

Calf management

- Calves given 4 litres of thawed out pasteurized colostrum within 1 hour of birth (so are not fed colostrum from their own dam).
- Moved to calf house and housed in large individual type calf pens in pairs for the first 2 weeks.
- Fed transition milk during this time.
- Individual pens have good deep straw bed and sufficient slope on floor to drainage channel at front to keep dry.

- After two weeks moved to phase 2 house.
- Fed powdered milk for next 5 weeks – 10 litres per day at 135 g/litre (so up to 1,350 g powder/day).
- Weaned gradually over following 3 weeks - offered chopped straw and 18% protein concentrate ad lib throughout.
- Two phase 2 houses – one with a 15 degree pitch and the other 22 degree pitch.
- Calves much healthier in house with steeper roof angle – 90% better health.
- All calves tagged with movement sensors – monitor movement and calf health with sick calves being diagnosed some 3-4 days before any physical symptoms.
- Calves always treated with anti-inflammatory and then antibiotic, but only if required.

Sire selection

- Sire selection conducted by Genus – who also conduct breeding.
- Only recently started genomic testing of heifers.
- Principle selection criteria are yield and robot friendly.
i.e. bred for yield and feed for milk quality.
- Colour-coded tailpaint to indicate breeding status:
 - Green – not served
 - Orange – served
 - Blue – PD+

Stocking density trial

- During Covid restrictions conducted trial using coloured red and white motorway barriers block off cross passages in one of the cow houses to reduce area within cows housing and effectively increase stocking rates, without adjusting cow numbers or feed space.
- Had the effect of reducing average yield by several litres/cow/day.

David and Will Bacon – Gleadthorpe Farm

- Former ADAS farm which was bought some 20 years ago
- Established new dairy unit on green field site for 350 cows – but now around 520
- Very sandy soil and prone to drought – poor grass growth
- Maize grows well with slurry and no plastic – but requires irrigation (last year grew 14 t fresh weight/acre)
- Also grow lucerne, which is sandwiched in pit between layers of grass silage
- Winter water extraction license with water pumped to reservoir created on farm and used as necessary for summer irrigation
- 36-point internal rotary parlour (installed 12 years ago) with cows milked 3 times per day.
- Fully confined all year round calving system
- High input/High output system with cows producing 11,800 litres at 3.9% BF and 3.45% PR
- Currently averaging 39 litres/day
- Sainburys cost of production milk contract with Muller processing milk
 - avg cost of production assessed quarterly across all suppliers, including feed, fuel and fertiliser
 - Missed highest prices of 2022 but worth it in periods of low milk price
 - Have to record herd health – including foot health, mastitis rates, etc
 - Would be done anyway, so no real additional recording
 - Cannot make us of soya protein – use rapeseed protein instead
- All data captured on farm using software (GEA DairyPlan)
- Monthly full milk recording through NMR
- 4x yearly Johnes' disease antibody screening
- CowManager tags to monitor rumination, temperature and general ill-health
 - Early detection of health problems has helped to reduce antibiotic use

Herd aims:

- Best performance from cows
- Best possible start for calves
- Focused on transition cow management and herd fertility

Mastitis management

- Hard to keep down mastitis incidence – currently running at some 40 cases/100 cows/year.
- Main problem is environmental lactation origin mastitis.
- Good dry period cure rates – around 90%.
- Selective dry cow therapy – if SCC <200 get orbeseal only; SCC >200 get antibiotic dry cow therapy + orbeseal
- Dry cows kept on straw yards for 2 weeks before calving – this had previously been 3 weeks but reducing to 2 weeks has reduced bacterial load and incidence of dry period origin mastitis.
- CowManager tags give early indication of health problems around calving – Ketofen treatment for subclinical ketosis.

- Milking herd fully confined with cubicles mattresses.
- Scraped down and bedded 3x/day (at each milking) with sawdust containing 25 kg lime/tonne
- This has reduced mastitis incidence by some 20 cases/100 cows/year.
- Daily bedding essential for control of Klebsiella and Pseudomonas type mastitis, but now most prevalent cause is an aggressive form of E. Coli.

- Importance of not have too high a stocking density – 80 cows per 100 cubicles for fresh calved group and 90 cows/100 cubicles for main milking group.
- Don't want to go down route of sand bedding – slurry problems with sand
- Milking routine important:
 - First person – pre-strips every quarter, foam dips and leaving 30 seconds to kill – dry wipes
 - Second person – after 60 second break to stimulate milk production puts on ADF clusters

Dry cow diets

- Dry cows cubicle housed, close to calving cows loose housed on straw bedding
- No grass or grass silage as too inconsistent and high in potassium that led to milk fever related problems – retained fetal membranes, endometritis, etc
- Instead fed TMR comprising:
 - 15 kg maize silage
 - 5.5 kg chopped straw
 - 1.2 kg rapeseed
 - 1.8 kg rape expellar
 - Methionine based mineral
- At risk cows treated with a Kexstone bolus 30 days pre-calving
i.e. fat cows, thin cows, cows in 3rd lactation or older, lame cows
- Transition cow management very important to overall health of herd, and by reducing subclinical milk fever improves fertility and lowers mastitis risk, etc.,
 - have worked a lot on it and now in control
 - fertility and yield improved as a result

Fertility

- Pregnancy rate now running at 20-25% (formerly 15%) - with conception rate of 37%.
- Fertility has improved massively through improvements in transition cow management.

Lameness

- Has now become the focus of attention.
- Cows trimmed at drying off, 60 days (heifers), 90 days (cows) and all again at 200 days in milk.
- Mobility scored every 2 weeks on 4-point scale (0-3) with 2's and 3's examined each time.
- Fewer lame cows leading to better bulling activity and improved fertility.

Welbeck Estates – Collingthwaite Farm

- Tenanted farm on 15,000 acre estate of which 6,000 acres are in woodland
- Graham farms some 5,000 acres on the Collingthwaite Farm
- Long established dairy farm with cows from 1921 – originally Jerseys but Holsteins from 1982
- Autumn block calving herd with 250 cows calving from 1 Aug each year – though calvings spread.
- All TMR feeding – no in-parlour feeding or out-of-parlour feeders
- Replacement rate of 19-20% - 52 heifers last year in herd of 250 cows.
- Some milk sold to the separately owned and run Stichelton Dairy which operates from old buildings on the farm for the manufacture of Stichelton Cheese – a Stilton type cheese that can't be called Stilton since not made in Stilton.
- All other milk sold to First Milk on a manufacturing contract.
- All data captured on farm using software (UNIFORM Agri)
- Monthly full milk recording through NMR
- 4x yearly Johnes Disease antibody screening

Mastitis history

- Had problem of cows calving in with high SCCs – Dry period origin mastitis.
- Had formerly used straw bedded yards for both dry cows and fresh calvers.
- Now dry cows brought inside to cubicles a few weeks before calving and straw yards retained for fresh calvers – mastitis incidence in first month after calving has decreased.
- Calculation:
 - straw yard is 42 m x 9 m = 380 m² of bedded area
 - Take average yield of 11,500 litres and divide by 10 = 11.5
 - 380 m² divided by 11.5 = maximum stocking rate for this area of 33 cows

Drying off

- Drying off always done on a Friday
- Selective dry cow therapy with cows getting sealer or sealer + antibiotic, depending on SCC and incidence of clinical mastitis in previous 4 months of lactation.
- Only 20 cows treated with sealer and antibiotic in the last year.
- Conducted aseptically after milking has been completed (as a separate job)
- Cows moved to small grass paddock beside yard initially and moved on to far-off dry cow paddock the following Monday.
- Far-off dry cows moved every 4 weeks or less to avoid buildup of environmental opportunistic bacteria.

Transition cow management

- Far-off dry cows brought in from grass in batches once a week to close-up group
- Close-up cows on cubicles for three weeks now (rather than straw bedding)
- Moved across feeding passage to straw bedded yards at point of calving.
- Four pens in straw bedded yard and now operates all in/all out system to allow for cleaning and resting of pens (towards end of calving season after initial rush).
- All straw yards fully cleaned out every 6 weeks, with James Breen advising that this should be cut to 4 weeks to reduce dry period origin mastitis rates still further.

- Yards fully rebedded with 10 x 350 kg bales after cleaning out and topped up with a bale each day.
- As autumn progresses, the 60-odd dry cow cubicles get taken over by milking cows.

Milking cow management

- 180 milking cow cubicles with the 60 additional cubicles after dry cows have calved.
- Main milking group shed has a 750 mm fall in its' 200 foot length (10 x 6 metre bays).
- Cubicles cleaned and bedded twice daily pre-Christmas at time of greatest mastitis risk – then once daily post Christmas.

Ventilation calculation

- For outlet we have: $180 \text{ cubicles} \times 0.15 = 27 \text{ m}^2$ of outlet along length of building
- Shed is 60 m long so $27/60 =$ gap of 45 cm required along ridge for entire length of shed
- Skylights could be an issue in summertime as this raises internal temp of house leading to increased mastitis risk – however not an issue in this herd as cows graze throughout summer.

Milking parlour procedures

- 20/40 GEA swingover parlour with low level milk line and no in-parlour feeding.
- Use one medicated cloth per cow – washed, dried and dipped in peracetic acid before use
- Cloths washed in industrial washing machine at 67 degrees for 20 mins between uses, and all cloths boil washed once per week.
- Random cloths from each batch removed for quality control – bacterial testing
- With dry period mastitis infection now low, new focus is on lactation origin infection
- Backflush system to reduce spread of contagious mastitis – *Staph aureus*
- Post milking teat disinfection – hand-held spray with emollient to improve teat condition and reduce *Staph aureus*.
- Bactoscan needs to be low for cheese production – typically 8-9 for most of year.

Take Home Messages from Trip in General:

- University interesting – different concepts (but then it is research) but what they do will trickle down.
- James Breen was very knowledgeable and very approachable – though it would have been nice to see him dissect apart the mastitis pattern of one of our farmer's herds from basic milk recording info.
- Would be good to use tools James highlighted for assessing the mastitis patterns in our farmers own herds.
- (Unfortunately, the Total Vet program cannot operate on CAFRE networked laptops due to the firewall or at least this was the case.
- Would be good to record and assess own farmer antibiotic use by conditions treated
- Importance of preparing cows better, from drying off and through transition period and calving to reduce antibiotic use and reduce general health issues, which can impact on lameness/fertility and consequently antibiotic use
- Selective dry cow therapy only the tip of the iceberg in terms of reducing antibiotic use – need to have a serious look at injectable antibiotics and reduce these, particularly for lameness, when a simple cure may be to lift the cows' foot, pair if needed, apply shoe, etc
- Shed stocking rate – amazed at how putting motorway barriers into housing to restrict space and effectively increase stocking rate could have such an impact on reducing milk yield – need to consider stocking rate at home as well as feed space. Increased living area through provision of outside loafing areas seemed to help reduce mastitis issues.

James Breen subsequently sent through the email with various points highlighted below, plus links to various papers/articles and sign-ups for antibiotic recording

Reducing antibiotic use in dairy herds: Focus on mastitis control

- Measuring antibiotic use
 - Free calculator tool here: <https://herdhealth.shinyapps.io/toolkit/>
 - If your herds are NOT already reporting medicine use data electronically, the [AHDB medicine hub](#) is free to use AND will also run a full **medicine book**

- Looking at antibiotic use in dairy herds
 - Paper from Bobby Hyde [here](#)
 - Use of injectable antibiotics, antibiotic footbath and oral antibiotics in calves affect mg use
 - Use of lactating cow mastitis tubes affect daily doses
 - Antibiotic dry cow therapy increases course doses but not mg use

- Reducing antibiotic use in mastitis control?
 - *We focussed on avoiding the NEED to use antibiotics by reducing new infections*
 - (selective treatment or non-antibiotic treatment of clinical mastitis events not covered)
 - Selective antibiotic dry cow therapy is a subject in itself – but suffice to say practised in all the herds visited
 - See <https://youtu.be/l4sv65aM-kk>
 - See <https://youtu.be/gJHv177D1xc>
 - If you have individual cow cell count data AND clinical mastitis event data you can understand the mastitis infection “pattern” in YOUR herd
 - ...and direct control measures appropriately
 - For example:
 - Contagious mastitis infection predominates?
 - Dry period infections predominate?
 - Environmental infections in lactation predominate?

- **Mastitis Pattern Analysis Report – FREE sign up and use**
 - Based on research here: <https://www.nature.com/articles/s41598-020-61126-8>
 - Herds that are FULL milk recording with CIS, NMR or QMMS may sign up free of charge to receive this report here: <https://cloud.remedy.farm/dashboard/#/signup-mro>
 - The pattern report is stage 1 of the AHDB “QuarterPRO” mastitis scheme:
 - Step 1 – predict the infection pattern (using the report)
 - Step 2 – react with the appropriate resource material
 - Contagious? Use <https://ahdb.org.uk/knowledge-library/control-of-contagious-mastitis>
 - Dry period? Use <https://ahdb.org.uk/knowledge-library/dry-cow-management-a-practical-guide-to-effective-mastitis-control>
 - Environmental infections in lactation? Use <https://ahdb.org.uk/knowledge-library/control-of-dairy-cow-environmental-mastitis-in-lactation>
 - Step 3 – ongoing mastitis control – repeat 1 and 2 every 3 months.

- Example “Herd G”
 - Presented as part of a talk at Total Dairy last year (you can read the article [here](#))
 - Environmental lactation pattern
 - Less than 1 in 12 cows affected with clinical mastitis in the first 30 days of lactation (= good control of dry period origin clinical mastitis infections)
 - >2 in 12 cows affected with a FIRST case of CM >30 days in milk = lactation origin
 - ...and seasonal (summer) spikes in first cases