

Prescribing antibiotic dry-cow therapy in a changing landscape



The blanket use of antibiotic dry-cow therapy will no longer be the norm on Irish dairy farms, from January 2022, due to changes in EU regulations. Aurelie Moralis DVM Cert DHH MRCVS explores the importance and purpose of the dry period, and looks at selective dry-cow therapy and how to implement it successfully

Regulation (EU) 2019/6 on veterinary medicinal products states that antimicrobial products for metaphylaxis and prophylaxis should be prescribed only in exceptional circumstances, and for a limited duration to cover the period of risk. Prophylaxis, such as antibiotic dry-cow therapy (ADCT) should be limited to use in individual animals only. ADCT has been established for over 50 years and in 1963, blanket ADCT – mainly to control contagious mastitis pathogens – was one of the main pillars of the ‘five-point mastitis control plan’.

With antimicrobial resistance predicted to contribute to the loss of 10 million human lives by 2050 if nothing is done¹, governments, human health agencies, consumer groups and food retailers are putting greater pressure on food producers to rationalise the use of antibiotics.

Selective dry-cow therapy (SDCT) is the decision about whether a cow receives an antibiotic dry-cow tube in addition to an internal teat sealant.

WHAT IS THE IMPORTANCE OF THE DRY PERIOD?

Up to 70% of all new intra-mammary infections are acquired during the dry period.² The dry period is the main time during which mastitis infections are acquired on many Irish farms with infections entering the udder via the teat end. Although

the infection is acquired during the dry period, it does not manifest itself as a case of mastitis (or subclinical mastitis) until lactation begins. We, therefore, can attribute many early lactation infections to infection acquired during the dry period.

During the dry period, a keratin plug forms in the teat canal³ and acts as a natural physical defence mechanism to protect against bacterial infections. However, this natural protective mechanism is not always effective. Roughly, a quarter of lower yielding and up to half of the higher yielding dairy cows may fail to develop a complete keratin plug in the dry period (Figure 1). Without this barrier, there is a greater risk of bacteria entering the udder.⁴

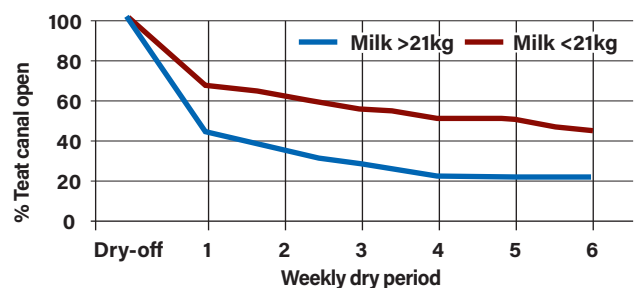


Figure 1: Percentage of teat canals open during the dry period.

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HOW TO DETERMINE THE IMPORTANCE OF THE DRY PERIOD ON FARM?

To determine the importance of the dry period on farm, you will need to analyse records of both clinical mastitis in the first 30 days after calving and somatic cell counts (SCCs) at first milk recording.

If more than one in 12 cows develop clinical mastitis during the first month of lactation, or more than one in 10 cows has a high SCC at first milk recording, then addressing the dry period in the herd is likely to improve mastitis control.

WHAT IS THE PURPOSE OF DRY-COW THERAPY?

The dry period allows the cow and her udder to recover and regenerate. The aim of dry-cow therapy is to optimise the chances of a cow calving with a low SCC (uninfected) and being at low risk of developing clinical mastitis in the next lactation. The dry period represents the best opportunity to cure existing infection, however it is still essential to prevent new infections.

Therapy allows:

- Treatment of existing intramammary infections – use of an antibiotic; and
- Prevention of new intramammary infections – use of an internal teat sealant.

It is essential that all other aspects of dry-cow management are optimal.

WHAT IS SELECTIVE DRY-COW THERAPY?

All cows benefit from the prevention of new infections by using an internal teat sealant but not all cows need antibiotics during the dry period. If a cow does require ADCT, then it is about selecting the most appropriate product for the cow's requirements. This may be broad or narrow spectrum.

Implementing an SDCT programme that consists of all cows being treated with an internal teat sealant can reduce antibiotic usage in two ways:

• Reduced clinical mastitis treatment

Research has shown that by imitating the cow's natural keratin plug, teat sealant products prevented mastitis-causing bacteria from entering the teat during the entire dry period, consistently reducing clinical mastitis by around 35% in the subsequent lactation.^{5,6}

• Reduced antibiotic use in dry-cow therapy

SDCT reduces the use of dry-cow antibiotics but requires an effective teat seal throughout the dry period. Teat sealant products are proven to work with or without a dry-cow antibiotic. This has been demonstrated in many clinical trials with Teatseal and OrbeSeal.^{5,6,7,8}

IMPLEMENTING DRY-COW THERAPY ON FARM

When implementing SDCT on farm, it is essential to gather enough information to decide whether the herd is suitable and which cows within the herd could be dried off with teat sealant only.

At a minimum the following information is required:

- Bulk milk SCC;
- Individual cow SCCs (four times, minimum); and
- Clinical mastitis records.

Ideally, clinical mastitis samples and samples of high SCC cows should be submitted throughout the year to determine the prevalence of gram-positive (eg. *Staphylococcus aureus*, *Streptococcus uberis*) and gram-negative bacteria (eg. *Escherichia coli*) on farm.

WHICH HERDS OR COWS ARE SUITABLE FOR SELECTIVE DRY-COW THERAPY?

Not all herds or individual cows will be suitable for SDCT. With SDCT, all cows are treated with an internal teat sealant, with or without a targeted antibiotic therapy. SDCT does not mean you have to stop using antibiotics altogether. Herds suitable for SDCT have⁹:

- Bulk milk SCC <200,000 cells/ml;
- Recent infection rate <5%;
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- Clinical mastitis <2% of cows over the last three months; and
- Excellent hygiene at dry off.

Cows from suitable herds have:

- Individual cow SCCs <100,000 cells/ml;
- No cases of clinical mastitis; and
- A negative California Mastitis Test (CMT).

Thresholds may vary up or down, in discussion with the veterinary practitioner, depending on the farm's individual situation, but hygiene at dry off should never be compromised.

BEST-PRACTICE DRYING-OFF TECHNIQUE

Drying off cows using the best-practice technique means that the treated cows are less at risk of post infusion infection and that you can expect the best possible results from the antibiotic dry-cow tube and teat sealant. Strict attention to detail is required. The hygiene required at drying off cows is like the hygiene that is required prior to a surgical procedure.

Initial preparation

- Drying off cows is a two-person job and cannot be done in a rush. Farmers must ensure help is available and take the time to do the job as well as possible. On average, two people can dry off up to 50 cows in two hours. Drying off should be performed in a clean, and safe environment at a separate time to milking. If drying off in the parlour, it must be washed down before starting. Drying off should be treated as a separate task with no concurrent tasks such as foot trimming or tail clipping being performed.
- All materials needed should be prepared in advance ready for dry off. Suggested materials for the gold standard approach include: a teat sealant; antibiotic tubes if required; pre- and post-dip; cotton wool swabs; surgical or methylated spirits; as well as plenty of clean, disposable gloves, paper towels and tail tape or marker



Figure 1: Preparation for drying off.

spray. Ideally, the cotton wool swabs should be prepared prior to the task and placed in a clean, covered tub of surgical or methylated spirits.

Process

- The operator must wear clean gloves. If gloves become dirty during the procedure, they need to be changed. Syringes must be kept clean whilst preparing the teats and not immersed in water.

Teats should be dipped in a rapid-acting pre-dip, left for 30 seconds and each teat wiped completely dry with separate disposable paper towels.

Gloves should be clean prior to the disinfection procedure and it is advised to start with teats furthest away from the operator. The teat end should be thoroughly disinfected with cotton wool soaked in methylated or surgical spirits until the teat wipe comes away clean.

It is easier to clean, prepare and tube one teat at a time.

If using ADCT in combination with a teat sealant, the antibiotic tube should be inserted first and massaged into the udder.

When inserting the teat sealant, the operator should firmly grasp the teat at the base of the udder, ensuring he/she does not touch the nozzle of the syringe, and slowly inject the contents. Some sealant may leak out of small teats. After insertion, the teat sealant should not be massaged into the udder. It must remain in the teat canal.

A post-milking disinfectant to cover more than 90% of each teat should be applied.

Each treated cow should be marked and kept away from the milk supply. Treated animals should be allowed to stand for 30 minutes to allow the teats to close.

All other aspects of good dry-cow management such as a clean environment and nutritional management must be considered.

WHICH ANTIBIOTIC DRY-COW THERAPY IS SUITABLE ON FARM?

The choice of antibiotic dry-cow therapy may depend on the spectrum of bacteria prevalent on the farm.

Broad-spectrum products are effective against both gram-positive and gram-negative bacteria, whereas narrow-



Figure 2: When inserting the teat sealant, the operator should firmly grasp the teat at the base of the udder.



Figure 3: Disinfectant should cover more than 90% of each teat.

spectrum dry-cow antibiotics kill gram-positive bacteria only. Generally, in broad-spectrum products the gram-negative cover is in case the cow has an infection (eg. *E. coli*) at the time of dry off or is at high risk of infusion infection – hence, a shorter acting component. The longer-acting gram-positive cover is in case the cow has an existing infection at dry off. Whether choosing a broad- or narrow-spectrum tube, ADCT is predominantly designed to kill gram-positive pathogens. In return this means that effective gram-positive kill makes gram-negative infections more likely.

There are several potential reasons for this:

- If gram-negative pathogens are present at the time of infusion they could worsen;
- There is a risk of infusion infection; and
- When using ADCT the commensals of the teat are killed because they are predominantly gram-positive. If you are reducing the cell count to a very low level, it will reduce the speed at which the immune system can react to a new infection.

Therefore, when using ADCT, there is the potential for substitution of mastitis causing organisms.

Reducing ADCT results in a potential increase in the prevalence of gram-positive infections and a rise in the bulk milk SCC. However, it decreases the risk of severe coliform mastitis.

Increasing ADCT results in a reduction in the prevalence of gram-positive infections and a reduction in the bulk milk SCC but increases the risk of severe coliform mastitis.

As a rule of thumb, high SCC cows, or cows suffering from chronic or recurrent mastitis cases are more likely to suffer from a gram-positive infection.

These cows would benefit from a targeted treatment with a narrow-spectrum cloxacillin tube as these have been shown to have better activity against gram-positive pathogens such as *S. aureus* and *S. uberis* than broad-spectrum antibiotics.¹⁰ In these herds, choosing a long-acting tube maximises the chances of a successful cure.

When appropriate, choosing a targeted treatment with a narrow-spectrum product could also help to reduce the risk of antimicrobial resistance (AMR).

The upcoming regulatory changes will provide an opportunity for vets to engage more with farmers on mastitis control and offer support, so that informed decisions on which cows are suitable for selective dry-cow therapy can be made. In the meantime, farmers should be encouraged to

ensure they gather information to support those decisions through milk recording and clinical mastitis records.

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READER QUESTIONS AND ANSWERS

1) WHAT PERCENTAGE OF NEW INTRA-MAMMARY INFECTIONS ARE PICKED UP DURING THE DRY PERIOD?

- A. Up to 35%
- B. Up to 70%
- C. 5%
- D. 21%

2) WHAT PERCENTAGE OF COWS FAILED TO FORM A COMPLETE KERATIN PLUG SIX WEEKS INTO THE DRY PERIOD?

- A. 12%
- B. 70% of high-yielding cows
- C. 35%
- D. Up to 25% of lower-yielding and up to 50% of higher-yielding cows

3) RESEARCH HAS SHOWN THAT TEAT SEALANTS HAD THE ABILITY TO REDUCE CLINICAL MASTITIS INCIDENCE BY WHAT PERCENTAGE?

- A. Up to 70%
- B. Around 35%
- C. 25%
- D. 50%

4) IMPLEMENTING SELECTIVE DRY-COW THERAPY ON FARM COULD HAVE WHICH OF THE FOLLOWING ADVANTAGES?

- A. A decrease in the prevalence of gram-positive pathogens
- B. A decrease in the number of high SCC cows
- C. It could decrease the risk of severe coliform mastitis
- D. A decrease in the bulk milk SCC

ANSWERS: 1:B; 2:D; 3:B; 4:C.