

Is it time to rethink how we use antibiotic dry cow therapy?

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What is antibiotic resistance, and why are we so concerned about it recently? What role does antibiotic use play in its development, and how can those of us working in the dairy sector positively influence this? Is there an opportunity for more prudent use of antibiotics on Irish dairy farms, particularly when drying off cows? What science is available to help guide these decisions, while still protecting the udder health of the herd? This article looks at these areas, drawing on national and international research to answer some of these questions, while also highlighting that there are still some questions to which we don't have all the answers.

WHAT IS ANTIBIOTIC RESISTANCE?

While antibiotic resistance, or AMR (antimicrobial resistance) as it is usually referred to, is a natural phenomenon and has been around as long as antimicrobials have been, it is fast becoming part of our everyday vocabulary. This is because the pace at which it has been developing in more recent years has increased, and it is now recognised as being a significant threat to human health. AMR is resistance of a microorganism to a drug to which it was previously susceptible. When the microorganism is a bacterium, and the drug to which it is resistant is an antibiotic, this is known as antibiotic resistance.

THE IMPORTANCE OF ANTIBIOTICS IN HUMAN AND ANIMAL HEALTH

Since the discovery of penicillin in 1928, antibiotics have revolutionised human and animal health and improved the quality of all of our lives. However, this is now changing, with AMR effectively 'weakening' these invaluable medical treasures. By 2050, it is estimated that AMR-related deaths in humans will have increased more than 10-fold globally, with more people dying of AMR than from cancer (Figure 1). Hence the sense of urgency about addressing this issue, and doing so at a global level.

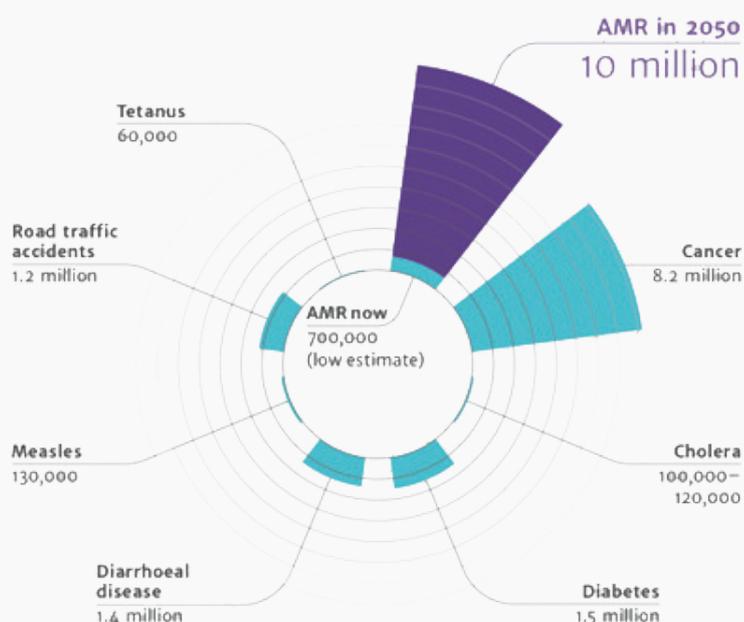


Figure 1. Estimated AMR-related deaths by 2050, relative to other causes of death. Source: www.amr-review.org.

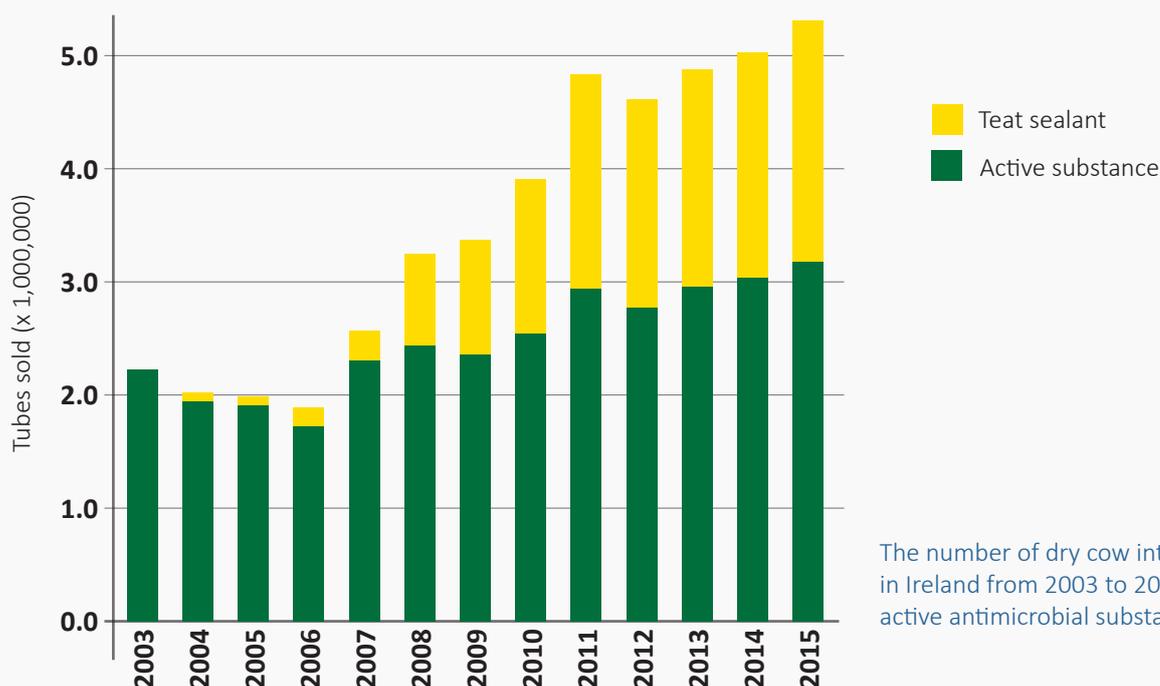
▶ CELLCHECK TIP OF THE MONTH

AMR is linked to antibiotic use – increased antibiotic use in both humans and animals is linked to an increase in AMR. In relation to mastitis-causing pathogens, there is evidence to show that different bacterial species develop resistance to different antibiotic groups at different rates. Currently, antibiotics are used by doctors to treat sick people, and in the agricultural sector to treat animals. In recent years, there has been increasing recognition of the linkage between AMR in people and antibiotic use in animals. For these reasons, there is increasing scrutiny of the use of antibiotics in the agricultural sector. There is agreement on the importance of antibiotics to treat sick animals. However, it is no longer considered acceptable that antibiotics should be used to prevent disease, particularly when there are other proven strategies. The focus of the Cellcheck programme is on improving herd and udder health, thereby reducing clinical and subclinical disease and also reducing the need for antimicrobials.

THE ROLE OF ANTIBIOTIC DRY COW THERAPY

The practice of dry cow therapy is being questioned in many countries, by farmers, consumers and society in general. Antibiotic dry cow therapy undoubtedly has an important role to play in treating infections that persist at the end of lactation and maximising cure rates. However, it has also traditionally been used to prevent new infections occurring over the dry period. Considering our changing attitude and approach towards the use of antibiotics in a 'preventative' fashion, do we also need to rethink how and why we use dry cow therapy? And in fact, how do we define dry cow "therapy"?

Recent analysis of sales data in Ireland (More et al., 2017) indicated that sales of dry cow intramammary antibiotics were sufficient to treat 100% of the national milking herd i.e. all quarters of all cows are being treated at the end of lactation. This is what is referred to as '*blanket dry cow therapy*', which until recently was recognised as best practice in mastitis control and has made a very positive contribution to udder health in many countries. However, as we learn more about AMR and what drives it, we need to review what is considered best practice, as well as the implications of modifying those 'traditional' recommendations. Change is not without risk.

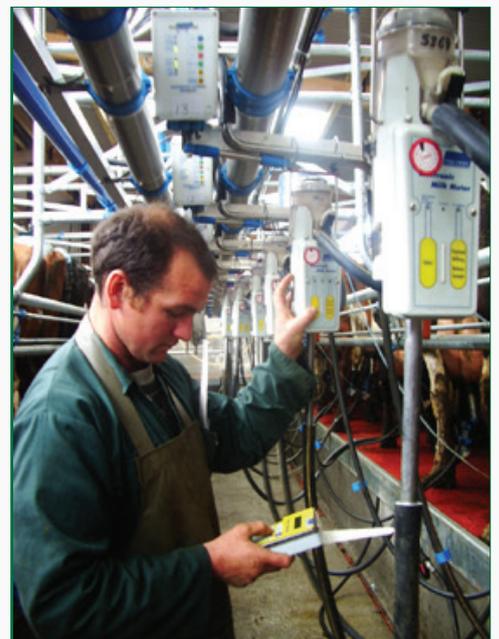
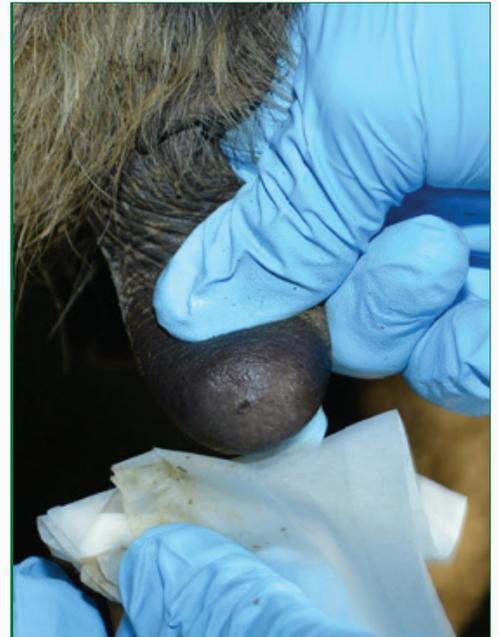


The number of dry cow intramammary tubes sold in Ireland from 2003 to 2015 containing either active antimicrobial substance or teat sealant.

WHAT ARE THE RISKS AND BENEFITS OF SELECTIVE DRY COW THERAPY?

An alternative to blanket dry cow therapy is *'selective dry cow therapy'*. This is when only selected cows i.e. those with infected quarters, are treated with antibiotic before drying off. Internal teat sealer is often then used in the remainder of the herd as one of the measures to prevent new infections. While this is considered a more prudent use of antibiotic and would reduce antibiotic use on many farms, we need to bear in mind that this practice is not without risk. So how can we manage this risk? The CellCheck Technical Working Group recently reviewed all of the science and research on dry cow therapy published since early 2000's, and have identified the following key risks:

1. The first risk is of introducing bacteria when we infuse any intramammary tube into a quarter. When we use internal teat seal only, there is no antibiotic present as "backup" and so the potential consequences are even greater. These 'introduced' bacteria are capable of causing severe cases of mastitis, sometimes resulting in death, early in the dry period. Hygiene standards and practices at drying off – as outlined in detail in the CellCheck Farm Guidelines (pages 117-119) – are essential to protect the udder health of the uninfected cow.
2. The second risk is of missing the opportunity to cure quarters that were infected at the point of drying off, to maximise cure rates before the next lactation starts. A very common question is *"how do I know which ones are the infected animals?"*. There are many criteria that need be considered when making these decisions, including milk recording results and milk culture results. Even with all this information on hand, further questions remain such as *"How many milk recording results do I need to have and how close to drying off do they need to be?"* and *"At what cow SCC level should I consider using antibiotic dry cow therapy?"*. The reality is that there are still many unknowns, and not all of these key questions can yet be answered. Everyone agrees about the key role of milk recording in helping with this decision. At this point however, different countries have adopted different herd and cow-level thresholds for deciding to treat with antibiotics at drying off. This highlights that there isn't one, simple answer to this question. Future research, both Irish and international, should help answer some of these questions, direct good and appropriate decision-making and help us to predict the outcomes and manage some of the risks involved.



IS SELECTIVE DRY COW THERAPY SUITABLE FOR MY HERD?

Currently the CellCheck Farm Guidelines for Mastitis Control, including Management Note C, outline some of the essential herd and cow-level information that must be available in order to safely consider adopting a selective dry cow therapy approach.

Selective dry cow therapy can be considered in herds where:

- There are good clinical mastitis records, milk culture results and at least 3 milk recordings in the current lactation for each cow
- Bulk tank SCC is consistently <200,000 cells/mL
- Clinical mastitis in the herd is <2% over the last 3 months prior to drying off
- The recent infection rate in the herd is consistently <5%, as indicated on the CellCheck Farm Summary Report
- Hygiene standards at drying off and management of dry cows are excellent.

Within these suitable herds, antibiotic treatment may not be required for individual cows with a somatic cell count at each of the last 3 milk recordings of <200,000 cells/mL and no history of clinical mastitis, in this lactation. These cows should also be checked with a CMT prior to drying off. The 'Milk Recording SCC' profile, available on the ICBF website for all farmers that are milk recording, can be used to create a list of all cows with an SCC <200,000 cells/mL on the last 3 (or more) milk recordings, by setting the relevant filters.

CONCLUSION

All decisions around dry cow therapy should be made in consultation with a veterinary practitioner who has knowledge of the herd, its history and environment. Over time, as more research and technologies become available, these decision-making thresholds and recommendations may change, reflecting changes in our ability to predict infection and treatment outcomes. However, the fundamental requirements of good quality information, excellent hygiene and risk management will never change.

References:

More S.J., Clegg T., McCoy F. The use of national-level data to describe trends in intramammary antimicrobial usage on Irish dairy farms from 2003 to 2015. *J. Dairy Sci.* 2017;100:6400–6413