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The SmartDry project

Summary

EU rules restricting preventative antibiotic use required a move away from blanket dry cow therapy. SmartDry is a Teagasc-led project combining on-farm trials, behavioural research and simulation modelling to define safe selection criteria, refine dry-off technique and produce decision support tools to help Irish farmers transition to a safe widespread adoption of selective dry cow therapy.

The "regulation"

European regulation on veterinary medicinal products that came into effect in Ireland in 2022 prohibits preventative use of antibiotics (European Parliament and Council, 2019). In Ireland, "blanket" antibiotic dry cow therapy (treating all quarters of all cows at dry-off) had been a widespread practice. A study by McAloon et al. (2021) estimated that dry cow antibiotic sales were sufficient to treat all cows in the country (100% coverage) in 2019. Although reducing, the level of blanket antibiotic use at dry-off remains a widespread practice in the industry. There is a need to promote compliance with the regulation and antimicrobial stewardship while maintaining udder health and productivity.

Selective dry cow therapy research in Ireland

International studies have mostly reported that low SCC or uninfected cows can be dried off with an internal teat sealant (ITS) alone without a negative impact for udder health compared to treatment with antibiotic plus ITS. However, the efficacy of ITS in Irish herds seems to differ from international research. Studies in research and commercial herds found that low SCC cows (<200,000 cells/mL) treated with ITS alone had higher SCC and more intramammary infections than cows treated with antibiotic plus ITS (McParland et al., 2019; Clabby et al., 2022). In the study by Clabby et al. (2022) the apparent new infection rate over the dry period was notably higher in ITS-treated cows, which was a surprising result given that ITS's only mode of action lies in preventing new dry period infections.

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The findings that in Ireland the use ITS alone in low SCC cows could result in negative impact to udder health highlighted the need of robust, local evidence and practical support tools to promote the uptake of selective dry cow therapy.

The SmartDry project received approximately 1 million euros funding from the Department of Agriculture, Food and the Marine in late 2024 to answer some of the questions around selective dry cow therapy, provide decision support and contribute to reduce antibiotic use in dairy farms.

This project combines controlled trials, observational studies, and modelling work. It will help identify dry period, calving and early lactation management practices that contribute to a low SCC in herds conducting selective dry cow therapy. Additionally, we aim to identify the optimal selection criteria to identify cows suitable for ITS treatment at dry-off and to develop an optimal teat hygiene and dry cow treatment infusion protocol for drying-off cows with ITS alone. The results from this project will contribute scientific evidence to inform the national guidelines for mastitis control.

By applying modelling techniques, we aim to predict the herd and national level impacts of widespread ITS use on SCC, infection prevalence and antibiotic use. SmartDry will also deliver decision support tools that guide dry-off treatment decisions, assess the farm level risk of ITS treatment and recommend corrective actions for its safe implementation.

One of the key features of SmartDry is to use the patient and public involvement in research model which focuses on conducting research "with" the stakeholder instead of "for" them. That is why we have designed three levels of participation:

1. a mailing list for stakeholders interested in updates from the project,
2. a group of dairy farmers that contribute to identify, co-design and disseminate the research, and
3. a targeted group of farmers that have struggled with mastitis issues and want to improve the situation so that they can implement selective dry cow therapy in their herds.

Project activities

Farmer workshops

We conducted 2 farmer workshops supported by a behaviour change specialist in 2025 to identify the research needed around selective dry cow therapy and co-design studies. In these workshops farmers identified the need for decision support on which cows should get antibiotics. Additionally, they have expressed an interest in a tool that helps them evaluate their dry period outcomes. Farmers actively participated in the design and features they would like to see in these tools, which will be hosted on ICBF (Ireland's platform to access milk recording and udder

Research co-design workshop with dairy farmers workshop.

health information). We aim to conduct 2 more workshops in 2026 and continue to develop these decision support tools.

Exploring the dry-off procedure in research and commercial herds

To date we have conducted two controlled studies in research herds and one study (on-going) in commercial herds.

We conducted a study to test a guidelines-based dry-off procedure compared to normal farm practice. This study was presented at the NMC and mastitis research workers meeting in 2024. It highlighted that, if drying-off cows with ITS alone, achieving a high level of teat cleanliness and proper technique can improve udder health in the next lactation. As a result, we have developed an evidence-based dry-off protocol for the industry and efforts now need to focus in encouraging its adoption.

A follow-up study currently ongoing is testing this dry-off protocol compared to normal farm practice in commercial herds with low, medium and high bulk tank SCC. During the autumn of 2025, the research group visited 15 farms to dry off a group of 15 cows with ITS alone and the SmartDry dry-off protocol, while the farmers dried-off 15 cows with their normal farm practice. We will evaluate the impact of this protocol on SCC and intramammary infection during the spring of 2026. We have found a high variability on the cleanliness achieved by farmers when drying-off cows.

A third study was conducted on research farms to test 3 SCC based and 2 alternative decision criteria to select ITS treatment at dry-off and its impact on udder health in the following lactation. The SCC based criteria assigned cows to ITS alone if cow SCC was <150,000 cells/mL, <100,000 cells/mL or <65,000 cells/mL. The alternative criteria used the CMT to assign ITS to cows (i.e. if all 4 quarters had a negative CMT reaction) or using an on-farm culture system (i.e. if there was no growth in all 4 quarter samples collected). Although preliminary, results suggest that udder health did not differ between the criteria. This indicates that many tests (and possibly a combination of tests) could be suitable for decision making at dry-off.

Dry-off protocol developed and tested for the project.

Cows dried on two commercial farms (by farmers) highlighting the differences in hygiene. Left: dirty teat after dry-off. Right: clean teat after dry-off.

Pilot mastitis advising

For SmartDry, we approached farmers that have struggled with mastitis issues but express a desire in improving their situation and eventually implement selective dry cow therapy on their farms. The initiative involved a pilot mastitis advising service to 5 commercial herds. We conducted a first visit, where we evaluated milking practices, collected quarter milk samples and had a conversation supported by the group's behavioural

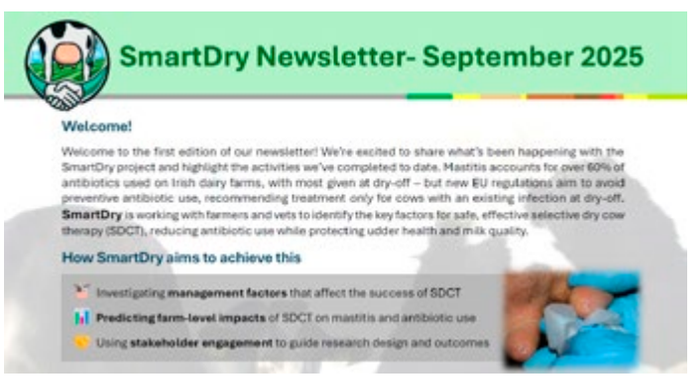
specialist with a "motivational interviewing" approach. This was farmer-led, allowing them to explore barriers for changing practices and design a way to improve. A second visit (together with several phone conversations) involved a follow-up to evaluate changes in management practices and results. Farmers have expressed an interest in continuing the initiative and, although not fully resolved, they see improvements on their farms.

During the visits, farmers highlighted that visual material and protocols would be of use to them, therefore the team is working on developing general mastitis infographics and treatment decision trees that can increase the knowledge and protocols for mastitis control. These will also be distributed to advisors, veterinarians to promote knowledge sharing.

Draft of SOPs and infographics to provide mastitis control supporting material.

Newsletter

Dissemination of research results to the wider dairy industry is a key part of this project. SmartDry will deliver a newsletter twice a year. The first one was sent in September 2025 to a list of over 300 farmers, advisors and veterinarians interested in learning more about dry cow therapy research. We are developing a dedicated project website within Teagasc's website (https://teagasc.ie) to upload the material generated from the project.



Newsletter.

Lessons from SmartDry

Reducing antibiotic use at dry-off is both a regulatory necessity and a public health priority. It will be challenging because blanket dry cow therapy was an embedded practice. By recognising dairy farmers motivations for change and making them participants of the research process we are hoping to encourage them to lead that change.

Early results from the project identify some practices (e.g. steps to achieve cleanliness at dry-off) that could improve the outcome of selective dry cow therapy in Irish herds therefore reducing antibiotic use without compromising udder health.

Acknowledgements and contact

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For further information about the project, you can reach out to pablo.silvabolona@teagasc.ie. M²