

# New trends in dairy cows drying

## Introduction

Ruminant's milk is a traditional raw material for the production of a range of dairy products that are unique in their composition. Many of them in various geographical and social locations can be included among the so-called functional foods. However, EU provisions emphasize that such products must come from milk produced by healthy animals which significantly limits milk production and consumption. A number of factors influences the continued good health of ruminants reared for market milk production. The imbalance of several factors and their combinations facilitate virulence of etiological agents, usually of bacterial origin. Worldwide, mammary gland infections - mastitis - account for up to 30% of economic losses on dairy farms and the cost of treatment of clinical mastitis is estimated on the average to reach \$ 120-150 apiece.<sup>1,2</sup>

In particular, the treatment and drying of dairy cows, which is associated with administration of intramammary antimicrobials (ATBs), has been a standard part of udder health management on dairy farms around the world in recent decades. However, this will change in the near future, as the European Union plans from January 2022 to reduce livestock ATB sales by 50% by 2030, based on strategy "Farm to Fork". This reduction is planned due to concern about the development of resistance of microorganisms to ATBs used in veterinary and human medicine.<sup>3</sup>

Medicines that are used in both humans and animals, such as third- and fourth-generation cephalosporins, fluoroquinolones and colistin, are becoming the so-called last choice drugs. The urgently required or necessary administration of ATBs in veterinary medicine remains possible in the future, but only if justified, thus eliminating the routine use of ATBs during drying, which is unfortunately still a common practice on some farms.<sup>4</sup> However, the administration of

ATBs should take place during drying only after proper diagnosis, which is already a common standard in some EU countries. Examples include the Netherlands and Ireland, which have prepared methodological manuals for their farmers describing approach to the transition to selective drying. Based on the developed methodologies, the Netherlands has managed to reduce the consumption of ATBs on dairy farms by 48% and cefalosporin by up to 99% since 2014 compared to 2009.<sup>5</sup>

In other EU countries such materials for farmers are not available which is alarming because the date of transition to selective drying for the entire EU was set for 28<sup>th</sup> January, 2022 when a new act will enter into force banning all forms of routine use of ATBs and zinc oxide, including preventative group treatment, such as a widespread drying of dairy cows.<sup>3</sup> An overview of the most commonly used intramammary antibiotics for dry cow therapy is provided in Table 1.

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**Table 1** The most commonly used intramammary antibiotics for dry cow therapy

Product	Active ingredients	Category
Kloxerate Plus DC	Cloxacillinum 500 mg Ampicillinum 250 mg	DC
Bovaclox DC Extra	Cloxacillinum 600 mg Ampicillinum 300 mg	DC
Orbeseal DC	Bismuthi subnitras 2600 mg	DC
Noroclox DC Extra	Benzathini cloxacillinum 600 mg	DC
Cefquinor DC IMM	Cefquinomum (ut sulfas) 150 mg	DC
Cepravin DC	Cefalonium 250 mg	DC
Orbenin DC	Cloxacillin Benzathine 500 mg	DC
Orbenin Extra DC	Benzathine Cloxacillin (equivalent to cloxacillin) 600 mg	DC
Ubrostar Red DC	Benethamine Penicillin 280 mg, Framycetin Sulfate 100 mg, Penethamate Hydriodide 100 mg	DC
Spectramast DC	Ceftiofur Equivalents (as the hydrochloride salt) 500 mg	DC
Quadran DC	Cephalonium 250 mg	DC
ToMorrow	Cephapirin 300 mg	DC
Quartermaster® Suspension	Procaine Penicillin G 10 <sup>6</sup> units, Dihydrostreptomycin Sulfate 1 g	DC

Note: DC – dry cows

## Selective drying of dairy cows

With the incoming legislation resulting from consumer pressure to reduce antibiotics used in primary milk production, one of the ways how to dry cows is to administer ATBs selectively. For selective administration of long-acting antibiotics only those dairy cows should be selected that have been treated during lactation (mostly with clinical mastitis) or dairy cows showing high percentage of squared bias (PSB) as part of a performance check in the last months before drying. Drying of dairy cows by waxing or keratin plugs (without antibiotics) is recommended in cases when the dairy cow had a low PSB at the last sampling before drying. If the dairy cow has a high PSB in the last control determination before drying, it is more than certain that she has subclinical mastitis and administration of antibiotics before drying is justified.<sup>4</sup>

Under breeding conditions, the selective administration of antibiotics during drying of dairy cows should be made on the basis of history, clinical examination of the udder and evaluation of SCC from the milk utility control. After considering all aspects, breeders classify dairy cows into three categories:

- **The first category** includes dairy cows which did not show any problems with the health of the mammary gland during lactation, the PSB in the sample taken before drying did not exceed  $200 \times 10^3$  in 1 ml and no clinical or subclinical form of mastitis was currently diagnosed. These dairy cows are ideal for drying without administration of antibiotics by using a keratin preparation (it definitely closes the teat canal and prevents entry of pathogenic germs) or by immersing the teats in a protective solution (Figure 1). A perfect sealing of teats prevents pathogens

from entering the teat canal. However, the keratin sealant must be applied to each teat under strict hygienic conditions.<sup>6</sup>

- **The second category** consists of dairy cows with SCC higher than  $200 \times 10^3$  in 1 ml, in which mastitis was recorded during lactation, but currently the mammary gland does not show signs of a clinical form of inflammation. For drying cows, a “Combo” application therapy for the administration of preparations based on antibiotics and keratin seal is effective. In this case, a long-acting intramammary antibiotic is applied to each quarter in conjunction with a keratin plug or protective solution. The choice of antibiotic for drying should be based on mapping the overall susceptibility of bacteria to the antibiotics used (antibiogram) on the farm as well as on the last examination of milk samples from the particular dairy cow.<sup>7</sup>
- **The third category** includes dairy cows with current clinical mastitis or chronic mastitis, or dairy cows with non-milked quarters to which it is possible to administer antibiotic preparation. In these dairy cows, the infected quarter must first be treated with intramammary antibiotic for lactating dairy cows with proper milking. Subsequently, the dairy cow should be dried according to the above scheme for the second group. This involves administration of antibiotic intramammary preparation and sealing of teats. Drying of dairy cows with clinical mastitis is very risky, and therefore, in addition to thorough milking, administration of antibiotics and keratin plug also antibiotics are applied parenterally after inspection by a veterinarian. Such dairy cows must be constantly monitored and in case of worsened health they must be milked again.<sup>8</sup>



**Figure 1** Teat sealant application with protective teat dip for cows during dry period.

## Conclusion

Observation of welfare rules and maintenance of animal health on dairy farms must remain a priority for all those involved in primary milk production. This requires correct decisions and measures aimed at minimizing the factors that increase the risk of mammary gland inflammation. The date of enforcement of relevant EU provisions is approaching, so it is high time to try new selective drying methodologies which will not only lead to the abandonment of widespread application of ATBs but will also aim to keep mastitis cases to a minimum. Correct selection cows for drying and appropriate drying procedure are very important because the faulty approach can significantly contribute to the increased incidence of mastitis, especially in the peripartum period. The use of ATBs must be based primarily on the results of targeted diagnostics which, by means of anamnestic data, clinical examination, SCC and culture of samples, reveal the health status of the udder and its physiological functions in each dairy cow. In addition to confirming the presence of the

etiological agent it is also important to examine its virulence factors as the primary cause of the majority of most mastitis are pathogens of bacterial origin that are able to penetrate into teat canals from the teat surface.

## Conflicts of interest

Authors declare that there are no conflicts of interest.

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