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## Veterinarians' attitudes toward antimicrobial use and selective dry cow treatment in the Netherlands

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### ABSTRACT

In the Netherlands, regulations have been in place since 2008 to reduce the overall use of antimicrobials to mitigate antimicrobial resistance. As part of these regulations, a ban on the preventive use of antimicrobials, such as applying blanket dry cow treatment, was introduced and alternative measures such as selective dry cow treatment (SDCT) were implemented. Both farmers and veterinarians play an important role in implementing these measures and have a shared responsibility with respect to prudent antimicrobial use (AMU). The attitude of Dutch dairy veterinarians toward restricted AMU and toward SDCT is unknown, but a favorable attitude toward this approach seems crucial for successful implementation. In 2015, an online questionnaire was collected from 181 veterinarians that contained questions with regard to their attitude and behavior toward reduction of AMU and toward SDCT. Descriptive statistics were used to describe the data, and multivariable logistic regression models with a logit link function were applied to evaluate potential associations between veterinarians' attitudes toward AMU and SDCT and the rationale behind their mindset, based on positive and negative aspects of reduction in AMU. The veterinarians were divided into 3 groups based on their opinion on 4 statements with regard to AMU and SDCT: veterinarians with an unfavorable, a neutral, and a favorable attitude toward reduction of AMU and toward SDCT. For the multivariable logistic regression analysis, the first 2 groups were combined and compared with the veterinarians with a favorable attitude. The general attitude of Dutch dairy veterinarians toward reduction of AMU was positive, and most expressed the belief that they can still be a good veterinarian when they prescribe less antimicrobials. Veterinarians indicated they progressively promoted SDCT

beginning in 2013. Most veterinarians see the advice they provide to farmers on SDCT as the best possible approach and are convinced that their farmers apply this SDCT approach. The results of the multivariable analyses showed that veterinarians with a favorable attitude mentioned positive aspects of SDCT, such as an increased consciousness of AMU among farmers, improving animal health, reducing antimicrobial resistance, and a chance to add value for the farmer, more often than other veterinarians. The latter group significantly more often indicated negative aspects of SDCT, such as a higher risk of sick cows and feeling pushed to follow the rules. In conclusion, the general attitude of Dutch dairy veterinarians toward reduction of AMU and SDCT was found to be positive. However, given the influence veterinarians potentially have on the attitude of farmers and the variability found in their attitude and behavior, veterinarians need specific attention if regional or national programs are organized trying to change behavior of farmers and encourage prudent AMU and SDCT.

**Key words:** antimicrobials, udder health, selective dry cow treatment, veterinary attitude

### INTRODUCTION

Prudent antimicrobial use (AMU) is of major importance to reduce the risk of development of antimicrobial resistance (Chantziaras et al., 2014). Several European countries closely monitor human as well as veterinary AMU. In the Netherlands, AMU in animal husbandry became subject of public debate around 2008. This debate led to regulations with respect to decreasing AMU, and AMU in animal husbandry is monitored not only at the national level, but also at the individual farm level and at the level of veterinary practices, with specific targets for each (Bos et al., 2015). Currently, in most western countries, the majority of the antimicrobials in the dairy sector are applied by farmers. The veterinarian subsequently has an advisory role toward AMU, with different responsibilities in different countries based on national legislation. Irrespective of legis-

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lation, however, farmers and veterinarians both have a role with respect to AMU and antimicrobial resistance and ought to share the accountability for prudent on farm AMU.

In the Netherlands, preventive use of antimicrobials in animal husbandry has been prohibited since November 2012 and farmers and veterinarians are encouraged to restrict curative AMU, specifically of antimicrobials that are critical in human medicine. For many years, approximately 60% of AMU in dairy cattle was related to mastitis, of which roughly two-thirds could be assigned to dry cow treatment (DCT; Kuipers et al., 2016). Since the ban on preventive use of antimicrobials, blanket DCT (BDCT) has been replaced by selective DCT (SDCT; Santman-Berends et al., 2016). To optimize AMU in the Netherlands, including the introduction of SDCT, farmers and veterinarians have a shared responsibility that is reflected in a compulsory one-on-one relationship between them that was introduced as part of the new legislation (Speksnijder et al., 2015b); together, they have to make a herd health plan and a herd treatment plan, which is based on the actual herd situation. The herd health plan contains the main points of disease monitoring and prevention at the herd level. The herd treatment plan contains the therapies for diseases such as mastitis and lameness that are treated by the farmer solely.

Rules and regulations such as this are an important cue to change human behavior, besides other factors such as education, social pressure, economics, and tools that are part of the RESET Mindset Model described by Lam et al. (2017). Apart from the actual behavior of dairy farmers and veterinarians with respect to AMU and DCT, the veterinarians' behavior is also of importance with respect to influencing farmer behavior (De Briyne et al., 2013; Postma et al., 2016; Higgins et al., 2017).

At the time when BDCT was prohibited in the Netherlands, it was unclear how to select cows for SDCT, which complicated implementation. Additionally, given the fact that BDCT had been fiercely promoted to that point (Lam et al., 2013), implementation of SDCT was perceived to be quite a challenge, specifically for veterinary practitioners as the primary udder health advisors for farmers (Lam et al., 2011). At the end of 2012, when SDCT became the standard, no guidelines were available on how to interpret and implement SDCT. Nevertheless, in 2013 most farmers implemented some form of SDCT according to their own comprehension (Santman-Berends et al., 2016). In January 2014, the Royal Dutch Veterinary Association launched a guideline for veterinary practitioners on how to select cows for DCT (KNMvD, 2014).

As of the introduction of SDCT, a major change in the farmers' approach toward the use of dry cow antimicrobials has taken place. In general, farmers have had a positive attitude toward reduction of AMU and toward SDCT (Scherpenzeel et al., 2016). Understanding the attitude of the veterinarian toward AMU, and specifically toward SDCT, seems crucial to maintain and support responsible use of antimicrobials in dairy practice. In the Netherlands, however, that attitude is unknown. Therefore, the objective of our study was to obtain insight into the attitude of Dutch dairy veterinarians toward reduction of AMU and use of SDCT.

## MATERIALS AND METHODS

### *Study Population*

In the Netherlands, all veterinary practitioners that want to work with dairy cattle are obliged to be registered as qualified cattle veterinarian in the database Geborgde Rundveedierenarts (SGD, 2015). In March 2015, all 648 Dutch dairy veterinary practitioners in that database were approached twice by email, requesting their participation in an online questionnaire. The questionnaire was subsequently distributed to the respondents who agreed to participate.

### *Survey Questionnaire*

The detailed questionnaire was distributed online to collect data on the opinion of veterinarians on SDCT as compared with BDCT, their attitude toward AMU and SDCT, their experiences with SDCT, and their experience on positive and negative aspects of reduction of AMU in general. The survey also contained generic questions about demographics of the veterinarian and their veterinary practice.

Open questions, multiple choice questions with predefined answer categories, and statements that had to be filled in on a 5-point Likert scale (Likert, 1932) were included. Veterinarians were asked about their attitude toward and knowledge from AMU and SDCT, as well as their self-reported prescribing practices, interaction with farmers, and perceived role in advising on reduction of AMU and specifically on SDCT. To study which aspects of SDCT and reduction of AMU were perceived as most important, veterinarians were asked which 3 positive and 3 negative aspects they considered most important in a multiple choice question. This question contained both predefined answers and open spaces to provide the possibility to mention aspects that were not included in the list provided. Subsequently, veterinarians were asked to rank these aspects from most to least important.

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