



Trust, agreements, and occasional breakdowns: Veterinarians' perspectives on farmer-veterinarian relationships and use of antimicrobials for Swedish dairy cattle

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ABSTRACT

Studies have shown that farmer-veterinarian relationships influence antimicrobial use (AMU) in livestock, though how they do so is unclear. On the one hand, research shows that well-established veterinarian-farmer relationships are positive for implementation of antibiotic stewardship and restrictive AMU. On the other hand, studies also show that farmer demands can increase antimicrobial prescribing and that prescribing antimicrobials can strengthen the veterinarian's relationship with farmer clients. In the present study, we focus on veterinarians' perspectives on the relationships between dairy cattle farmers and veterinarians in Sweden and explore what characterizes these relationships when restrictive AMU is described as unproblematic and when AMU becomes a matter of tension or conflict. The study draws on semistructured interviews with 21 veterinarians working with livestock in Sweden. Interviews were analyzed thematically. The study shows that from the perspectives of veterinarians, well-established veterinarian-farmer relationships generally facilitate restrictive AMU in 3 slightly different but related ways: (1) they create trust in the veterinarian and their prescribing decisions; (2) they create shared understanding concerning when antimicrobials are needed and not needed; and (3) they facilitate constructive discussions between veterinarians and farmers on AMU. To make the farmer feel listened to and to come to an agreement on AMU was described as central for the veterinarians. However, the veterinarians described agreements on restrictive AMU as sometimes requiring strategic work, such as discussions to motivate the farmer and leave the door open for antimicrobials later if needed. Such work takes time and energy and is easier within well-established relationships accord-

ing to the veterinarians. We also identified examples where veterinarians explained that they occasionally make compromises with farmers concerning antimicrobials—compromises that, according to the veterinarians, facilitate the relationship with the farmer, which in turn facilitates restrictive AMU in the longer term. The examples in our interviews where antimicrobials became a matter of tension and even conflict between veterinarians and farmers could, with a few exceptions, be traced to absence of well-established relationships. However, some veterinarians also described AMU as a matter of tension within well-established relationships, especially with older farmers who do not trust new treatment strategies. We also found a small number of examples where disagreements on antimicrobials made a relationship with specific farmers impossible. Thus, even though the interviewed veterinarians generally meant that their restrictive antimicrobial prescribing did not threaten the relationship with the farmer, our study also, to some extent, confirms research showing that restrictive AMU can harm the relationship with some clients who simply choose another, less restrictive, veterinarian. In summary, our study supports that decisions on AMU cannot be reduced to the individual prescriber's behavior, nor to a strict medical judgment. Antimicrobial use for dairy cattle needs to be understood as taking form in relationships in which both veterinarians and farmers are active parts.

Key words: antimicrobial, antimicrobial resistance, veterinarian-farmer relationship, policy

INTRODUCTION

In recent years, various researchers have argued that antimicrobial use (AMU) for human as well as animals needs to be understood as socially situated and influenced by the negotiations between various actors (Buller et al., 2015; Broom et al., 2016; Will, 2018; Chandler, 2019). Therefore, AMU can be reduced neither to a solely medical phenomenon nor to the behavior of in-

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dividual prescribers. Along similar lines, several studies have shown that farmer-veterinarian relationships influence AMU for livestock (see Farrell et al., 2021 for a review). However, exactly how these relationships affect AMU is not clear. On the one hand, research shows that a well-established veterinarian-farmer relationship is positive for the implementation of antibiotic stewardship and restrictive AMU (Higgins et al., 2017; Bard et al., 2019). Restrictive AMU includes mainly using narrow-spectrum substances, no prophylactic or metaphylactic AMU, no routine AMU to compensate for poor hygiene, and AMU only when certain that a bacterial infection is present and preferably based on bacterial culture and susceptibility testing (SVF, 2020). On the other hand, studies also show that veterinarians might prescribe unnecessary antimicrobials due to farmer demands and that antimicrobial prescribing can be a way for veterinarians to strengthen their relationship with farmer clients (Speksnijder et al., 2015; Hardefeldt et al., 2018; Golding et al., 2019). In the present study, we focus on the relationships between dairy cattle farmers and veterinarians in Sweden and explore what, from the veterinarians' perspectives, characterizes these relationships when restrictive AMU is described as unproblematic by veterinarians and when AMU becomes a matter of tension or conflict.

Farmer-Veterinarian Relationships and AMU

Studies exploring the general relationship between farmers and veterinarians have shown that farmers tend to see their veterinarian as a valuable source of information and advice on animal health (Gunn et al., 2008; Garforth et al., 2013) and that a high level of trust exists between veterinarians and farmers (Ruston et al., 2016). Research also shows that farmers' trust in veterinarians facilitates their adherence to veterinarians' advice in general (Svensson et al., 2019). According to Fisher (2013), the long and regular relationship between farmers and veterinarians creates mutual trust and a perception of shared perspectives, making the transfer of knowledge between veterinarians and farmers possible. Previous research thus indicates that long-term relationships in which mutual trust can develop between veterinarians and farmers benefit animal health.

However, studies also show that tensions between farmers and veterinarians concerning animal health practices may arise and that veterinarians perceive difficulties in making farmers implement adequate animal health and biosecurity measures. According to a study by Shortall et al. (2016), such tension could be traced to farmers' and veterinarians' divergent perspectives on what constitutes good biosecurity. In addition, farmers

and veterinarians appear to expect the other party to take the main responsibility for biosecurity (Moya et al., 2021).

Studies of how farmer-veterinarian relationships interact with AMU show slightly divergent results. On the one hand, research shows that well-established veterinarian-farmer relationships are positive for the implementation of antibiotic stewardship and restrictive AMU. On the other hand, studies also show that farmer demands can increase antimicrobial prescribing and that more frequent prescribing of antimicrobials can strengthen the veterinarian's relationship with farmer clients. Nevertheless, several studies indicate that farmers tend to trust veterinarians' decisions concerning antimicrobials. Building on trust and shared understanding, well-established relationships between farmers and veterinarians appear to facilitate the implementation of AMU policies and prudent use of antimicrobials. Similarly, a lack of mutual understanding is a barrier (cf. Higgins et al., 2017; Bard et al., 2019). In their study of pig veterinarians in the United Kingdom, Coyne et al. (2016) showed that veterinarians perceived that farmers' trust in them was essential for the AMU decision-making process. The study moreover showed that while the veterinarians perceived most clients as respecting their decisions on antimicrobials, they also recognized a small group of bullying clients who applied pressure on the veterinarians to prescribe antimicrobials. Coyne et al. (2016) also showed that while most veterinarians understood prudent use of antimicrobials solely as their responsibility, some veterinarians instead saw AMU as a shared responsibility between farmer and veterinarian. These veterinarians generally described their relationship with farmers as a mutual partnership characterized by cooperation.

Hardefeldt et al. (2018) showed that Australian veterinarians in companion animal, equine, and bovine practices occasionally felt pressure to prescribe antimicrobials to keep clients satisfied and happy—and thus not lose them as clients, which would negatively affect business. Because convincing clients that antimicrobials are not needed takes time and energy, a large workload and lack of time made restrictive use of antimicrobials particularly challenging. Along similar lines, Speksnijder et al. (2015) showed that veterinarians working with different kinds of farm animals (poultry, swine, veal calves, and dairy cattle) in the Netherlands reported that refusing to prescribe antimicrobials was potentially uncomfortable and might lead to the farmer choosing another veterinarian. In their study on dairy cattle veterinarians, Golding et al. (2019) made similar findings in relation to cattle (dairy and beef) and sheep veterinarians in the United Kingdom.

A previous qualitative study from Sweden (Fisher, 2013) shows that dairy cattle farmers do not perceive antimicrobial use as a common cause of conflict with veterinarians. Farmers were loyal to their veterinarian's prescribing decisions and the strict Swedish AMU policy, which means a veterinary prescription is necessary for receiving antimicrobials for the animals. The dairy farmers explained that they value the relationship with the veterinarian highly. They wanted the communication with the veterinarian to be trust-based, e.g., drawing on mutual trust regarding competence and knowledge. Our study (Gröndal et al., 2021) confirmed that AMU is not a common matter of conflict between Swedish dairy cattle farmers and veterinarians. Veterinarians described a restrictive use of antimicrobials as something that is mostly unproblematic and seldom causes disputes with farmers. In the present article, we focus on this matter, thus bringing further insights into how dairy cattle farmers and veterinarians interact with AMU in general and restrictive AMU in particular. We explore dairy cattle veterinarians' perspectives on what characterizes farmer-veterinarian relationships when AMU is described as unproblematic and when AMU is described as a matter of tension or conflict. Thus, the article explores Swedish dairy cattle veterinarians' perspectives on how farmer-veterinarian relationships interact with antimicrobial prescribing. The study primarily aims to contribute to the ongoing discussion in research and policy on antimicrobial use and implementation of AMU policies in relation to livestock where assumptions on the effects on veterinary behavior need to be based on perspectives from different settings. However, it also has the ambition to give more general insights into veterinarians' perspectives on farmer-veterinarian relationships, which are also of importance beyond antimicrobial use.

MATERIALS AND METHODS

Ethics Statement

According to the Swedish Ethical Authority, the study did not require ethical approval because no sensitive personal information was collected (Ethical Review Act, 2003).

Setting

From an international perspective, the AMU and antimicrobial resistance (AMR) are low in Sweden (ECDC, 2021). Sweden has a long history of work against AMR and toward reducing AMU in human as well as veterinary medicine. In 1986, Sweden was the first country in the world to ban the use of antibiotic

growth promoters in feed. In 1998, the Swedish Veterinary Association adopted a general antibiotic policy (SVF, 2020), stating that antimicrobials should only be used when absolutely necessary, and that infection preventive measures should be applied as far as possible. Preventive AMU is not acceptable; broad-spectrum antibiotics should be avoided as far as possible and treatment should be based on bacterial culture results. Swedish legislation has long contained restrictions on veterinary use of quinolones and third- and fourth-generation cephalosporins, and a ban on veterinary use of certain antimicrobial substances. Importantly, Swedish veterinarians are not allowed to sell the pharmaceuticals that they prescribe (Grundin et al., 2020).

A prescription is always required for antimicrobials and, in most cases, must be preceded by an on-farm diagnosis. Dairy farmers are generally not allowed to initiate treatments themselves and do not have antimicrobials on the farm. The Swedish Veterinary Association has also published guidelines for AMU in various species, and detailed guidelines for AMU in cattle and pigs have existed since 2011 (Lingheimer et al., 2016; SVF, 2017; Grundin et al., 2020).

A small proportion of the Swedish dairy farms are associated with VILA (conditional medical use) and are allowed to keep a small stock of narrow-spectrum antimicrobials and anti-inflammatory drugs to initiate treatment for a specific set of conditions (mastitis and interdigital dermatitis). Any other treatments require a visit by a veterinarian. Farmers enrolled in VILA must fulfill certain animal health and biosecurity requirements and the farmer or personnel must take part in a specific education. In addition, the farm is regularly visited by the ordinary herd veterinarian who inspects the farm, the health of the animals, and the treatment records.

In addition, Sweden has stricter animal health and welfare regulations than EU standards. There has also been a large focus on biosecurity and prevention of disease both from governmental organizations and the industry (Grundin et al., 2020; Wierup et al., 2021). Voluntary programs for systematic herd health management and biosecurity have been established, and the majority of dairy herds are affiliated with some herd health program. Veterinarians also perform more frequent advisory visits to farmers on demand (Svensson et al., 2019). Thus, bovine veterinary practice involves attending to emerging health problems and providing preventive animal health advice. All veterinarians have a responsibility to report suspicion of notifiable diseases and noncompliance with the animal welfare legislation.

As in many countries, Swedish animal production has undergone large structural changes and farms have become larger and fewer (Lingheimer et al., 2016;

Hajdu et al., 2020). The age of the average farmer has constantly increased. Smaller farms do not tend to be taken over by a younger generation, but rather tend to disappear when the farmer retires (Lingheimer et al., 2016; Jordbruksverket, 2021). Studies indicate that Swedish farmers experience increased competition, decreased agency, and a general impoverishment of the conditions of farming (Wästfelt and Eriksson, 2017; Hajdu et al., 2020).

The structural changes in animal production are particularly evident in relation to dairy. Between 2010 and 2020, the number of dairy farms in Sweden was reduced by 45% (to approximately 3,000 dairy farms). At the same time, the average farm increased from 62 to 98 milking cows (Jordbruksverket, 2021). The milk yield per cow has increased, and Swedish dairy cows are among the most productive in Europe (Lingheimer et al., 2016). However, despite this development, the Swedish dairy industry is still quite diverse. While around 66% of dairy cows live in herds larger than 100 cows, many smaller farms still exist (Lingheimer et al., 2016; LRF, 2022).

Participant Recruitment and Data Collection

Recruitment of veterinarians was done by the first author, who called both veterinarians in the District Veterinary Organization (**DVO**; a separate branch of the Swedish Board of Agriculture that offers year-round 24 h/d national animal health services, on a pay-per-consultation basis) and self-employed practitioners (all located in the middle and south of Sweden). Practices were initially identified through the DVO website and, when calling, the veterinarian(s) who worked most with dairy cattle were requested. Self-employed veterinarians were identified by searching for web pages of cattle veterinarians. Inclusion criteria were: working with dairy cattle and having experience in prescribing antimicrobials to dairy cattle. Many Swedish veterinarians work in mixed practices and we did not want to limit the study to veterinarians who work exclusively (or almost exclusively) with cattle. Veterinarians from the same practice were welcome to participate, and 2 veterinarians participated from 5 practices each.

Only 1 veterinarian explicitly declined to take part in the study. In some practices, however, we never got in touch with the veterinarian after the initial call, although these veterinarians did not explicitly decline to participate in the study. We aimed for a mix of employment type (self-employed or employed by the DVO), gender, and experience, and a sample size large enough to allow for variation of perspectives and identification of key issues. Hence, we ceased the interviews when no new issues emerged during several interviews.

The interviewer did not know the veterinarians beforehand. All interviews but 1 were conducted via telephone and took between 45 min and 1 h (median 1 h). The interviews were recorded and transcribed by the first author. The quotes included in the Results section were translated from Swedish to English by the authors.

Analysis

The data were part of a larger study, and a general analysis of how the veterinarians relate to AMR, AMU, and AMU policy is published in Gröndal et al. (2021). In the present article, however, we draw on a new analysis of the same data, focusing on how veterinarian-farmer relationships interact with AMU and what characterizes these relationships when the veterinarians describe restrictive AMU as unproblematic in relation to farmers and when it is causing tension and even conflict.

The analysis was performed manually. First, a descriptive coding (17, 18) of the interviews was performed and a range of codes were created. The second step in the analysis focused on codes referring to how interviewees described relationships with the farmers in general and how these interacted with AMU in particular. Several more analytical themes (17) mirroring the complex interactions between the farmer-veterinarian relationship and AMU were developed (17). These themes are described and illustrated with quotes in the Results section below.

RESULTS

The article draws on semistructured interviews with 21 veterinarians who worked with dairy cattle in Sweden (Table 1). Some recruited veterinarians worked exclusively with cattle, while others worked primarily with other animals, particularly horses. To a large extent, this reflects the density of dairy cattle in the area where the veterinarians work. The veterinarians from southern Sweden, where there are more dairy farms, generally worked more or exclusively with dairy cattle. However, veterinarians from the middle of Sweden, where the number of dairy farms is limited and declining, generally worked with other species as well.

The extent to which the veterinarians work with planned visits and herd health management also varies. Thus, some of them work with systematic herd health management on at least 1 farm, but 10 of the veterinarians did not work in this way but only made emergency visits and planned visits in relation to castration and dehorning of calves.

The Results section is divided into 3 parts. The first 2 sections focus on the most dominant pattern

Table 1. Veterinarians who participated in interviews

Number	Practice type	Work experience (yr)	Gender	Animal species treated
1	Self-employed	33	Woman	Companion animals, cattle, horses, pigs
2	Publicly employed	2	Woman	Horse, cattle, companion animals
3	Publicly employed	20	Woman	Primarily horses and cattle
4	Publicly employed	2	Woman	Primarily horses and cattle
5	Self-employed	7	Man	Primarily cattle and horses
6	Publicly employed	12	Woman	Horses, cattle, pigs, sheep
7	Publicly employed	12	Woman	Only cattle
8	Self-employed	22	Woman	Primarily cattle, horses
9	Publicly employed	27	Woman	Primarily cattle, horses
10	Publicly employed	6	Woman	Horses, cattle, companion animals
11	Self-employed	9	Woman	Primarily cattle and horses
12	Self-employed	10	Woman	Primarily cattle and horses
13	Publicly employed	7	Man	Horses, cattle, companion animals
14	Publicly employed	32	Woman	Horses, cattle, sheep, pigs
15	Self-employed	8	Woman	Primarily horses and cattle
16	Publicly employed	2	Woman	Companion animals, horses, cattle
17	Publicly employed	8	Woman	Cattle and companion animals
18	Publicly employed	13	Woman	Cattle, horses, companion animals, sheep
19	Publicly employed	>1	Woman	Horses, cattle, sheep, companion animals
20	Self-employed	22	Man	Horses, cattle, companion animals
21	Self-employed and publicly employed	7	Woman	Only dairy cattle

in the interviews, namely when AMU is not perceived as a matter of tension or conflict and how this interacts with veterinarian-farmer relationships. First, we describe how well-established relationships, according to the veterinarians, create trust in the veterinarian's prescribing decisions and a shared understanding of AMU. In the next section, we explore further how the veterinarians describe reaching agreements on AMU within well-established relationships. In the last section, we explore the more uncommon examples in the interviews where the veterinarians describe AMU as problematic and, more specifically, how this relates to the farmer-veterinarian relationship. Illustrative quotes are used throughout the Results section.

Well-Established Relationships as Creating Trust and Shared Perspectives on AMU

The veterinarians in our study described their relationships with dairy farmers as generally well-established. Relationships were often long-term—commonly ongoing over several years—and involved frequent visits to the farm. Importantly, the veterinarians generally noted that they communicated with the animal owners. Thus “farmer” was generally equalized with owner of the farm in the interviews. As a consequence, the veterinarians shared how they and the dairy farmers often come to know each other personally and how a collaborative atmosphere could develop. For example, 1 veterinarian jokingly referred to her and her ordinary dairy farmer clients as “partners in crime” (Interview 17), indicating that they cooperated toward a shared goal. Several veterinarians described the relationship

and cooperation with farmers as important for them and a positive side of being a livestock veterinarian. One example from the interviews follows:

Interviewer: So you get to know them?

Veterinarian: God, yes, I do.

Interviewer: You have worked with the same [farmers] for a pretty long time then?

Veterinarian: Yes. [laugh]

Interviewer: So you get to know each other?

Veterinarian: Yes, but actually that's sort of the fun thing with this job—that you know them well and ... yes ... (Interview 8).

As shown in Gröndal et al. (2021), a dominant pattern in the interviews was that the veterinarians generally described antimicrobial prescribing—and to be restrictive with antimicrobials—as rather unproblematic. However, when analyzing the interaction between AMU and the veterinarian-farmer relationship, it became evident that this was especially characteristic for AMU within well-established relationships. The veterinarians explained that such relationships facilitated both shared understanding of when antimicrobials are needed and perceived that their ordinary farmer clients trusted their decisions on antimicrobials. The clearest examples of this are from interviews with veterinarians who have worked with the same farmer over several years:

Interviewer: Yes. But does it happen that ... is it seldom, never more or less that you perceive that the animal owner wants antimicrobials when you say no, or is it more like ...?

Veterinarian: No, actually not. If I say that they do not need it, then ... then they accept it.

Interviewer: You who have worked for quite a long time, has it changed or has it always been relatively simple ... that?

Veterinarian: No, I think that it always has been simple, and then of course ... the more time you spend in the same place, you get to know each other. So it never emerges discussions about that. ... Yes, well, you become as good old friends after all these years. (Interview 9).

The veterinarians generally described themselves as adhering to the national AMU policy and the Swedish Veterinary Association's guidelines for AMU in cattle. Well-established relationships where farmers trust their veterinarians were, according to the veterinarians, key to communicating and implementing changes in AMU policies and guidelines. One example was when the quinolone drug Baytril vet (previously used for *Escherichia coli* mastitis in dairy cows) had become restricted to save quinolones for human use. Most veterinarians described this new national policy as quite fast and, importantly, some veterinarians described how the implementation was made easier by well-established relationships with farmers. An example of this from the interviews follows:

Interviewer: But how was it, you know, the first time when you said that [Baytril should not be used for coli mastitis]?

Veterinarian: Then there has been opposition, and there are farms who [have] switched to another veterinarian since they became irritated by this. So it's not uncontroversial, and again it probably comes down to whether or not you are trusted in the first place, because you cannot come to whomever and say "This is how it is." But if you have—if they know you do it for a reason or ... how can I put it? (Interview 8).

In the quote, the veterinarian emphasizes that she believes that the farmer's trust was crucial for implementing new treatment strategy for *E. coli* mastitis, which meant that instead of quinolones, frequent milking and anti-inflammatory drugs were used.

Reaching Agreements on AMU Within Well-Established Relationships

Within well-established farmer-veterinarian relationships, decisions on antimicrobials were generally described as matters of discussion or shared reasoning. Decisions concerning antimicrobials were therefore framed as something in which the farmer was an active

part. Throughout the interviews, involving farmers in discussions and reaching agreements with the farmers was described as central for the veterinarians. An example follows:

Interviewer: And in general, when you prescribe or chose not to prescribe, do you agree then? Do you feel that—do you and the animal owner usually agree?

Veterinarian: Yes, I think so. We have known each other for a long time, so we have a good discussion. (Interview 9).

Importantly, this state of affairs (e.g., agreements about AMU after discussions) was generally described as positive for restrictive antimicrobial use. Thus, in most examples, relating to the farmers as an active part in decisions on antimicrobials was not described as producing unnecessary AMU. To some extent, this could be traced to the shared perspectives on antimicrobials that, according to the veterinarians, generally characterized well-established farmer-veterinarian relationships. Thus, and as showed in Gröndal et al. (2021), veterinarians described farmers as making adequate assumptions concerning when antimicrobials were or were not needed and as unwilling to use unnecessary antimicrobials. As 1 veterinarian stated: "... and you notice, you know, that they want—none want to use antimicrobials if they do not have to" (Interview 17).

Notably, however, the unproblematic status of restrictive AMU within well-established relationships was not always described as something that could be taken for granted. The veterinarians described that they employed various strategies to avoid potential tension and conflicts and still be restrictive with antimicrobials. Thus, the unproblematic status of restrictive AMU within well-established relationships was described as the consequence of active work in many interviews. One strategy commonly referred to was explaining and motivating the AMU decisions for the farmer:

Veterinarian: ... I usually ... to take a concrete example, it's maybe interdigital dermatitis. We know that many cows get better simply by salicylic acid bandage. And then you can [say], "Well, we give Metacam or Dinalgen [anti-inflammatory drugs] now and then if the fever does not get down. If it does not get better, you call tomorrow or the day after and then we arrange for you to get antibiotics."

Interviewer: Yes, so they can just get in touch again if it ...

Veterinarian: Yes, and then, most of them are OK with that. And then you can motivate them. If it

is beef, I usually motivate with that it's less work, that they only need to change this bandage a few times. And if it's dairy it—they can deliver, if you give Dinalgen, they can deliver the milk directly, directly when the cow is OK, and they do not have to wait in . . . almost a week before they can, can deliver milk. . . . But then I can usually say like this, that “If it doesn't get better, you get in touch and then we will discuss and see how we can proceed.” (Interview 11).

In this quote, the veterinarian describes how she uses the withdrawal times to motivate decisions not to prescribe antimicrobials for a cow with interdigital dermatitis. The veterinarian also explains how she encourages the farmer to get in touch again if the cow (which is not treated with antimicrobials) is not getting better. Several veterinarians described this strategy as something they—often successfully—employed to prevent farmers from being disappointed by a decision to refrain from antimicrobials. A similar example follows:

Veterinarian: Most often . . . I feel that the majority of the animal owners in our area perform their own selection. They might not contact us for all cows with lumps in the milk, but have kind of learned who will get antimicrobials, for whom it is worth the effort of contacting a vet. And so they mainly contact us for them, maybe. Some farmers become a little—if you say that they don't get any antimicrobials, some farmers might be a bit like . . . I would not call it grumpy, but like this: “Yes, but what if antimicrobials are needed after all?” But we have an OK relationship with most of our animal owners, I think, and then you can say like this: “But we will find out what grows in there, and when you get the result of the test, you call me.” (Interview 2).

By awaiting the result from the bacterial culture, the veterinarian can refrain from antimicrobials and still make the farmer feel that antimicrobials are not ruled out. Several veterinarians described this strategy. The quote also illustrates how farmers (especially within well-established relationships) often have learned when antimicrobials could potentially be needed. A similar example follows:

Veterinarian: And you can always say like: “I don't think this one will need antimicrobials and I think we should do like this, but if it doesn't get better, if it is worse tomorrow or the day after . . .” I mean that you can have a plan and that they are welcome to call and say “No, this does

not work. I need antimicrobials.” And then, then it usually does not—then it usually works out well to arrange it in that way if they were expecting antimicrobials and are a bit reluctant, then you can have such an arrangement and then you seldom need to prescribe antimicrobials.

Interviewer: No.

Veterinarian: But they feel that they are listened to, that you don't dismiss them totally, you know. (Interview 17).

To make the farmers feel that they are listened to and that their knowledge and views are not dismissed but accounted for was emphasized in many interviews as important for the veterinarians. Another example follows:

Interviewer: Right, but do you not feel that it's hard, that they become irritated when you say you want to wait, or that it doesn't . . . Does it usually go down well?

Veterinarian: Well, yes it does. It does. Then sometimes . . . and if you notice that they become a bit quiet and had other expectations, you can reason. And sometimes, if you prescribe antimicrobials despite that you had not planned for it, they understand that they can get their own way sometimes also, and if they feel that, “No, we want to treat this,” then I don't say just no, but I discuss and then we arrive at something. Then it becomes much simpler later also, but there isn't much . . . not much fuss about that actually. (Interview 5).

In the quote above, the veterinarian, on the one hand, states that a decision to refrain from antimicrobials generally does not cause conflicts with farmers. On the other hand, he describes that he does not say “just no” but discusses with the farmer and sometimes even prescribes unneeded antimicrobials to maintain a good relationship with the farmer. Thus, in this example, being restrictive is described by the veterinarian as generally unproblematic. However, to reach this state of affairs, the veterinarian might at specific times need to be non-restrictive. Below follows a similar example concerning the policy change restricting Baytril vet (quinolone drug):

Interviewer: Has it changed, do you think, you who have worked for a pretty long period of time, or has it been just as easy to get along all the time?

Veterinarian: Well, it was some discussions when, when the strategy for treatment of coli masti-

tis was reshaped, and then we got—there were several years when you had to discuss, but they have, most farmers have understood the strategy nowadays, so they accept it.

Interviewer: But was it hard then, or was it like ... did you have to make efforts ...?

Veterinarian: Yes, hard. You had to ... you had to discuss and motivate why and sometimes you had to, how should you put it, compromise. But if—most of them has ... nowadays I don't think that is a problem. (Interview 14).

Also, in this quote, compromises with farmers are described as a tool for managing farmers' dissatisfaction with a more restrictive policy and AMU practice.

Tensions and Breakdowns

Even though the veterinarians describe restrictive AMU as seldom being problematic in relation to, or causing conflict with, farmers, we have also identified examples of the opposite in the interviews. In most cases, these can be traced to a lack of well-established relationships between farmer and veterinarian. Thus, while generally describing AMU as unproblematic, several veterinarians stated that tensions potentially emerge when they come to new farms. Trust and shared perspectives concerning when antimicrobials are needed might be lacking here. One example follows:

Veterinarian: ... That's the way it is now in our—so we have a collaboration when on call time with 2 older colleagues who have worked alone for quite long without colleagues to discuss with, and sometimes you can notice that they are stuck in that kind of old treatment regimen that no one, that no one of us really wants to acknowledge, so ...

Interviewer: But can it be difficult in relation to animal owners, if you come to someone who is used to ...?

Veterinarian: Yes, it can and sometimes, it has happened that we have prescribed when the animal owner has requested it, but we are usually quite bold with saying that there is no evidence for this and next time, yes we take the discussion always, also next time, so. But it is hard as long as these older colleagues work in the same district since it's the same, yes, it is these farms we come to when on duty. So I am thinking it will be easier when they quit. (Interview 12).

In this quote, the veterinarian describes that she and her colleagues at the shared practice “take the discus-

sion always” about antimicrobials, also when meeting new clients. Compared with discussions within the well-established farmer-veterinarian relationships, however, in this case, the discussion ends with an (according to the veterinarian) unnecessary prescription. A similar example follows:

Interviewer: In those places [specific farms], could it also be that they wanted something broader than penicillin?

Veterinarian: Yes, we have—they ... used to always get Hippotrim [Trimethoprim-sulphonamide combination] for coli mastitis, and we don't treat those with antimicrobials at all. Yes, in exceptional cases, it happens of course. Of course it has happened. It's not like that, but we don't use it as a standard treatment on coli mastitis, and there are some farms who are, who are used to that. And then, sometimes, it might of course [have] happened that “Yes, sure.” You know, you are tired, it is a late night, you: “Yes, fine.” You sometimes don't have the energy to take the discussion, but it probably is, it probably is a question of getting used. (Interview 11).

Also, in this quote, the veterinarian describes how restrictive AMU might be difficult at farms where she does not usually work since they are used to other prescribing practices. The veterinarian emphasizes that it is harder to resist farmers' wishes if she is tired and does not have the energy to discuss. Also, in these examples, the veterinarian tries to avoid conflicts and reach agreements. However, in contrast to the well-established relationships described in the previous section, avoiding conflicts is harder to align with restrictive AMU in these situations.

Another example illustrating how the veterinarians in our interviews describe the difference between well-established and non-established relationships between farmer and veterinarian follows:

Interviewer: But it is common that they do not really ... or that ... Do you perceive that it is more common that the animal owners are a bit hesitant [if you do not prescribe antimicrobials]?

Veterinarian: It actually differs a bit. I feel that those we visit regularly are sort of more, but those we don't usually visit, when you say, for example, about a interdigital dermatitis: “Here we could wait with the antimicrobials,” [they respond] “No, I want it instantly anyway.” “But I don't believe it is needed, and then you will get seven days of withdrawal time.” “Yes, but we might skip it then.” “If it does not get better,

you can come in and pick up a bottle.” So the [farmers] we usually meet, I feel they trust us more, while the other [ones] are more like: “Yes, but this is how we always do it.” It is probably dependent on the personal relationship I believe. (Interview 16).

Veterinarians state that personal relationships with farmers make refraining from antimicrobials unproblematic, whereas not having a personal relationship makes refraining harder. In several interviews, veterinarians also described that it had been harder to be restrictive with antimicrobials when they were newly graduated and well-established relationships with farmers were lacking.

Not all examples in the interviews where restrictive AMU was described as problematic can be traced to a lack of well-established relationships. In some interviews, the veterinarians describe that AMU sometimes is difficult in relation to older farmers (old was defined by veterinarians) who, according to the veterinarians, have not understood or accepted recent changes in AMU policies.

Veterinarian: Generally speaking, the older farmers with very few cows, who have not really kept themselves updated, who maybe are getting closer to retirement now, who have had the cows since the '80s at least, then we had another AMU policy. **Interviewer:** Yes.

Veterinarian: So, they sometimes think that “This one needs treatment.” “No we do not treat those cows today.” And it’s not as it becomes a conflict, but they cannot really understand because you did that in the past. Then you prescribed for . . . Today we have learned that especially these we call subclinical, those who have no actual symptoms, they have high cell counts, so there are bacteria and if you culture, there are bacteria but they are not sick from them, not in the udder and not in the cow. In the past, we put them on treatment . . . and sometimes they don’t understand why we do not want to prescribe. It doesn’t become a conflict, but they don’t understand and it might be that there is no point in explaining. It’s just to say “This is how it is. This is how we do now.” You know “Sorry. I am sorry, but it won’t be better with something else.” (Interview 18).

In this example, the veterinarian describes how explaining is impossible in some veterinarian-farmer relations. In this case, however, the veterinarian leaves the tension intact and leaves the farmer disappointed. In a

similar example, the farmers’ wish for unnecessary antimicrobials is instead met by the veterinarian:

Veterinarian: But I can say that there still are places where we cannot take the discussion that they should not have Bimotrim [for *E. coli* mastitis], so they get it. There are some farmers we do not . . . where, no, no.

Interviewer: They feel it has effect?

Veterinarian: Yes. They are so convinced that it has an effect. And you know, they have had someone who died, and I can say that “Well, she had died anyway, but ahhh . . . so then, yes.” (Interview 6).

Another example follows:

Veterinarian: It is specific. Here in [X] or maybe at our station, we treat some coli mastitis at some farms with Trimsulfa (Trimethoprim-sulphonamide).

Interviewer: Yes, hm . . .

Veterinarian: Despite that, you know, you have explained it theoretically that this won’t make any difference and then you have shown it practically with some animals that “Look here, we have treated some just supportively” but then they have one who dies and then you are back on square one, you know. And then it’s difficult, so there are some specific farms that have problems and yes, there you have sort of came to a dead end because they know that now I am coming and I will nag and they have already decided that . . . yes. There are such farms. Otherwise, I would say that they generally trust what do you, but in relation to some specific stuff, they are determined. (Interview 15).

Also, in this example, the farmers’ experiences from animals dying and their conviction that a specific prescribing practice is wrong causes an unnecessary prescription of antimicrobials. However, worth noting is that this veterinarian states that these farmers in general trust her and her AMU decisions.

Importantly, in some cases, the lack of shared perspectives, and conflicts on AMU, make the veterinarian-farmer relationship impossible. One veterinarian explains that his way of adhering to AMU policy has led to him losing some clients:

Interviewer: Generally speaking, how do you think, if you think about mastitis with, yes, maybe the example you had, if you come to a farm or if they

call you . . . do you generally feel that you and the farmer share an understanding of when antimicrobials [are] needed or not—is it, you know?

Veterinarian: Yes, but we do that. It is like this that I actually have these farms since these farms think I am good and we share perspectives. When I started, there were other farms who always wanted to treat coli mastitis with Baytril or Bimotrim and penicillin at the same time and they do not call me any longer because I said no and then they call X and they apparently accept to do it that way. So the ones I have, yes, I can discuss with them and we agree. I think we share the same approach. (Interview 6).

In the quote, antimicrobial use, on the one hand, is described as unproblematic and easy with ordinary clients. On the other, the veterinarian also describes how a lack of shared perspectives concerning when antimicrobials are needed can make the farmer-veterinarian relationships impossible. Thus, shared views and constructive discussions and agreements concerning AMU are described by this veterinarian as necessary for maintaining a farmer-veterinarian relationship.

Beyond the generally unproblematic status of restrictive AMU, which was a dominant pattern in the interviews (Gröndal et al., 2021), there were also examples of the opposite. Occasionally, farmer-veterinarian relationships break down due to a lack of shared perspectives on when antimicrobials are needed. By ending such relationships, conflicts can be avoided. However, the unnecessary AMU (according to the interviewed veterinarians) can continue due to the possibility for the farmer to find another, less restrictive veterinarian.

DISCUSSION

Well-Established Relationships as Facilitating Restrictive AMU

This article explores Swedish dairy cattle veterinarians' perspectives on how farmer-veterinarian relationships interact with antimicrobial prescribing. A key finding is that the veterinarians describe well-established veterinarian-farmer relationships as generally facilitating restrictive AMU. Within such a relationship, AMU and, importantly, restrictive AMU was commonly described as unproblematic. This finding resonates with several previous studies, showing that well-established relationships and farmers' trust in the veterinarian is important for restrictive AMU (Coyne et al., 2016; Higgins et al., 2017; Bard et al., 2019).

However, the study indicates that the mechanisms through which well-established relationships interact

with restrictive AMU are complex. From the perspectives of veterinarians, well-established relationships seem to make AMU unproblematic in relation to farmers in 3 slightly different but related ways: 1) They facilitate trust in the veterinarians in general and their prescribing decisions. 2) They create shared understanding of when antimicrobials are needed and not needed. 3) They facilitate constructive discussions between veterinarians and farmers on AMU. According to our analysis, the unproblematic status of restrictive AMU within well-established relationships is thus not simply the consequence of the farmers' adherence to decisions by veterinarians. The veterinarians described making the farmer feel listened to and coming to an agreement on AMU as central for the veterinarians. Several of the veterinarians in our study even describe the personal relationship to farmer clients as a positive aspect of their work. This finding complements research showing that farmers value the relationship with the veterinarians (Gunn et al., 2008; Garforth et al., 2013) and indicates that veterinarians value the relationship with farmers and put a lot of effort into this relationship.

Farmers were thus described by the veterinarians as actively involved parties in decisions on antimicrobials. Thus, from the veterinarians' perspective, decision-making was shared, at least to some extent. In their study of cattle veterinarians in the United Kingdom, Ruston et al. (2016) made similar findings; most of their respondents described how they strived away from the role of authoritarian expert and instead aimed for shared decision-making with farmers. Shared decision-making between veterinarians and farmers has been discussed both as desirable and a factor for successful interventions, and as challenging due to veterinarians' and farmers' different perspectives on animal health (Ritter et al., 2019; Svensson et al., 2019; Shortall, 2021). Notably, the veterinarians in our study did not describe that discussions and agreements with farmers generally lead to unnecessary AMU. Instead, they explained how they managed to be restrictive in cases where restrictive AMU could potentially conflict with farmers' wishes through diligent work such as discussions, motivating the farmer, leaving the door open for antimicrobials later if the cow did not get well, and referring to the result of a bacterial culture, etc. Thus, the veterinarians described how they take farmers' concerns seriously and try to account for them without overusing antimicrobials. A well-established relationship facilitated this kind of work according to the veterinarians. Our analysis indicates that the unproblematic status of restrictive AMU, which most informants described, might require efforts from the veterinarian. This finding resonates with findings from human medi-

cine (Gröndal and Holmberg, 2021), showing that physicians use strategic work to manage restrictive AMU. Especially, the strategy of safety netting (opening the door for antimicrobials if the patient does not get better) has been described in human medicine (Hansen et al., 2015). However, it is also important to note that it is likely that farmers' and human patients' position in relation to the prescriber differ. Farmers are professionals who, in most cases, have extensive experience in assessing their animals' health. The veterinarians in our study describe that farmers often have an adequate guess of what is wrong with the animal and what kind of treatment is needed. Thus, it is most likely easier for farmers than for human patients (and, for example, companion animal owners) to engage in discussions on antimicrobials with prescribers. That veterinarians perceive farmer clients as active parts in decisions on antimicrobials confirms that it is important to target not only veterinarians but also farmers when implementing policies for prudent use of antimicrobials. Improved communication with farmers and participatory policymaking where both veterinarians and farmers are involved are 2 possible ways to handle this insight (Reyher et al., 2017; van Dijk et al., 2017).

A related finding is that we identified some instances where veterinarians describe that they occasionally make compromises with farmers concerning antimicrobials—compromises that, according to the veterinarians, facilitate the relationship with the farmer and maintain the farmer's trust. They justify such compromises—and occasional lapses from the restrictive policy—with the fact that they can facilitate the farmer-veterinarian relationship and restrictive use of antimicrobials in the longer term. Even if these examples are quite rare in our data, they illustrate how the implementation of AMU policies sometimes cannot be reduced to a matter of adherence and nonadherence to the policy. Due to the socially situated character of antimicrobial prescribing and the specific relationships at hand, nonadherence in the short term might improve long-term adherence. Also, this insight resonates with findings from human medicine, showing that flexibility and lapses from the policy are sometimes necessary to make the policy work (cf. Timmermans and Berg, 1997; Singleton, 1998; Gröndal and Holmberg, 2021). The examples in our interviews where antimicrobials, according to the veterinarians, became a matter of tension and even conflict could, with a few exceptions, be traced to the absence of well-established relationships. To manage restrictive AMU in non-well-established relationships was in some interviews described as especially difficult when the veterinarian was tired and did not have the energy nor time. That restrictive AMU requires that the prescriber make efforts and take time,

and that this is not always compatible with long and stressful workdays has been described in previous studies from both veterinary and human medicine (Gibbons et al., 2013; Hardefeldt et al., 2018).

Importantly, however, in some instances, veterinarians did describe that they perceived it as occasionally problematic to be restrictive with antimicrobials with their ordinary clients. Veterinarians described that they knew very well which farmers it was not worth discussing AMU with. These cases indicate that long-term relationships between farmers and veterinarians and knowing each other does not necessarily lead to farmers trusting the veterinarian's treatment decisions.

Some veterinarians described how disagreements concerning antimicrobials have made the relationship with some farmers impossible. Thus, even though the interviewed veterinarians generally perceived restrictive AMU as not threatening the relationship with the farmer, our study also, to some extent, confirms studies showing that restrictive AMU can harm the relationship with some clients who choose to find another, less restrictive veterinarian (Speksnijder et al., 2015; Hardefeldt et al., 2018; Golding et al., 2019). The finding illustrates that the relationships between farmers and veterinarians are produced in and through decisions on AMU (and other matters) and when too much tension or conflict emerges, the relationship becomes impossible.

Limitations

Our findings need to be interpreted with some caution. First and foremost, we have only studied farmer-veterinarian relationships from the veterinarians' perspective. Since we have not analyzed similar analyses on interviews with farmers, we do not know if they actually experience trust in the veterinarians' decisions or if they perceive themselves as involved in decisions on antimicrobials. Importantly, farmers might challenge the veterinarians' expertise on AMU and have other perspectives than veterinarians, such as what a restrictive AMU actually is. Further studies drawing on interviews with dairy cattle farmers are thus warranted.

Moreover, our sample is small and should not be interpreted as representative of all Swedish dairy veterinarians. It is, for example, possible or even likely that the 21 veterinarians who chose to take part in our study were more positive toward AMU policies than the average Swedish veterinarian. Further studies addressing how veterinarians with varying experience and working conditions perceive the interaction of farmer-veterinarian relationships and AMU would thus be desirable.

It is also uncertain to what extent our findings are tied to the Swedish context where AMU is comparably

low and where restrictive AMU for livestock has been a prioritized issue among farmers, veterinarians, and policymakers since the 1980s. In addition, there has for many years been a large focus on both animal welfare and the prevention of infectious diseases in food-producing animals in Sweden (Grundin et al., 2020). Thus, our study calls for more research from various contexts on how the relationships between veterinarians and farmers and other actors interact with veterinarian AMU. In addition, it is uncertain how the findings from this study relate to veterinarians and farmers working with other species, for example, species where diagnosis as well as treatment of individual animals is impossible. One such example is poultry, for which, in Sweden, the AMU is extremely low (ECDC, 2021). Thus, other kinds of issues and tensions may arise here.

CONCLUSIONS

Our study supports that decisions on AMU cannot be reduced to the prescribers' behavior, nor is it solely a medical judgment. The study indicates that prescribing antimicrobials for dairy cattle needs to be understood as taking form in a relationship in which both veterinarians and farmers take active part.

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