example is the noninclusion of tetracyclines, which are by far the most extensively used class of antimicrobials in livestock. Although tetracyclines are ranked as highly important, veterinarians and farmers may regard the absence of the critically important status as justification for a more-unrestricted use. Such apparent "harmless" administration requires tetracycline resistance to be absent—or at best sparse—in zoonotic organisms. Additionally, structurally unrelated compounds linked to tetracycline-resistance genes should also be absent, because they permit the rapid spread of these genes by coselection. The converse is also true—that is, the use of tetracyclines can enhance the spread of other, unrelated genes when such genes are linked to those that confer tetracycline resistance.

Among organisms of zoonotic importance, tetracycline resistance is abundantly present and is often found on mobile elements together with other, unrelated resistance genes. Livestock-associated methicillin-resistant *Staphylococcus aureus* (LA-MRSA)—also known as untypeable MRSA (by pulsed-field gel electrophoresis with *Sma*I digestion), ST398, and CC398 (by multilocus sequence typing)—serves as a prominent example for this rationale, especially in swine husbandry, where tetracycline is by far the most abundantly used compound for oral group treatment [2]. Because this organism is virtually 100% resistant to (oxy)tetracycline, often in combination with additional linked resistance genes [3], one must consider the administration of tetracyclines to be a risk factor for the widespread occurrence of LA-MRSA infections. Although still sparse, severe cases of LA-MRSA infections have been described among persons working in close contact with livestock. It is also important to realize that tetracyclines (in particular, doxycycline) are an empirical treatment for community-acquired MRSA in human medicine.

In contrast to the exclusion of cost as a primary consideration in the WHO's list of critically important antimicrobials in human medicine, cost is highly likely to be an important consideration for farmers when antimicrobial therapy is given for prophylaxis in livestock. In this respect, the increasing number of generic compounds entering the veterinary market as potential replacements for older compounds—with a potential price shift as a consequence—may also be a point of concern.

For the reasons stated above, we consider that veterinary guidelines to reduce antimicrobial consumption—and thereby antimicrobial resistance—among key zoonotic pathogens should regard any antimicrobial agent or class as critically important when abundantly used in veterinary medicine.

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Reply to Catry and Threlfall

To the Editor—The important points raised by Catry and Threlfall [1] are that antimicrobial-resistant bacteria frequently transfer from animals to people, that there is extensive use (and overuse) of antimicrobials in food animals, and that coselection of multiresistant bacteria occurs with the use of older antimicrobials. We agree with all these points. In particular, we agree that a reduction in the use of *all* antimicrobials through judicious use is important, not just those classified as critically important on the World Health Organization's (WHO's) list. As we said in our article, "[w]e should strive to reduce the use of antimicrobials everywhere (and thus reduce resistance everywhere), including reduction of inappropriate use in humans for treatment of viral and fungal diseases, as well as for treatment of diseases in which the benefit of antibacterials is unclear (e.g., sinusitis and bronchitis)" [2, p 138].

We had no intention of leaving the impression that the use of antimicrobials not in the critically important group should not be curtailed through judicious use, nor are these other antimicrobials unimportant in human medicine. Indeed the names chosen for the other groups—*highly important* and *important*—reflect that point. As we said previously, "[i]n developing the list, the consultants did not consider any antimicrobial or class of antimicrobials used in human medicine to be unimportant" [2, p 134].

We agree that coselection of multiresistant bacteria by the use of older agents such as tetracycline is an important issue. If the use of these agents selects for bacteria resistant to critically important an-

timicrobials, then in some situations risk-management strategies for older agents should be similar to those for critically important drugs. This is an issue that needs ongoing surveillance and evaluation. To our knowledge, data on the selection of coresistance in methicillin-resistant *Staphylococcus aureus* via tetracycline use are still emerging.

Although we agree with most of the points raised in the letter of Catry and Threlfall, we do not agree that wide use in veterinary medicine alone should be a criteria for ranking antimicrobials as critically important for human medicine. The rankings of drugs according to their importance in human medicine are based on 2 criteria: (1) the agent or class is the sole therapy or one of few alternatives used to treat a serious, life-threatening disease in humans and (2) the agent or class is used to treat diseases caused by organisms that may be transmitted via nonhuman sources or diseases caused by organisms that may acquire resistance genes from nonhuman sources. WHO has made a commitment to readdress the rankings in the list of critically important drugs every few years. At a June 2009 meeting in Copenhagen, the consultants (among others) reevaluated the tetracycline class and advised that their ranking be changed to critically important on the basis of their use as one of the sole agents in the treatment of human brucellosis and the potential transmission of that disease from animals to humans [3].

The ranking of antimicrobials allows us a starting place in controlling what is happening now in terms of resistance. However, the rankings do not obviate risk-management strategies for all antimicrobials used in human medicine. Hence, we still believe that our conclusion that "[t]he ranking allows stakeholders to focus risk management efforts on drugs used in food animals that are the most important to human medicine and, thus, need to be addressed most urgently, such as fluoroquinolones, macrolides, and third- and fourth-generation cephalosporins" [2, p 132] continues to be appropriate. However, we should continue to look at all issues that cause multiresistant bacteria to arise and spread to people from food animals, including the issues raised by Catry and Threlfall.

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Antibiotic Dosing in Extended Dialysis

To the Editor—We read with interest the article by Mushatt et al [1] summarizing the slowly expanding knowledge on antibiotic dosing in extended dialysis. We would like to extend the call for additional studies in the field by suggesting changes in legislation and regulatory approval of new antibiotics/antimycotics aimed to be used in patients with acute and chronic renal failure. Basic pharmacokinetic studies under the circumstances of renal replacement therapy should be mandatory [2]. Those studies should be within preset coordinates of the renal replacement therapy that are based on current standards or current clinical practice. This would give treating physicians guidance as average fuel consumption based on the meticulous procedure of the European Union New European Driving Cycle or the Motor Vehicle Emissions Federal Test Procedure does to potential car buyers.

Furthermore, on 11 September 1945, Ms Schafstaat was the first patient who successfully underwent a dialysis treatment for acute kidney injury. The Dutch physician Willem J. Kolff, who passed away in February of this year [3], saved the life of the 67-year-old woman by treating her for 690 min (ie, 11.5 h) with a blood flow rate of 116 mL/min [4]. The treatment coordinates he set with this first renal replacement therapy (ie, prolonged dialysis time with low blood and dialysate flow rates) are enjoying an unsurpassed renaissance over the past decade for treatment of severely ill patients with acute kidney injury—these days called extended