

Risk-mitigation for antimicrobial resistance in Danish swine herds at a national level

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Abstract

In Denmark, actions to mitigate the risk related to antimicrobial resistance have been put in place continuously. Due to an increase in the consumption of antimicrobials in the Danish pig production further actions were implemented in July 2010. These were: a voluntary ban on use of cephalosporin in Danish swine herds for a 2-year period and a so-called "Yellow card" scheme from the Danish Veterinary and Food Administration (DVFA). Farmers with the highest use of antibiotics receive a Yellow Card. Approximately 10% of Danish herds are above the yellow card threshold value. The consumption in pigs is evaluated as animal daily doses (ADD) per 100 animals seen over the last 9 months (by age group). Current permit limits for a yellow card in ADD/100 animal days are 5.2 (sows and piglets), 28 (weaners), and 8 (finishers). In July 2010, farmers with an antimicrobial use close to these limits were warned by the DVFA, that unless actions were taken to reduce their antimicrobial use, they would receive a Yellow card in December. The means are, for instance, restrictions on oral medication usage and supervision from the authorities to which most expenses are to be covered by the farmer. The warning resulted in a decrease in the national consumption to pigs of 12.5 % during the last half-year of 2010 compared to the same half-year in 2009. This decrease has continued into 2011 where the consumption in January-February was 24.5% lower than for January-February 2010.

Introduction

In Denmark, actions to mitigate the risk related to antimicrobial resistance are put in place continuously. Actions have for instance been implementation of the monitoring system called VETSTAT based on recording of drug usage at herd level (Stegé et al., 2003), herd health agreements, restrictions on the use of fluoroquinolones and supervision of all veterinary practitioners in large animal practices by the DVFA. As veterinary medicine in Denmark is prescription only, the focus of risk management by DVFA, in order to reduce antimicrobial consumption, has been on the veterinary practitioner. Despite of this, the consumption of antimicrobials in the Danish pig production increased from to 3.4 g per pig in 2008 to 3.8 g per pig in 2009. The amounts used per pig are low compared to other countries with a similar pig production, and so is the prevalence of resistant zoonotic bacteria in both human and animal isolates (Danmap 2009). Hence, the current food safety risk related to antimicrobial resistance in Denmark occurs to be low.

However, among politicians and stakeholders there was a growing concern due to both the increased use of antimicrobials and due to the occurrence specifically of MRSA and ESBL in the Danish swine production. Therefore, further actions were required. The interventions applied were: 1) a voluntary ban on the use of cephalosporin in Danish swine herds for a 2-year period and 2) a so-called "Yellow card" initiative from the Danish Veterinary and Food Administration (DVFA). Thus, for the first time focus is on risk communication to the herd owner regarding the use of antimicrobials in his herd. This paper describes the interventions applied, and their effect on the total consumption of antibiotics in the Danish swine production.

Material and Methods

In Denmark, the monitoring system VETSTAT makes it possible to monitor the antimicrobial consumption closely both at the herd- and national level, and at the level of the individual antimicrobial compound. The herd's consumption can be followed closely by the farmer and herd-consultants and compared to the national average. This makes it possible to implement interventions based on the level of antimicrobial consumption in the individual herd.

In July 2010, initiatives were taken to decrease the use of antibiotics (Initiative 1) and prevent a further development of ESBL (Initiative 2).

Initiative 1. The course of events in DVFA's implementation of the "Yellow card" scheme was following:

In July 2010, permit limits for the Yellow Card scheme were defined for each of the three age groups: sows, weaners and finishers. For this purpose, the consumption was given as animal daily doses (ADD) per 100 animals, calculated as a simple 9-month moving average (by age group). Approximately the upper 10 % of the swine herds were affected, depending of the age group. The current permit limits, given for the years 2010 and 2011 are 5.2 (sows and piglets), 28 (weaners), and 8 (finishers) ADD/100 animal days.

In July 2010, 1249 farmers with an antimicrobial consumption close to or above these permit limits were warned by the DVFA, that unless actions were taken to reduce antimicrobial use, they would receive a Yellow Card scheme in December. In the future, Yellow Cards will be given monthly to new herds whose use of antimicrobials exceeds the defined permit limits. Yearly, permit limits will be regulated towards new lower values, as the consumption is reduced.

For farmers receiving a Yellow Card scheme, the following course of events may occur (Figure 1):

- A 14-day examination of party, during which the farmer can object to the decision
- If the objection is not accepted by the DVFA, a 9-month period of surveillance is started, during which the farmer must bring his herd's consumption below the permit limit. During this period there will be restrictions on oral medication usage and supervision from the authorities. All expenses are to be covered by the farmer.
- If the consumption is not below the limit following the first 9-month period, then further restrictions are implemented. These include a tightened supervision, 2nd opinion visits by external consultants who elaborate a plan of actions to be followed to decrease the consumption below the permit limits. Such a plan could include changes in the management or purchasing of animals. The farmer is charged for the expenses related to supervision, enforcement orders and bans, and 2nd opinion visits.

Figure 1. Course of events following the pig producer's receipt of a Yellow Card warning



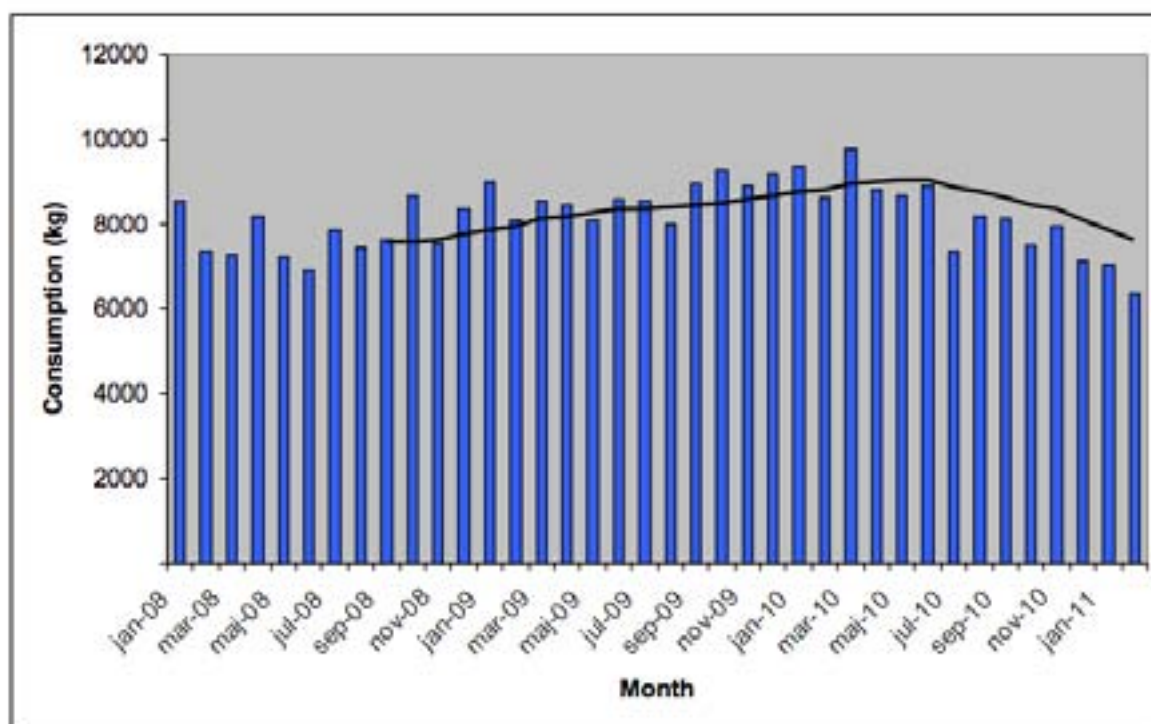
Initiative 2. With effect from July 2010, a voluntary ban on the use of cephalosporin in Danish swine herds was implemented for a 2-year period. Exemptions are only granted to farmers, who can document that cephalosporin is the only drug with effect towards a given disease causing problems within the herd.

Results

Until the Yellow Card warning in July 2010, the total consumption of antimicrobials had increased from 2008 to 2009. However, after the warning there was a significant decrease in the total consumption of antimicrobials (Figure 2). Thus, for the period July-December 2010 the total consumption was 12.5% lower than during the same half-year in 2009. This decrease is continuing into 2011 where the consumption in January-February was 24.5% lower than for January-February 2010. It is especially the use of tetracycline, macrolide, sulfa-TMP and lincomycin, which has decreased. The use of simple penicillins has increased slightly.

In December 2010, 1100 Danish farmers received a Yellow Card scheme. However, in 600 of these cases, the apparent high use was due to mistakes in the database (e.g. to low a number of animals registered to be present on the farm). The remaining 500 herds are now required to lower their antimicrobial use to below the permit limit within the next 9 months.

Figure 2. Total consumption of antimicrobials in the Danish pig production (January 2008 - February 2011). Dark line: 9-month moving average.



Exemptions from initiative 2, the cephalosporin ban in Danish pigs, have only been given to one herd. Therefore, the use of cephalosporin in Danish swine production is now negligible.

Discussion

The implementation of the Yellow Card Scheme has had a significant effect on the national consumption of antibiotics in the Danish swine production. Presumably some of the main motivators have been the fear of intensified supervision, risk of being publicly exposed and economically strained by charges and restrictions. However, the individual farmer may not necessarily see him or herself as contributing to the national consumption unless directly paid responsible. The decreased use of tetracyclines and macrolides indicates a declined oral medication of weaners; while the declined use of sulfa-TMP and lincomycin, could be due to less medication of sows.

The implementation of the Yellow Card scheme was possible because of the Danish monitoring programme VETSTAT. This system is very unique for Denmark, and therefore the Yellow Card intervention cannot easily be imitated in other countries. However, the Yellow Card scheme also has its drawbacks. These include f a w s in the registration of the number of animals

presenting a herd. Thus, if a herd is registered incorrectly as having a low number of animals, the ADD/100 animal days will be falsely high, and the herd may incorrectly receive a Yellow Card. Also, outbreaks of diseases can periodically cause a significant increase above the permit limits.

It still needs to be explored if this significant decrease in antimicrobial consumption has caused an under-treatment of animals and therefore is jeopardizing animal welfare. Although the driver behind the Yellow Card scheme is to improve or ensure food safety, no specific follow-up on the occurrence of resistance has been planned. The national surveillance on resistance in Denmark, DANMAP, may, in time, give an indication of the effect of the decreased consumption on the prevalence of resistant bacteria. It should here be born in mind that there are several other – presumably more cost-effective ways of mitigating the exposure of consumers to resistant bacteria through food, e.g. by having focus on hygiene and decontamination procedures in relation to slaughter of pigs.

Conclusion

The recently introduced Yellow Card scheme has a significant effect on the total consumption of antimicrobials in the Danish swine production. This might, in part be due to the fact that the risk management focus have been on the herd owner for the first time.

Already after the warning in July 2010 there was a significant decrease in the total consumption of antimicrobials. Thus, for the period July-December 2010 the total consumption was 12.5% lower than during the same half-year in 2009. This decrease is continuing into 2011 where the consumption in January-February was 24.5% lower than for January-February 2010.

Also, the voluntary ban on the use of cephalosporin in pigs has lead to a negligible use of this class of antimicrobial, preventing the development of ESBL.

It still needs to be explored if this significant decrease in antimicrobial consumption has caused an under-treatment of animals and therefore jeopardized animal welfare.

References

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