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Evolution of macrolide resistance of enterococci isolated from faeces of calves fed with antibiotic contaminated milk

Objectives There is a significant use of antibiotics in animal production, for example during intramammary treatment of mastitis in lactating dairy cows. Milk containing antibiotics produced during treatment and withdrawal period is usually fed to calves and pigs. The aim of this project is to study if and how this disposal of antibiotic contaminated waste milk on dairy farms may contribute to the selection and dissemination of resistant bacteria.

Conclusions The usual practice of feeding spiramycin contaminated milk to calves and pigs is causing a marked selection of resistant enterococcal strains. An exchange of resistance genes cannot be excluded. Therefore, under practical conditions, there is a high contamination pressure of raw milk during milking in such situations. The potential risk for introducing resistance genes into the food chain can not be excluded based on the present data. For this reason, it would be wise to advise milk producers not to use antibiotic contaminated milk as animal feed and to find a different destination for this product.

Main results and findings

5 cows were treated intramammarily twice with Spiramastin (1 g spiramycin) at an interval of 24 hours. Over a period of 14 days, the milk was pooled. There were 3 groups of calves:

- Group B (18 calves), fed with pooled milk
- Group K+ (6 calves), fed with normal milk and kept in the same barn
- Group K- (6 calves), the control group, fed with normal milk and kept apart from the other two groups (no direct or indirect contact with the other two groups).

During the whole experiment, milk samples were taken twice a day and faecal samples every 3 days.

The results can be summarised as follows:

- For group B, the relative number of spiramycin-resistant enterococci increased from 18% (onset) to nearly 100% at day 3 of the experiment. A small decrease began at day 15, but the relative numbers remained high at day 28 (72.4%), and absolute values did not change significantly.
- For group K+, a significant transfer through direct contact of spiramycin-resistant enterococci from group B could not be observed.
- Antibiotic susceptibility testing of the 160 spiramycin-resistant *Enterococcus* isolates revealed high acquired resistance to macrolides (100%), tetracycline (96.4%), chloramphenicol (75%) and nalidixic acid (100%). No vancomycin resistance was observed.
- All spiramycin resistant isolates possessed the *erm(B)* resistance gene. The *erm(B)* resistance gene from the 57 *Enterococcus faecalis* isolates of group B was carried on plasmids and genome (68.4%), only on plasmids (17.5%) and only on the genome (12.3%).

Publications of the NRP 49 project

Würgler-Aebi IC.

Entwicklung von Resistenzen gegen Makrolid-Antibiotika bei Enterokokken im Kot von Kälbern, gefüttert mit Antibiotika-haltiger Milch.

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