The effect of cephalosporin usage on the occurrence of ESCs producing E. coli in pig herds

An increased occurrence of bacterial strains producing extended-spectrum cephalosporinases (ESCs) has been observed and it is now the fastest emerging antimicrobial resistance problems worldwide. The usage of 3rd- and 4th-generation cephalosporins (ceph.) in livestock is believed to be significant for the development and spread of ESCs resistance. Generic antimicrobials usage is assumed to have an impact on the spread of ESCs resistance as well. The objective of this study was to assess the effect of prescribed ceph. in pig herds on the occurrence of ESCs producing Escherichia coli. The study was conducted in 19 pig herds which have had five to fourteen prescriptions of ceph. and 20 pig herds without prescribed ceph. in a previous 12 month period. The 39 herds were all integrated and represent typical Danish pig farms. The occurrence of ESCs producing E. coli in the herds were tested in a total of 9 pooled samples per herd. A pig herd was considered positive if one or more of the nine samples contained ESCs producing E. coli. Initially, the association between usages of ceph. and occurrence of ESCs producing E. coli in the pig herds was analyzed using logistic regression, and the effect was adjusted for potential confounding effect due to purchase of pigs, number of sows, and use of disinfectant. The change of OR for ceph. usages, when the potential confounders were added were less than 20%, which indicated no confounding effect of these risk factors. Therefore, the effect of ceph. usage on occurrence of ESCs producing E. coli was estimated as risk ratio (RR). The results showed that consumption of ceph. increased the risk of occurrence of ESCs producing E. coli significantly with a RR of 5 (95% CI: 2-11). This demonstrates that ceph. usage significant affect the occurrence of ESCs resistance, and in order to limit further emerging and spread, considerations of ceph. use in livestock should be taken into account. The next phase will be to consider occurrence of ESCs due to co-selection from generic antimicrobial usage.

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