

Treated and untreated cows housed side by side in tie-stalls and their respective risk of harboring bacteria resistant to antimicrobials

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Objectives: Parenteral antimicrobial treatment results in the excretion of antimicrobial-resistant bacteria. Dairy cows are commonly housed side by side in tie-stalls and often receive antimicrobial treatment. However, studies investigating treated cows as source of colonization of neighboring cows with resistant bacteria are scarce. Antimicrobial resistance (AMR) in cows (treated and untreated) in tie-stalls was investigated to assess their respective risks of carrying resistant bacteria. Furthermore, we analyzed associations of farm management with AMR.

Methods: For isolation of indicator *Escherichia (E.) coli*, rectal swab samples were taken. Cows were sampled depending on treatment history and location within barn (cow A: recently treated parenterally; cow B: untreated, next to cow A; cow C: untreated, at considerable distance to all treated cows). Antimicrobial susceptibility was tested by microdilution. Associations of AMR, treatments and management were analyzed using generalized mixed-effects logistic models.

Results: Susceptibility data on 571 isolates from 131 dairy farms were obtained. Almost no difference in prevalence of resistant *E. coli* was observed between cows B and C (B: 29.3%; C: 31.0%). Untreated cows had lower odds of carrying resistant *E. coli* than treated cows (B: OR 0.44, $P < 0.001$; C: OR 0.54, $P = 0.007$). Non-pansusceptibility of isolates was associated with antimicrobial treatment (1 treatment: OR 2.27, $P = 0.001$; ≥ 2 : OR 1.88, $P = 0.038$). Not using manure on forage crops was associated with non-pansusceptibility (OR 2.01, $P = 0.004$).

Conclusions: For daily practice, with regard to the risk of AMR transmission, results of this study do not provide evidence for the need to separate treated cows from others during treatment in tie-stalls.