Prevalence of Fecal Carriage of Acquired Expanded-Spectrum Cephalosporin Resistance in Enterobacteriaceae Strains from Cattle in France

In gram-negative pathogens, extended-spectrum beta-lactamases (ESBLs) confer resistance to penicillins, cephalosporins (including extended-spectrum cephalosporins), and aztreonam, but not to cefepime and carbapenems, and are inhibited by beta-lactamase inhibitors (8). Recently, ceftazidimases have become the most prevalent ESBLs worldwide (7) and have also been detected in animals (for instance, references 2 and 9).

Contrary to the human field (see, for instance, references 10, 11, and 13), little has been reported on the prevalence of fecal carriage of ESBL producers by animals (1, 3, 4, 12), and this issue was examined here by testing 1,264 nonduplicate specimens collected from cattle at farms and slaughterhouses in France.

From March to October 2006, fecal samples from 657 sick cattle (farm) were plated on agar supplemented with ceftazidime (1 μg/ml) or ceftaxime (1 μg/ml), 117 of which allowed colonies to grow. After determination of MICs with ESBL Etest strips, 52 ESBL or cephalosporinase producers were identified. Species identification revealed 41 Escherichia coli isolates, 25 of which produced ESBLs (21 had blaCTX-M-1, 2 had blaCTX-M-14, and 2 had blaSHV-12), either alone (19 isolates) or with a blaTEM gene (6 isolates).

Thus, the prevalence of E. coli producing acquired expanded-spectrum cephalosporinases was 6.2% and 5.8% in sick and healthy cattle, respectively (Table 1). All 42 ESBL-producing E. coli isolates were qnrA, -B, and -S negative by PCR, and most of them (39/42) showed unrelated pulsed-field gel electrophoresis patterns (not shown).

The use of expanded-spectrum cephalosporins (such as ceftiofur) in veterinary medicine may select ESBL producers in animals. Most genes were of the CTX-M-1 group, so that the epidemiology in farm animals seems to mirror the trend observed in humans in France (5, 6). The absence of the qnr gene was reassuring, and the predominant absence of clonality may argue for multiple transferable genetic elements supporting ESBL-encoding genes.

Overall, our study indicates a worrying prevalence of fecal carriage of cephalosporin resistance in cattle in France, with a higher prevalence of ESBL-producing E. coli at slaughterhouses compared to farms (Table 1).

This study was supported in part by a grant from the Direction Générale de l’Alimentation, Ministère de l’Agriculture, France. We gratefully thank Vincent Jarlier and Jérôme Robert (Hôpital de la Pitié-Salpêtrière, Paris, France) for helpful discussions and critical reading of the manuscript.

REFERENCES


