This study evaluates the efficacy of eight different cephalosporins for detection of cephalosporin resistance mediated by extended spectrum beta-lactamases (ESBL) and plasmidic AmpC beta-lactamases in Salmonella and Escherichia coli. A total of 138 E. coli and 86 Salmonella isolates with known beta-lactamase genes were tested for susceptibility toward cefoperazone, cefotaxime, cefpodoxime, cefquinome, cefazidime, cefotiofur, ceftriaxone, and cefuroxime using minimum inhibitory concentration determinations and disc diffusion. The collection consisted of 84 ampicillin-susceptible, 57 ampicillin-resistant but cephalosporin-susceptible, 56 ESBL isolates and 19 isolates with plasmidic AmpC, as well as 10 ampC hyper-producing E. coli. The minimum inhibitory concentration distributions and zone inhibitions varied with the tested compound. Ampicillin-resistant isolates showed reduced susceptibility to the cephalosporins compared to ampicillin-susceptible isolates. Cefoperazone, cefquinome, and cefuroxime were not useful in detecting isolates with ESBL or plasmidic AmpC. The best substances for detection were cefotaxime, cefpodoxime, and ceftriaxone, whereas ceftazidime and cefotiofur were not as efficient. Ceftriaxone may be the recommended substance for monitoring because of some ability in separating ampC hyper-producing E. coli from ESBL and plasmidic AmpC isolates.