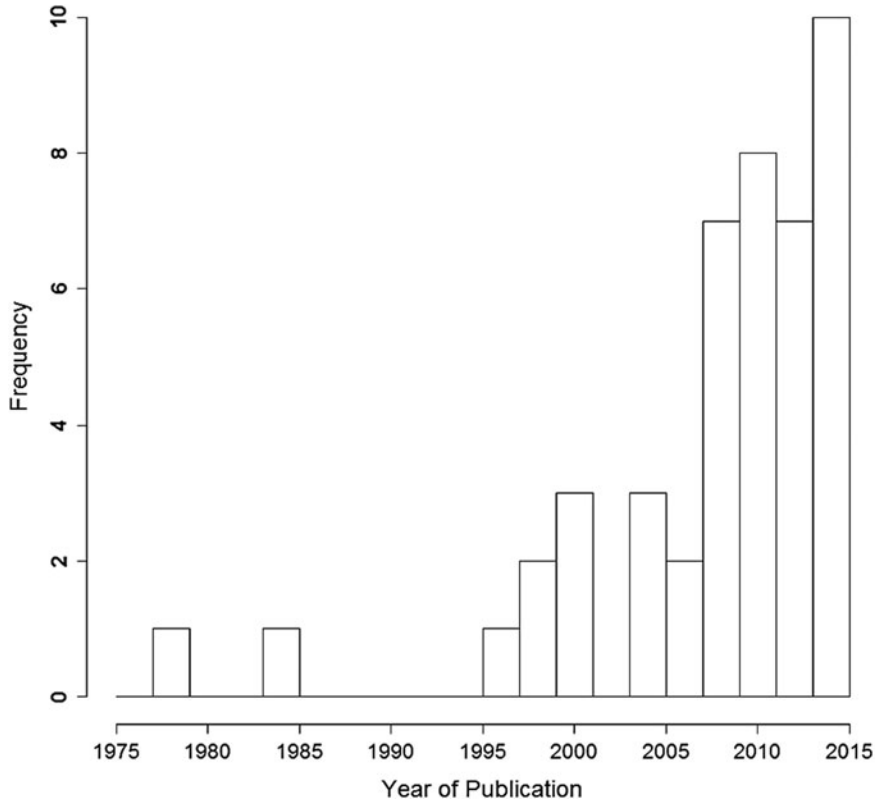
Supplementary Data



SUPPLEMENTARY FIG. S1. Annual frequency of studies in our review

Data Search Strategies

Search strategy for PubMed

((((((((((((antibiotic resistan*) OR antimicrobial resistan*) OR drug resistan*) AND *Escherichia coli*) OR *E. coli*) OR Enterobacteria*) AND human*) AND livestock) OR food animal*) OR pig*) OR swine) OR poultry) OR bovine*) OR cattle) OR cow*)

Search strategy for Web of Science and SCOPUS

(antibiotic resistan*) OR (antimicrobial resistan*) OR (drug resistan*) AND (*Escherichia coli*) OR (*E. coli*) OR (Enterobacteria*) AND (human*) AND (livestock) OR (food animal*) OR (pig*) OR (swine) OR (poultry) OR (bovine) OR (cattle) OR (cow*)

Search strategy for EMBASE

1. antibiotic resistance/exp
2. antibiotic resistance/exp
3. drug resistance/exp
4. *Escherichia coli*/exp
5. Enterobacteria/exp
6. human/exp
7. livestock/exp
8. food animal/exp
9. pig/exp
10. swine/exp
11. poultry/exp
12. bovine/exp
13. cattle/exp
14. cow/exp
15 1 or 2 or 3
17. 4 or 5
18. 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14
19. 6 and 15 and 17 and 18

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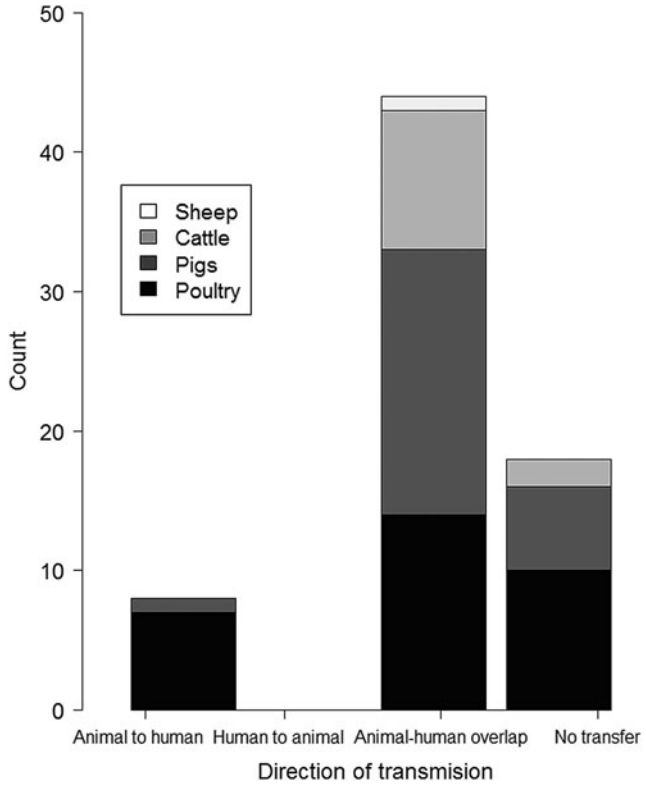
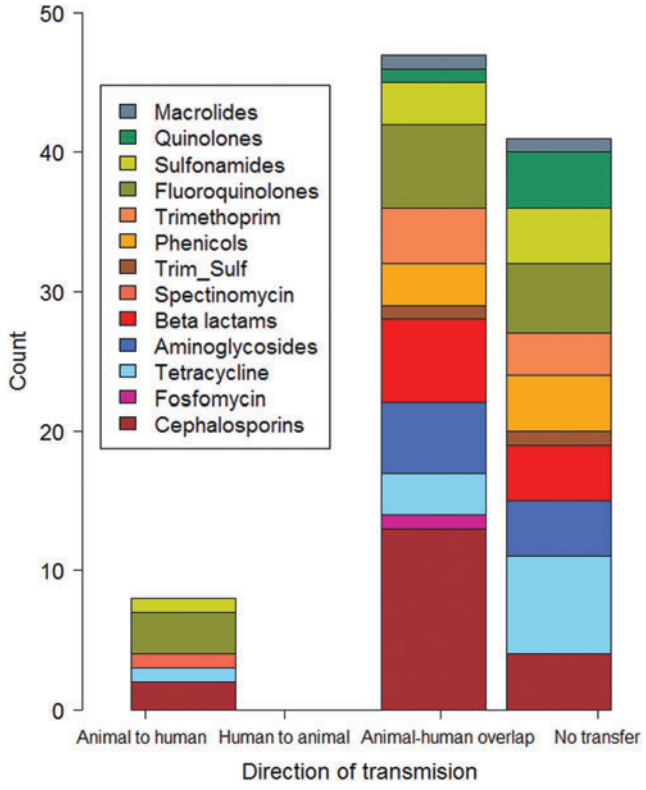
Dahms C, Hubner NO, *et al.* Occurrence of ESBL-Producing *Escherichia coli* in Livestock and Farm Workers in Mecklenburg-Western Pomerania, Germany. PLoS One 2015;10:e0143326.

de Been M, Lanza VF, *et al.* Dissemination of Cephalosporin Resistance Genes between *Escherichia coli* Strains from Farm Animals and Humans by Specific Plasmid Lineages. PLoS Genet 2014;10:e1004776.

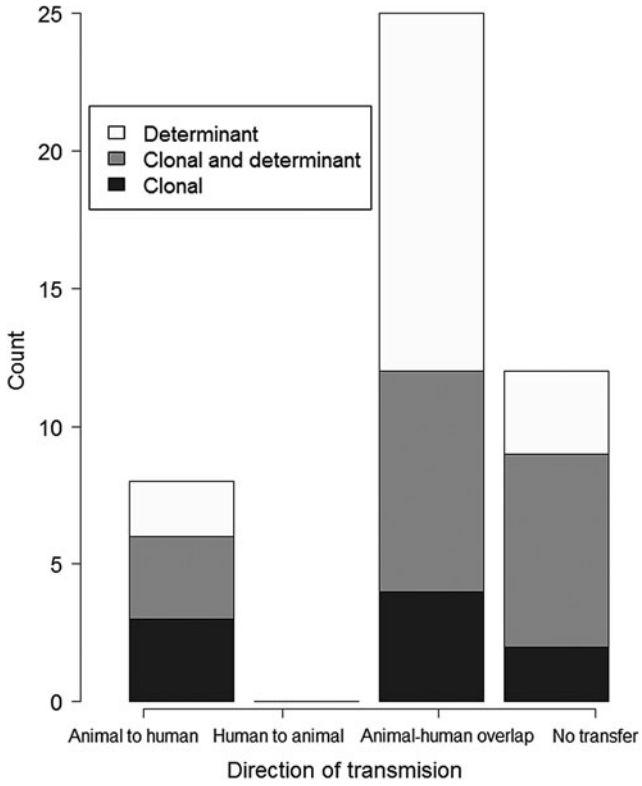
Deng Y, Zeng Z, *et al.* Dissemination of IncFII plasmids carrying rmtB and qepA in *Escherichia coli* from pigs, farm



SUPPLEMENTARY FIG. S2. Counts of food animal species reported.



SUPPLEMENTARY FIG. S3. Counts of antibiotics reported. Note that some studies reported more than one antibiotic. (*Trim_Sulf = Trimethoprim/Sulfamethoxazole)



SUPPLEMENTARY FIG. S4. Nature of transfer.

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Supplementary Table S1. Summary of 45 Included Studies

Author, Year of publication	*Sample origin and collection date*	*Source and No. of animal isolates*	*Source and No. of human isolates*	*Matching*	*Study type*	*Antibiotics reported*	*Methods used*	*Direction stated*	*Nature of evidence*	*Nature of transfer*	*Evidence for nature of transfer*
Al-Ghamdi *et al.*, 1999	Saudi Arabia, 1999	Poultry, 119	Clinical, 100 Healthy, 117	No matching	Active	Beta lactams, Chloramphenicol, Gentamicin, Spectinomycin, Tetracycline, Nitrofurantoin, Trimethoprim/ sulfamethoxazole, Ceftazidime	AST and Serotyping	Animal to human	Low resolution typing	Clonal	Overlapping serotypes High spectinomycin resistance in humans and poultry isolates despite limited use in humans
Ueda, 2015	Vietnam, 2013	Poultry, 47	Healthy, 199	Spatial and temporal	Active	Cephalosporins	AST, PCR for gene detection, MLST for genotypic relatedness and replicon typing for plasmid characterization	No transfer	Intermediate resolution typing	Clonal and determinant	Distinct clonal, ARGs, and plasmid profiles
Jakobsen *et al.* 2015	Denmark, 2006–2010	Cattle, 4 Poultry, 3 Pigs, 21 Horses,15	Clinical, 22	Spatial and temporal	Active	Cephalosporins	PFGE for genotypic relatedness and PCR-based replicon typing and pMLST and restriction fragment length polymorphism (RFLP) for plasmid characterization	No transfer	Intermediate resolution typing	Clonal and determinant	Distinct clonal and plasmid profiles
Tseng, *et al.* 2015	Taiwan, 2013	Pigs, 22	Clinical, 123	Spatial and temporal	Active	Cephalosporins, Fosfomycin	AST, PFGE, and MLST for genotypic isolate relatedness, PCR for gene characterization and plasmid characterization	Animal-human overlap	Intermediate resolution typing	Determinant	Distinct clonal profiles
Lupindu, 2015	Tanzania, 2012	Cattle, 50 Soil, 21 Water, 7	Healthy, 40	Spatial and temporal	Active	Beta lactams, Tetracycline	AST and PFGE for isolate genotypic relatedness	Animal-human overlap	Low resolution typing	Clonal	Overlapping clonal profiles
Huijbers *et al.*, 2015	Netherlands, 2011–2012	Poultry, 70	Healthy, 27	Spatial and temporal	Active	Cephalosporins	AST, MLST for isolate genotypic typing and PCR for gene characterization	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping ARG profiles
Valentin *et al.*, 2014	Germany, 2011–2014	Cattle, 120 Poultry, 49 Pigs, 139	Clinical, 422 Healthy, 213	No matching	Active	Cephalosporins	AST, PCR for gene and isolate genotypic characterization	Animal-human overlap	Intermediate resolution typing	Clonal and determinant	Overlapping clonal and ARG profiles
Hammerum *et al.*, 2014	Denmark, 2010–2011	Pigs, 339	Healthy, 195	Spatial and temporal	Active	Cephalosporins	AST, PCR for gene detection, PFGE and MLST for isolate genotypic typing, and PBRT for plasmid replicon typing	Animal-human overlap	Intermediate resolution typing	Clonal and determinant	Overlapping clonal and ARG profiles
Hu *et al.*, 2013	China, 2012–2013 & archived isolates	Pigs, 31 Water, 26	Clinical, 36 Healthy, 46	No matching	Active & Passive	Cephalosporins	AST, PCR for gene detection, PFGE, and MLST for isolate genotypic typing	Animal-human overlap	Intermediate resolution typing	Clonal and determinant	Overlapping clonal and ARG profiles
Ciccozzi *et al.*, 2013	Italy, 2009–2010	Poultry, 43	Clinical, 129	No matching	Passive	Beta lactams, Trimethoprim/ sulfamethoxazole, Gentamicin, Cephalosporins Ciprofloxacin	AST, phylogenetic analysis of MLST sequence type sequences	Animal-human overlap	Intermediate resolution typing	Clonal	Overlapping clonal profiles
Dierikx, 2013	Netherlands, 2009	Poultry, 26	Healthy, 18	Temporal	Active	Cephalosporins	AST, Microarray analysis and PCR for gene characterization, MLST for isolate genotypic typing and RFLP for plasmid typing	Animal to human	Intermediate resolution typing	Determinant	High prevalence of resistance in poultry isolates compared to human isolates Overlapping ARG and plasmid profiles

(*continued*)

Supplementary Table S1. (Continued)

Author, Year of publication	Sample origin and collection date	Source and No. of animal isolates	Source and No. of human isolates	Matching	Study type	Antibiotics reported	Methods used	Direction stated	Nature of evidence	Nature of transfer	Evidence for nature of transfer
Stokes, *et al.* 2012	United Kingdom, 2006–2010	Cattle, 33 Poultry, 9 Sheep, 2	Clinical, 26	No matching	Passive	Cephalosporins	PFGE and DNA arrays for isolate typing, and RFLP for plasmid characterization	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping plasmid profiles
Johnson, *et al.* 2012	USA, Netherlands and Japan, 1990–2005	Broilers and Poultry, 1331	Patients, 629 Healthy, 252	No matching	Passive	Sulfonamides, Tetracyclines, Macrolides, Beta lactams, Chloramphenicol, Ciprofloxacin, Gentamicin, Quinolones,	AST, PCR for ARGs and virulence genes characterization, and PRBT for plasmid typing	No transfer	Intermediate resolution typing	Clonal and determinant	Distinct clonal, ARG and, plasmid profiles
Deng *et al.*, 2011	China, 2002	Pigs, 24 Environment, 5	Healthy, 12	Spatial and temporal	Passive	Fluoroquinolones	AST, PCR for ARGs characterization, PFGE and MLST for isolate genotypic typing, and PBRT for plasmid replicon typing	Animal-human overlap	Intermediate resolution typing	Clonal and determinant	Overlapping clonal, ARG, and plasmid profiles
Zhao *et al.*, 2010	China, 2002	Poultry, 25 Pigs, 73	Healthy, 33	Spatial and temporal	Active	Quinolones, Ciprofloxacin	AST, PCR for ARGs characterization, PFGE and MLST for isolate genotypic typing, and RLFP for plasmid typing	Animal-human overlap	Intermediate resolution typing	Clonal and determinant	Overlapping clonal and ARG profiles
Schwaiger, 2010	Germany, 2002–2004	Pigs, 137	Patients,152	No matching	Active	Tetracyclines, Sulfonamides, Streptomycin	AST, PCR for ARGs characterization	No transfer	Intermediate resolution typing	Determinant	Distinct ARG profiles
Moodley, 2009	Denmark, 2007	Pigs, 70 Environment, 35	Healthy, 5	Spatial and temporal	Active	Cephalosporins	AST, PCR for ARGs characterization, PFGE for isolate genotypic typing and, RLFP for plasmid typing	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping plasmid profiles
Mulvey, 2009	Canada, 1999–2000	Cattle,51	Patients, 25	Temporal	Passive	Cephalosporins	AST, PCR for ARGs characterization, PFGE for isolate genotypic typing and plasmid typing	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping plasmid profiles
Ho *et al.*, 2009	China, 2002–2004	Cattle, 11 Poultry, 25 Pigs, 28	Patients, 51 Healthy, 59	No matching	Passive	Trimethoprim-Sulfamethoxazole	AST, PCR for ARGs and integron characterization, and PFGE for isolate genotypic typing	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping integron and ARG profiles
Graziani, 2009	Italy, 2006	Poultry, 113	Healthy, 125	No matching	Passive	Ciprofloxacin	AST, PCR, and PFGE for isolate genotypic and virulence gene typing	No transfer	Intermediate resolution typing	Clonal	Distinct clonal profiles
Hammerum *et al.*, 2006	Denmark, 2002–2003	Pigs, 610 Pork, 189	Healthy, 199	No matching	Active	Sulfonamides	AST, PCR for ARGs characterization	Animal to human	Intermediate resolution typing	Determinant	Overlapping ARGs in animal and human isolates High prevalence of resistance in animal isolates compared to human isolates
Johnson *et al.*, 2006	Spain, 1996–1998	Poultry, 49	Healthy, 68	Spatial and temporal	Passive	Ciprofloxacin	AST, PCR, and PFGE for genotypic and virulence gene typing	Animal to human	Intermediate resolution typing	Clonal	High similarity in resistant animal and human isolates
Maynard *et al.*, 2004	Canada, 2001	Pigs, poultry, cattle and pets, 39	Patients, 70	No matching	Active	Beta lactams, Aminoglycosides, Tetracycline, Phenicols, Trimethoprim, Sulfonamides	AST,PCR, and colony hybridization for ARGs characterization and distribution	No transfer	Intermediate resolution typing	Clonal and determinant	Distinct clonal profiles

(*continued*)

Supplementary Table S1. (Continued)

Author, Year of publication	*Sample origin and collection date*	*Source and No. of animal isolates*	*Source and No. of human isolates*	*Matching*	*Study type*	*Antibiotics reported*	*Methods used*	*Direction stated*	*Nature of evidence*	*Nature of transfer*	*Evidence for nature of transfer*
Kang, 2005	South Korea, 2001–2003	Poultry, 163 Pigs, 133	Patients,201 Healthy,167	Temporal	Active	Trimethoprim, Aminoglycosides, Sulfonamides	AST, bPCR for integron characterization, PFGE for genotypic typing, and plasmid typing	No transfer	Intermediate resolution typing	Clonal and determinant	Distinct clonal and plasmid profiles
Oppegaard *et al.*, 2001	Norway, 1996	Cattle, 13	Healthy, 7	Spatial and temporal	Active	Beta lactams, Tetracycline, Sulfonamides, Streptomycin, Trimethoprim	AST, PCR for integron characterization, serotyping, and plasmid typing	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping plasmid profiles
van den Bogaard *et al.*, 2001	Netherlands, 2001	Poultry, 122	Healthy, 216	Spatial and temporal	Active	Ciprofloxacin	AST, PFGE for isolate genotypic typing	Animal to human	Low resolution typing	Clonal	High prevalence of resistance in animal isolates compared to human isolates Overlapping clonal profiles
Kariuki, 1999	Kenya, 1994	Poultry, 248	Healthy,128	Spatial and temporal	Active	Beta lactams, Aminoglycosides, Tetracycline, Chloramphenicol, Trimethoprim, Ciprofloxacin, Quinolones,	AST, PFGE for isolate genotypic typing, and plasmid typing	No transfer	Low resolution typing	Clonal	Distinct clonal profiles
Leverstein-van Hall *et al.*, 2011	Netherlands, 2006–2010	Poultry, 35 Poultry meat, 81	Patients,409	No matching	Passive	Cephalosporins	AST, microarray analysis for ARGs characterization, MLST for isolate genotypic typing, and PBRT for plasmid typing	Animal to human	Intermediate resolution typing	Clonal and determinant	Overlapping clonal, ARG, and plasmid profiles
Jakobsen *et al.*, 2011	Denmark, 2004	Poultry, 17 Pigs, 8 Pork, 30 Broiler meat,18	Patients, 52 Healthy, 36	Spatial and temporal	Active	Beta lactams, Chloramphenicol, Trimethoprim, Ciprofloxacin, Quinolones, Macrolides	Microarray analysis for ARGs and virulence genes characterization	Animal-human overlap	Intermediate resolution typing	Clonal and determinant	Overlapping clonal and ARG profiles
Vieira *et al.*, 2011	Europe, 2005–2008	Poultry, 4000 Pigs, 4500 Cattle, 3500	Patients, 100,000	Temporal	Passive	Beta lactams, Ciprofloxacin, Aminoglycosides, Cephalosporins	AST	Animal-human overlap	Co-occurrence	Clonal	Significant correlations between human and animal isolates
Ho *et al.*, 2010	China, 2002–2004	Cattle, 11 Poultry, 37 Pigs, 33 Fish, 1	Patients, 167	No matching	Active	Aminoglycosides	AST, PCR for ARGs characterization, PCR and PFGE for isolate genotypic typing, and PBRT for plasmid typing	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping ARG and plasmid profiles
Xia *et al.*, 2010	China, 2007	Poultry,198 Pigs, 137	Patients,139 Healthy,18	Spatial and temporal	Active	Fluoroquinolones	AST, PCR for ARGs characterization, PCR and PFGE for isolate genotypic typing	No transfer	Intermediate resolution typing	Clonal and determinant	Distinct clonal patterns
Dohmen *et al.*, 2015	Netherlands, 2011	Pigs, 160	Healthy, 13	Spatial and temporal	Active	Cephalosporins	AST, PCR for ARGs characterization, PCR and MLST for isolate genotypic typing, and PBRT for plasmid typing	Animal-human overlap	Intermediate resolution typing	Clonal and determinant	Overlapping clonal, ARG, and plasmid profiles
Kariuki, *et al.* 1997	Kenya, 1993–1994	Poultry, 246	Patients,168	Spatial and temporal	Active	Beta lactams, Tetracycline, Chloramphenicol, Cephalosporins, Ciprofloxacin, Quinolones,	AST and restriction endonuclease digestion (RED) for plasmid typing	No transfer	Low resolution typing	Determinant	Distinct clonal patterns

(*continued*)

Supplementary Table S1. (Continued)

Author, Year of publication	*Sample origin and collection date*	*Source and No. of animal isolates*	*Source and No. of human isolates*	*Matching*	*Study type*	*Antibiotics reported*	*Methods used*	*Direction stated*	*Nature of evidence*	*Nature of transfer*	*Evidence for nature of transfer*
Phongpaichit, 2007	Thailand, 2004–2005	Pigs, 432	Healthy, 185	Spatial and temporal	Active	Beta lactams, Aminoglycosides, Tetracycline, Chloramphenicol, Cephalosporins, Trimethoprim-Sulfamethoxazole, Ciprofloxacin, Quinolones, Macrolides	AST and PCR for ARGs and integron characterization	No transfer	Intermediate resolution typing	Determinant	Distinct integron patterns
Riccobono*et al.*, 2012	Bolivia, 2002–2005	Poultry, 36	Healthy, 30	Spatial and temporal	Active	Tetracyclines, Quinolones	AST and PCR for ARGs characterization and genotypic typing	No transfer	Intermediate resolution typing	Clonal and determinant	Distinct clonal and plasmid profiles
Zhang *et al.*, 2009	China, 2004–2007	Poultry, 106 Pigs, 172	Healthy, 23	Spatial and temporal	Active	Aminoglycosides, Trimethoprim, Sulfonamides	AST and PCR for ARGs and integron characterization	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping ARG and integron profiles
Levy, 1978	USA 1974	Poultry, 320	Healthy, 337	Spatial and temporal	Active	Tetracyclines	AST	Animal to human	Low resolution typing	Clonal and determinant	Overlapping clonal profiles
de Been *et al.*, 2014	Netherlands, 2006–2011	Poultry, 4 Poultry meat, 7 Pig, 4	Healthy, patients, 17	No matching	Passive	Cephalosporins	AST, MLST, and WGS for genotypic typing, and phylogenetics for relatedness analysis	Animal - human overlap	High resolution typing	Determinant	Increase in antibiotic-resistance in humans in contact with both tetracycline-fed chicken and oxytetracycline supplemented feed
Jorgensen, 1983	Denmark, Britain 1960–1981	Pigs, 19	Patients, 13	No matching	Passive	Cephalosporins	AST and hybridization techniques for plasmid analysis	Animal-human overlap	Low resolution typing	Clonal and determinant	Overlapping plasmid profiles
Dahms *et al.*, 2015	Germany, 2012	Cattle, 10 Pig, 33 Poultry, 13	Healthy, 5	Spatial and temporal	Active	Beta lactam, Chloramphenicol, Ciprofloxacin, Streptomycin, Sulfamethoxazole, Tetracycline, Trimethoprim	AST, PCR for ARGs characterization, MLST for isolate genotypic typing	Animal-human overlap	Intermediate resolution typing	Clonal	Overlapping clonal and ARG profiles
Jakobsen *et al.*, 2010	Denmark, 2004–2006	Broiler meat, 283 Pork, 187 Poultry, 138 Pigs, 145	Patients, 102 Healthy, 109	Spatial and temporal	Active	Ciprofloxacin	AST, PCR for genotypic typing	Animal to human	Intermediate resolution typing	Clonal and determinant	Overlapping clonal profiles
Giufre *et al.*, 2012	Italy, 2009	Poultry, 101	Patients, 277	Temporal	Passive	Chloramphenicol	AST, PCR for ARGs characterization, PCR and MLST for isolate genotypic typing	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping clonal profiles
Winokur *et al.*, 2001	USA, 1998–2000	Cattle &pigs, 377	Patients, 1017	Temporal	Active	Beta lactams	AST, isoelectric focus analysis for ARGs characterization, PFGE for genotypic typing and RFLP for plasmid analysis	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping plasmid and ARG profiles
Smet *et al.*, 2009	Belgium, 2001–2007	Poultry, 4 Pigs, 2	Healthy, 3	No matching	Active	Cephalosporins	AST, PCR, and isoelectric focus analysis for ARGs characterization, and PBRT and RFLP for plasmid analysis	Animal-human overlap	Intermediate resolution typing	Determinant	Overlapping plasmid and ARG profiles

AST, antibiotic susceptibility testing; PCR, polymerase chain reaction; ARGs, antibiotic resistance genes; MLST, multilocus sequence typing; PFGE, pulsed-field gel electrophoresis; RFLP, restricted fragment length polymorphism; pMLST plasmid multilocus sequence typing; PBRT, PCR-based replicon typing.