Supplementary data

Genomic characterization of ESBL-producing *Escherichia coli* isolates belonging to a hybrid aEPEC/ExPEC pathotype O153:H10-A-ST10 *eae*-beta1 occurred in human diarrheagenic isolates, meat, poultry and wildlife

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**Table S1.** Thirty-two isolates included in the study (in red) from our own collections

|  |  |  |  |
| --- | --- | --- | --- |
| **Origin of isolation** | **Sampling period** | **No. ESBL aEPEC O153 isolates / total ESBL isolates a** | **No. NON-ESBL****aEPEC O153 isolatesb** |
| Chicken meat study | 2009-2010 | **7** / 127 | NA |
| Beef meat 1st study | 2005-2009 | **5** / DNA | **2** |
| Beef meat 2nd study | 2011-2012 | **1** / 5 | NA |
| Pork meat study | 2011-2012 | **1** / 13 | NA |
| Poultry farm environment | 2010-2012 | **1** / 96 | NA |
| Wildlife study | 2014-2015 | **1** / 95 | NA |
| Human diarrhea | 2006-2012 | **5** / DNA | **9** |

a Data not available (DNA); b Not analyzed (NA)

**Table S2.** Assembly data from Enterobase of the 17 O153:H10-A-ST10 genomes sequenced using Illumina NextSeq technology

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Assembly barcode** | **Coverage** | **N50** | **Length** | **Contig No.** **(>=200 bp)** | **ST\_ 7 gene** | **ST Complex** | **wgMLST****25,002 loci** | **cgMLST****2,513 loci** | **rST****53 loci** | **O antigen prediction** | **H antigen prediction** |
| LREC-110 | ESC\_KA7423AA\_AS | 361 | 147271 | 5152970 | 178 | 10 | ST10 Cplx | 38372 | 37600 | 2021 | O153 | H10 |
| LREC-111 | ESC\_KA7425AA\_AS | 370 | 126323 | 5239837 | 221 | 10 | ST10 Cplx | 38373 | 37601 | 2021 | O153 | H10 |
| LREC-112 | ESC\_KA7429AA\_AS | 124 | 109355 | 5084929 | 342 | 10 | ST10 Cplx | 38377 | 37605 | 2021 | O153 | H10 |
| LREC-113 | ESC\_KA7430AA\_AS | 92 | 93205 | 5172711 | 213 | 10 | ST10 Cplx | 38378 | 37606 | 2021 | O153 | H10 |
| LREC-114 | ESC\_KA7438AA\_AS | 163 | 126323 | 5201046 | 213 | 10 | ST10 Cplx | 38386 | 37614 | 2021 | O153 | H10 |
| LREC-115 | ESC\_KA7437AA\_AS | 141 | 126291 | 5232022 | 228 | 10 | ST10 Cplx | 38385 | 37613 | 2021 | O153 | H10 |
| LREC-116 | ESC\_KA7436AA\_AS | 118 | 124442 | 5187480 | 212 | 10 | ST10 Cplx | 38384 | 37612 | 2021 | O153 | H10 |
| LREC-117 | ESC\_KA7433AA\_AS | 163 | 124771 | 5160744 | 169 | 10 | ST10 Cplx | 38381 | 37609 | 2021 | O153 | H10 |
| LREC-118 | ESC\_KA7706AA\_AS | 39 | 69529 | 5166783 | 292 | 10 | ST10 Cplx | 39187 | 38299 | 2021 | O153 | H10 |
| LREC-119 | ESC\_KA7435AA\_AS | 296 | 125664 | 4994631 | 189 | 10 | ST10 Cplx | 38383 | 37611 | 2021 | O153 | H10 |
| LREC-120 | ESC\_KA7432AA\_AS | 150 | 102481 | 5263192 | 230 | 10 | ST10 Cplx | 38379 | 37607 | 2021 | - | H10 |
| LREC-121 | ESC\_KA7434AA\_AS | 71 | 73833 | 5134535 | 170 | 10 | ST10 Cplx | 38382 | 37610 | 2021 | - | H10 |
| LREC-122 | ESC\_KA7440AA\_AS | 168 | 124771 | 5209684 | 223 | 10 | ST10 Cplx | 38388 | 37616 | 2021 | O153 | H10 |
| LREC-123 | ESC\_KA7439AA\_AS | 78 | 123102 | 5208501 | 253 | 10 | ST10 Cplx | 38387 | 37615 | 2021 | O153 | H10 |
| LREC-124 | ESC\_KA7441AA\_AS | 201 | 119599 | 5258246 | 171 | 10 | ST10 Cplx | 38389 | 37617 | 2021 | O153 | H10 |
| LREC-125 | ESC\_KA7442AA\_AS | 166 | 119599 | 5274856 | 272 | 10 | ST10 Cplx | 38390 | 37618 | 2021 | O153 | H10 |
| LREC-127 | ESC\_KA7426AA\_AS | 208 | 126318 | 5253322 | 213 | 10 | ST10 Cplx | 38374 | 37602 | 58738 | O153 | H10 |

Raw reads were uploaded and automatically assembled in Enterobase (<https://enterobase.warwick.ac.uk/>) using SPAdes Genome Assembler v3.5. with a threshold on contigs of minimum 200 nt. Subsequently, the *de novo* assembled contigs were MLST (7 gene ST, wgST, cgST and rST) and serotype predicted using Enterobase typing tools

**Table S3.** HierCC designations from Enterobase for the 17 Spanish collection and other 7 related genomes within each cluster group. SNPs of the core genomic regions

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name** **(Enterobase)** | **Source** **Details a** | **Collection Year a** | **Country****a** | **O Antigen** | **H Antigen** | **ST** | **Lineage** | **fimH allele** | **cgMLST** | **HC0** | **HC2** | **HC5** | **HC10** | **HC20** | **HC50** | **HC100** | **HC200** | **HC400** | **SNPs b** |
| 110084 | DNA | DNA | DNA | O5 | H27 | 10 | A | 54 | 8886 | 8886 | 8886 | 8886 | 8886 | 8886 | 8886 | 8886 | 8886 | 8224 |  |
| 166357 | Human; Homo sapiens | 2015 | United Kingdom | O40 | H10 | 10 | A | 54 | 21500 | 21500 | 21500 | 21500 | 21500 | 21500 | 21500 | 21500 | 8224 | 8224 |  |
| 208917 | Human; Homo sapiens | 2016 | United Kingdom | O40 | H10 | 10 | A | 54 | 21361 | 21361 | 21361 | 21361 | 21361 | 21361 | 21361 | 21361 | 8839 | 8224 |  |
| 853984 | Homo sapiens; human | 2019 | United Kingdom | O153 | H10 | 10 | A | 54 | 124093 | 124093 | 124093 | 124093 | 124093 | 124093 | 124093 | 37600 | 8224 | 8224 |  |
| 866428 | Homo sapiens; human | 2019 | United Kingdom | O153 | H10 | 10 | A | 54 | 129194 | 129194 | 129194 | 129194 | 129194 | 129194 | 124093 | 37600 | 8224 | 8224 |  |
| AM\_LREC-110 | Chicken meat | 2010 | Spain | O153 | H10 | 10 | A | 54 | 37600 | 37600 | 37600 | 37600 | 37600 | 37600 | 37600 | 37600 | 8224 | 8224 | 37 |
| AM\_LREC-111 | Fox faeces | 2015 | Spain | O153 | H10 | 10 | A | 54 | 37601 | 37601 | 37601 | 37601 | 37601 | 37601 | 37600 | 37600 | 8224 | 8224 | 61 |
| AM\_LREC-112 | Human clinical faeces | 2011 | Spain | O153 | H10 | 10 | A | 54 | 37605 | 37605 | 37605 | 37605 | 37605 | 37605 | 37600 | 37600 | 8224 | 8224 | 361 |
| AM\_LREC-113 | Human clinical faeces | 2007 | Spain | O153 | H10 | 10 | A | 54 | **37606** | **37606** | **37606** | **37606** | **37606** | **37606** | 37600 | 37600 | 8224 | 8224 | 0 |
| AM\_LREC-114 | Beef meat | 2008 | Spain | O153 | H10 | 10 | A | 54 | 37614 | 37614 | 37614 | 37614 | 37614 | 37600 | 37600 | 37600 | 8224 | 8224 | 20 |
| AM\_LREC-115 | Chicken meat | 2009 | Spain | O153 | H10 | 10 | A | 54 | 37613 | 37613 | 37613 | 37613 | 37613 | 37613 | 37600 | 37600 | 8224 | 8224 | 101 |
| AM\_LREC-116 | Human clinical faeces | 2006 | Spain | O153 | H10 | 10 | A | 54 | 37612 | 37612 | 37612 | 37612 | 37612 | **37606** | 37600 | 37600 | 8224 | 8224 | 22 |
| AM\_LREC-117 | Beef meat | 2007 | Spain | O153 | H10 | 10 | A | 54 | 37609 | 37609 | 37609 | 37609 | 37609 | 37609 | 37600 | 37600 | 8224 | 8224 | 36 |
| AM\_LREC-118 | Chicken breast | 2009 | Spain | O153 | H10 | 10 | A | 54 | 38299 | 38299 | 38299 | 38299 | 38299 | 37615 | 37600 | 37600 | 8224 | 8224 | 24 |
| AM\_LREC-119 | Beef meat | 2007 | Spain | O153 | H10 | 10 | A | 54 | 37611 | 37611 | 37611 | 37611 | 37611 | **37606** | 37600 | 37600 | 8224 | 8224 | 15 |
| AM\_LREC-120 | Beef meat | 2011 | Spain | - | H10 | 10 | A | 54 | 37607 | 37607 | 37607 | 37607 | 37607 | 37607 | 37600 | 37600 | 8224 | 8224 | 537 |
| AM\_LREC-121 | Human clinical faeces | 2007 | Spain | - | H10 | 10 | A | 54 | 37610 | 37610 | 37610 | 37610 | 37610 | 37610 | 37600 | 37600 | 8224 | 8224 | 51 |
| AM\_LREC-122 | Pork meat | 2011 | Spain | O153 | H10 | 10 | A | 54 | 37616 | 37616 | 37616 | 37616 | 37616 | 37615 | 37600 | 37600 | 8224 | 8224 | 28 |
| AM\_LREC-123 | Chicken meat | 2010 | Spain | O153 | H10 | 10 | A | 54 | 37615 | 37615 | 37615 | 37615 | 37615 | 37615 | 37600 | 37600 | 8224 | 8224 | 25 |
| AM\_LREC-124 | Human clinical faeces | 2007 | Spain | O153 | H10 | 10 | A | 54 | 37617 | 37617 | 37617 | 37617 | 37617 | **37606** | 37600 | 37600 | 8224 | 8224 | 31 |
| AM\_LREC-125 | Beef meat | 2008 | Spain | O153 | H10 | 10 | A | 54 | 37618 | 37618 | 37618 | 37618 | 37618 | **37606** | 37600 | 37600 | 8224 | 8224 | 21 |
| AM\_LREC-127 | Poultry farm environment | 2010 | Spain | O153 | H10 | 10 | A | 54 | 37602 | 37602 | 37602 | 37602 | 37602 | 37602 | 37600 | 37600 | 8224 | 8224 | 54 |
| E89 | Broiler; Liver | 2015 | Denmark | uncertain | H10 | 7003 | A | 54 | 36964 | 36964 | 36964 | 36964 | 36964 | 36964 | 36964 | 36964 | 8224 | 8224 |  |
| Escherichia coli2312 | DNA |  DNA |  DNA | O40 | H10 | 10 | A | 54 | 8224 | 8224 | 8224 | 8224 | 8224 | 8224 | 8224 | 8224 | 8224 | 8224 |  |

a Data not available (DNA); b Not analyzed (NA); b SNPs of the core genomic regions present in 90% of the 17 compared genomes of our collection and using LREC-113 as reference

**Table S4.** Number of human stool samples analyzed and positive for aEPEC O153

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Nº stool samples** | **No. of positive samples (%)****for aEPEC O153** | **No. of positive samples (%)****for O153:H10 *eae*-beta1 *fimAVMT78*** |
| 2006 | 1,842 | 4 (0.22) | 1 ( 0.05) |
| 2007 | 2,095 | 11 (0.52) | 8 ( 0.4) |
| 2008 | 1,001 | 5 (0.50) | 3 (0.3) |
| 2009 | 550 | 0 (0) | 0 (0) |
| 2010 | 514 | 0 (0) | 0 (0) |
| 2011 | 1,207 | 2 (0.50) | 1 (0.08 ) |
| 2012 | 2314 | 1 (0.04) | 1 (0.04 ) |
| Total | 9,523 | 23 (0.14) | 14 (0.15) |

**Table S5.** Twenty-threeaEPEC O153 human isolates recovered in the period 2006-2012

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Isolate code** | **Year of isolation** | **Symptomatology** | **O153 Serogroup** | **H10** **Antigen** | ***eae*****gene** | ***eae* beta-1****intimin** | ***fimH*AVMT78****gene** |
| 22250.06 | 2006 | Diarrhea | + | - | + | + | - |
| 37979. 06 | 2006 | Diarrhea | + | + | + | - | - |
| 41824. 06 | 2006 | Diarrhea | + | - | + | - | - |
| 45990. 06 (LREC 116)\* | 2006 | Diarrhea | + | + | + | + | + |
| 57646. 06 | 2007 | Diarrhea | + | - | + | - | + |
| 18396.07 (LREC 124)\* | 2007 | Diarrhea | + | + | + | + | + |
| 19979. 07 (LREC 113)\* | 2007 | Diarrhea | + | + | + | + | + |
| 30981. 07 (LREC 121)\* | 2007 | Diarrhea | + | + | + | + | + |
| 31952. 07 | 2007 | Diarrhea | + | + | + | + | + |
| 32182. 07 | 2007 | Diarrhea | + | - | + | - | - |
| 32651. 07 | 2007 | Hemorrhagic gastroenteritis | + | + | + | + | + |
| 32884. 07 | 2007 | Diarrhea | + | + | + | + | + |
| 34535. 07 | 2007 | Acute gastroenteritis | + | + | + | + | + |
| 39044. 07 | 2007 | Acute gastroenteritis | + | + | + | + | + |
| 65905/07 | 2007 | Hemorrhagic colitis | + | - | + | - | + |
| 110431.08 | 2008 | Hemorrhagic colitis | + | - | + | + | - |
| 2477.08 | 2008 | Diarrhea | + | - | + | - | - |
| 21011. 08 | 2008 | Diarrhea | + | + | + | + | + |
| 38506. 08 | 2008 | Diarrhea | + | + | + | + | + |
| 40237. 08 | 2008 | Diarrhea | + | + | + | + | + |
| 48633.11 | 2011 | Diarrhea | + | - | + | - | - |
| 9727.011 (LREC 112)\* | 2011 | Hemorrhagic colitis | + | + | + | + | + |
| 55515.12 | 2012 | Diarrhea | + | + | + | + | + |

(\*) code of those strains which were WG sequenced

**Table S6.** *in silico* characterization of seven *E. coli* related genomes from Enterobase using CGE databases

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Name** | **Serotype** | **Phylo****group** | **CHType** | **ST**  | **Plasmid content****Inc group (pMLST)** | **Acquired resistances** | **Virulence genes** |
| 866428 | O153:H10 | A | 11-54 | 10 | **IncF (F2:A-:B-)**IncX1Col156 | *aadA1; catA1; mdf(A); tet(A)* | *astA, eae, espA, espB, gad, iss, mchF, nleA, tir* |
| 853984 | O153:H10 | A | 11-54 | 10 | **IncF (F2:A-:B-)**IncX1Col156 | *aadA1; catA1; mdf(A); tet(A)* | *astA, eae, espA, espB, gad, iss, mchF, nleA, tir* |
| 166357 | O40:H10 | A | 11-54 | 10 | **IncF (F2:A-:B-)**IncHI2 (ST4)IncQCol156 | *blaTEM-1B; aph(3´´)-Ib, aph(3´)-Ia, aph(6)-Ib; catA1; mdf(A); florR; tet(A); sul2; dfrA8* | *astA, eae, espA, espB, gad, iss, mchF, nleA, nleC, tir* |
| *E. coli* 2312 | O40:H10 | A | 11-54 | 10 | **IncF (F2:A-:B-)**IncI1 (STunknown)Col156Col (MG828) | *aac(3)-IV, aph(3´´)-Ib, aph(3´)-Ia, aph(4)-Ia, aph(6)-Ib; mdf(A); tet(A); sul2* | *astA, eae, espA, espB, gad, ireA, iss, mchF, nleA, nleC, tir* |
| E89 | ND:H10 | A | 11-54 | 10 | **IncF (F2:A-:B-)**Col156 | *aadA1; mdf(A);* | *astA, eae, espA, espB, gad, iss, mchF, nleA, tir* |
| 208917 | O40:H10 | A | 11-54 | 10 | **IncF (F2:A-:B-)**Col156 | *mdf(A)* | *astA, eae, espA, gad, ireA, mchF, nleA, nleC, tir* |
| 110084 | O5:H27 | A | 11-54 | 10 | IncF (F-:A-:B-)pO111 | *aph(6)-Ib; mdf(A); sul2; dfrA8* | *astA, celB, eae, espA, gad, iss, mchF, nleA, tir* |

**Table S7.** Targets and primers associated with diarrheagenic pathotypes of *E. coli*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Pathotype** | **Target** | **Primers** | **Nucleotide sequence (5´- 3´)** | **Size (bp)** | **Reference** |
| STEC | *stx1* | VT1‐F | TCGCTGAATGTCATTCGCTCTGC | 539 | Mora et al., 2011 |
| VT1‐R | TCAGCAGTCATTACATAAGAAC |
| STEC | *stx2* | VT2‐F1 | TTTCTTCGGTATCCTATTCCC | 358 | Mora et al., 2011  |
| VT2‐F2 | TGTCTTCAGCATCTTATGCAG |
| VT2‐R | CTGCTGTCCGTTGTCATGGAA |
| EPEC | *eae* | EAE-V3F | CATTGATCAGGATTTTTCTGGT | 510 | Mora et al., 2011  |
| EAE-MBR | TCCAGAATAATATTGTTATTACG |
| EPEC | *eae* | aEAE-R11 | TCTTCGGAGGGTTTTTTATT | 1125 | Alonso et al., 2017 |
| aEAE-FBN | CAGGTCGTCGTGTCTGCTAAAAC |
| EPEC | *eae* | aEAE-R12 | CCAGACGAATATATACATATTC | 1181 | Alonso et al., 2017 |
| aEAE-FBN | CAGGTCGTCGTGTCTGCTAAAAC |
| tEPEC | *bfp* | BFP-NF1 | ATGGTTTCTAAAATCATGAATAAG | 262 | Bennett, 2003García-Meniño et al., 2018 |
| BFP-NR1 | ATTATTCCGGAATTGCAGATGTGT |
| ETEC | *estA* | STa-A | ATTTTTATTTCTGTATTGTCTTT | 176 | Penteado et al., 2002 |
| STa-B | GGATTACAACACAGTTCACAGCAGT |
| ETEC | *estB* | Stb-F | ATCGCATTTCTTCTTGCATC | 175 | Blanco et al., 1997 |
| Stb-R | GGGCGCCAAAGCATGCTCC |
| ETEC | *eltA* | LT-A-1 | GGCGACAGATTATACCGTGC | 696 | Schultsz et al., 1994 |
| LT-A-2 | CCGAATTCTGTTATATATGTC |
| EIEC | *ipaH* | EI1 | GCTGGAAAAACTCAGTGCCT | 424 | Tornieporth et al., 1995 |
| EI2 | CCAGTCCGTAAATTCATTCT |
| EAEC | *aatA* | pCVD432/start | CTGGCGAAAGACTGTATCAT | 630 | Schmidt et al., 1995 |
| pCVD432/stop | CAATGTATAGAAATCCGCTGTT |

a Primers used for sequencing

Table S8. Targets and primers associated with extraintestinal pathotypes of *E. coli*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Pathotype** | **Target** | **Primers** | **Nucleotide sequence (5´- 3´)** | **Size****(bp)** | **Reference** |
| ExPEC | *kpsM II* | KpsII f | GCGCATTTGCTGATACTGTTG | 272 | Johnson & Stell, 2000 |
| KpsII r | CATCCAGACGATAAGCATGAGCA |
| ExPEC | *kpsM II-K2* | kpsII f | GCGCATTTGCTGATACTGTTG | 570 | Johnson & O’Bryan, 2004 |
| KpsII-K2r | AGGTAGTTCAGACTCACACCT |
| ExPEC | *kpsM II-K5* | K5 f | CAGTATCAGCAATCGTTCTGTA | 159 | Johnson & Stell, 2000 |
| kpsII r | CATCCAGACGATAAGCATGAGCA |
| ExPEC | *neuC-K1* | neu1 | AGGTGAAAAGCCTGGTAGTGTG | 676 | Moulin-Schouleur et al., 2006 |
| neu2 | GGTGGTACATCCCGGGATGTC |
| ExPEC | *kpsM III* | kps III f | TCCTCTTGCTACTATTCCCCCT | 392 | Johnson & Stell, 2000 |
| kps III r | AGGCGTATCCATCCCTCCTAAC |
| ExPEC | *cvaC* | CoIV-Cf | CACACACAAACGGGAGCTGTT | 680 | Johnson & Stell, 2000 |
| CoIV-Cr | CTTCCCGCAGCATAGTTCCAT |
| ExPEC | *ibeA* | Ibe10 f | AGGCAGGTGTGCGCCGCGTAC | 170 | Johnson & Stell, 2000 |
| Ibe10 r | TGGTGCTCCGGCAAACCATGC |
| ExPEC | *iss* | is-f | CAGCAACCCGAACCACTTGATG | 323 | Johnson et al., 2008 |
| is-r | AGCATTGCCAGAGCGGCAGAA |
| ExPEC | *malX* | MALX-F | GCATGAGCAGTGCGATACATCGC | 828 | Mora et al., 2013 |
| MALX-R | AGGGCTGGGAAGTGGTTTAGCC |
| ExPEC | *traT* | TraTf | GGTGTGGTGCGATGAGCACAG | 290 | Johnson & Stell, 2000 |
| TraTr | CACGGTTCAGCCATCCCTGAG |
| ExPEC | *tsh* | tsh03 | GGTGGTGCACTGGAGTGG | 640 | Dozois et al., 2000 |
| tsh15 | AGTCCAGCGTGATAGTGG |
| ExPEC | *usp* | usp-f | ACATTCACGGCAAGCCTCAG | 440 | Bauer et al., 2002 |
| usp-r | AGCGAGTTCCTGGTGAAAGC |
| ExPEC | *fimH* | FimH F | TGCAGAACGGATAAGCCGTGG | 508 | Johnson & Stell, 2000 |
| FimH R | GCAGTCACCTGCCCTCCGGTA |
| ExPEC | *fimAvMT78* | fimA215 | ACTTTAGGATGAGTACTG | 266 | Marc & Dho-Moulin, 1996 |
| fimA201 | TCTGGCTGATACTACACC |
| ExPEC | *papC* | Forward | GTGGCAGTATGAGTAATGACCGTTA | 205 |  Johnson et al., 2015 |
| Reverse | ATATCCTTTCTGCAGGGATGCAATA |
| ExPEC | *sfa/focDE* | sfa 1 | CTCCGGAGAACTGGGTGCATCTTAC | 410 | Le Bouguenec et al., 1992 |
| sfa 2 | CGGAGGAGTAATTACAAACCTGGCA |
| ExPEC | *afa/draBC* | afa1 | GCTGGGCAGCAAACTGATAACTCTC | 750 | Le Bouguenec et al., 1992 |
| afa2 | CATCAAGCTGTTTGTTCGTCCGCCG |
| ExPEC | *cnf 1* | CNF1-F2 | CAGGAGGTACTTAGCAGCGT | 468 | Mora et al., 2013 |
| CNF1-RC | TAATTTTGGGTTTGTATC |
| ExPEC | *cdtB* | cdt-s1 | GAAAGTAAATGGAATATAAATGTCCG | 466 | Tóth et al., 2003 |
| cdt-as1 | AAATCTCCTGCAATCATCCAGTTA |
| cdt-s2 | GAAAATAAATGGAACACACATGTCCG |
| cdt-as2 | AAATCACCAAGAATCATCCAGTTA |
| ExPEC | *hlyA* | hly f | AACAAGGATAAGCACTGTTCTGGCT | 1177 | Yamamoto et al., 1995 |
| hly r | ACCATATAAGCGGTCATTCCCGTCA |
| ExPEC | *sat* | SatF | GCAGCTACCGCAATAGGAGGT | 937 | Johnson et al., 2003 |
| SatR | CATTCAGAGTACCGGGGCCTA |
| ExPEC | *iucD* | Aer f | TACCGGATTGTCATATGCAGACCGT | 602 | Yamamoto et al., 1995 |
| Aer r | AATATCTTCCTCCAGTCCGGAGAAG |
| ExPEC | *iro*N | Ironec-f | AAGTCAAAGCAGGGGTTGCCCG | 665 | Johnson et al., 2000 |
| Ironec-r | GACGCCGACATTAAGACGCAG |

**Table S9.** Detection and sequencing of *bla*TEM, *bla*SHV and *bla*CTX-M genes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Target** | **Primers** | **Nucleotide sequence (5´- 3´)** | **Size (bp)** | **Reference** |
| *bla*CTX‐M | CTX-C3 | ATGTGCAGCACCAGTAAAGTGATG | 542 | Mora et al., 2013 |
| CTX-C4 | ACCGCGATATCGTTGGTGGTGCC |
| *bla*CTX‐M-grupo 1 | M13U | GGTTAAAAAATCACTGCGTC | 863 | Saladin et al., 2002 |
| M13L | TTGGTGACGATTTTAGCCGC |
| *bla*CTX‐M-grupo 1 | aCTX-15-F1 | GAAGCTAATAAAAAACACACGTGG | 1044-1123 | Mora et al., 2013 |
| aCTX-15-R | GTATGCGCAAGCGCAGGTGG |
| *bla*SHV | SHV-F2 | TTGTCGCTTCTTTACTCGCC | 879 | Mora et al., 2013 |
| SHV-R2 | CCCGGCGATTTGCTGATTTCGC |
| *bla*SHV | aSHV-1 | GGGTTATTCTTATTTGTCGC | 930 | Rasheed et al., 1997 |
| aSHV-2 | TTAGCGTTGCCAGTGCTC |
| *bla*TEM | bTEM-1F | ATGAGTATTCAACATTTCCG | 868 | Rasheed et al., 1997 |
| bTEM-1R | CTGACAGTTACCAATGCTTA |

a Primers used for sequencing; b Primers used for amplification and sequencing

**Figure S1.** GrapeTree inferred using the NINJA NJ algorithm and based on the cgMLST V1 + HierCC V1 scheme from Enterobase



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