# Escherichia coli – STEC/EPEC

**Animal Groups Affected**

<table>
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<tr>
<th>Shigatoxigenic <em>E. coli</em> (STEC): ruminants, swine</th>
<th>Fecal-oral; animal to animal; Direct contact with contaminated surfaces; contaminated feed.</th>
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<tbody>
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<td>Enteropathogenic <em>E. coli</em> (EPEC): various serotypes based on pili typing or enteropathogenesis: ruminants, swine</td>
<td>Fecal-oral; direct contact with infected surfaces and pastures</td>
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**Transmission**

- Shigatoxigenic *E. coli* (STEC): Asymptomatic infection without clinical disease in animals
- Enteropathogenic *E. coli* (EPEC): Severe acute diarrhea, usually seen between 1-10 days of age

**Clinical Signs**

- Shigatoxigenic *E. coli* (STEC): Asymptomatic infection without clinical disease in animals
- Enteropathogenic *E. coli* (EPEC): Severe with death common if untreated

**Severity**

- Shigatoxigenic *E. coli* (STEC): Non-pathogen transient predominantly but not exclusively; summer commensal of ileum and large colon
- Enteropathogenic *E. coli* (EPEC): Severe acute diarrhea, usually seen between 1-10 days of age

**Treatment**

- Shigatoxigenic *E. coli* (STEC): Oral neomycin (experimental)
- Enteropathogenic *E. coli* (EPEC): Fluid and electrolyte replacement, systemic antibiotics

**Prevention and Control**

- Shigatoxigenic *E. coli* (STEC): Two commercial vaccines for cattle; environmental hygiene; gloves when working with known colonized animals
- Enteropathogenic *E. coli* (EPEC): Good colostrum transmission, birthing area management, vaccination of the dam preparturition or use of oral antibody preparation at birth

**Zoonotic Potential**

- Shigatoxigenic *E. coli* (STEC): Yes; young children <5 years of age at highest risk especially from direct animal contact, e.g. at children’s zoos although STEC-induced disease can occur in people of all ages.
- Enteropathogenic *E. coli* (EPEC): Not generally

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**Fact Sheet compiled by:** Victor Cortese  
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**Fact Sheet Reviewed by:** Guy Loneragan, Franklyn Garry

**Susceptible animal groups:** Ruminants, swine; also for EPEC, all species to a lesser degree should be considered susceptible. Serotype pathogenicity tends to be strongly related to animal species. Disease is almost exclusively seen in neonates.

**Causative organism:** Shigatoxigenic *Escherichia coli* (STEC) O157:H7 or O157:non-motile; many STEC serogroups including O26, O45, O103, O111, O121 and O145 may also infect ruminants and may cause zoonotic disease. For EPEC, enterotoxigenic, enterohemorrhagic and attaching and effacing. Further identification based on pilus types - K99 (predominant in cattle), F4 (K88), F5 (K99), F41, F6 (987P) and F18 *E. coli*.

**Zoonotic potential:** STEC is zoonotic and may result in mild to severe disease which may occasionally be
**Escherichia coli – STEC/EPEC**

**Fatal:** EPEC causes mild to severe in other species, but rarely causes disease in humans, although occasional fatal disease in infected people has occurred.

**Distribution:** Highly prevalent in ruminant herds in temperate regions throughout the year with very high prevalence in summer months; uncommon in swine. Variable distribution within herds is observed.

**Incubation period:** In STEC, the incubation period is unknowable because there is no disease. The patent period of fecal shedding is summer biased, variable (2 weeks +/- one week) and may be sporadic or episodic. For EPEC, the incubation period is very short with diarrhea often seen within 12-48 hours after exposure.

**Clinical signs:** Asymptomatic condition is noted with STEC. However, for EPEC, severe watery diarrhea that may be blood tinged is presented and resultant severe dehydration. With some attaching and effacing *E. coli*, mucosal lining maybe be sloughed and voided in the diarrhea. Toxins may cause a hypersecretory diarrhea.

**Post mortem, gross, or histologic findings:** In STEC, no visible gross lesions; may observe rare attaching and effacing histopathological lesions in colonic mucosal of colonized animals. For EPEC, fluid filled intestinal tract and mucosal lining damage is observed with some strains.

**Diagnosis:** Culture and isolation using enrichment, immuno-concentration, selective chromogenic agar, and PCR or serologic confirmation of suspect isolates is available for STEC. Similarly for EPEC, culture and isolation can be used, with FA, EM and PCR as confirmation.

**Material required for laboratory analysis:** Fresh rectal feces or freshly ground deposited feces (10gm) for either STEC or EPEC, or for STEC, environmental samples (e.g., hide swabs, surface swabs, soil and water) can be cultured, and for EPEC, intestinal section.

**Relevant diagnostic laboratories:** Various veterinary research laboratories; any BSL-2 bacteriological laboratory if personnel are adequately trained in STEC detection methods

**Treatment:** In STEC, oral neomycin sulfate in water at label dose has been used experimentally. In EPEC, oral electrolytes and IV fluids, in severe cases, systemic antibiotics, and NSAIDs may be needed.

**Prevention and control:** One vaccine based on siderophore technology has been shown to decrease fecal shedding of O157 and is available for use in cattle. Isolate infected animal groups and prevent contact of people with animals and animal feces. Clean and disinfect animal housing areas and surfaces. Animal hides, oral cavity and feces may contain high numbers of viable STEC O157. Handling sanitation of workers and handlers is recommended. Hand-washing stations recommended for visitors. Several vaccines are available for use in cattle and swine to enhance colostral transmission of antibodies against the various types of enteropathogenic *E. coli*. Oral antibody preparation can be given to the neonate have also been shown to be helpful in controlling the disease. Isolate infected animal groups and change birthing area is important.

**Suggested disinfectant for housing facilities:** Potassium peroxymonosulfate and sodium chloride (i.e. Virkon-S); avoid bleach solutions and lime as disinfectants.

**Notification:** Reportable in all 50 US states if human disease occurs for STEC.

**Measures required under the Animal Disease Surveillance Plan:** None currently

**Measures required for introducing animals to infected animal:** Await negative fecal test results. Consider use of vaccination of known infected animals to decrease potential shedding of the bacteria.

**Conditions for restoring disease-free status after an outbreak:** For STEC, isolation from contact with other animals or public for at least two weeks, followed by serial negative fecal culture of all animals in group. Place in cleaned and disinfected housing; may wish consider permanent withdrawal from herd or euthanasia of animal having direct contact with public, especially children. For EPEC, isolation from contact with other animals or public for at least two weeks and separation of recovered animals form newborns.
### Experts who may be consulted:

Victor Cortese, DVM, PhD Dipl ABVP  
Zoetis Inc.  
746 Veechdale Road  
Simpsonville, KY 40067  
610-662-6505  
victor.cortese@zoetis.com

Guy Loneragan BVSc, PhD (STEC)  
Animal and Food Sciences  
Texas Tech University, MS 2141  
Lubbock, Texas 79409  
806-742-2805x268  
guy.loneragan@ttu.edu

Franklyn Garry DVM, PhD (EPEC)  
School of Veterinary Medicine  
Colorado State University  
1678 Campus Delivery  
Fort Collins, CO 80523-1678  
970-297-0371  
franklyn.garry@colostate.edu

### References:

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