

Testing for  
*E. coli* O157 (Including H7)  
in Composite  
375 gram samples

# Ground Beef





*E. coli* O157:H7 is an important human pathogen that has been linked to numerous food borne outbreaks due to the consumption of improperly cooked beef. It is regulated by the USDA-FSIS under directive 10.010.1 as an adulterant if present in raw beef products. Beef producers and suppliers have rigorous testing programs in place to screen their products for *E. coli* O157 including *E. coli* O157:H7.

Due to the perishable nature of raw beef, pathogen testing methods must provide accurate results in the

shortest timeframe possible. Testing must facilitate the recovery of potentially injured cells plus allow amplification of low cell numbers to levels that are detectable by rapid microbiological methods. The quality of the enrichment media used for the initial part of any rapid screen plays a vital role in the success of the entire method.

### Recommended Sample Size For RapidChek *E. coli* Testing: Ground Beef

The use of rapid methods to detect *E. coli* O157 and *E. coli* O157:H7 are standard practices for meat suppliers and processors. No matter what method a supplier chooses to use, all tests consist of two parts: **Enrichment** followed by **Detection**. Many factors need to be taken into consideration: sample matrix, time, temperature and sample size. Each plays an important role in the ability of the **Enrichment** to resuscitate and grow the *E. coli* if present in a sample. The importance of proper and efficient enrichment applies to all types of detection methods whether they are PCR, immunoassay, cultural, or any combination of these.

Standard food industry practice has been to test 25 gram samples of meat. This is the sample size that rapid methods had initially validated. Recently, the meat industry trend is to move from the validated 25 gram sample size to a more economical and efficient composite sample size ranging from 65 to 375 grams. RapidChek *E. coli* O157 has been validated by a third party laboratory to test 375 gram samples of ground beef within 12 hours when incubated at 42°.

### Recommended Best Practices For Testing Ground Beef With RapidChek *E. coli* O157.

Following is a comparison between the USDA method and the RapidChek O157 method for assuring accurate results while testing 375 gram composite samples of raw ground beef.

#### Regulatory Samples: USDA

A two pound sample is collected by the USDA and sent to the USDA laboratory. At the lab, a 325 gram sub-sample is removed from the two pound sample. This sub-sample is then further divided into 5 x 65 gram samples. Each of these 65 gram sub-samples is enriched individually and tested for the presence of *E. coli* O157:H7. If a 65 gram sample is positive, it is confirmed following cultural analysis as per MLG 5.04, Sections 5.6 and 5.7.

#### Routine samples: RapidChek *E. coli* O157

There is third party validation data to demonstrate that RapidChek *E. coli* O157 detects *E. coli* O157:H7 in a 375 gram ground beef sample when incubated for 12 hours at 42°.

SDIX recommends that meat suppliers, processors and third party laboratories follow current practices when screening ground beef samples. Proper testing of a 375 gram ground beef composite sample follows these steps:

- 1 Collect and prepare the sample
- 2 Enrich the sample for 12 hours at 42°C
- 3 At 12 hours, perform detection and document results

Cited below is the validation study demonstrating that RapidChek *E. coli* O157 is reliable and accurate for screening a 375 gram ground beef sample.

#### Validation of the RapidChek *E. coli* O157 (Including H7) System on composite 375 gram Ground Beef Samples

Study performed by Food Safety Net Services  
–funded by SDIX

SIDE BY SIDE COMPARISON									
	Sample		Subsample		Enrichment		Detection		Documentation
<b>USDA</b>	2 lbs.	→	325 grams	→	5 x 65 grams (15 hrs at 42°)	→	3.5 hour Assay	→	Results
<b>RapidChek® <i>E. Coli</i> O157</b>	375 grams	→		→	375 grams (12 hrs at 42°)	→	10 min. Assay	→	Results

Choosing the best testing approach is essential to achieving the standard of continuous improvement required under HACCP. Testing methods should also have a meaningful impact on the total cost in use for food safety programs and most importantly, provide maximum assurance of reliability in your results through documented studies and data.

In response to recent industry testing changes, it has become increasingly important to review and redesign testing protocols to detect *E. coli* O157:H7 in raw beef products. The effects of compositing samples while maintaining shortened incubation times and the use of rapid detection devices must be managed appropriately. This technical document provides information with the goal of contributing to your success in implementing good HACCP principles and ensuring accurate results.





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