

## Colitag shown 300% superior in detecting coliforms

# A comparative study of Colitag and Colilert water detection systems for coliform and *E. coli*

### SUMMARY

A study was performed by researchers in Japan<sup>1</sup> that compared the capabilities of Colitag™ (Neogen, Lansing, MI) and Colilert (IDEXX Laboratories, Westbrook, ME). Colitag and Colilert are both specific enzyme substrate media designed to detect total coliforms and *Escherichia coli* in water. In addition to proprietary ingredients, both products use ONPG and MUG as nutrients/indicators.

When compared with Colilert, Colitag produced superior results, especially in detecting coliforms in chlorine-treated environmental water. Colitag was 300% better in detecting coliforms and 170% superior in detecting *E. coli* in chlorine-treated water — often detecting microbes which entirely escaped detection by Colilert.

### METHODOLOGY

In “Water Testing Methods, 2001 Edition,” three new methods (using ONPG-MUG medium with IPTG added, X-Gal-MUG medium with X-Gal-MUG medium with pyruvic acid) and 2 conventional methods (using LB-BGLB medium and MMO-MUG medium) were compared for performance using standard bacterial strains, and the results were summarized.

The present study conducted tests using water samples from rivers, lakes, and marshes in 8 prefectures throughout Japan according to the procedure recommended by the Japan Water Works Association for evaluation of specific enzyme substrate media. This method involves the comparison and evaluation of detection sensitivity and speed with respect to coliforms and *E. coli* by methods that included Colitag and Colilert.

### RESULTS

The table on the back of this sheet shows the sensitivity of detection of microbes from chlorine-treated environmental water after a 24-hour incubation in Colitag and Colilert. Microbes were enumerated both colorimetrically and with fluorescence. Colitag’s ratio of detection, with Colilert representing 100%, was 300% more sensitive in detecting coliforms, and 170% more sensitive in detecting *E. coli*.

**(See the back of this sheet for results Table 1)**

### CONCLUSION

This study demonstrates that Colitag was significantly superior to Colilert in detecting coliforms and *E. coli* in chlorine-treated environmental samples. Often, Colitag detected microbes when Colilert’s media and test procedure failed to detect any.

1. Sasaki, Tetsuro and Akihiko Endo. 2002. Practice of synthetic enzyme substrate media for detection of coliforms. Soc. Antibacterial and Antifungal Agents, Jpn, (Bokin, Bobai) 30 (9) 617-624.



**Table 1. Comparison of detection sensitivity.** This table shows the sensitivity of detection of microbes from chlorine-treated environmental water after a 24-hour incubation in Colitag and Colilert. Microbes were enumerated both colorimetrically and with fluorescence. Colitag's ratio of detection, with Colilert representing 100%, was 300% more sensitive in detecting coliforms, and 170% more sensitive in detecting *E. coli*. For example with water sample A, Colitag showed approximately 10-fold sensitivity over Colilert. For sample A, the results shown represent the number of tubes showing a positive response. For samples B-G, the average MPN of two observations is expressed as cfu/100 mL. *tnc=too numerous to count*

|                           |                          |          | Chlorine treatment (seconds) |       |       |       |       |       |
|---------------------------|--------------------------|----------|------------------------------|-------|-------|-------|-------|-------|
|                           |                          |          | None                         | 20    | 60    | 180   | 300   | 1,800 |
| <b>Sample: A</b>          | Total live cell (cfu/mL) |          | 1,500                        | 950   | 940   | 1100  | 930   | 1,400 |
| Kanto, swamp water        | Colormetric              | Colilert | 830                          | 220   | 320   | tnc   | 130   | 150   |
|                           |                          | Colitag  | tnc                          | tnc   | tnc   | tnc   | tnc   | tnc   |
| Chlorine added: 0.5 mg/L  | Fluorescence             | Colilert | 1                            | 0     | 1     | 0     | 1     | 0     |
|                           |                          | Colitag  | 36                           | 9     | 27    | 9     | 9     | 11    |
| <b>Sample: B</b>          | Total live cell (cfu/mL) |          | 740                          | 3     | 5     | 3     | 5     | 7     |
| Kin-ki area, lake water   | Colormetric              | Colilert | 1,600                        | 55    | 5     | 3     | 2     | 0     |
|                           |                          | Colitag  | 2,400                        | 16    | 23    | 3     | 5     | 1     |
| Chlorine added: 0.25 mg/L | Fluorescence             | Colilert | 10                           | 0     | 0     | 0     | 0     | 0     |
|                           |                          | Colitag  | 12                           | 0     | 0     | 0     | 0     | 0     |
| <b>Sample: C</b>          | Total live cell (cfu/mL) |          | 10,000                       | 550   | 440   | 480   | 100   | 80    |
| Kin-ki area, river water  | Colormetric              | Colilert | 17,000                       | 210   | 12    | 17    | 4     | 1     |
|                           |                          | Colitag  | 140,000                      | 4,000 | 79    | 49    | 17    | 2     |
| Chlorine added: 0.5 mg/L  | Fluorescence             | Colilert | 900                          | 0     | 0     | 1     | 1     | 0     |
|                           |                          | Colitag  | 1,700                        | 4     | 0     | 3     | 0     | 0     |
| <b>Sample: D</b>          | Total live cell (cfu/mL) |          | 43,000                       | 600   | 460   | 520   | 400   | 170   |
| Kanto area, river water   | Colormetric              | Colilert | 27,000                       | 32    | 17    | 14    | 3     | 6     |
|                           |                          | Colitag  | 190,000                      | 300   | 44    | 30    | 18    | 5     |
| Chlorine added: 0.5 mg/L  | Fluorescence             | Colilert | 37                           | 0     | 0     | 0     | 0     | 0     |
|                           |                          | Colitag  | 37                           | 0     | 0     | 0     | 0     | 0     |
| <b>Sample: E</b>          | Total live cell (cfu/mL) |          | 15,000                       | 1,500 | 1,000 | 1,300 | 1,400 | 670   |
| Kanto, river water        | Colormetric              | Colilert | 32,000                       | 240   | 140   | 39    | 34    | 10    |
|                           |                          | Colitag  | 30,000                       | 300   | 137   | 37    | 43    | 16    |
| Chlorine added: 0.5 mg/L  | Fluorescence             | Colilert | 102                          | 4     | 0     | 0     | 1     | 1     |
|                           |                          | Colitag  | 102                          | 6     | 1     | 0     | 1     | 1     |
| <b>Sample: F</b>          | Total live cell (cfu/mL) |          | 17,000                       | 1,500 | 1,100 | 770   | 1,100 | 550   |
| Kansai, river water       | Colormetric              | Colilert | 27,000                       | 240   | 550   | 120   | 80    | 210   |
|                           |                          | Colitag  | 27,000                       | 350   | 170   | 540   | 400   | 92    |
| Chlorine added: 0.5 mg/L  | Fluorescence             | Colilert | 200                          | 3     | 2     | 2     | 3     | 0     |
|                           |                          | Colitag  | 240                          | 5     | 4     | 2     | 3     | 0     |
| <b>Sample: G</b>          | Total live cell (cfu/mL) |          | 3,700                        | 180   | 160   | 150   | 180   | 210   |
| Joshin area, river water  | Colormetric              | Colilert | 9,000                        | 140   | 77    | 42    | 72    | 100   |
|                           |                          | Colitag  | 13,000                       | 490   | 540   | 170   | 170   | 84    |
| Chlorine added: 0.5 mg/L  | Fluorescence             | Colilert | 24                           | 0     | 0     | 0     | 0     | 0     |
|                           |                          | Colitag  | 74                           | 1     | 0     | 0     | 0     | 0     |
| <b>Sample: H</b>          | Total live cell (cfu/mL) |          | 1,100                        | 240   | 180   | 221   | 190   | 140   |
| Kyushu, river water       | Colormetric              | Colilert | 8,300                        | 240   | 34    | 29    | 21    | 8     |
|                           |                          | Colitag  | 5,900                        | 830   | 64    | 110   | 33    | 6     |
| Chlorine added: 0.5 mg/L  | Fluorescence             | Colilert | 29                           | 3     | 0     | 0     | 0     | 1     |
|                           |                          | Colitag  | 49                           | 4     | 2     | 0     | 0     | 0     |