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## Detecting *Campylobacter* Contamination in Food: New O.B.I.S. Campy Kit

By: Christine Hilbert, Ph.D., Industrial Product Manager, Remel Brand Products

### A Widespread Disease

*Campylobacter* is the leading cause of enteric disease in most Western countries and is the most common bacterial cause of diarrheal illness in the United States. *Campylobacter* species differ from other foodborne pathogens in that they do not multiply within the food. However, as few as 500 cells are sufficient to cause infection. Most frequently, poultry and cattle are the sources of human infection, but puppies, kittens, pigs, sheep, rodents, and birds may also serve as reservoirs. In fact, most cases of *Campylobacteriosis* are associated with handling raw poultry or eating raw or undercooked poultry meat.

*Campylobacteriosis* is a serious disease; even when causing only a self-limiting infection, the economic effect can be huge. The worldwide commercial cost of the disease associated with poultry alone has been estimated at between \$400 and \$800M annually. The pathogen can be transmitted from animal to person, through ingestion of fecally contaminated water or food, or by direct contact with contaminated environmental surfaces. Therefore, key markets for testing are the poultry and meat industries as well as milk and water processing facilities.

Since as few as 500 organisms can lead to disease, testing methods must be



sensitive enough to detect these low numbers of organisms. In addition, to minimize outbreaks of *Campylobacter* and other food pathogens, rapid detection methods are needed. Such methodology can lead to savings of hundreds of millions of dollars annually by minimizing, or even eliminating, both food recalls and disease outbreaks and the associated costs.

### Current methods

Current testing methods typically involve an enrichment step followed by plating and confirmation, taking up to one week to verify *Campylobacter* contamination. This is primarily due to the fact that isolation from food is difficult because the bacteria are usually present in very low numbers.

These methods require an enrichment broth containing antibiotics, special antibiotic containing plates and a microaerophilic atmosphere (generally with 5% oxygen and an elevated concentration of carbon dioxide at 10%). Isolation using these methods can take from several days to a week. In addition, isolation of the organism from highly contaminated samples may require different selective media dependent on the food type and with incubation under microaerobic conditions. They are not the fastest-growing organisms – it can still take up to a week to obtain a final test result.

Following isolation on selective media, identification must be carried out using biochemical, immunological and molecular techniques, including:

- Biochemical profiles can be obtained; however, biochemical activity of *Campylobacter* organisms has been reported to be low.
- Immunological techniques such as antibody/antigen interactions; e.g., latex agglutination.
- Molecular methods using PCR or nucleic acid techniques have been reported and are the subject of current research studies.
- Clinical samples; usually referred to specialist laboratories for serotyping and antibiotic sensitivity testing.

### Rapid confirmation

To address the need for a rapid, sensitive test for confirmation of *Campylobacter* contamination, a new rapid screening kit for the detection of *Campylobacteraceae* has been introduced. This kit, referred to as O.B.I.S. campy (Oxoid Biochemical Identification System for *Campylobacter*), provides an easy-to-use rapid testing solution for the detection of *Campylobacteraceae*, differentiating *Campylobacteraceae* from other organisms with similar colony morphology.

*Continued on back cover*

## Clean, Clean, Clean!

By: Tom Seebuk, Market Manager, LaMotte Company



Yes, your mother was right all those years that she made you wash your hands every time you touched anything or anybody. And her advice remains truer than ever today, in light of all of the bacterial outbreaks that have been in the news. The food and beverage processors are well aware of the effects that such outbreaks can have. Some recalls have actually forced companies out of business, so cleaning and sanitizing have become a high priority in this area.

### Cleaning vs. Sanitizing

There is a difference between cleaning and sanitizing. With cleaning, one is primarily dealing with anything from tank cars to kitchen fryers and greasy areas---basically any place that might have a buildup of proteins, soils, etc. There is also a process called "clean in place" (CIP) whereby chemicals are used to clean bottles and other packaging components. For these types of jobs, acid or alkaline compounds are used. This is step one (and the most difficult step) of the cleaning process: removing the "funky" material so that the surface can then be sanitized. Once this organic load is removed, the sanitizers can do their job more easily.

The type of cleaner and dosage used depends on the surface (particularly if metal) that is being cleaned. Stainless steel is preferred for food surfaces, but other metals such as

aluminum, zinc and iron are sometimes used and can be corroded by certain cleaners. Alkaline cleaners are good for removing fats, grease, proteins and most soils. Mineral deposits usually require acid cleaners. Either type can be used in CIP. It is a good idea to check with the chemical supplier for the recommended cleaner.

Strong alkaline cleaners are usually sodium or potassium hydroxide based. Weaker ones use trisodium phosphate, silicate or carbonate salts. Acid cleaners can use phosphoric, nitric, sulfamic, sulfuric or hydrochloric acids. Surfactants can be added to the cleaners to help the cleaning process and make the cleaner foam. The foam helps the contact time.

### Checking the Strength of a Cleaner

To check the strength of acid or alkaline cleaners, it is best to use an acid-base titration, with a phenolphthalein indicator. Rather than buying separate kits for different acids, one can use the 7182 Acidity Test Kit. This kit includes titration equivalence factors for hydrochloric, sulfuric or phosphoric acids. By using different sample sizes it also allows a 1 drop = 0.1% or 1% equivalence. If other acids are used, it is easy to convert to the particular acid.

To titrate caustic soda as sodium hydroxide (NaOH), one should eliminate the contribution of any carbonates. The 7181 Caustic Test Kit uses barium to precipitate the carbonate, then a standard acid titrates the caustic. This kit also uses two sample sizes for 1 drop = 0.1 or 1% equivalences. Of course, if one wants to determine the strength of the cleaner with the carbonates, simply eliminate the barium precipitation.

The three main chemicals that have been used over the years for sanitation are chlorine, quaternary ammonium compounds (QAC or quats), and

iodine. Other chemicals such as chlorine dioxide, peracetic acid and peroxide have recently gained in popularity, but chlorine, QAC and iodine are still the most common sanitizers.

### Chlorine

Chlorine can be used in a variety of forms. Usually bleach solutions are diluted to the required usage level. The key factors for efficacy are pH (the lower, the more active the chlorine) and temperature (the higher, the more active). In the produce area, 50-200ppm is the usual concentration for spraying or cleaning fruits and vegetables. In poultry processing, workers dip implements, gloves and boots in 200 or more ppm chlorine solutions. Higher organic load areas in these plants sometimes require up to 800ppm or more. Chlorine is also used in the chiller water to reduce contamination.

Contact surfaces require 50-200ppm chlorine. Above 200ppm, the surface should be rinsed. Since chlorine is corrosive, caution should be used on such surfaces. Chlorine is used in the dairy industry to rinse milking machines and in the egg industry to clean eggs. The 4250-BJ is an easy-to-use test paper that has values of 10, 50, 100 and 200ppm chlorine. The 3031 is a high-range chlorine test strip that can read to 800ppm.

### Quaternary Ammonium Compounds

Quats are not as efficacious as chlorine, but are less noxious and tend to cling to surfaces better. This is their primary use. Their tendency to foam helps with surface cleaning, but this can be a drawback. Quats are better in killing gram-positive bacteria than negative. Originally, only simple quats were used. These were based on various forms of alkyl dimethyl benzyl ammonium chloride, which was referred to as ADBAC. But soon, researchers were combining various chains to make more complex quats, now referred to as 4th and 5th gen-

eration, that are safer to use, have better efficacy and foam less.

The usual quat concentration is 100-400ppm, depending on use. As with chlorine, they are used in many food processing operations and can exceed 1,000ppm in some food plant areas. They, too, are used in the dairy and egg industries. The 2951 strips read all types of QAC. There are 2 ranges – the 2951 reads 0-400ppm; and the 2951HR reads 0-1,500ppm.

### Iodine

Iodine is more specialized and thus used less than chlorine or QAC. It is used frequently in restaurant ware-wash applications. It sanitizes ware-wash and helps with a sheeting action to prevent drops on glasses. Health codes usually call for a range of 12.5-25ppm iodine for warewash, but because iodine vaporizes at 120°F, the washers must be run at lower temperatures.

Iodine can also be used where chlorine is too corrosive. Here the concentration can be 40-50ppm, but contact time is longer. It is frequently used in the wine and beer industries. The main problem with regular use or longer contact time is staining. However, it usually does not need to be rinsed from containers before use. Because of the no-rinse requirement, it is ideal for milking operations. The 2948-BJ strips read from 12-100ppm iodine. There are also field titration kits for iodine.

### Assuring a Safe Product

The food and beverage process areas perform two tasks to assure safe product: clean then sanitize. The field kits and strips described here help the plant to make sure that these goals are achieved quickly and easily.

## Ohaus® FD Series Food Scales: Ensuring Accurate Portion Control

By: Jason Lecker, R&P Public Relations. Article courtesy of Ohaus Corporation



At Rockne's Restaurant in suburban Fairlawn, Ohio, where diners are invited to enjoy "great food and fun," General Manager Ann Lord and her staff arrive at the establishment well before its 11 a.m. opening to prepare for their lunch and dinner guests. One of the many things the employees do during those early hours is to weigh out dozens of foods that are featured on the menu.

### Portion Control: A Key to Profitability

"Restaurants live and die by portion control," Lord says. "Consistent portions help insure customer satisfaction and contribute to the restau-

rant's profitability," she continues. For example, diners want to feel they are receiving value and, consequently, Rockne's risks losing these customers if they are served different-sized portions on separate visits. Additionally, Lord said, a restaurant's profit decreases if extra food is served due to inaccurate portion control.

On this particular morning, the line cooks at Rockne's meticulously weigh out portions of cooked foods, such as turkey and other deli meat, tuna salad, chicken stir-fry, chicken salad, vegetables, beef taco melt and even fruit for fruit salad. On days when large food shipments arrive, the cooks also portion frozen appetizers by weight. While recipe ingredients are occasionally weighed, the majority of the activity is centered around cooked food.

### The Ohaus FD Series Food Scale

With such a busy back-of-the-house operation, the workers appreciate

equipment that is durable, and easy to set up and use. Lord says that the Ohaus FD Series food scales meet these requirements and more. The staff also likes the scale's easy-to-read, large, backlit LCD display and the option to select from several weighing units like ounces or pounds.

The FD Series also provides fast and accurate results within two seconds. "The scales are very exact – it's easy to get what you are looking for," Lord adds. Ease of use is also an important factor. "They are very simple to use," she says. "All you have to do is turn them on and recharge them occasionally. And they are easy to clean up and put away."

### Solid Construction; Portable Design

To meet stringent cleanliness requirements in food preparation, the FD Series scale features a stainless-steel top and bottom housing as well

as a removable stainless-steel pan. Designed for maximum portability, it includes an internal rechargeable battery which can run for more than 120 hours before requiring a recharge. It can also be used throughout the week on a single overnight recharge.

Lord turned to the Ohaus scales about four years ago. "We had been going through scales left and right," she explains. We needed to find reliable equipment." She tried the Ohaus FD Series scale and was pleased with its dependability. Rockne's now has three such scales in their restaurant kitchen.

Rockne's has been able to retain customers while keeping food costs constant through the use of Ohaus FD Series scales in its kitchens. Lord said this weighing process has improved the diner "experience" as the restaurant chain is able to maintain consistency – a key factor in a very competitive industry.

## Keeping the Ice in Ice Cream

By: Article courtesy of Dickson



In one of the hottest environments in the world, keeping ice cream cool and frozen can be a difficult task. A leading manufacturer of ice cream in Dubai uses a network of Dickson data loggers to monitor this task. Their goal is to monitor temperatures and deliver sweet frozen treats across the Middle East.

Constant monitoring is a necessity, with outdoor temperatures routinely exceeding 90°F. The monitoring solu-

tion must have the ability to log past data to meet government regulations, but also allow Quality Assurance Officials the ability to view current conditions. This is necessary so action can be taken if environmental conditions change. It must also allow staff to react and save inventory or fix a potential problem.

### Convenient Monitoring Solution

The solution is a network of Dickson Data Loggers connected by a multiple point monitor (SM325 with MP100). This combination saves the facility manpower by not having to download individual data loggers and is an easy way to document all environmental conditions.

With this configuration, QA officials are able to monitor all nine cool rooms from one central location.

From one single point, employees are able to view current conditions, log past readings, and present reports for government officials. It also allows for a quick response in order to save valuable inventory.

### Disposable Chart Recorders

While monitoring their storerooms is essential, this dairy company also needs a solution for their transportation logistics system. They export ice cream across the Middle East, from Saudi Arabia to Kuwait and need to monitor the trucks to ensure proper conditions are maintained during transportation. To accomplish this, they use Dickson disposable chart recorders (D301). These convenient, accurate recorders allow for single use and also provide an economical solution.

In addition, the trucks travel on some rough roads, so they require a product that can handle rugged driving conditions. The chart recorders not only provide shock and vibration protection, but also are tamper-proof and have a pull-out start tab for fail-safe startup. These features provide an ideal solution for cold-chain monitoring.

When critical conditions for food safety exist, many Food Service Professionals have had positive results with Dickson Data Loggers. They offer ease of use, a high degree of accuracy, and a proven track record for solving difficult, complex customer issues.

## Detecting *Campylobacter* Contamination in Food: New O.B.I.S. Campy Kit

Continued from front cover

O.B.I.S. Campy is a simple, rapid, colorimetric test for the detection of L-alanyl aminopeptidase, an enzyme present in most Gram-negative organisms but absent in *Campylobacter*, *Helicobacter* and *Arcobacter* species. It has been designed to differentiate these three species from other Gram-negative organisms and also incorporates a Gram-lysis test which will quickly and easily demonstrate Gram status.

Each kit is sufficient for 60 enzymatic tests (including sufficient NaOH for up to 600 screens). Included in the kit are ten test cards, each with six separate reaction zones, Campy buffer (7mL), DMAC developer (7mL), NaOH (for Gram lysis test, 6mL), and 60 paddle pastettes. The kit has a 12-month shelf life and is stored at 2-8°C. It has 100% sensitivity and 99.6% specificity, demonstrating its ability to accurately differentiate *Campylobacter* spp. from other contaminating organisms. This easy-to-use, simple methodology is an inexpensive way to rapidly confirm if *Campylobacter* contamination is present.

### Testing Principle

The O.B.I.S. campy test will differentiate species of *Campylobacter*, *Helicobacter* and *Arcobacter* from all other Gram-negative organisms. Unlike other Gram-negative organisms, *Campylobacteraceae* do not possess the enzyme L-alanyl aminopeptidase (L-ALA). The O.B.I.S. campy test incorporates a rapid test to detect this enzyme and a Gram-lysis reagent to rapidly determine the Gram status.

First, the Gram-lysis test (or a Gram stain) must be carried out. This test differentiates between Gram-positive and Gram-negative bacteria. The test is carried out on a glass slide. Sodium Hydroxide (0.5M) is used to lyse the cell wall of Gram-negative organisms and release the DNA. The DNA forms a "string" which can be seen when the loop is raised from the surface of the slide. This reaction does not occur with Gram-positive organisms.

Once the organism has been identified as Gram-negative, the L-ALA test can be carried out. Enclosed reaction cards have been impregnated with the L-ALA substrate (L-alanyl-7-amino-4-methylcoumarin) in each of the six reaction zones. An acidic solution of dimethylaminocinnamaldehyde (DMAC) is used as a color developer. If this substrate is hydrolyzed by the organism, the resulting free 7-amino-4-methylcoumarin will combine with the developer to produce a purple-colored Schiff's base.

L-alanyl aminopeptidase (L-ALA) is an enzyme which cleaves L-alanine from various peptides. It is found in the bacterial cell wall of most Gram-negative organisms but rarely in Gram-positives. The O.B.I.S. campy kit aids in the differentiation of *Campylobacter* spp. from other organisms by screening out all Gram-positive, and all Gram-negative, L-ALA positive organisms.

### Summary:

With the recent publicity regarding food-related outbreaks and illnesses, now is the time to respond with rapid, reliable solutions. *Campylobacter* is the leading cause of enteric disease in the United States. Testing methods must be sensitive enough to detect low numbers of organisms, since as few as 500 organisms can lead to disease. To minimize outbreaks of *Campylobacter* and other food pathogens, rapid detection methods are needed. Such methodology can lead to savings of hundreds of millions of dollars annually by minimizing, or even eliminating, both food recalls and disease outbreaks and the associated costs. To address this need, a new rapid screening kit for the detection of *Campylobacteraceae* has been introduced. The kit, O.B.I.S. campy, provides an easy-to-use rapid testing solution for the detection of *Campylobacteraceae*. It allows rapid confirmation of contamination, minimizing risk, resulting in product being released to market sooner, and ultimately leading to a safer food supply.

For more information about this product, call Remel Technical Service at 1-800-447-3641 or contact your Fisher Scientific sales representative.

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