FOOD MICRO
VOL.1

HARDY DIAGNOSTICS
A Culture of Service™

Our heroes wear lab coats.

Hardy Diagnostics may have had humble beginnings but since has grown to become one of the top producers of culture media in the country. Not only that, but Hardy Diagnostics has the unique distinction of being a 100% employee owned company. The Hardy Diagnostics ESOP was created in 2012, and in October 2015, Jay Hardy sold the remainder of his majority share in Hardy Diagnostics back to his employees. Hardy Diagnostics now operates as a 100% Employee Owned ESOP.

So how did we get here? Meet our founder and president, Jay Hardy.

"Many people have asked me how I got started in business. First of all, you will need to know that our company, currently consisting of 430 co-workers, manufactures culture media that microbiologists use in the laboratory. Culture media is what we call the "bug food" that bacteria and fungi feast upon in order for microbiologists to determine the identity of the pathogen and to help determine how to kill them in order to restore the health of the patient.

The year was 1980, and I had just finished a one year internship at a hospital in Santa Barbara to train as a Medical Technologist. These are people that are licensed to conduct laboratory tests in a clinical setting. The requirements are a bachelor's degree and a rigorous year of practical training in the hospital lab. After finishing and passing the California State Board exams, my dream had been realized and I had finally become full-fledged Medical Technologist.

However, there were no jobs available at the time! Having come from the LA area, spending a year in the Central Coast of California was like paradise to me, so I very much wanted to stay in Santa Barbara. Being disappointed and dejected about not being able to find

Contents

work in my new profession, I was talking to my friend who had also completed the internship. We did not know which way to turn, but somehow came up with the idea of making culture media. My father was an entrepreneurial pharmacist who operated many drug stores during his career, so starting a new business seemed to be a somewhat natural path for me to follow.

So my friend and I started our fledgling business on a shoestring budget. We rented two small rooms in what had once been a motel in Santa Barbara. After borrowing $10,000 from each of our Dads, and rescuing some antiquated equipment from a trash heap, our little business was ready to be launched. We started with one customer, which was the hospital where we had trained. Over the years, we began to service more and more hospitals in Central California, and eventually grew to a company that now supplies over 10,000 laboratory customers worldwide with over 13,000 products that are used in the laboratory.

I often stop and wonder how different my life would have been if I had gotten my wish and had been offered a job back in 1980. I am constantly reminded of one of my favorite sayings when faced with adversity, which is the Marines' motto: "Adapt, Improvise, Overcome." We did just that, and I'm now enjoying the ride with no regrets!"

Jay Hardy, CLS, SM(NRCM),
Co-Founder and President

SO WHAT'S UP WITH ENVIRONMENTAL MONITORING?

A basic overview of the importance of environmental monitoring in a food processing facility.

Microorganisms are always present in food handling environments. These microorganisms can be characterized as belonging to 2 distinct groups: transient and resident. Transient microorganisms are usually introduced into the food environment through raw materials, water and employees. Normally the routine application of good sanitation practices are able to kill these organisms. However, if contamination levels are high or sanitation procedures are inadequate, transient microorganisms may be able to establish themselves, multiply and become resident. Organisms such as Coliforms, *Salmonella* spp. and *Listeria* spp. have a well established history of becoming residents in food handling environments. Environmental Monitoring Food processors should employ environmental sampling programs to monitor for general levels of hygiene (the efficacy of general cleaning and sanitation for the removal of transient microorganisms). Furthermore, indicator testing may be achieved through a variety of methods including visual inspection, ATP monitoring or the detection of surface protein residues. In addition, pathogen specific environmental sampling should be undertaken to monitor for the presence of specific pathogens that may be present as transient or resident microorganisms. The detection of specific pathogens serves two important roles. Firstly it highlights the presence of important food pathogens which may have been introduced into a food handling environment but may not have been eliminated by routine sanitation practices and therefore may be passed onto other food materials being processed. Secondly, it assists in determining sources of these important pathogens that may be resident.

Sampling should not only be conducted on food contact surfaces, but the evaluation of non-food contact surfaces such as conveyor belts, rollers, walls, drains and air is equally as important as there are many ways in which microorganisms can migrate from non-food contact surfaces to food.

At Hardy, we are here to help with your environmental monitoring needs. From a full line of environmental testing swabs to the most advanced air sampling systems available, Hardy is a compliance partner with the experience and expertise you need.

The Food Safety Pyramid helps food manufacturers and processors at all levels understand how to enable the protection of their environments. With an eye on safety from contamination by microorganisms (which have the potential to cause food spoilage and food poisoning), these standards protect both the products manufactured by the company and the customers who may later consume these products.

Air Sampling

TRIO.BAS™ BIOLOGICAL AIR SAMPLER

TRIO.BAS™ Impact Air Samplers introduced the newest generation of microbial air sampling These ergonomically designed instruments combine precise air sampling with modern connectivity to help you properly assess the air quality of your laboratory and simplify your process.

TRIO.BAS™ DUO

Each kit includes:
TRIO.BAS™ DUO air sampler, battery charger and cable, aspirating heads, cover heads, hard shell carrying case, and calibration certificates.

100 liters/min., Petri plate	**BAS221K**
200 liters/min., Petri plate	**BAS226K**
100 liters/min., CompactDry™	**BAS255K**

ATP Monitoring

EnSURE™ Touch

The EnSURE™ Touch is designed to adapt to your workplace, providing the data you need for complex multi-location supply chain monitoring, audit and risk management, and recall prevention. Featuring a 5-inch touch screen, wireless sync technology, and cloud-based software. Supports all Hygiena swab types. Visit HardyDiagnostics.com/Ensure-Touch for all luminometers and swabs.

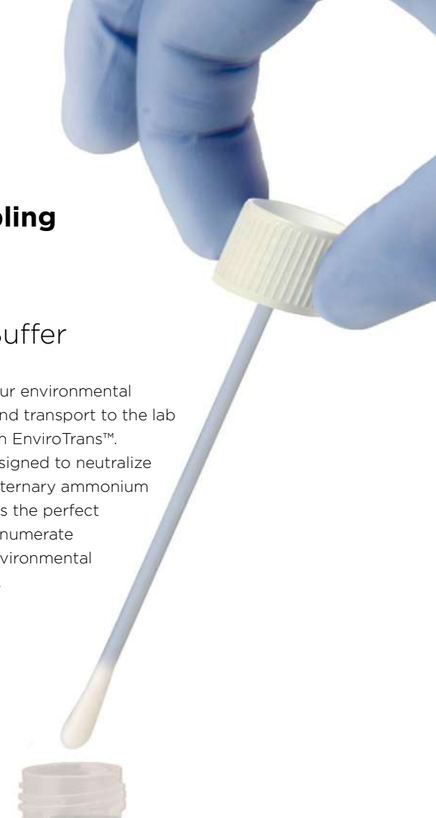
EnSURE™ Touch

By Hygiena, each	**ETOUCH**

Surface Sampling

EnviroTrans™ Neutralizing Buffer

Collect and transport your environmental samples from surfaces and transport to the lab efficiently and easily with EnviroTrans™. Neutralizing Buffer is designed to neutralize chlorine, iodine, and quaternary ammonium disinfectants, making this the perfect medium to collect and enumerate microorganisms from environmental surfaces and equipment.



EnviroTrans™ Neutralizing Buffer

5ml with swab, 20/bx	**SRK15**

POULTRY

FEEL LIKE YOU'RE WALKING ON EGGSHELLS?

Working out how to monitor your poultry environment.

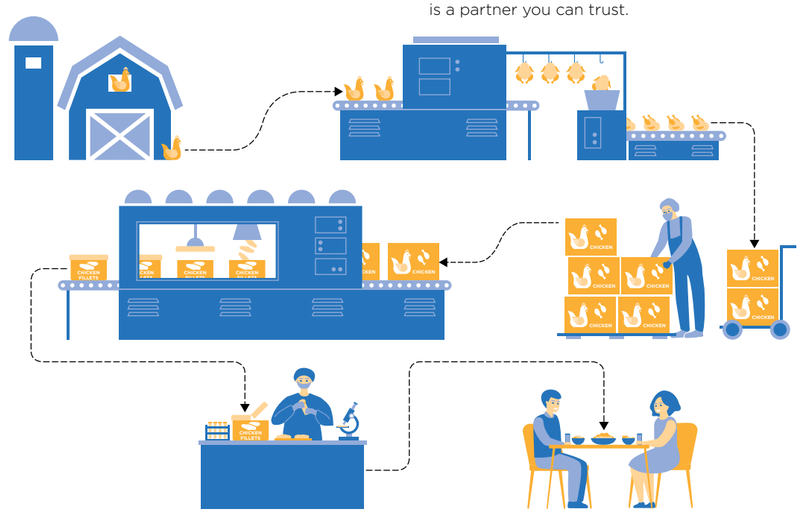
Every year, there are illnesses reported in our country's food supply chain. Most recently, a public health alert was issued by the U.S. Department of Agriculture's (USDA) Food Safety and Inspection Service in response to a *Salmonella* outbreak linked to raw frozen chicken across 7 different states.

There is no doubt that the manufacturer indicated in this outbreak is hard at work to implement new process controls that demonstrate their commitment to food safety regulators and consumers. The challenges facing the industry are higher as a whole because the FSIS – the regulatory authority that regulates the controls for the handling and microbiologic monitoring of poultry and eggs (as well as other products and meats) in the U.S. – has issued important new testing standards for *Salmonella* and *Campylobacter*.

The Center for Disease Control and Prevention (CDC) estimates 1.35 million cases of food borne illness and more than 420 deaths are annually attributed to Salmonella infections in the U.S. Furthermore, Campylobacteriosis is the most common bacterial cause of diarrheal illness in the United States, with *Campylobacter jejuni* the most common strain causing illnesses. FSIS hopes to prevent 50,000 of these illnesses with its recently amended pathogen reduction program that has outlined specific changes to its sampling protocol when it comes to locating these pernicious bacteria.

Overall, the majority of food borne illnesses can be attributed to preparation- eating raw or undercooked poultry. *Salmonella*, is top pathogen of concern in poultry, This contaminant can spread from the farm to processing facilities. This means that during slaughter, defeathering, rinsing and/or various other steps in the poultry production process, proper sanitary operations and the implementation of effective environmental monitoring plans are necessary to minimize contamination and quickly initiate corrective actions.

It is a an important process that brings our food from the farm to the dinner table, and our food safety professionals are there to keep us all safe. Whether your team is looking for a total solution that supports you from sample collection to detection, or some help with understanding a new regulatory requirement, it is important to work with others dedicated to meeting the challenges of the highest safety standards in the food industry. Hardy is a partner you can trust.



Poultry Barn Monitoring

EnviroBootie™ Collection System

EnviroBootie™ is a collection system for the monitoring of Salmonella contamination in flock floor litter and other surfaces. This “one size fits all” gauze shoe cover is ready- to-use and pre-moistened with skim milk.

EnviroBootie™ Collection System

Two pre-moistened (with 2X skim milk) booties per bag, 50 bags/pk **EB50**

Carcass Monitoring

Neutralizing Buffered Peptone Water

Neutralizing Buffered Peptone Water (nBPW) is recommended for use in the recovery of sub-lethally injured Salmonella species from industrial samples prior to selective enrichment and isolation.

This product is not intended to be used for the diagnosis of human disease.

Neutralizing Buffered Peptone Water, nBPW

400ml fill, 500ml wide-mouth, polycarbonate bottle, 10/pk **U181**

Product Testing

Campy Cefex Agar, Modified

Campy Cefex Agar, Modified plates are recommended for the selective isolation of cephalothin-resistant *Campylobacter* species such as *C. jejuni*, *C. coli*, and *C. lari* from human, animal, or food samples.

Campy Cefex Agar, Modified

15x100mm plate, 10/pk **A122**

Process Facility Monitoring

EnviroTrans™ Environmental Swab Rinse Kit

Collect and transport your environmental samples from surfaces and transport to the lab efficiently and easily with EnviroTrans™.

Butterfield’s Phosphate Buffer is used as a diluent for the preparation of dilutions in plate count and other laboratory processes.

EnviroTrans™ Butterfield’s Phosphate Buffer

15x75mm tube, 1ml fill with swab, 20/pk **SRK90**

Pathogen Detection

Gluten and Allergen Testing

Surface Sampling

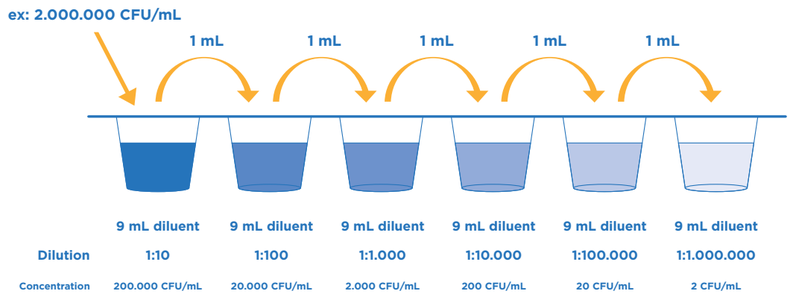
Environmental Monitoring

No matter what your proceessing and finished goods needs are, Hardy has a compliance product that can help! Join the Hardy family and let us know how we can support you today.

THE DILUTION SOLUTION

The ability to accurately estimate the number of microorganisms in a sample is necessary for labs to successfully identify, cultivate, isolate and characterize the contaminants they are looking at. Microbiologists have employed serial dilution and various plating techniques for over a century to reliably quantify bacterial load in food, beverage, industrial laboratory environments, and more. Descriptions of how to perform serial dilutions first appeared in 1883 when the German scientist and physician Robert Koch published his work on infectious disease-causing agents. Often referred to as the father of modern bacteriology, Koch's forenamed techniques have become the gold standard for enumeration of microorganisms, culturable or otherwise, throughout the world. So let's understand a little more about how it works.

Dilution is the process of making a solution weaker or less concentrated. In microbiology, serial dilutions (log dilutions) are used to decrease a bacterial concentration to a required concentration for a specific test method, or to a concentration which is easier to count when plated to an agar plate. The chart below offers a visual explanation of how this works:



Serial dilution is the simplest technique for obtaining manageable concentrations of a desired organism. This technique is a perfect partner to petri dish streaking and spreading. It also works well when using dehydrated media plates that provide both chromogenic and enumerated results. One of the benefits of this approach is that the technician can harvest pure strains of a single species or separate strains from a mixed population.

Serial dilution is used in many different industries

Food
- Processing of food and feed samples
- Analysis of liquid products (milk, juice, drinks, etc)
- A first dilution, often in a stomacher bag, is needed for other matrices such as meat, fish, whole egg, vegetables, animal feed, milk powder, cream, etc, before moving to the serial dilution step

Breweries
All fermentation types need to be controlled and monitored at various levels:
- Control of purity and concentration of the starters (bacteria, yeasts)
- Quantification of the microbiological population in reactors/ fermenters
- Assessment of the quality of the final products

Paper Industry & Process Water
Slime forming bacteria are prohibited around the paper machines and their growth is controlled through the use of efficient combinations of chemicals (biocides, dispersing agents, etc).
- Environmental monitoring of microorganisms present in pipes, basins, tanks, cooling towers, etc.

Cosmetic Industry
It's common to introduce microbial inhibitors in cosmetics to prevent the proliferation of microorganisms in the products. The efficiency of these inhibitors must be checked with a microbiological method.
- Control of initial concentrations of test microorganisms

Serial Dilutions

LabRobot

The Dilugent Shaker for use with Dilucup® Elegance, uses orbital rotation to make sure each dilution is thoroughly vortexed. It is activated by either an hands-free optical sensor or the optional foot pedal. The 42 LED indicators light each cup, letting you easily see what dilution well you are in.

Dilugent Shaker

Machine dimensions:
38cm x 29.5cm x 5cm

Dilugent Shaker LIght	**40DGT84LT**
Dilugent Shaker Standard Version	**40DGT84SD**
Dilugent Shaker Pro	**40DGT84PO**

Sample Prep

interscience

BagMixer® 100 Minimix™ Blender is the smallest blender in the world! Digital screen and window door, easily control speed and time of blending and quickly obtain a ready-to-analyze sample, with no risk of cross-contamination.

BagMixer® 100 Minimix™ Blender

Laboratory Paddle Blender
(homogenizer, masticator) with
window door and removable paddles.

Each	**100WCC**

Whirl-Pak® Blender Bag

Plain sterile bag for use in all types of
homogenizing blenders. Made from
sturdy, blended polyethylene.

19cm x 30cm, 3ml (.076mm) thick, 1,000/bx	**B01420WA**
37.5cm x 50cm, 4ml (.102mm) thick, 250/bx	**B01474WA**

UNDER THE MICROSCOPE WITH KOMBUCHA

Kombucha, an effervescent beverage originating in Asia, has received much attention lately in the neutraceutical and alternative health industries as being an anti-carcinogenic, fermented tea. It is believed to help regulate the gut microbiome, aid in metabolism and cell proliferation, increase detoxification, and help protect the liver. Kombucha originated in China over 2,000 years ago and made its way into Russia, where it was known as tea kvass. In the last century, Kombucha has increased in popularity in the Western world, however due to its recent introduction, there is very little scientific evidence to support its many health claims. Though further research is needed to support its claim as a true probiotic, it is similar to other microbial-based foods with documented health benefits.

Kombucha is a fermented tea consisting of a symbiotic culture of bacteria and yeast (SCOBY). The dominant bacterium is *Gluconacetobacter xylinus* (formerly *Acetobacter xylinum*), it can be paired with many genera of yeast: Zygo-saccharomyces, Schizosaccharomyces, Saccharomyces, and Saccharomycodes. Kombucha is made by adding the SCOBY to sweetened tea and allowing it to ferment. *G. xylinusferments* the alcohols produced by the yeast into acetic acid. The high acidity and low ethanol content give the culture intrinsic resistance to contamination by most airborne molds or bacterial spores. Within several weeks of adding a starter culture, the SCOBY will form a thick layer on top of the liquid (see photos). Kombucha has seen increasing attention over recent years with many new companies capitalizing on the craze.

The resulting liquid contains vinegar, B vitamins, and a number of other essential nutrients and chemical compounds. The benefits of drinking a fermented tea are not well documented. Many epidemiologic studies were conducted in Russia in the early part of the 20th Century where doctors noticed a lower rate of cancer in regions where the tea kvass was popular compared to regions where it was not. Recent research shows that regular brewed teas contain a variety of antioxidant properties, and that probiotic foods can help promote the growth of favorable microorganisms in the human gut microbiome. Yet, is it beneficial to combine the two? *Epigallocatechin gallate* (EGCG) is the main antioxidant found in green tea and in Kombucha fermented from green tea. EGCG may have some benefit in the treatment of AIDS and cancer as it has been shown to bind to the CD4 molecule on T cells and inhibit the anti-apoptotic protein Bcl-xl in vitro (Williamson et al. 2006). D-saccharic acid 1,4 lacton (DSL) and glucuronic acid are also found in Kombucha (Gunther 2003). DSL inhibits glucosidase activity, leaving glucuronic acid to neutralize carcinogens such as polycyclic aromatic hydrocarbons, some nitrosamines, aromatic amines, and fungal toxins (Dutton 1980, Levvy and Conchie 1965). However, recent research shows that it is more likely that glucaric acid is the active component in Kombucha. Glucaric acid inhibits beta-glucuronidase activity in normal gut bacteria, thereby reducing the potential for toxin recycling and increasing the liver's efficiency.

There is limited research on the effects of Kombucha consumption in vivo. In one study published in the Journal of Food & Function, researchers fed Kombucha brewed for four days from black tea to mice with stomach ulcers. They found no significant difference in the effectiveness of treating the ulcers between the control medication, omeprazole, and Kombucha (Banerjee et al. 2010).
Removing the large SCOBY layer
While many people who tried Kombucha have told tales of health transformation, some doctors caution against it without considering all the potential side effects. People with compromised immune systems should avoid interactions with live cultures, especially ones made in an amateur or home-brew environment.

However, if you are a healthy individual looking for a wholesome alternative to traditional nutrient-poor and sugary soft drinks, Kombucha may be worth trying.

Membrane Filtration

Microsart® system for microbiological analysis or particle count in quality assurance. The system features a modular design and field-proven standard accessories to make your choice easier. At the heart of the Microsart® system is a stainless steel manifold, designed to accommodate all types of filter holders and funnels, such as ready-to-use funnels, flammable units, like stainless steel funnels for colony counting and autoclavable glass and polycarbonate filter holders.

Microsart® 3-Branch Manifold

3-branch Microsart® manifold for Microsart® funnels and Microsart® @filter units **168M3MS**

Prepared Media

Universal Beer Agar with Cyclohexamide

Universal Beer Agar with Cyclohexamide is for the selective isolation and cultivation of microorganisms significant in the brewing industry.

Universal Beer Agar with Cyclohexamide

15x60mm plate, 10/pk **G182**

Malt Extract Agar with 0.01% Chloramphenicol

Malt Extract Agar with 0.01% Chloramphenicol is for the cultivation, isolation, and maintenance of yeasts and molds.

Malt Extract Agar with 0.01% Chloramphenicol

15x100mm plate, deep fill, 10/pk **W80**

CBD: HOW PET PARENTS ARE LEADING THE PACK

The current landscape for pets and medical cannabis products

In America, nearly 67% of households own a pet. This means that roughly 85 million families have welcomed a four legged (or maybe feathered) friend into their homes. (Clement, 2019) Not only do most people own a pet or two, the way we treat our pets is changing. According to a 2011 Harris poll, 90% of pet owners think of their dogs and cats as members of the family. Therefore it should be no surprise that pet food and care is a rapidly growing market. (Taylor, 2019) As people focus more on the comfort of their animals, products that claim to increase the quality of life for man's best friend are flying off the shelves.

CBD oil and other cannabis derived products for human ailments like chronic pain, seizures and other common disorders, have become very popular across the US. The public is turning to these remedies to help their pets as well. Most people live in an area with access to some form of legal, medicinal cannabis oils and extracts. This accessibility is contributing to the growth of these alternative treatments. The demand is pushing the development of an entire veterinary industry in which Fido or Fifi have a full line of cannabis derived products available to them. Some products have been developed by veterinarians and designed to help with the treatment of specific ailments. It is common to find sublingual CBD oils or pills, infused treats, and topical creams. The most common ailments addressed by veterinary CBD products are:

- Arthritis and other types of inflammation-related pain
- Behavior problems (including separation anxiety and noise phobias)
- Cancer
- Digestive tract disorders and inflammatory bowel disease
- Bacterial and fungal infections
- Intervertebral disc disease (IVDD)
- Kidney and liver diseases
- Glaucoma
- Epilepsy, seizures and other disorders of the nervous system
- Skin disorders
- Chronic pain management

Most of the products being made for pets are using CBD oil derived from hemp or marijuana plants through different extraction methods. Hemp is currently defined by the FDA as any cannabis plant with less than 0.3% THC, plants with higher amounts of THC are considered "marijuana." Both marijuana and hemp are members of the cannabis sativa family and both are commonly used for CBD extraction. THC is often thought of as the "psychoactive" compound, while most varieties of CBD are considered "non-psychoactive." Hemp is a federally legal cannabis plant, but the products made from hemp-derived CBD are largely not approved for use as medicine. The FDA is clear about its stance on CBD in consumer goods. In a recent consumer update, issued on November 25, 2019, "It is currently illegal to market CBD by adding it to a food or labeling it as a dietary supplement." (FDA, 2019) From the perspective of the FDA, any CBD containing product claiming to have medicinal benefits or CBD added to food is the same as adding any other prescription drug to the product- and that requires a doctor's prescription. Adding to the confusion is the

myriad of state laws that allow for CBD to be infused in food and drinks, making it difficult for consumers to understand the legality of the products where they live.

While some are skeptical about the efficacy of CBD for the treatment of disease, others are defending the medicinal benefits they see animals experiencing. CBD has an interesting relationship with the endocannabinoid system, a complex cell-signaling system found in mammals, birds, fish and even reptiles. Scientists only discovered this system in the 1990's and early indicators suggest the system helps maintain the body's homeostasis. (Pacher. 2006) Dr. Tim Shu founded VETCBD in 2015, a cannabis company focused on providing cannabis-derived medicinal oils to dogs and cats. According to Shu, "Relief is provided as the cannabinoids in marijuana interact with the endocannabinoid system. It's a series of receptors that run throughout the body," he says. "Many people are unaware that pets can safely and effectively benefit from cannabis using proper formulation and dosing. And it's not just dogs and cats that can benefit, we've had ferrets, rabbits, pigs, rodents, and horses find therapeutic relief through cannabinoid therapy." Shu believes that unlike some traditional pain medicine for dogs, medical cannabis has no life-threatening side effects with proper dosage. "It does-'t damage the kidney, liver, or GI tract. The dogs aren't high or sedated." (Semigran, 2019) While Dr. Gary Richter of Montclair Veterinary in Oakland, CA, also promotes the use of broad spectrum cannabis derived medicines containing both CBD and THC for veterinary applications, he cautions owners to understand what is in the cannabis medications. "The most significant [risk] is THC toxicity, meaning, essentially, they are high," Richter says. "Depending on how significantly a pet has been overdosed, the effects of that can be quite long-lasting, even days. Even if the THC toxicity is not excessive, they can sometimes have problems due to these other ingredients." If an overdose or counteraction is suspected, take the pet to the veterinarian immediately. (Semigran. 2019) Even with that concern in mind, Dr. Richter remains very enthusiastic about the potential for properly administered cannabis medicine. "I had somebody come in with their cat that had chronic inflammatory bowel issues. This kitty was on all kinds of medications. The woman pretty much told me that unless I could do something to help this cat, she was going to have to put him to sleep because he was so miserable and there was nothing more to do. We put him on some supplements and made some dietary alterations but without a doubt the thing that turned a corner for this cat was the cannabis. Literally within two days of putting this cat on cannabis he had his first normal bowel movement that he'd had in almost a year. We were able to drastically improve this kitty's life to the point where he was stable. The owner was ecstatic." (HelloMD. 2019)

All of this is encouraging for those looking for an alternative method to treat the medical needs of their pets. Early indicators from clinical studies (Gamble. 2018) and owner testimonials suggest that CBD oils may have effect on a number of conditions. In addition, there are few, if any, known significant drug interactions between cannabis and traditional medications. There are some cautions, though, that need to be properly addressed.

We need more research to truly understand the proper dosing for pets and their associated ailments.
Correct dosage is imperative. "As is the case with any medication, success has everything to do with dosing," Dr. Richter says. "If you dose pets properly, then they are going to get the positive effect that you're looking for while not having any psychoactive side effects." As for now, the best option is to work with a veterinarian experienced in treating animals with CBD products.

Many CBD products do not contain the amount of active ingredients listed on the label.
Independent testing has found there can be wide variances when products are taken to lab for analysis. In a recent study by NBC news, 35 products were taken to labs for a cross check. 20 had less than half of the amount of CBD advertised on the label. Some had no CBD at all. (Krauth. 2019) This is extremely concerning and is evidence that consumers should research the products and brands they choose to buy from. This includes reading and understanding the lab certificates of analysis that should be provided upon purchase.

Most products are not tested to the same standards as traditional medicine.
Most have come to expect a certain standard of safety when it comes to the quality of products, especially those advertised as medicine. However, CBD is still largely unregulated by agencies such as the FDA. The FDA states, "To date, the agency has not approved a marketing application for cannabis for the treatment of any disease or condition. FDA has, however, approved one cannabis-derived and three cannabis-related drug products. These approved products are only available with a prescription from a licensed healthcare provider." (FDA, 2019) That means that the CBD oil for sale to the public for therapeutic use may or may not have been properly screened for contamination.

Not all people have access to the most appropriate CBD product.
Hemp derived CBD is legal in all states thanks to the Farm Bill of 2018. However, "marijuana" derived CBD is not. If a pet has a condition that responds better to product made from marijuana plants with more than 0.3% THC, the owner's location may prevent them from being able to legally provide that to their pet.

CAN CBD ALSO BE CONSIDERED AN ANTIBIOTIC?

Just weeks ago, researchers from the University of Queensland in Australia announced promising results of their studies regarding cannabidiol (CBD) and its ability to inhibit various types of bacteria.

CBD is the non-psychoactive component of marijuana, not to be confused with the mind-altering THC. Many claims have been made regarding CBD's capacity for healing and reducing inflammation. Now it appears that there may be one more item added to the long list of CBD's benefits to humankind.

Dr. Mark Blasovitch's research team found that CBD could be useful in treating infections caused by Neisseria gonorrhoeae, Methicillin Resistant Staph, Legionella, and others.

The mechanism of action is thought to be the destruction of the bacteria cell membrane. Not only that, but they claim that the likelihood of bacteria developing resistance to CBD is very low.

One more added benefit to CBD treatment is it ability to break up biofilms, the sort that leads to dental decay.

More research is needed to see if this will represent the first new class of antibiotics in over 60 years.

PATHOGEN SPOTLIGHT

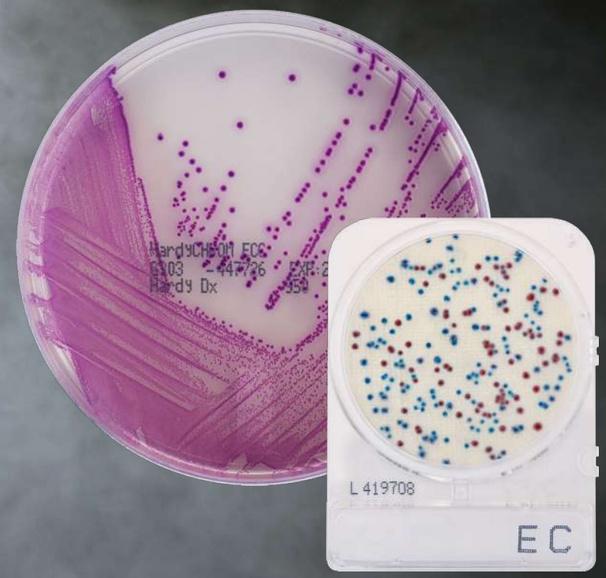
E. coli

Escherichia coli is one of the predominant species of facultative anaerobes in the human gut and usually harmless to the host; however, a group of pathogenic *E. coli* has emerged that causes diarrheal disease in humans. Referred to as Diarrheagenic *E. coli* or commonly as pathogenic *E. coli*, these groups are classified based on their unique virulence factors and can only be identified by these traits. Hence, analysis for pathogenic *E. coli* often requires that the isolates be first identified as *E. coli* before testing for virulence markers. The pathogenic groups includes enterotoxigenic *E. coli* (ETEC), enteropathogenic *E. coli* (EPEC), enterohemorrhagic *E. coli* (EHEC), enteroinvasive *E. coli* (EIEC), enteroaggregative *E. coli* (EAEC), diffusely adherent *E. coli* (DAEC) and perhaps others that are not yet well characterized. Of these, only the first 4 groups have been implicated in food or water borne illness.

Listeria

Listeria was first discovered around 100 years ago. Historically, it has occasionally been the cause of meningitis and septicemia, especially in newborn babies. This pathogen received little attention, until the discovery that *Listeria monocytogenes* could be transmitted to contaminate food. Foodborne outbreaks of listeriosis were reported in North America and Europe in the 1980s, and the incidence of the disease rose steadily year-by-year. In the UK, a peak of nearly 300 cases was reached in 1988 and this is thought to have been the result of a single foodborne outbreak associated with pork pâté.

These outbreaks led the World Health Organization to conclude that *Listeria monocytogenes* is an environmental contaminant mainly transmitted to humans through food. Although the incidence of listeriosis is at least 100 times lower than those of other foodborne pathogens, such as Campylobacter and Salmonella, the seriousness of the disease, the high mortality rate (up to 40% in some outbreaks) and the fact that it mainly affects vulnerable sections of the population, has focused a great deal of attention on *Listeria monocytogenes*. It has now become the target for much of the microbiological testing carried out by the food industry.



Salmonella

There are many different groups, called serotypes, of *Salmonella*. Scientists classify each serotype based on the structures on the bacteria's surface. Some *Salmonella* serotypes are found in only one kind of animal or in only one place. Others are found in many different animals and all over the world. The serotypes also differ in how often they cause illness in people and in what types of food and other places they contaminate. Some serotypes can cause severe illness in people, while other cause milder illness. Scientists have described more than 2,500 *Salmonella* serotypes, but less than 100 cause most cases of salmonellosis in people. Both FDA and CDC consider all serotypes capable of infecting people.

Freezing and drying, which typically prevent the growth of bacteria, do not kill *Salmonella*. The bacteria can survive several weeks in dry environments and several months in wet environments.

HardyCHROM™ Salmonella

HardyCHROM™ Salmonella is a differential medium that facilitates the isolation and differentiation of *Salmonella* spp. from other members of the family Enterobacteriaceae.

15x100mm plate, 10/pk **G309**

CompactDry™ SL

For the presumptive identification of *Salmonella* spp. Growing colonies will appear green or blue-green with black centers.

240 plate/pk **54085**

HardyCHROM™ ECC

A chromogenic media recommended for the detection, differentiation, and enumeration of *Escherichia coli* and other coliforms in food, water, or environmental samples based on colony color.

15x100mm plate, 10/pk **G303**

CompactDry™ EC

AOAC RESEARCH INSTITUTE

For the isolation and enumeration of coliforms and *E. coli*. Coliform colonies will appear red, and *E. coli* colonies will appear blue.

240 plate/pk **54082**

HardyCHROM™ Listeria

A chromogenic medium recommended for the selective isolation, differentiation, and enumeration of *Listeria monocytogenes* from food and environmental samples by colony color and appearance.

15x100mm plate, 10/pk **G317**

CompactDry™ LS

For the isolation, presumptive identification and enumeration of *Listeria* spp. Colonies of Listeria will turn blue due to the presence of chromogenic substances.

100 plate/pk **LS100**

At Hardy Diagnostics, you're not just a number. You're not a figure on a graph in a quarterly report. At Hardy Diagnostics, you're a partner. From laboratories that utilize our tests to diagnose illness, to our employee owners who ensure that every lot meets your rigorous expectations, Hardy Diagnostics is about a group of people coming together to better the world, one test at a time.

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