

# EM PROBIOTIC USAGE GUIDE

## EFFECTIVE MICROORGANISMS (EM) PROBIOTIC: BENEFICIAL SOIL-BASED MICROORGANISMS FOR PLANTS & ANIMALS

Did you know that plants or animals do not digest their own food? What then is responsible for digestion? Ultimately, enzymes and soil-based microorganisms in the digestive tract. "Effective Microorganisms™," or EM, is the name of a versatile, nontoxic, beneficial soil-based probiotic bacteria culture developed by Japanese agricultural scientist Teruo Higa, PhD. These microorganisms occur naturally in soil and have been used for thousands of years in different cultures around the world. Many of these safe, helpful microorganisms are also used in processing cheese, soy sauce, yogurt, and other similar foods, and in various industrial, agricultural, and environmental applications. Made by fermenting molasses in water with a mixture of nutrients and special synergistic probiotic bacteria strains developed by Dr. Higa, EM has many beneficial uses, including:

- human and animal digestive/immune system enhancement
- water purification and remediation
- plant nutrition and root growth acceleration
- soil enhancement
- acceleration of garden and landfill waste composting
- mold and mildew elimination
- odor elimination
- septic tank maintenance reduction and odor elimination
- remediation of polluted or stagnant ponds and other water
- remediation of polluted soil, including radioactive soil

EM can be ingested to improve digestion and to help eliminate an overabundance of candida albicans yeast in the GI tract. EM is also a strong antioxidant, which reduces damaging free radicals in the body.

EM is a superior probiotic because of the wide range of beneficial *soil-based* microbes, as opposed to dairy or other animal derived organisms. Being soil-based is important because those microbes break down minerals and nutrients in soil into particle sizes of just a few atoms each, so humans and animals can metabolize them a cellular level. These particle sizes of single atoms or just a few atoms clustered are the only sizes that can enter cell membranes and feed cells, especially important since most people these days have poor absorption from chemical toxicity and irradiation. Soil-based microbes are present in and on living plants growing in the ground and are a naturally-occurring nutrient delivery system for plants, and ultimately, the animals that eat them. Monatomic elements are very rejuvenative to the body and increase the superconductivity in the body, nervous system, and brain, which enhances cellular communication and other functions.

### DO THESE PROBIOTICS SURVIVE THE STRONG STOMACH ACIDS AND INTESTINAL ALKALIS?

A myth perpetuated by those unfamiliar with how the digestive system *actually* works is that probiotics and enzymes cannot survive passage through the stomach and/or small intestine because of their strong acid and alkali environments. Logically, if this were true then the enzymes and probiotics found in uncooked living foods would never survive the digestive process, populate the gut, and provide benefits beyond a dead cooked food diet. Living foods include uncooked raw and living plants (fruits, vegetables, sprouts, algae, etc.), raw meat and dairy (sushi, low temperature dehydrated jerky, unpasteurized milk, raw cheeses, etc.), and fermented foods (unpasteurized yogurt, sauerkraut, buttermilk, pickled foods, kimchi, real soy sauce, raw vinegar, tempeh, etc.) The stomach and small intestine do not sit with pools of acid and base respectively, waiting to digest food. If they did, they would digest themselves. They manufacture these digestive juices only when needed and only as much as needed to digest the quantity of food coming through them. Plain water for example, requires no digestive juices. As the food is digested, the acids or bases are consumed and neutralized in the chemical reaction.

There is overwhelming evidence that these enzymes and probiotics easily survive digestion; see medical texts, online sources, books and clinical research done by Hippocrates Health Institute ([www.hippocratesinst.org](http://www.hippocratesinst.org)), Tree of Life Rejuvenation Center ([www.treeoflife.nu](http://www.treeoflife.nu)) and other studies of living foods, enzymes, and probiotics. Enzyme Nutrition by Dr. Edward Howell is an excellent book on the topic. Included below is a more detailed article on the topic by health researcher John Barron. Ultimately you can determine for yourself if probiotics and enzymes survive and have an impact on *your* body by:

1. Taking them and see how you feel after a few weeks.

- After taking them for several weeks, get a live blood cell analysis (light or dark field microscopy) from an experienced microscopist and they will be able to show you the evidence of probiotics in your blood. To find a microscopist in your area, check with your local health food store, or dark field microscope training companies such as [www.phmiracleliving.com/t-Microscopist-List.aspx](http://www.phmiracleliving.com/t-Microscopist-List.aspx) or [www.biomedx.com](http://www.biomedx.com).

## EM USES

### DILUTION GUIDE — EM TO UNCHLORINATED\* WATER

Dilution Ratio	EM	to Water
1:50	1 tsp	1 cup
	4 tsp	1 quart
	5 tbsp	1 gallon
1:100	1 tsp	2 cups
	2 tsp	1 quart
	2.5 tbsp	1 gallon
1:500	3/4 tsp	2 quarts
	1-1/2 tsp	1 gallon
	2 tbsp	4 gallons
1:1,000	3/4 tsp	1 gallon
	1 tsp	6 quarts
	1-1/2 tsp	2 gallons
1:10,000	3/4 tsp	10 gallons
	1 tbsp	40 gallons

\* Chlorine is a bactericide and will kill the EM Probiotic. Most municipal tap water is chlorinated.

#### FOR HUMAN CONSUMPTION

For maintenance, mix two to three tablespoons of EM probiotic in 8 to 12 ounces of water or vegetable juice (not fruit juice, the sugars will feed pathogens in the body), or one of Ken Rohla's superfood detox tonics (do not use hot liquids, it will kill the culture) and drink in the morning on an empty stomach. The same mixture can be taken three to five times a day, preferably before a meal for the first three to five days, then slowly lower the frequency to once or twice a day, preferably once before bedtime.

#### FOR FOOD POISONING, FLUS, COLDS, INFECTIONS

EM Probiotic has also proven helpful in cases of bacterial food poisoning, flus, and colds. Start out with 1/4 cup of EM Probiotic in one of the drinks above, at the onset of symptoms, then two to three tablespoons hourly until symptoms subside. This can be further enhanced by taking a heaping teaspoon of Dr. Richard Schulze's Intestinal Formula #2 ([www.herbdoc.com](http://www.herbdoc.com)) in the drink, or a mixture of 1 heaping teaspoon each of bentonite clay, food grade charcoal, and psyllium husk.

#### FOR A TRAVEL "FIRST AID KIT"

Carry the ingredients above when traveling to stop bacterial food poisoning, dysentery, flus, colds, and infections much faster than normal. If started at the very first symptoms (sore throat, headache, temperature, congestion, etc.) symptoms can be relieved quickly and worse conditions averted entirely.

#### HOUSEHOLD USES — CLEANING WITH EM

EM is a very acidic solution like vinegar that repopulates surfaces with beneficial microbes. The presence of these microbes discourage mold, fungus, and harmful bacteria from taking root. In sufficient concentration, EM bacteria will eat mold and mildew. EM helps to eliminate odors from pets, cigarette smoke, and odor-causing bacteria as well.

### **Kitchen**

A small squirt bottle filled with straight EM is handy to keep by the kitchen sink. It is convenient to add to water for washing vegetables, to pour down the garbage disposal to reduce odors and aid septic tank digestion, and to spray on sponges to keep them fresh and reduce harmful bacteria.

### **Laundry**

One teaspoon of EM can be added per load as the washing machine fills with water. (This is recommended for white and light-colored fabrics only since the microbes love fabric dyes and tend to make dark colored articles fade.) When using EM, reduce detergent to 1/3 the usual amount. If possible, let the clothes presoak for 10 to 15 minutes before running through the cycle. Soak overnight for bad stains and dingy whites.

### **Bathrooms**

A small squirt bottle filled with straight EM Probiotic is handy to keep in the bathroom. Use several drops in the toilet bowl when it refills after flushing in order to reduce odors. Wipe ceramic tile or vinyl floors with EM Probiotic to remove odors.

### **Mopping Floors, Cleaning Furniture**

Use 2 tbsp of EM to 2 gallons room temperature water for mopping ceramic tile or vinyl floors. No detergent is needed. For use on wood floors and furniture, dilute 3/4 teaspoon to one gallon water. Wipe dry immediately.

### **Counters and Cutting Boards**

Add 1 teaspoon EM to one quart of water, and spray or wipe on tile, porcelain, and Formica. Let it stand on wood or plastic cutting boards to discourage salmonella and other harmful bacteria. Then rinse. This dilution must be used within 3 days.

### **Odor and Mold Inhibitor**

Add 1 teaspoon EM to one quart of water, and spray lightly in shoes to keep them smelling fresh, and on shower curtains to discourage mold. Clean garbage receptacles with this mixture to reduce odors. Spray generously on light colored automobile interiors, door panels, light-colored upholstery, and carpets to freshen and deodorize. (This is recommended for light-colored fabrics only since the microbes love fabric dyes, and dark colored articles have a tendency to fade.)

## **GARDENING AND LANDSCAPING USES**

EM can be used to inoculate plants, water, and soil in various ways to achieve beneficial results. It can be sprayed on soil as a pre-planting treatment, used to inoculate seeds or transplants, applied to growing crops as a foliar spray or through irrigation systems, and used to accelerate composting. EM is useful in growing nursery crops, container-grown plants, and even in hydroponics. After crops are harvested, EM is used to help break down crop residues. EM can be applied to cover crops and green manures during growth and upon incorporation into the soil, and is applied to pastures with good results.

Keep in mind that you are dealing with living organisms. Best results are realized when EM is supported with good soil management. Avoid bare soil. Feed beneficial and effective microorganisms with crop residues, cover crops, compost and other forms of organic matter.

### **General Directions**

For most crop applications, EM is diluted with **unchlorinated** water at a ratio of 1 part EM to 1,000 parts water. Do not apply with pesticides or fungicides. It is best to start on a small scale and experiment with EM to determine the best methods and ratios for specific locations. **All ratios below are parts EM to parts water unless stated otherwise.**

### **Pre-Planting**

Between two and three weeks before planting, apply a 1:1,000 dilution of EM to the soil. Apply as a spray, drench, or introduce into irrigation water. Cultivate weeds that emerge after 10-14 days. To activate EM on a large scale, you may start with 1 gallon of EM and 1 gallon of molasses per acre treated. Dilute EM and molasses in water to a concentration of 1:1,000 and apply. Do not exceed recommended dilution.

### **Seed Treatment**

Gardeners may want to try soaking seeds in a solution of EM before planting to increase seed viability. Dilute EM with water at 1:1,000. Soak seeds in solution for 5 to 10 minutes and no longer. Air dry and plant as usual. Experiment with small batches before treating larger quantities. Weak seeds and soil conditions may lead to decreased results.

### **Nursery/Container-Grown Plants**

Inoculate with EM at seeding and transplant stages, then on a monthly basis thereafter. Use the standard dilution of 1:1,000. Orchid growers have achieved good results by inoculating with EM immediately after planting in sterile media.

### **Hydroponics**

In hydroponic crop production systems, EM can be diluted with the nutrient solution at a rate of 1:10,000. This practice will coat the root systems with beneficial microorganisms and make nutrient uptake more efficient.

### **Grain Crops, Vegetables, Fruits, and Herbs**

Spray the standard dilution of 1:1,000 onto the plants. If introducing EM into an irrigation system, the dilution should be increased to 1:10,000. Apply as a pre-planting treatment, again at planting/transplanting and every three to four weeks during crop growth. Apply also to crop residues after harvest, just before incorporating residues into the soil. Use 1 gallon of activated EM per acre, diluted with the appropriate amount of water for each application.

### **Orchard Crops/Perennials**

For orchard crops, such as apples and pears, apply EM immediately after fall harvest, along with other amendments. Spray plants and soil thoroughly, applying 1 gallon of EM per acre at any dilution appropriate (1:500). Repeat this treatment weekly until the first snow or hard freeze. Then, discontinue application until spring. Resume application after the last spring frosts and continue until the fruit is fully formed. Stop applying EM before ripening begins.

### **Composting**

For composting garden beds use 1:100 dilution, spray the soil, leaves, and other organic materials that you have mixed for your raised bed garden. Then cover the bed for four weeks with a tarp and keep the air out! After four weeks, remove tarp and let stand for ten days to let the activity of the microorganisms cool down. If you plant seeds or live plants before the ten days, they will be composted!

## **ANIMAL HEALTH**

EM Probiotic can also be given full strength to any animal in order to produce better digestion and greater health. Herbivores (cows, horses, rabbits), omnivores (pigs), birds (chickens, etc.), carnivores (dogs, cats), & fishponds etc. will all benefit from consuming these microorganisms.

### **Dogs and Cats**

Mix EM Probiotic full strength in pet food, water, or squirt directly into mouth with a dropper or needleless syringe. Add Teraganix TERRA Powder to litter boxes to keep odor under control. Spray litter box with EM diluted 1:100 parts water. You can add 1 cup of EM to bathwater when bathing your dog. This will help keep the dog's coat shiny and clean. Add 1% (just a few drops in the water bowl) EM to pet's drinking water to help maintain good digestive health.

### **Aquariums**

To reduce ammonia in fish tanks, and promote beneficial bacteria in the water, add 1 part EM to 1000 parts water once a week, or as necessary. Use EMRO EM-X ceramics in the filter. S-type are porous to absorb ammonia and floating material and must be changed every six months. K-type are used to structure the water and need not be changed.

### **Birds and Bird Baths**

A few drops of EM Probiotic can be added to bird's drinking water or outdoor birdbaths. The beneficial microbes can foster better health and digestion and reduce bird pathogens.

### **Livestock and Farm Animals**

To improve microflora in the intestines and make nutrient absorption more efficient, try the following applications.

- For cattle, pigs, chickens and other farm animals, there are two ways to feed them. Mix 1:2:20 (1 part EM Probiotic, 2 parts molasses, and 20 parts non-chlorinated water) and:
  1. Spray on or mix into animal feed.
  2. Spray directly on their bodies, and as they lick and clean themselves, they will introduce these microorganisms into their systems. The technique will also have a side benefit — if the animal has any skin ailments or cuts, this solution will also help keep infection from setting up and thus help the healing process. Note: most herded animals all practice pecking order so there are always the minor injuries that occur each day. In addition, the larger barbed wire-type injuries, skin lesions

that could eventually develop into more serious infections, and feather and fur loss can also be prevented.

3. Mix EM into animal's drinking water at a ratio of 1:1000 to 1:5000
- Mix Teraganix Organic Rice Bran EM-1 Bokashi into livestock feed (1-5% of feed) or sprinkle bokashi on top of feed daily.
  - Spray EM dilution of 1:100 in barns and pens to control flies and odors. Foul odors are present in barns and livestock pens due to the proliferation of harmful, putrefactive microorganisms. These bacteria produce harmful toxins such as ammonia, hydrogen sulfide, and methane. EM controls the proliferation of harmful microorganisms by competitive exclusion. The animal's quarters will be drastically improved.

## **WATER TREATMENT**

### **Sewer Lines and Waste Systems**

To treat sewer lines, livestock holding facilities, solid waste and food waste, apply at a ratio of 1:100 parts water, saturate, then compost.

### **Septic Systems**

For septic systems, holding tanks, recreational vehicles and portable restrooms, apply 1 liter of EM per 1,000 gallon holding capacity every 3 months by pouring down a drain in the house, or directly into the holding tank. Septic system still may need regular pumping & maintenance.

### **Ponds and Fountains**

To control algae blooms, dilute EM concentrate at a ratio of 1:10,000 and spray over the pond or fountain once every two to four weeks beginning in the early spring, or apply as needed. If it is not possible to spray the solution, introduce EM at several different sources in order to avoid shock to other pond life. Results will vary depending on source of inflow & other factors.

## **STORING EM PROBIOTIC**

**DO NOT SHAKE THE BOTTLE. DO NOT REFRIGERATE, FREEZE, OR HEAT**

EM Probiotic should have a pleasant beer or vinegar smell. If it smells bad, it should not be used.

Store in a closed container at room temperature out of direct sunlight. Do not refrigerate, freeze, or heat above 115° fahrenheit (46° C); this is a live culture and refrigeration or excessive heat will reduce live bacteria count more quickly over time. Do not use in hot liquids. EM-1 is best if used before "Best used by" date on product, but the culture may be "activated" to grow more microbes by adding 3 tablespoons of organic blackstrap molasses per quart of EM-1 and mixing thoroughly. If activated, leave bottle cap slightly loose, enough to allow fermentation gas to escape.

It is okay if it EM-1 has some whitish flakes on the top surface or sediment on the bottom of the bottle, these are harmless by-products of fermentation.

# HOW TO MAKE YOUR OWN PROBIOTIC

“Effective Microorganisms™,” or EM, is the name of a versatile soil-based probiotic bacteria culture developed by Japanese agricultural scientist Teruo Higa, PhD. Made by fermenting molasses in water with a special mixture of probiotic bacteria strains developed by Dr. Higa, EM has many beneficial uses, including:

- human and animal digestive/immune system enhancement
- water purification and remediation
- plant nutrition and root growth acceleration
- soil enhancement
- acceleration of garden and landfill waste composting
- mold and mildew elimination
- odor elimination
- septic tank maintenance reduction and odor elimination
- remediation of polluted or stagnant ponds and other water
- and more.

EM can be ingested to improve digestion and to help eliminate an overabundance of candida albicans yeast in the GI tract. EM is also a strong antioxidant, which reduces damaging free radicals in the body. EM products go by several trade names: Efficient Microbes, Effective Microorganisms, EM-1, EM1, EM\*1(R), Beneficial Microbes, Beneficial Microorganisms (BM), Beneficial and Effective Microbes (BEM), EM Kyusei, Kyusei EM, Vita Biosa™, Terra Biosa™, Effective Microbes, Efficient Microorganisms, Compound Microorganisms (CM), Molasses Culture, Cultured Molasses, Inner Garden, and over a dozen other names.

EM is a superior probiotic because of the wide range of beneficial soil-based microbes as opposed to dairy or other animal derived organisms. Being soil-based is important because those microbes break down minerals and nutrients in soil into monatomic (ORMUS) and microclustered minerals and nutrients that humans and animals can metabolize at a cellular level. These particle sizes of single atoms or just a few atoms clustered are the only sizes that can enter cell membranes and feed cells. Soil-based microbes are present in and on living plants growing in the ground and are a naturally-occurring nutrient delivery system for plants, and ultimately, the animals that eat them. Monatomic elements are very rejuvenative to the body and increase the superconductivity in the body, nervous system, and brain, which enhances cellular communication.

At the commonly understood chemical level, fermentation has a unique ability to create products and byproducts that are more than the sum of the ingredients. But there are also little understood quantum physical properties such as the creation of monatomic elements, subtle high frequency energetics, and “biological transmutation” of elements during fermentation that also make fermented foods highly rejuvenative. Biological transmutation is the observed phenomenon of living organisms’ ability to create certain elements from the consumption of other elements, for example, the creation of calcium from consuming silica. See the book Biological Transmutations and other work by C. Louis Kervran for the science of this. When creating your own advanced ferments, you can add various fruits, vegetables, herbs, rock powders<sup>1</sup>, mushrooms, fungi, sea vegetables, algae, and more to increase the nutrient levels and create your own probiotic antioxidant superfoods.

You can buy EM probiotics ready-made for about \$30 to \$50 per quart, or make 5 gallons (20 times the amount) yourself for about the same price. It’s very easy to make, basically mix molasses, a bacteria culture, and water in a bucket and let it sit for a few days. This is particularly useful if you’re using the EM for gardening purposes (mold & blight treatment, composting, etc.), mold and mildew removal or prevention, water reclamation, or other larger scale uses. There are a vast range of uses for EM from remediating polluted water to composting to improving human health. For more info on EM and its uses, see [www.freshandalive.com](http://www.freshandalive.com) or [www.teraganix.com](http://www.teraganix.com).

## TO MAKE 5 GALLONS OF EM

### EQUIPMENT AND INGREDIENTS NEEDED

1. 6-1/2 to 7-gallon food grade plastic bucket, ideally with a spigot at the bottom and vented air lock in the lid such as shown on the right. Source: local beer & wine (homebrew) supply houses, or online at homebrew sites like [www.midwestsupplies.com](http://www.midwestsupplies.com) for about \$15. If you have a 6- to 7-gallon food grade bucket without an airlock, you can use it and burp the lid daily to release trapped fermentation gas.
2. 1 quart or liter of EM culture, such as Dr. Higa’s Original EM-1 from [www.freshandalive.com](http://www.freshandalive.com).

3. 1 quart or liter of organic molasses, preferably blackstrap, from health food stores, [www.amazon.com](http://www.amazon.com), or other online sources.
4. Wine making pH test paper, pH range about 2.6 to 4.4, available at [www.freshandalive.com](http://www.freshandalive.com) or [www.midwestsupplies.com](http://www.midwestsupplies.com) and other homebrew supply stores for about \$5. Do not use pH papers for testing urine, saliva, swimming pools, or other purposes, they will not work.
5. Oxygen-based cleaner like LD Carlson's One Step or Straight A (from Homebrew Supply stores), or OxiClean (widely available in grocery stores). Used to sanitize brewing equipment before use.
6. 5 gallons of pure spring or well water. Do not use municipal (city) tap water or chlorinated water.
7. Optional but highly recommended: home brew heat panel from [www.midwestsupplies.com](http://www.midwestsupplies.com), [www.homebrewing.org](http://www.homebrewing.org), [www.happyherbalist.com](http://www.happyherbalist.com), or others. This can accelerate brewing from 3 months to 3 weeks. Cost: about \$50.

## PROCEDURE

1. Using your oxygen cleaner as directed on package, clean and disinfect bucket, lid, stirring spoon or paddle, air lock, and anything else that will touch your brew.
2. In the plastic bucket, with the spigot closed, mix together the following:
  - a. One quart/liter of molasses
  - b. One quart of Dr. Higa's Original EM-1.
  - c. About 1 gallon of very warm pure well or spring water (temperature between 101 ° F to 115° F). Do not use tap water, it's toxic and the chlorine will kill your culture.
  - d. Stir well, add 4 more gallons of warm water at about the same temperature (101° F to 115° F).

3. Insert the airlock in the lid airlock hole, cover and seal the bucket with the lid, and fill the air lock about halfway with water. This will allow gas to escape and keep bad bacteria from entering the bucket. If you don't have an airlock lid, burp the lid daily to let gas escape.

4. Optional but recommended: place the bucket homebrew heat panel, wrap the bucket in a two to insulate it well, then plug the heat panel electrical receptacle and leave it on until your done.

5. Optional but recommended: dial thermometer brew temperature. You can punch a small hole bucket lid with a nail or awl and and slide the thermometer shaft into your brew to see its temperature without opening the bucket lid.  
**[www.midwestsupplies.com](http://www.midwestsupplies.com), part number**



on a blanket or into an brew is

to measure through

See **6425**.

## BREWING

At 95 to 100 degrees Fahrenheit, this diluted "extended EM" as it is called will ferment in two to four weeks, depending on temperature and conditions, and become "EM concentrate." At a room temperature of 75 degrees, ferment time can take 2 to 3 months. Fermenting EM is a mostly anaerobic process, so the presence of excessive oxygen is not desirable, however, opening the lid every day or two will not harm it and can actually help. Keep the brew as warm as possible, but below 115° F. If brewed between 85-95 degrees it should be done in approximately 4 to 6 weeks. If kept between 70-80 degrees, then allow 2 to 3 months. It is not recommended to use a brewer's heat belt (from homebrew stores) wrapped around the bucket instead of the brewer's heat pad since it will not heat the bucket sufficiently for this type of culture. The bacteria like sunlight and need light to grow, so keep it's best to keep the bucket in a well-lit or sunny area while brewing. However, once done, keep at room temperature out of direct sunlight to extend shelf life.

## WHEN IS IT DONE?

After a week or two of brewing, using wine making pH paper, start checking the brew pH to ascertain when the process is complete; EM is ready when the pH drops to 3.7 or below. Do not use EM that has not dropped below 4.0. If your pH continues to drop to 3.0 or even 2.0 this is normal and indicates high microbial activity. The end product

should smell slightly sweet and pickled, and taste like mild vinegar. If it smells foul or rotten, your brew has gotten contaminated and should be composted.

### **CAN I MAKE MY OWN MOTHER CULTURE?**

Studies on EM culturing show that unless strict lab conditions and processes are adhered to with high ORMUS ingredients, each batch of culture will have fewer microbes than previous batches. So you can get away with making one or two batches of brew from your first store bought mother culture, but if you want to maintain high quality and the maximum level of microbes and nutrients, especially for human consumption, it's best to start with a store-bought mother culture each time. It's also more likely you'll get harmful bacteria in your culture when brewing from a previous batch.

### **MAKE MINE SUPERFOOD**

You can make your probiotic into an ORMUS-rich antioxidant superfood by blending any variety of:

- organic fruits, vegetables
- herbs ([www.mountainroseherbs.com](http://www.mountainroseherbs.com) or [www.frontiercoop.com](http://www.frontiercoop.com))
- edible mushrooms and fungi ([www.fungi.com](http://www.fungi.com))
- sea vegetables ([www.seaveg.com](http://www.seaveg.com))
- minerals: azomite and other rock powders (see the book *The Enlivened Rock Powders* by Harvey Lisle) Concentrace sea minerals ([www.freshandalive.com](http://www.freshandalive.com)), Redmond Minerals ([www.redmondnaturals.com](http://www.redmondnaturals.com))
- algae (E3 Live, chlorella, spirulina, etc.) and add them to your brew before fermenting.



You can add nontoxic rock powders such as Azomite to increase mineral content. Which ingredients? How much? Play with it and find out! Like cooking, fermenting is an art and a craft. Some ingredients will taste better than others, some will be more healing. The more nutrients you put in, the more predigested antioxidant nutrients and ORMUS you get out.

### **NO ANTIBACTERIAL INGREDIENTS**

Avoid using antibacterial ingredients like garlic, horseradish, wasabi, cinnamon, thyme, tarragon, oregano, cumin, black walnut hull, some essential oils, and some hot peppers.

### **USE**

As a probiotic for human consumption, you can take 1 to 2 tablespoons in juice or water 1 to 5 times per day. Typically maintenance is one or two times per day, when cleansing use more frequently. It's difficult to overdose on, but if you did, symptoms are typically diarrhea or indigestion, but that is extremely rare, you'd have to drink a lot. See the article in this manual, "**EM Probiotic Info**" for more details on the many uses of EM.

### **EAT THE SLUDGE!**

The sludge that will deposit at the bottom of the fermentation bucket is a super-rich deposit of predigested antioxidant nutrients. It may taste funky depending on ingredients, but it is amazing food and medicine.

### **DON'T FEAR THE FLOATERS!**

EM fermentation leaves a harmless white byproduct floating in the mixture composed of harmless yeast, lipids, and proteins. As they say in Boston, "Forget about it!" You can scoop them out with a sieve.

### **STORAGE AND SHELF LIFE**

According to vendors of EM, this brew will last about 60 days, but Ken Rohla has saved it for as long as 18 months. The older it gets, the more of an antioxidant it becomes, and the less of a probiotic, since the bacteria eat up their food supply, creating antioxidants, before going dormant. If your brew has been sitting for many months and you want to activate it, add 1 part organic molasses to 5 parts of brew and the microbes will wake up and grow. When the culture is active it will create gas that will need to be released periodically.

Store EM out of direct sunlight at room temperature. Do not refrigerate, it will kill the culture. Do not use EM if a foul or rotten odor is present. If in doubt, check the EM's pH. Good quality EM will have a sweet-and-sour smell and a pH below 3.7. If the pH rises to 3.8, use the remaining EM as soon as possible or within 30 days, or add molasses to reactivate.

# DOES STOMACH ACID KILL PROBIOTICS AND ENZYME SUPPLEMENTS?

## INTESTINAL HEALTH: ENZYMES, DIGESTION & STOMACH ACID BY JON BARRON, 03/12/2007

From [www.jonbarron.org/weight-loss-program/03-12-2007.php](http://www.jonbarron.org/weight-loss-program/03-12-2007.php)

Something must be going on with stomach acid. We've received over 50 emails in the last 30 days on stomach acid. Yes, we get 10,000 emails a month, but getting 50 on one topic is highly unusual. The questions on stomach acid were of all kinds mind you, but surprisingly, not one on what I would consider the most important issue: low stomach acid.

Anyway, in this newsletter, we'll cover all aspects:

- Stomach acid and digestion
- Too much stomach acid
- Too little stomach acid
- Stomach acid and proteolytic enzymes
- Stomach acid and probiotics

### STOMACH ACID AND DIGESTION

Before we can even talk about stomach acid, we need to spend a little time talking about how it fits in the digestive process. Most people believe that when you eat a meal it drops into a pool of stomach acid, where it's broken down, then goes into the small intestine to have nutrients taken out, and then into the colon to be passed out of the body -- if you're lucky. Not quite.

What nature intended is that you eat enzyme rich foods and chew your food properly. If you did that, the food would enter the stomach laced with digestive enzymes. These enzymes would then "predigest" your food for about an hour - - actually breaking down as much as 75% of your meal.

Only after this period of "pre-digestion" are hydrochloric acid and pepsin introduced. The acid inactivates all of the food-based enzymes, but begins its own function of breaking down what is left of the meal in combination with the acid energized enzyme pepsin. Eventually, this nutrient-rich food concentrate moves on into the small intestine. Once this concentrate enters the small intestine, the acid is neutralized and the pancreas reintroduces digestive enzymes to the process. As digestion is completed, nutrients are passed through the intestinal wall and into the bloodstream.

That's what nature intended. Unfortunately, most of us don't live our lives as nature intended!

Processing and cooking destroy enzymes in food. (Any sustained heat of approximately 1180 - 1290 F destroys virtually all enzymes.) This means that, for most of us, the food entering our stomach is severely enzyme deficient. The food then sits there for an hour, like a heavy lump, with very little pre-digestion taking place. This forces the body to produce large amounts of stomach acid in an attempt to overcompensate. In addition to failing in this attempt (much of the meal still enters the small intestine largely undigested), there are two major consequences:

1. Too much stomach acid.
2. Too little stomach acid.

### TOO MUCH STOMACH ACID

This is obvious. In an attempt to overcompensate for lack of enzymes in the food, the stomach produces an inordinate amount of stomach acid to compensate, leading to acid indigestion. Taking antacids or purple pills doesn't actually solve the problem; it merely eliminates one of the symptoms. Ultimately, though, it passes even more quantities of poorly digested food into the intestinal tract where it leads to gas, bloating, bad digestion, chronic digestive disorders, in addition to blowing out your pancreas, which tries to compensate by producing huge amounts of digestive enzymes for use in the small intestine. All of this is exacerbated by foods and beverages such as alcohol (especially beer), high sugar foods, and caffeinated foods (coffee and tea, etc.) that can actually double acid production.

The simple solution for most people with excess stomach acid is to supplement with digestive enzymes which can digest up to 70% of the meal in the pre-acid phase, thus eliminating the need for large amounts of stomach acid and also taking tremendous stress off the digestive system and the pancreas.

One other factor which may be contributing to the problem is a hiatal hernia, in which part of the stomach can protrude through the diaphragm into the chest cavity allowing food and stomach acid to back up into the esophagus. Combine a hiatal hernia with excess stomach acid and you have the potential for great distress. The standard treatment for severe hiatal hernias is laparoscopic surgery -- with mixed results. Fortunately, there are chiropractic alternatives that can be quite effective.

In either case, dietary changes and supplemental digestive enzymes are likely to produce significant results, without creating problems further down the digestive tract.

Drinking 2-4 ounces of organic, stabilized, aloe vera juice every day can also help soothe irritated tissue in the esophagus and help balance out digestive juices in the stomach.

## **TOO LITTLE STOMACH ACID**

Follow the logic here for just a moment.

If you spend years forcing your body to massively overproduce stomach acid to compensate for the lack of enzymes in your diet, what do you think the long-term consequences might be in terms of your ability to produce stomach acid?

Bingo!

Eventually, your body's capacity to produce stomach acid begins to fade, with a concomitant loss in your body's ability to sufficiently process food in the stomach. The health consequences can be profound. Low production of stomach acid is quite common and becomes more prevalent with age. By age forty, 40% of the population is affected, and by age sixty, 50%. A person over age 40 who visits a doctor's office has about a 90% probability of having low stomach acid. Consequences can include:

- Poor digestion. Not only is there insufficient stomach acid to break down food, there is insufficient acidity to optimize the digestive enzyme pepsin, which requires a pH of around 2.0. This results in partial digestion of food, leading to gas, bloating, belching, diarrhea/constipation, autoimmune disorders, skin diseases, rheumatoid arthritis, and a host of intestinal disorders such as Crohn's and IBS.
- It is estimated that 80% of people with food allergies suffer from some degree of low acid production in the stomach.
- Many vitamins and minerals require proper stomach acid in order to be properly absorbed, including: calcium, iron, vitamin B12, and folic acid. Vitamin B12 in particular requires sufficient stomach acid for proper utilization. Without that acid, severe B12 deficiency can result. (Note: ionic delivery systems can bypass this problem.)
- With low acidity and the presence of undigested food, harmful bacteria are more likely to colonize the stomach and interfere with digestion. Normal levels of stomach acid help to keep the digestive system free of harmful bacteria and parasites.

It's worth noting that symptoms of low acidity include:

- Bloating, belching, and flatulence immediately after meals.
- Indigestion, diarrhea, or constipation.
- Heartburn.

Is it just me, or doesn't this list sound very similar to the symptoms associated with too much stomach acid? In fact, up to 95% of people who think they are suffering from too much stomach acid are actually suffering from the exact opposite condition. The use of antacids and purple pills then become exactly the wrong treatment to use since they exacerbate the underlying condition while temporarily masking the symptoms.

Options:

- Supplementing with digestive enzymes to reduce the need for stomach acid — giving the body a chance to rest and recover its ability to produce sufficient stomach acid.
- Mix one teaspoon of apple cider vinegar with water and a little honey and drink this with each meal. You may gradually increase the vinegar up to 3-4 tablespoons in water if needed.
- Supplementing with betaine hydrochloride (HCL) tablets can also help, but anything beyond minimal doses as found in most health food store supplements should only be administered under the supervision of a health practitioner to avoid damage to the stomach lining.

## **STOMACH ACID AND PROTEOLYTIC ENZYMES**

As I mentioned at the top of the newsletter, we received a number of questions on stomach acid in the last 30 days. Most of them had nothing to do with high or low stomach acid, but rather with the effect of stomach acid on supplements. In fact, the bulk of the questions we received were concerned with how stomach acid affects proteolytic enzymes, and they all pretty much ran along the following lines.

Since enzymes are made from proteins and proteolytic enzyme formulas are taken orally:

- How do they survive the digestion of proteins that takes place in the stomach? Wouldn't they be broken down by stomach acid into amino acids?
- If they do make it through the stomach, since they are so large, wouldn't they be unable to pass through the intestinal wall?

## **SURVIVING THE STOMACH**

Not all proteins (enzymes are proteins) are broken down by stomach acid. Rather than get technical, let me just point out pepsin. Pepsin is an enzyme secreted by the stomach to aid in digesting the proteins in your food. Not only is it NOT broken down by stomach acid, its optimum pH environment is about 2.0 (very, very acidic). Bottom line:

- Although some enzymes such as serapeptase are destroyed by stomach acid, most are not — just temporarily rendered inactive. (Note: that's one of the reasons I do not use serapeptase in my own proteolytic enzyme formulation.)
- Different enzymes function differently in different pH environments, which is why I formulated my proteolytic enzyme formula, pHi-Zymes™, to function in a wide range of pH's.

## **PASSING THROUGH THE INTESTINAL WALL — ABSORPTION**

Enzyme absorption absolutely occurs and manifests through two main avenues:

- Pinocytosis
- Peristalsis

### **Pinocytosis**

Enzyme molecules are bound to, and encapsulated, by other substances such as water. Since they are encapsulated, the intestinal wall cannot recognize them as enzymes and thinks they are "water," thus readily passing them through the intestinal wall. Once the enzymes are in the bloodstream they attach to lymphocytes and travel easily throughout the vascular and lymphatic systems.

### **Peristalsis**

Peristalsis not only forces food (and enzymes) down through the intestinal tract, it also forces transit through the intestinal wall.

## STOMACH ACID AND PROBIOTICS

The questions related to probiotics are essentially the same as those for proteolytic enzymes: aren't they broken down and destroyed by stomach acid — thus requiring special, acid-proof capsules? And the answer, for most probiotics, is absolutely not. (I think this is primarily a marketing pitch for companies selling probiotics in enteric coated capsules, but the logic is flawed.)

The reason we're supposed to take probiotic supplements is to replace the probiotics that we used to get in a wide range of unprocessed **fermented foods such as homemade yogurt, sauerkraut, buttermilk, pickled foods, kimchi, real soy sauce, raw vinegar, tempeh, etc. — foods that are no longer a significant part of our diet. But think about this for a moment. These foods are not enteric coated. How could these foods provide probiotic value if the beneficial bacteria were destroyed by stomach acid?**

**The simple truth is that beneficial bacteria, for the most part, easily survive stomach acid. Also, if you take your probiotic supplements with water on an empty stomach (as we've already discussed), they encounter almost no stomach acid anyway.**

## CONCLUSION

The bottom line here is that most people are very confused about the role stomach acid plays in health. Most people:

- Think they have too much, when in fact they have too little.
- Treat the symptom and suppress stomach acid production, ultimately leading to long-term health problems.
- Ultimately lose the capacity to produce sufficient stomach acid as a result of dietary abuse and continual use of medications to suppress the body's ability to produce it.

Don't get into that trap.

- Use digestive enzymes with all your meals.
- Drink aloe vera juice.
- Use probiotic supplements with confidence.
- Use proteolytic enzyme supplements with confidence.
- And, if needed, use apple cider vinegar or betaine hydrochloride supplements to make up for stomach acid insufficiency.