Background

- **Calcium is Naturally Transmutable in Nature**
  Modern scientists have achieved transmutation in nuclear reactions, but in Nature, calcium is naturally transmutable. A French scientist named Corentin Louis Kervran theorized that the amount of calcium in a hen’s eggshell can only be due to transmutation because a chicken does not eat that much calcium. Kervran wrote a book called *Biological Transmutation*. 
Background

• **Calcium (continued)**
  Sources of Calcium that are suitable as soil nutrients include:

a. **Dolomite**
   A common mineral found in Nature consisting of calcium and magnesium carbonate. Dolomite has a granular texture and is distributed on soil with a spreader. Soil bacteria assist in plant absorption.

b. **Ground Eggshells**
   Eggshells are made almost entirely of calcium carbonate crystals.
• Calcium (continued)
  Sources of calcium that are suitable as soil nutrients (continued):

b. Ground Eggshells (continued)
  Eggshells can be air dried and ground in a Blendtec Fit blender, or a heavy-duty Victoria grain grinder with a clamp. This powder can then be added to a single chamber tumbling composter for aerobic biological processing by bacteria that need air.
Background

• **Bacteria’s Role in Biological Processing**
  There is evidence that biological processing accomplished by bacteria was understood in Iran, Egypt and Mesopotamia 7,000 years ago. Chemical tests of ancient pottery jars reveal that beer was produced using spontaneous fermentation of domesticated cereal and wild yeast that exist in the air.

There are two types of fermentation in food. One process requires air. For example, Crème fraîche is made with heavy cream that can be fermented with the bacterial cultures in a small amount of buttermilk overnight. These bacteria need air and the cover of a jar must be left slightly open.
Another type of fermentation is accomplished without air. Sauerkraut is an example. Lactic acid bacteria that are naturally present in cabbage will begin to ferment the kraut in shredded leaves that are pressed into a jar that has no air. The bacteria “predigest” the cabbage. This type of ferment is called spontaneous fermentation and it has been practiced by ancient societies all over the world. For example, kimchi is a Korean fermented vegetable mix that was stored underground early as 37 B.C.

Although spontaneous fermentation occurs naturally, the results can be uneven. Bacterial cultures in whey, separated from raw milk, can be used as a starter culture for more predictable results.
Background

- Types of Composting

There are two types of composting:

a. Aerobic

Aerobic composting is decomposition of organic matter using microorganisms that require oxygen. This type is rapid and it generates heat. The heat produced in aerobic composting is sufficient to kill harmful bacteria. It also helps support the growth of beneficial bacteria species that thrive at higher temperature levels (higher than conditions underground).
Types of Composting (continued)

There are two types of composting (continued):

a. Aerobic (continued)

Beneficial bacteria species that thrive at higher temperature levels include:

- Psychrophilic bacteria (5 °F and 14 °F)
- Mesophilic bacteria (temp (68 °F and 113 °F)
- Thermophilic bacteria (temp 113 °F and 251.6 °F)

b. Anaerobic

Anaerobic composting occurs without air and requires an entirely different set of organisms than aerobic composting. The anaerobic process is essentially “digestion.”
• Municipal and Private Composting

Thousands of American and European cities have created municipal composting to biologically process food waste. The City of Fort Lauderdale, Florida composts seaweed to create nutrient-rich organic fertilizer using mostly an anaerobic system.

Large-scale aerobic composting is accomplished with “in-vessel” systems that provide air using technology from companies such as TMA Organics and Green Mountain Technologies.
• **At-Home Aerobic Composting**

Small-scale aerobic composting can be accomplished with waterproof tumblers that can be placed outdoors in warm weather.

Although tumblers have capacities of up to 80 gallons, small tumblers are easier to spin (some moisture is required that adds to the weight).

Because beneficial bacteria need air, tumblers should be partially filled. An ideal amount to add to a 37 gallon tumbler is 12 gallons.
At-Home Aerobic Composting (continued)

At-home composting will benefit from a starter culture in the same way a batch of sauerkraut will benefit from the beneficial bacteria in whey. You will want to add about 6 cups.

Besides a starter culture, a compost batch needs a combination of green material as a source of nitrogen and brown material as a source of carbon in a ratio of 80% green to 20% brown. Tall kitchen garbage pails can be marked to distribute the 12 gallons of material that you collect.

Green would be seaweed, used coffee grounds in the filter paper and used tea bags. Brown would be used paper towels that contain environmentally friendly soap that does not kill beneficial bacteria.
• **At-Home Aerobic Composting (continued)**

Other additions include 2 cups of ground eggshells and 4 cups of *Spring Water* per day until beginning dry mixture stops escaping through the drainage holes in your tumbler.

Spin your tumbler 6 times a day.

Develop a routine and spin at the same time every day so you won’t forget to spin.

Your compost will be cured in approximately 3 weeks. An extra three days of spinning is acceptable if you cannot empty the tumbler immediately. A small tarp needs to be placed under the tumbler to collect the completed compost.
At-Home Aerobic Composting (continued)

A paper 30 gallon lawn and leaf bag can be used to store the compost for up to 6 months. Add the date that you bagged your compost to the outside of the lawn and leaf bag.

Paper lawn and leaf bags have a large 16 inch by 12 inch bottom as they are designed to stand up by themselves. Use a heavy stapler and staple the bottom to one half of the gusset so the bags can be stored flat. Staple the top closed.
Spreading Dolomite

Dolomite is heavy (ground from rock) and pelletized. The granular texture should be small enough to flow through the holes of a walk-behind or towable spreader. Small broadcast spreaders with capacities of 20 to 80 pounds will not be sufficient to spread Dolomite.

Companies that make large, 175-pound capacity spreaders include John Deere and Agri-Fab.
Background

- **Brix**
  The nutrition you add to your soil will show up in the vegetables you grow and it can be measured with an instrument called a brix meter that is also called a refractometer. Brix is a measure of total sugars, minerals and other dissolved nutrients in a liquid. Adolf Ferdinand Wenceslaus Brix (1798 - 1870), a German mathematician and engineer, invented the brix meter for the winemakers of Europe who wanted to predict which grape juices would make the best wine (high brix foods taste better than low brix foods).
Brix (continued)

Today’s farmers use brix meters to determine when a crop is ready for harvesting. Livestock producers who are concerned about animal health also use brix to determine the nutrient density of grass, and grocers use brix meters to determine if food has been picked too early, or grown in depleted soils.

A brix meter measures the extent to which light is bent (refracted) through a liquid sample. To measure the brix value of a food, you will need to spread juice squeezed from a fruit or vegetable (or white of an egg) on a brix meter’s glass prism. Once the cover is closed, the prism needs to be pointed to a light source and a look through the eye piece will reveal a shaded numerical scale showing the concentration of a solute in solution.
Brix (continued)

Dr. Carey Reams developed a brix table in the 1930s that describes desired brix levels. International Ag Labs in Fairmont, Minnesota, has created a Web site called High Brix Gardens (www.highbrixgardens.com) with a link to a PDF file containing the Reams’ reference values. For example, the following list includes Reams’s brix values for tomatoes:

4 - poor
6 - average
8 - good
12 - excellent
Farmers who know how to raise high-brix crops often attend Acres U.S.A. conferences. They’re alternative farmers, or biological farmers, who understand that high-brix food is important for animals as well as humans. Rex Harrill of Keedysville, Maryland, who was interviewed for an article about brix for the Weston A. Price Foundation monthly magazine, estimates that only 5% of the food grown in the United States can be considered high-brix.

![Brix numeric scale as seen through a brix meter eye piece](image)
Greenway Biotech

Dolomite Lime Plus Magnesium and Calcium

- 22.7 percent Calcium
- 11.8 percent Magnesium
- Primary component of the sedimentary rock known as dolostone and the metamorphic rock known as dolomitic marble

Dolomite Lime Plus Magnesium and Calcium “Greenway Biotech Brand” 5 Pound, Walmart, $13.99
Products

Blendtec Fit Blender
(for grinding eggshells)

- High-performance blender
- Engineered with an extremely sturdy base
- Handles ice and other tough foods

Blendtec Fit Blender, Walmart, $279.95
Victoria Grain Grinder with Clamp
(for grinding eggshells)

- Cast iron
- Professional self-sharpening stainless steel blade
- Adjustable grinding degrees from coarse to fine
- Overall height from top to bottom: 12.5”
Products

**Green Culture Compost Tumbler**
- Capacity: 37 gallons or 4.9 cubic feet
- Rugged weather-resistant metal and plastic
- Produced using 50% recycled materials
- Intended for outdoor use
- Large door access

Green Culture Compost Tumbler, Walmart, $107.54
Products

Jobe’s Organics Compost Starter Fertilizer, 4 lbs
• Contains billions of beneficial microorganisms
• Promotes fast composting
• Helps break down organic matter
Products

Hefty Touch-Lid 13.3-Gallon Trash Can
• Holds 13.3 gallons
• Uses 13-gallon trash bags

Hefty Touch-Lid 13.3-Gallon Trash Can, Walmart, $10.46
Products

Blue Tarp Tarpaulin Poly Tent Canopy Cover Camping
Ground Sheet w/ Grommets 4’x 6’

- Light weight, tear & mildew resistant
- Water proof
- Laminated on both sides, washable & reusable
- Aluminum grommets

Blue Tarp Tarpaulin Poly Tent Canopy Cover Camping Ground Sheet w/ Grommets 4’x 6’, Walmart, $5.59
Products

Duro Bag 30 gal. Lawn & Leaf Bag Flap Tie 25 pk
- 2-ply wet-strength paper
- Construction for durability
- Tear resistant

Duro Bag 30 gal. Lawn & Leaf Bag Flap Tie 25 pk, Walmart, $27.11
Products

Rapid Classic K1 Plier Stapler, 50-Sheet Capacity, Chrome

- Made in Sweden
- 50 Sheet Capacity
- Chrome plated metal
- Ergonomic handle
- Back loading with adjustable anvil for pinning

Rapid Classic K1 Plier Stapler, 50-Sheet Capacity, Chrome, Walmart, $27.19
Products

Rapid Staples for S50, SuperFlatClinch High Capacity Stapler -RPD90003

- SuperFlatClinch high capacity staples.
- Loads half strips.
- 5/16”
Products

Agri-Fab, Inc. 175 lb. 42” Spread Drop Spreader/Spike Aerator Tow Behind Lawn Groomer Model #45-03012

- Capacity covers about 1 acre (40,000 sq ft)
- On off control accessible from the tractor seat
- Universal hitch attaches easily and quickly to all tractors
- 3 Year Limited Warranty
- Assembly videos on the Walmart Web site

Agri-Fab, Inc. 175 lb. 42” Spread Drop Spreader/Spike Aerator Tow Behind Lawn Groomer Model #45-03012, Walmart, $313.54
Products

Agri-Fab has produced an impressive series of how-to assembly videos.

Agri-Fab’s how-to assembly videos can be found on the product page on the Walmart site.
John Deere Pull Type Spin Spreader - 175-lb

- Fully enclosed gear box with metal gears for long life
- 13 in. x 5 in. Pneumatic tires for easy rolling
- Includes screen and cover

John Deere Pull Type Spin Spreader - 175-lb, Walmart, $389.00
Products

Ade Advanced Optics
Brix 0-32% + Salinity 0-28% Dual Scale 2 in 1 Refractometer for Beer Wine and Aquarium

- Measures Brix: 0-32% and Salinity 0-28%. No need to purchase 2 refractometers separately
- Measure salt water or salinity of water, ideal for aquariums and marine monitoring

Brix 0-32% + Salinity 0-28% Dual Scale 2 in 1 Refractometer for Beer Wine and Aquarium By Ade Advanced Optics, Walmart, $26.22
The Cartoon Guide to Chemistry (Paperback)

• Authors: Larry Gonick and Craig Criddle

• A collaboration between a scientist and a cartoonist that covers both the history and the basics, including electrochemistry, organic chemistry, biochemistry, environmental chemistry, physics as chemistry, and much more.
Products

Cartoon Guide: The Cartoon Guide to Physics

- Authors: Larry Gonick and Art Huffman
- A humorous and effective cartoon explanation of the principles of physics

Cartoon Guide: The Cartoon Guide to Physics (Paperback), Walmart, $15.76 - 32.45