



Global Fermentation “Today & Tomorrow”

LISA A. MOELLER

DECEMBER 9, 2020



Topics



1. **Pickle Trends**
2. **“No Salt” Fermentations**
3. **Forecasts for Fermented Vegetables**
4. **Handling Crop “Relish”**



Major Fermented Food Product Categories

Beer
Cheese
Chocolate
Coffee
Hard Cider
Kefir
Kimchi

Kombucha
Kvass
Mead
Miso
Pickles
Sake
Sauerkraut

Sourdough
Soy
Spirits
Tempeh
Vinegar
Wine
Yogurt





Today Cucumbers Dominate the Fermented Vegetable Category

Processed cucumbers fall under three major categories of “PICKLES.”

Fermented
Acidified
Refrigerated



Cucumber Pickle Type Trends

Fermented

Most relish and Quick Service Restaurant (QSR) pickles are still fermented cucumbers.

McDonald's sells about 2 billion hamburgers each year. It is estimated Americans eat over 50 billion burgers/year. That is a lot of hamburger dill chips.

Most cucumbers are fermented using traditional salt methods in bulk.

A large part of the "pickle industry" is still involved with fermented cucumbers, but it is not the leader in the retail category at this time.



Cucumber Pickle Type Trends

Acidified

Since 1975, the majority of processed cucumber products on grocery store shelves is acidified and pasteurized.

Placing cucumbers directly in the jars saves costs and reduces negative environmental impacts for large operations.

Product is usually labeled “Fresh Pack” to acknowledge the difference.



Cucumber Pickle Type Trends

Refrigerated

Refrigerated products have become more popular recently in the US.

They are often very tasty, have minimal ingredients and appear “fresh.”

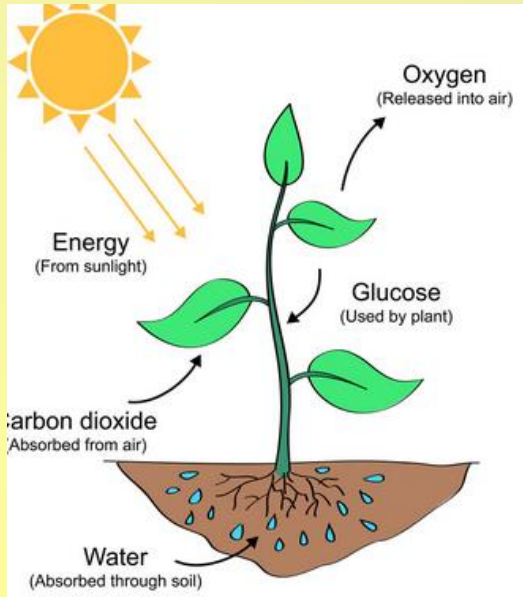
These refrigerated products require constant refrigeration though and have a short shelf life compared to fermented and acidified products.



Fashionably Pickled, LLC



**The sun's
energy.**



Photosynthesis

**We harvest this
stored energy.**



**We use microorganisms
to convert this energy to
further stability and
create healthier options.**



**Hurdles and advantages
to achieve desired
finished products.**



Globally Most Popular Vegetables



	(M) Metric T
Tomatoes	180
Onions	93
Cucumbers	72
Cabbage	72
Eggplant	51
Carrots/Turnips	43
Peppers	35



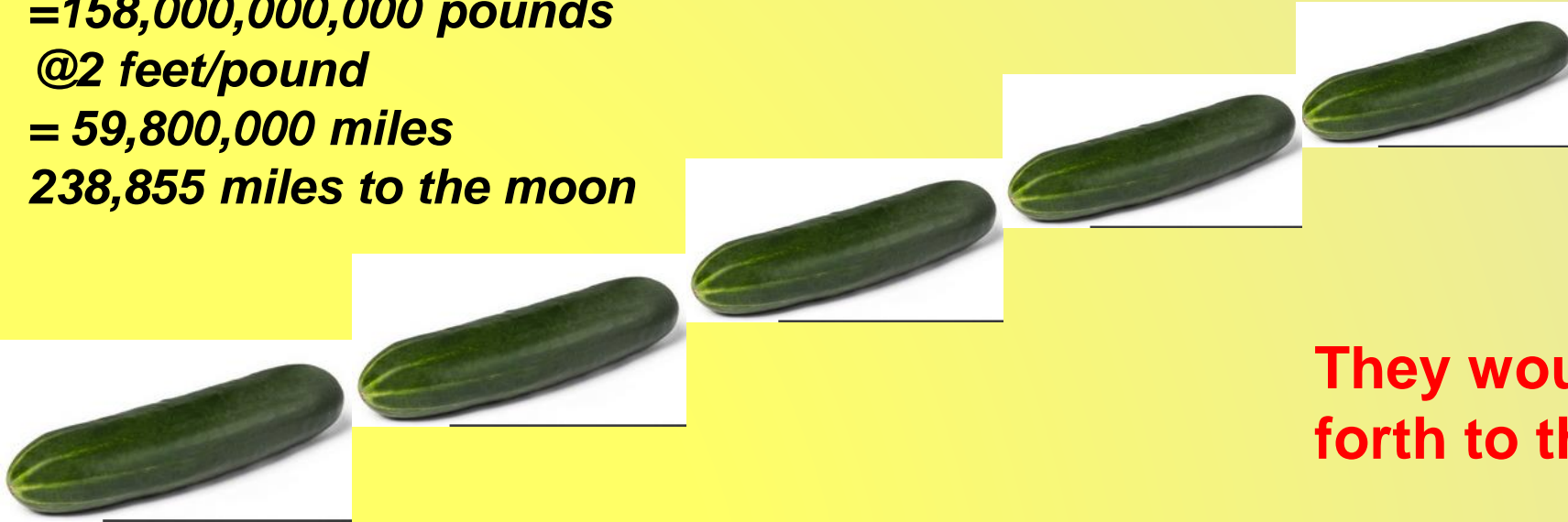
Fashionably Pickled, LLC

Cucumbers to the Moon



They would reach back and forth to the moon > 120 times.

72 M MT=
72,000,000 tons=
X1000= 72,000,000,000kg
=158,000,000,000 pounds
@2 feet/pound
= 59,800,000 miles
238,855 miles to the moon





Cucumbers



Cucumbers have very little odor until they are cut.



Once the cucumber is cut, oxygen quickly reacts with several acids in the fruit and the odor given off is that of “cucumber.”



Why is This Important?

Because cucumbers with a characteristic flavor and odor when fresh can uniquely be turned into a blank pallet that can take on many flavors when fermented.





Sauerkraut and Kimchi Production

Cabbage production is also estimated to be 72 million metric tons per year.

Much of this cabbage is converted to kimchi and sauerkraut.

According to recently reported SPINS data; kimchi makes up 7% of the fermented food category, but sales increased 90% in the past year.



Current Increased Production For:

Sweet Potatoes

Kale

Fresh Cut Herbs

Ginseng

Cauliflower

Brussel Sprouts





World Population by Country



Country	Population	Density (#/km2)
China	1,439,323,776	153
India	1,380,004,385	464
USA	331,002,651	36
Indonesia	273,523,615	151
Pakistan	220,892,340	287
Brazil	212,559,417	25
Nigeria	206,139,589	226
Bangladesh	164,689,383	1265

These eight countries represent 55% of the world's population. 7.8 billion people in 2020 and an estimated 9.9 billion by 2050.







Fashionably Pickled, LLC





Fashionably Pickled, LLC

US markets unlike most global shopping options, offer many selections in every category, a LOT of packaging, and large refrigerated and frozen sections.





No Such Thing As “Global Tastebuds”



Four Successful Product Adaptations



Adapted Flavors for Regional Differences

23,000 restaurants in
over 140 countries.

Multiple Choices



500 brands in over 200 countries.

The US represents 31.9% of Coco-Cola's revenue.

It doesn't taste the same in Mexico as it does in the US.

Aggressive Marketing

Heinz has been clever in their marketing and packaging.

Heinz owns 80% of the EU and 60% of the US ketchup market share.



Size Matters

Proctor & Gamble recognizes that size matters!

Individuals in many areas can't afford large containers because of cost and transportation.

For them packaging choices are critical.



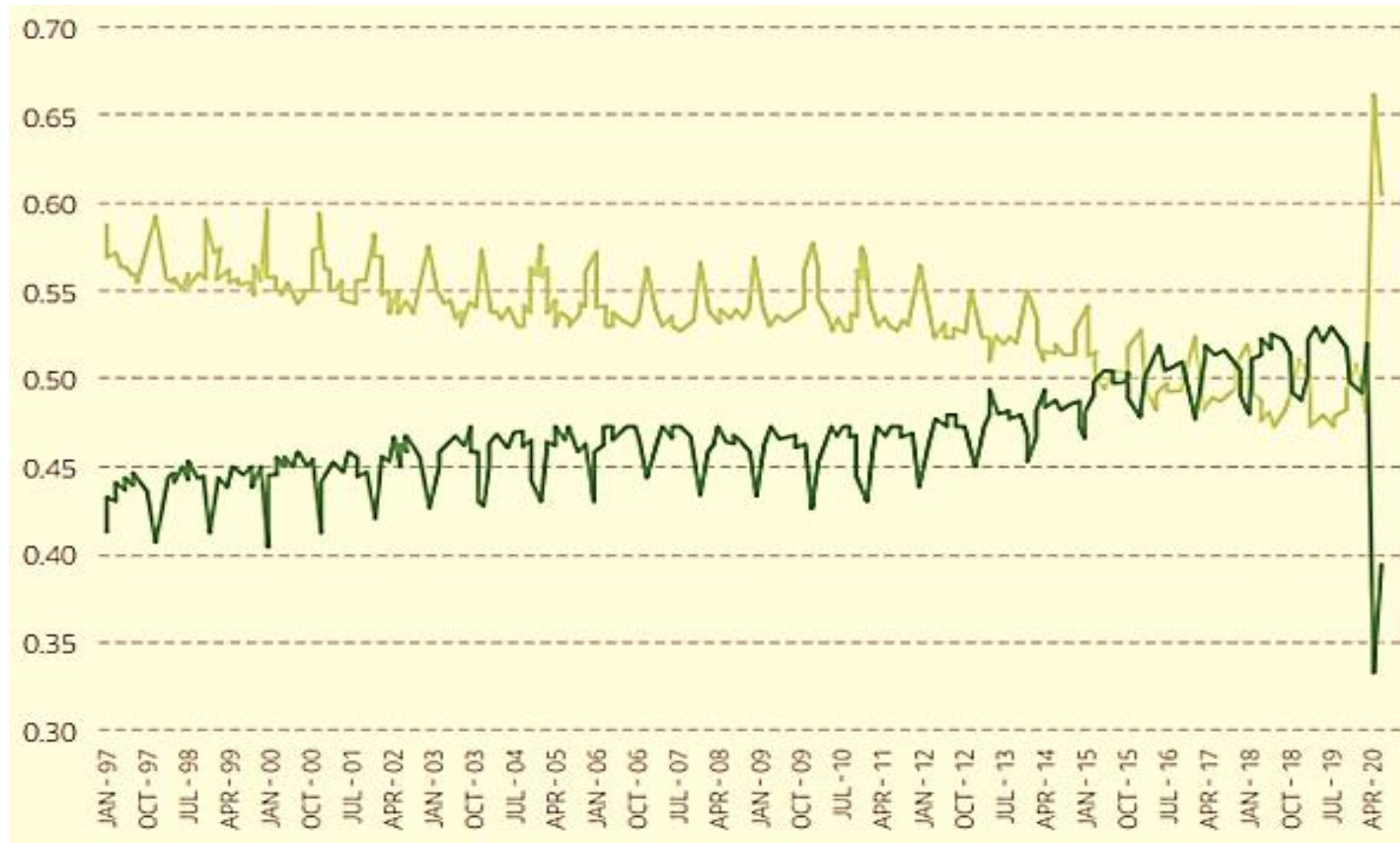
P&G
Procter & Gamble







Fashionably Pickled, LLC



Food At Home

Food Away From Home



Traditional versus “No Salt” Fermentation Pickle Brines and Products



Traditional Fermentation Pickle Brine



Water



Salt



**Calcium Chloride
Potassium Sorbate**



Vinegar



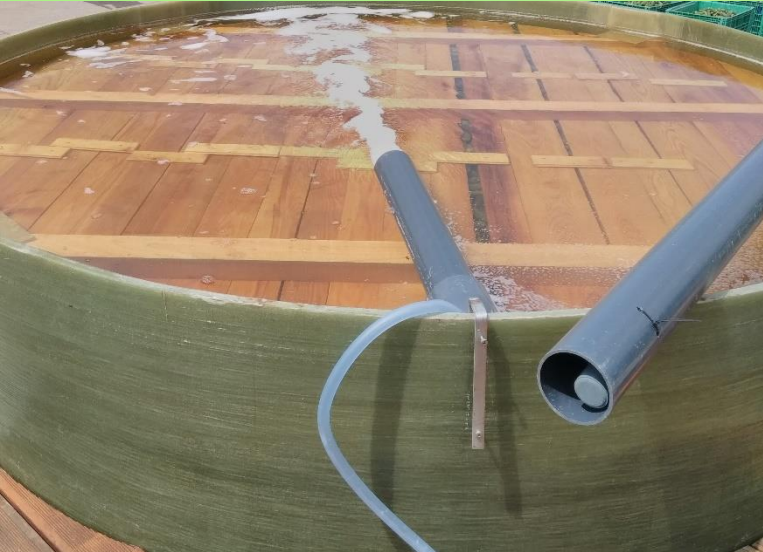
Fashionably Pickled, LLC

Number of natural microorganisms is around 10,000 to 100,000 colony forming units (cfu) per square cm on fresh cucumbers.





Traditional Fermentation Process

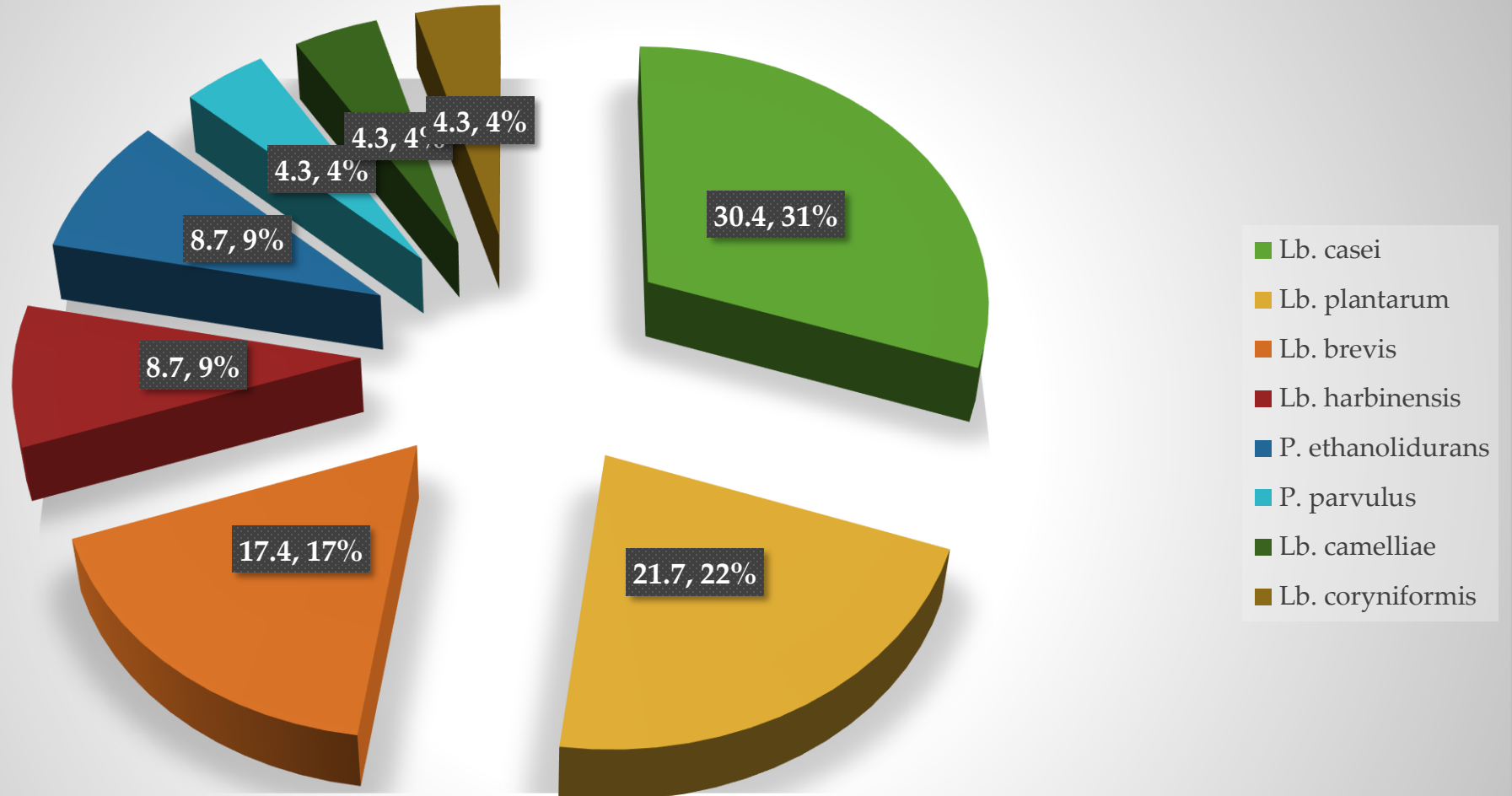


- Add brine to the bottom of often large (10,000-gallon) tanks.
- Introduce cucumbers and fill to nearly the top.
- Install “headboards.
- Fill the tank with brine to submerge the fruit.
- Purging systems are required to prevent bloating of whole cucumbers and achieve equilibrium in the tanks.

The type, size, and condition of fruit, temperature of brine, rates of purging with either air or nitrogen, and concentration of salt, potassium sorbate and calcium chloride all affect the rate of fermentation and the final quality of the resulting pickles.



Bacteria in an Actual Tank



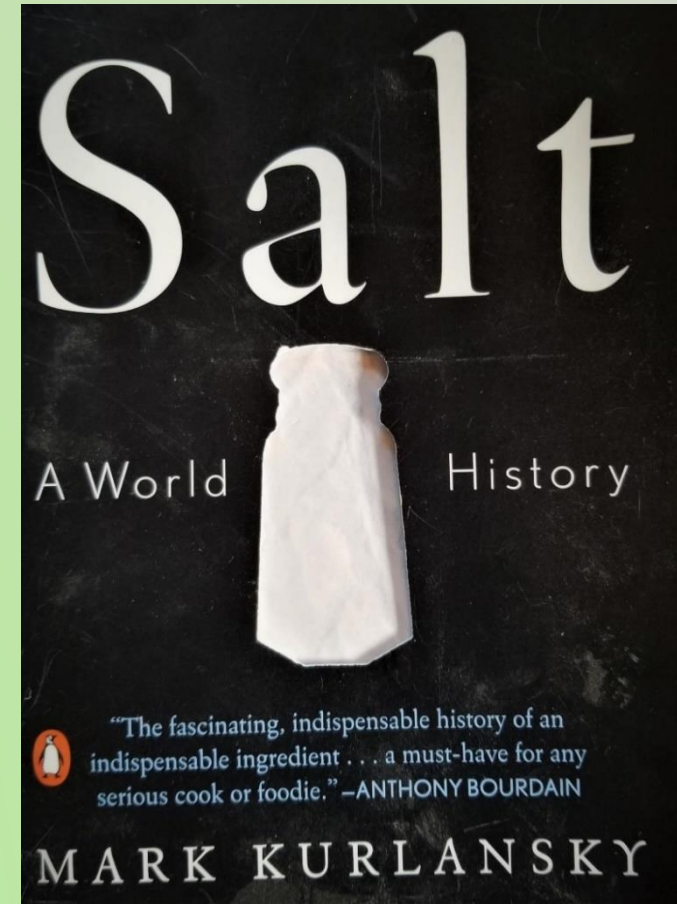
Lb. = *lactobacillus*, P. = *pediococcus*, both are gram + lactic acid bacteria



Mark Kurlansky's 452-page book describes how until 100 years ago salt was one of the world's most sought-after commodities.

"It served as currency, influenced wars, trade routes, secured empires and inspired revolutions."

**"Salted Cucumbers" are described in the book;
"To a barrel add sand, black currant leaves, dill and horseradish. Mix one and a half pounds of salt in one pail of water and keep cucumbers submerged."**





10,000-gallons at 7% salt (sodium chloride) requires 5,838 pounds of salt.

A 1,000-tank yard then requires 5,838,000 pounds of salt.

Most tank yards do a good job of reusing as much brine as possible, but some brines must constantly be disposed.



“No Salt” Fermentations

“No salt” brines require no sodium chloride, but rather use only calcium chloride to create a perfect osmotic pressure for the fruit and desirable microorganisms to carry on fermentation.





“No Salt” Pickle Fermentation Brine



Water

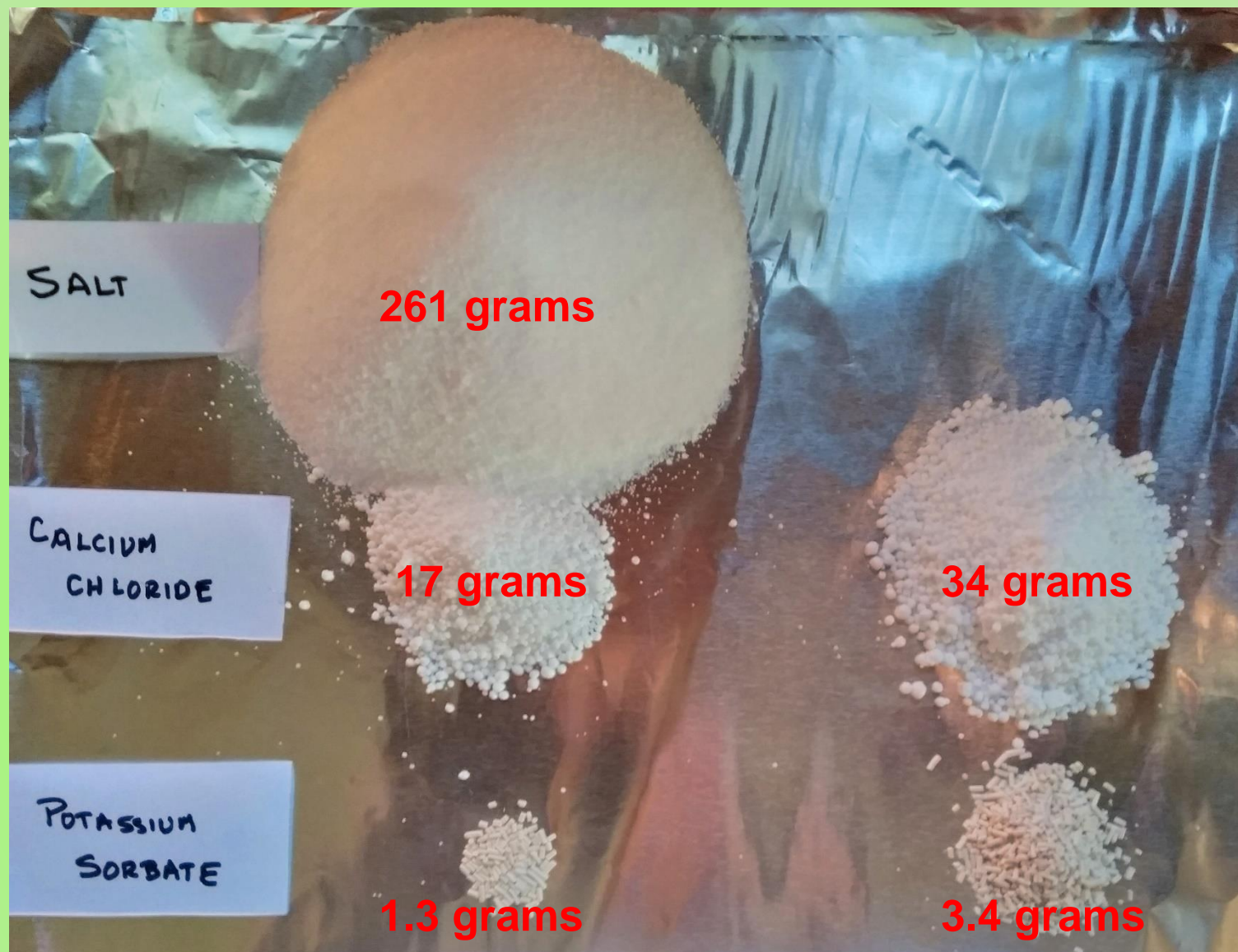


Salt



**Calcium Chloride
Potassium Sorbate**

Vinegar



Traditional Brine

"No Salt" Brine



“No Salt” Fermentations on Whole Produce

“No salt” fermentations for whole produce are not restricted under any patents.

A “No Salt” fermentation process on modified produce to achieve a “Quick Pickle Cure” I will refer to as the AFerm[®] Process and is patented. My contact information is included in the last slide for more information.



AFerm[®] Process

Fruits or vegetables are modified by piercing, slicing, shredding or dicing.



Calcium chloride brine solution at close to 1% equilibrated is added to submerge produce. The mixture is cultured and kept in a warm state. The culture is generally *L. plantarum*.



If the culture is at 100 billion cfu/gm add at a rate of 0.0001%

Within days the mixture is fermented and shelf stable.



New Fermentation Products by AFerm®





Traditional Brine

“No Salt” Brine

Time in brine: 1 hour.

Note: The buoyancy of the carrots in the “Traditional Brine.”

There is also loss of yield going on with the “Traditional Brine” as the water is being driven out of the fruit.



Time in brine: 24 hours.

Note: The “No Salt” brine has become cloudy. The carrot slices in the “Traditional Brine” continue to float, while the carrots in the “No Salt” brine begin to settle.



Traditional Brine “No Salt” Brine



Time in brine: 48 hours.

Note: After 48 hours the “Traditional Brine” is still clear, the pH has changed little, and the carrot slices are still floating.

The bacteria in the “No Salt” brine are very active, and the pH dropped from 6.3 to 3.3 in less than 48 hours.

Traditional Brine “No Salt” Brine





AFerm® Allows for Exciting Innovative New Items:



Fermented carrots, green tomatoes, hot peppers, radish, turnips and cauliflower are all achievable with a “no salt” fermentation.

This process allows a grower to turn their raw produce into shelf stable ingredients.

Easier to produce low sodium products.



AFerm[®] Promotes Sustainability by:



Faster fermentation rates using fewer inputs.

Reducing salt discharges.

Allowing a closed system that can lead to a processing plant with “zero” waste.



Forecasts





Three Forecasts for All Fermented Foods

The health attributes and complicated flavors created by fermentation are going to become more valuable than ever.

Labeling and marketing are always key but for the fermented foods category, knowing the intended consumer and sales venue are critical to optimize success.

Growing environmental concerns are going to be more important and company behavior will become more transparent.



Health Attributes of Food Will Become More Important Especially After Covid19



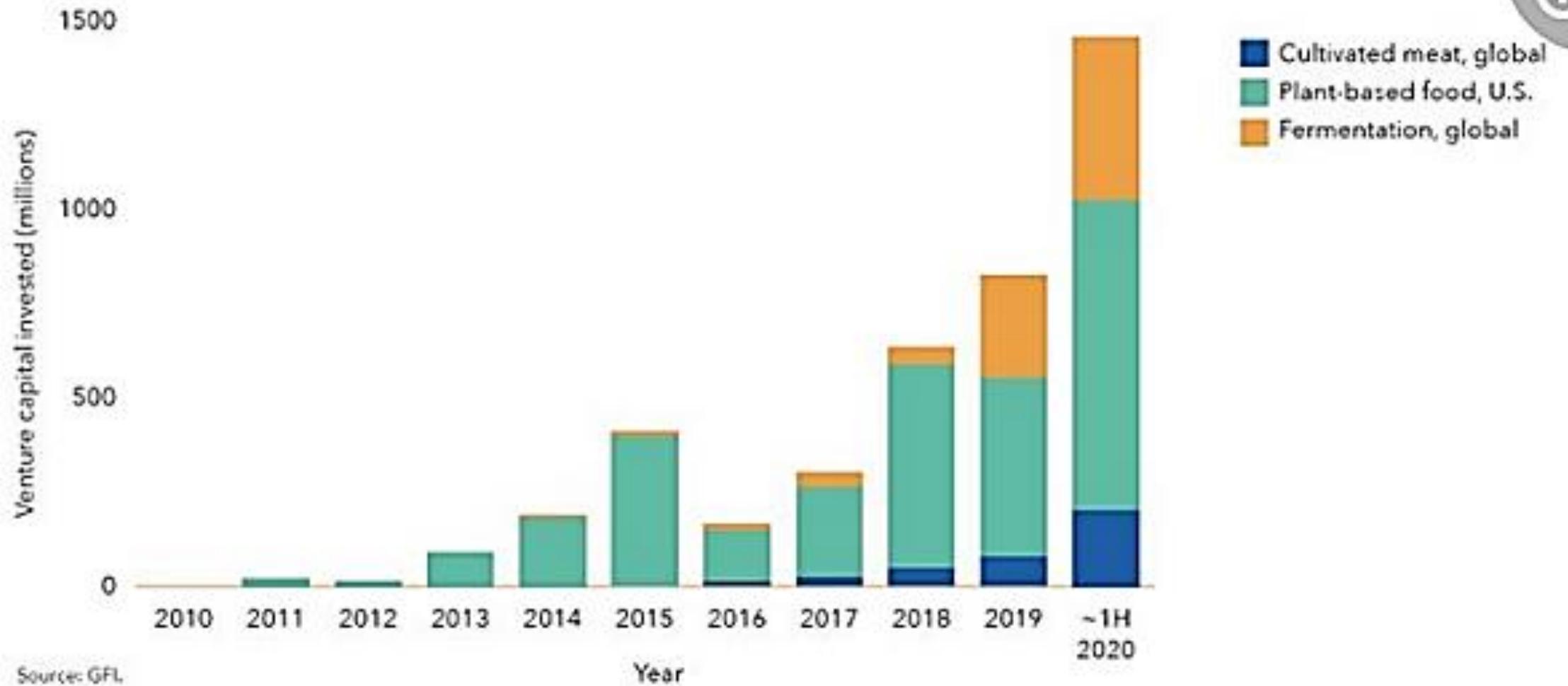
Boost
Immunity



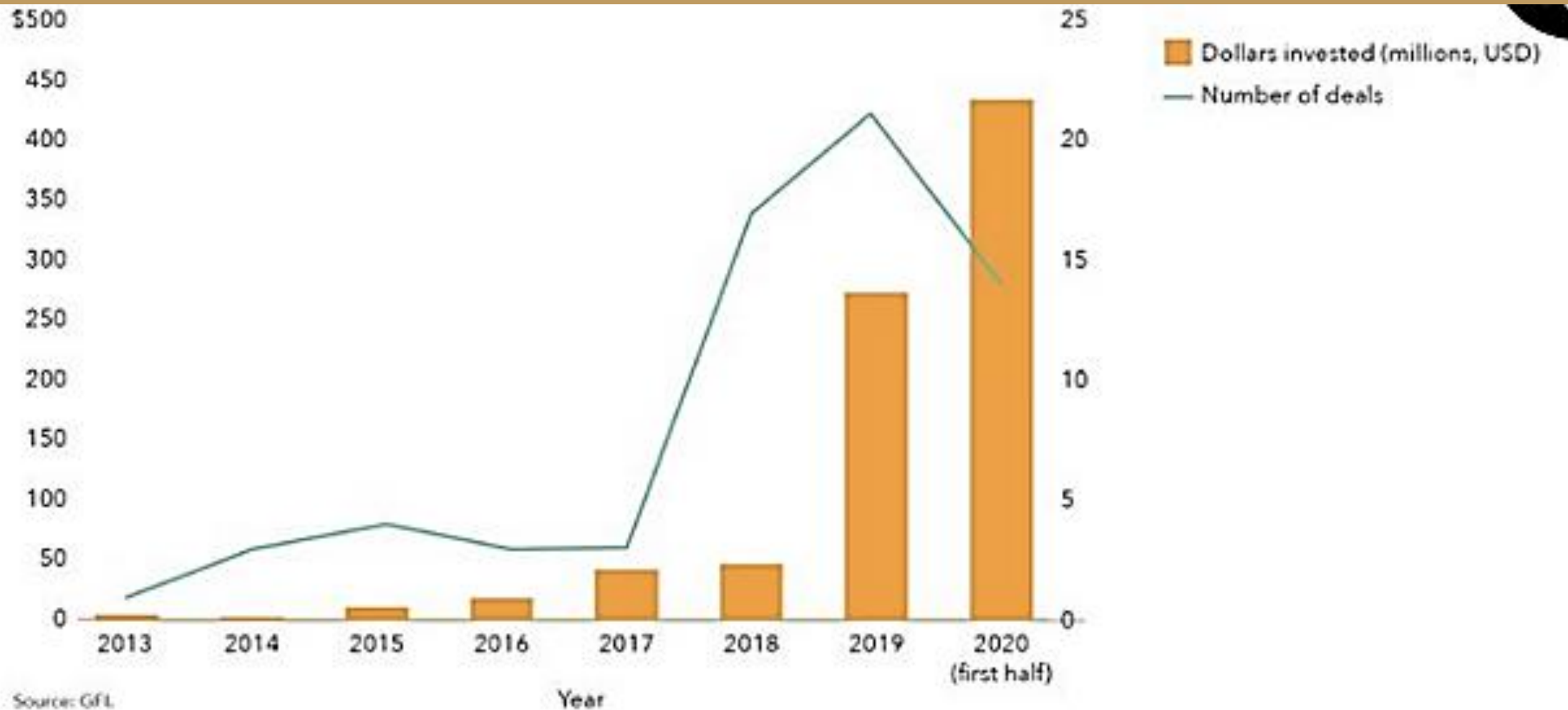
Healthy
Weight



Nutritious



Venture Capital Investment Trends in Alternative Proteins



Total Venture Capital Invested in Fermentation Companies



The Burger King “Impossible Burger.”

The large burger chains are experimenting with plant-based meat substitutes.



These “fermented burger” items can easily be complemented with fermented slaws, chutneys, or green tomatoes as well as fermented relish and cucumber pickles.



Labeling

Hopefully, it will be as advantageous to attach “Fermented” as it is “Fresh Pack” to shelf stable pickle products at some point in time.

Online purchases with Covid19 have increased greatly so your brand recognition and labeling may be seen on the internet first.





Labeling is Even More Important When Selling Your Brand

Know what is important to the folks that are going to make the decision to add your products to their store shelves. Whole Foods is different than Walmart. Ingredients, packaging and reputation are now more transparent and matter!



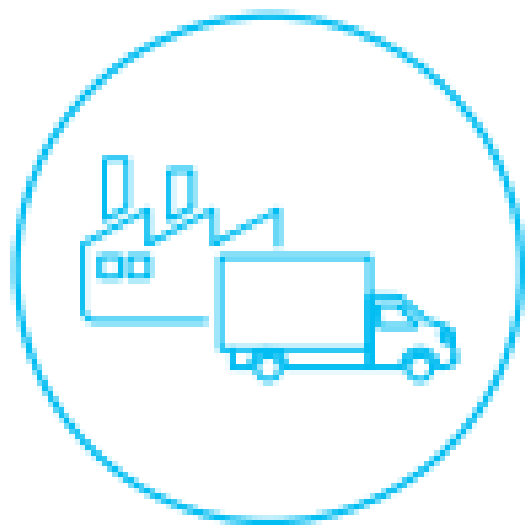


Fashionably Pickled, LLC

My Passion



The Environment!



**Production
& distribution**

The global food system
accounts for

26%

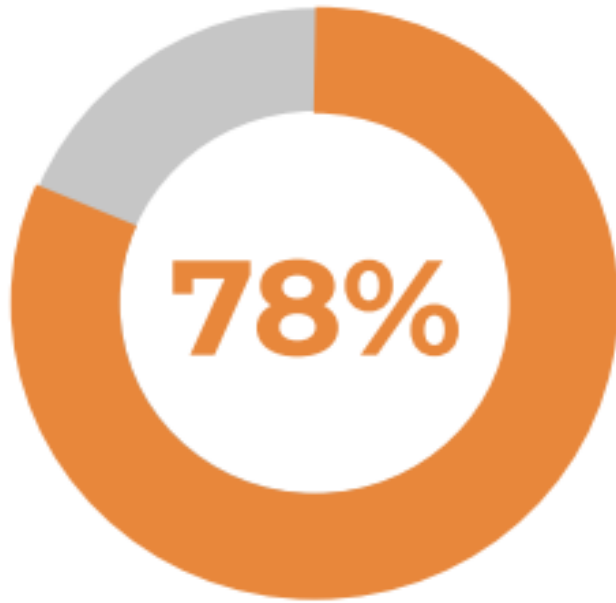
of greenhouse
gas emissions.





No matter
where I go
in the
world,
WATER is
a topic of
concern!



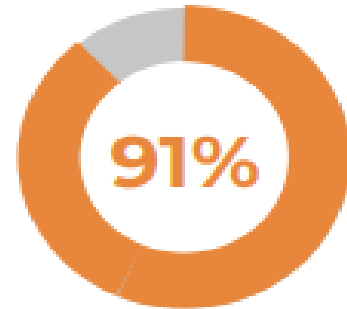


of consumers are
**concerned about
the environment**

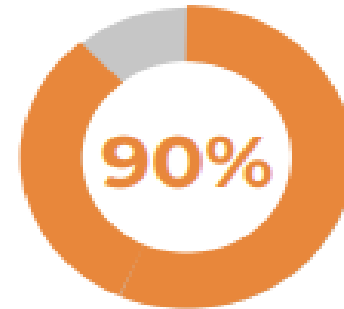




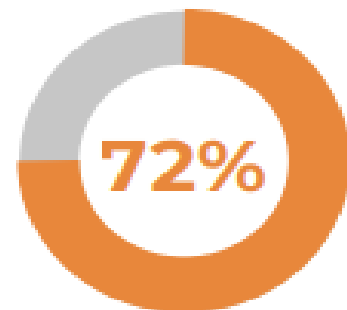
For the following countries, the percentage of consumers that show concern about the environment are:



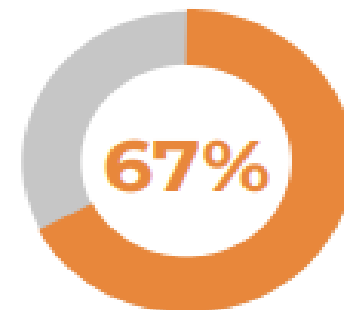
Thailand



South Africa



USA



UK





Handling Crop “Relish”

“Upcycling” was crowned Cambridge Dictionary’s word of the year in 2019.

It is estimated 40% of the food we produce is not consumed.

According to the UN Food and Agriculture Organization, 1.3 billion tons of food is wasted annually.





Upcycling is a Global Initiative

12 Companies Recognized for Tackling Food Waste:

Aqua Botanical, Australia

Kromkommer, The Netherlands

Matriark Foods, USA

NETZRO, USA

Pure Plus, USA

RISE + WIN Brewing Co., Japan

Rubies in the Rubble, UK

Sweet Benin, West Africa

Toast Ale, UK

Treasure8, USA

Upcycled Grain, New Zealand

Wize Monkey, Canada



**The trends and forecasts and processes like
upcycling all have one theme;**

CHANGE





Change in My Lifetime



My great grandparents immigrated to the US from Schleswig-Holstein in 1887.



My grandmother was born in a sod house in Nebraska. Long winters and short summers.



The land that my grandmother's family homesteaded is now a cattle pasture.

Thank-you!



Lisa A. Moeller
Fashionably Pickled, LLC
Fashionablypickled.com
fashionablypickled@gmail.com
919-223-0083