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Slide 2

A presentation slide with a white background and a thin black border. At the top, the text "Fermented Foods" is written in a bold, red, sans-serif font. Below the text is a bulleted list of four points in a small, black, sans-serif font.

- Research does exist for fermented foods
- Plus there is a lot of historical use information
- You can use both in helping clients make decisions as to what to try
- The key is to helping them find what works for their diet and that they can consume on a regular basis

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A presentation slide with a white background and a thin black border. At the top, the text "Does It Make A Difference" is written in a bold, red, sans-serif font. Below the text is a bulleted list of two points in a small, black, sans-serif font.

- 3 different studies have compared the microbiome of rural Africans, Japanese and South Americans consuming a traditional diet with plenty of fermented foods
- They found that those consuming the traditional diet had higher levels of lactobacillus and bifidus strains and lower levels of clostridium than people living in western urban centres

Below the text is a photograph of several glass jars filled with various fermented foods, including what appears to be sauerkraut and pickled vegetables, arranged on a wooden surface.

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Lowering Anxiety

- In another study at the 445 students answered questions regarding fermented foods, neuroticism, and social anxiety – they also looked what else they ate and exercise levels
- Found that those with high neuroticism had lowers levels of anxiety the more fermented foods they ate - exercise had a similar effect



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How much per week

- A study looked at people who consumed at least 3 different types of fermented food and had at least 5 servings per week
- The fermented foods were removed for two weeks and immune response was lowered
- Yogurt was added back first and while immune response improved, it did not return to previous level until all the fermented foods added back in
- Quantity and diversity matter



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Understanding Fermented Foods

- Most fermented foods are made with an anaerobic process – meaning the good bacteria, and the build up of lactic acid and other acids do so without oxygen
- This means there are no molds present or bad bacteria and only synergistic yeast in some products
- Milk and water kefir – it is anaerobic but synergistic yeast is present
- Kombucha and sourdough – is an aerobic process – oxygen is needed for the development of the wild yeasts

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Sauerkraut

- Produced in a brine and has a pH of about 4
- Has all the benefits of cabbage which have been potentiated
- As the cabbage ferments, it secretes lactic acid which is what lowers the pH level from neutral to 4
- Other vegetables can be added or herbs to add to the flavour and to increase the nutrient diversity
- It is antimicrobial and anti-fungal and the foods or juice can be used to preserve other foods.



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Sauerkraut

- Isothiocyanates in sauerkraut have cancer-protective effects in animal studies.
- Good bacteria produces enzymes that activate the isothiocyanates for absorption
- This is already done for you if the food has been fermented
- Source of Vitamin U = S-Methylmethionine – may help peptic ulcers and protect the liver
- Aid digestion and helps digestion of other foods in the meal
- Prebiotic



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Strains in Sauerkraut

- Weissella species
- Lactobacillus plantarum
- Lactobacillus curvatus
- Lactobacillus sakei
- Lactobacillus paraplantarum
- Lactobacillus coryniformis
- Lactobacillus brevis
- Lactococcus lactis subsp lactis
- Leuconostoc mesenteroides
- Leuconostoc fallax
- Leuconostoc citreum
- Leuconostoc argentinum
- Pediococcus pentosaceus

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Kimchi

- Has the benefits of several key foods as it is a combinations of cabbage, carrots, onions, garlic, ginger, daikon radish and hot red pepper powder (capsacin)
- Kimchi helps carbohydrate metabolism and the capsacin in the red pepper powder boosts the body's metabolism
- The cabbage and radish contain phytonutrients such as isothiocyanates and sulfide helpful in detoxifying heavy metals found in the liver, small intestine and kidney.
- Isothiocyanates may also help prevent stomach cancer



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Kimchi Benefits

- Kimchi causes immune cells to be more active and antibodies to be more abundant
- A high cholesterol diet and kimchi can increase immune activity better than a normal diet alone or a high cholesterol diet alone
- Garlic and red pepper powder help prevent gastritis and peptic ulcer by inhibiting H. Pylori
- 3 or 6 g of freeze dried kimchi capsules daily taking by obese women decreased body weight significantly
- It aids digestion of all the food in the meal, has antimicrobial properties and aids intestinal health and helps prevent constipation

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Kimchi Benefits

- Lowers homocysteine in blood that causes blood vessel diseases and is a factor in developing heart disease and Alzheimer's
- People who eat kimchi twice or three times a day had lower chances of having a heart attack
- Prevents aging of the skin and is a major antioxidant with nutrients such as beta carotene and selenium
- Bacillus pumilus, found in kimchi helped detox carcinogen and xenoestrogen Bisphenol A (found in plastic)
- Kimchi with added mustard leaf, Korean Mistletoe and Chinese pepper inhibited human colon cancer cells 62-80 % (in a lab)

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Strains

- *Weissella koreensis*
- *Leuconostoc gasicomitatum*
- *Leuconostoc gelidum*
- *Leuconostoc mesenteroides*
- *Leuconostoc carnosum*
- *Leuconostoc inhae*
- *Leuconostoc kimchii* 1.9
- *Lactobacillus sakei* 13
- *Lactobacillus curvatus* [Type text]
- *Lactobacillus brevis*
- *Lactobacillus algidus*
- *Bacillus pumilus*

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Kombucha

- Made with a scoby (symbiotic colony of bacteria and yeast) tea (with caffeine) and sugar
- It has anti-microbial properties
- One study showed that it aided wound healing in rats
- Another study looked at its ability to inhibit the spread of cancer cells and found it has some properties to do this
- It helps stabilize blood sugar
- Aid digestions

A white ceramic bowl filled with a golden-brown liquid, likely kombucha. A translucent, gelatinous, light-brown scoby (Symbiotic Culture of Bacteria and Yeast) is floating on the surface of the liquid.

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Kombucha

- It helps with cholesterol and offers beneficial antioxidant protection
- Research focusses on the tea polyphenols found in black and green tea which are more bioavailable in kombucha and can explain a lot of the health benefits.
- Improves learning, memory, and mood. It can help alleviate anxiety and increase resilience to stress
- Also protects the brain from oxidative stress and protect telomeres from damage
- L-Threonine- which keeps you calm and helps produce serotonin

A clear glass bottle filled with a golden-brown liquid, likely kombucha. A white, fuzzy scoby is visible on top of the liquid, secured with a white cloth and a rubber band.

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Strains in Kombucha

- **Bacteria Strains:**
 - Bacterium gluconicum
 - Bacterium xylinum
 - Acetobacter xylinum
 - Acetobacter xylinoides
 - Acetobacter Ketogenum
 - Lactobacillus aerobic
 -
- **Yeast Strains:**
 - Saccharomycodes ludwigii
 - Saccharomycodes apiculatus
 - Schizosaccharomyces pombe
 - Zygosaccharomyces
 - Saccharomyces cerevisiae
- **Acids and Others:**
 - Acetic acid
 - Acetoacetic acid
 - Benzoic acid
 - propenyl ester
 - Benzointrile
 - Butanoic acid
 - Caffeic Acid
 - Citric acid
 - Cyanocobalamin
 - Decanoic acid
 - Ethyl Acetate
 - Fructose

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Acid and Others

- d-Gluconic acid
- Glucose
- Hexanoic acid
- Itaconic acid
- 2-Keto-gluconic acid
- 5-Keto-gluconic acid
- 2-Keto-3-deoxy-gluconic
- Lactic acid
- Niacinamide
- Nicotinic acid
- Pantothenic acid
- Phenethyl Alcohol
- Phenol, 4-ethyl
- 6-Phospho gluconate
- Propionic acid
- Octanoic acid
- Oxalic acid
- Riboflavin
- d-Saccharic acid
- (Glucaric acid)
- Succinic acid
- Thiamin

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Water Kefir

- The exact origin of water kefir grains is unknown – may be Mexico, Japan..
- A combination of symbiotic good bacteria and yeasts that work together
- It feeds on sugar
- Contributes to gut health, like other fermented foods
- Good bacteria strains in water kefir are immune supportive
- Anecdotaly, may help prevent colds and flus
- More research needs to be done on the specific strains



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Water Kefir

- There is little research for water kefir
- Contain antioxidants which increases as fermentation increases
- Lowers cholesterol and triglycerides
- Stabilizes blood sugar and can help provide sustained energy
- Help aid digestion
- Synthesizes vitamins especially the B's



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Strains

Species Lactobacillus <i>L. brevis</i> <i>L. casei</i> <i>L. hilgardii</i> <i>L. hordei</i> <i>L. nagelii</i>	Species Streptococcus <i>S. lactis</i>
Species Leuconostoc <i>L. citreum</i> <i>L. mesenteroides</i> Species Acetobacter <i>A. fabarum</i> <i>A. orientalis</i>	Yeasts <i>Hanseniaspora valbyensis</i> <i>Lachancea fermentati</i> <i>Saccharomyces cerevisiae</i> <i>Zygorhizula florentina</i> •

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Milk Kefir

- Originated from the Caucasian mountains in Russia. Despite attempts to duplicate them, only kefir grains can make traditional kefir
- Kefir grains are a symbiotic combination of 32 strains of good bacteria (both lactic acid and acetic acid strains) and yeasts
- The kefir bacteria and yeasts do not survive when separated as pure cultures – which is unusual
- Kefir has anti-inflammatory properties including it shows an ability to reduce histamine



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Milk Kefir benefits

- Stimulates the function of the immune system
- Polysaccharides found in kefir have been shown to inhibit tumour growth
- Anti-microbial properties – can inhibit food borne pathogens
- Lower serum triglycerides and cholesterol
- Beneficial for skin conditions like acne and eczema
- Studies with mice show kefir has anti-tumour properties
- May aid those who are lactose intolerant
- In a human study: 15 people were fed kefir, and saw a reduction in symptoms by 54 -71 %

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Alternative Milk Kefir

- Works best with cow and goat milk – the lactose and GOS help feed the grains
- Coconut milk makes a great substitute
- Grains must be returned to cows milk every 3 batches or the grains will not proliferate and eventually will not survive



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Strains In Milk Kefir

- | | |
|--|---------------------------------|
| · Lactobacillus kefir a,c,j,n,o,p,r | Lactobacillus delbrueckii a,h,p |
| · Lactobacillus kefiranoferiens i,n,p | Lactobacillus rhamnosus a,r |
| · Lactobacillus kefirgranum n | Lactobacillus casei h |
| · Lactobacillus parakefir n,o | Lactobacilli paracasei p |
| · Lactobacillus brevis g,h,p,r | Lactobacillus fructivorans k |
| · Lactobacillus plantarum o,p L | Lactobacillus hilgardii k |
| · Lactobacillus helveticus a,b,h | Lactobacillus fermentum r |
| · Lactobacillus acidophilus g,p,r | Lactobacillus viridescens r |
| · Lactococci | |
| · Lactococcus lactis subsp. | Lactis a,c,e,f,g,h,k,o,r |
| · Lactococcus lactis subsp. cremoris a,e,f | |

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Strain in Milk Kefir

- **Streptococci**
- Streptococcus thermophilus e,h
- **Enterococci**
- Enterococcus durans d*,e*
- (reported as Streptobacterium durans in ref. d; reported as Streptococcus durans in ref. e)
- **Leuconostocs**
- Leuconostoc sp. r
- Leuconostoc mesenteroides a,b,g*,o
- (reported as Leuconostoc kefir in ref. g)
-
- **Acetic acid bacteria**
- Acetobacter sp. o
- Acetobacter pasteurianus g*
- (reported as Acetobacter rancens in ref. g)
- Acetobacter aceti a,d

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Strains in Milk Kefir

- Bacillus sp. r
- Micrococcus sp. r
- Bacillus subtilis g
- Escherichia coli r
- **Yeasts**
- Kluyveromyces marxianus a,b,i*,g,h,j,k,m*,n
- (reported as Saccharomyces lactis in ref. f; reported as Kluyveromyces lactis in ref. m)
-
- Saccharomyces sp. k
- Saccharomyces cerevisiae a,d,e,i*,g,j,m,n
- (reported as Saccharomyces carlsbergensis in ref. f)
- Saccharomyces unisporus c,h,j,m
- Saccharomyces exiguus f*
- (reported as Torulopsis holmii in ref. f)
- Saccharomyces turicensis h
- Saccharomyces delbrueckii d
- Saccharomyces dairensis n
- Torulaspora delbrueckii a,h,m
- Brettanomyces anomalus h
- Issatchenkia occidentalis j
- Candida friedrichii n
- Candida pseudotropicalis f
- Candida tenuis f
- Candida inconspicua g
- Candida maris g
- Candida lambica j
- Candida tannochiensis e
- Candida valida 6 e
- Candida kefyr a,j,n
- Candida holmii j,m
- Pichia fermentans b,m,

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Beet Kvass

- Beet Kvass is well known in Caucas Mountains along with milk kefir and other fermented foods.
- It was used as a means to clean water – allowing the good bacteria to take care of the bad
- Often raisins are added or other fruits or vegetables to create a unique beverage
- Beets contain nitrates but fermentation converts nitrates to nitric oxide
- Nitric oxide increases blood flow to the brain which will help improve cognitive function and may help prevent dementia
-



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Beet Kvass

- All the health benefits of beets apply to beet kvass – except the nutrients are more bioavailable plus kvass contains good bacteria
- Beets contains different types of phytonutrients called betalains, - responsible for the red colour
- Betalains are both antioxidants and anti-inflammatories
- Beets aid the liver detoxification and support the kidney (fermenting prevents oxalates)
- Beets also contain tryptophan which converts serotonin – which is our anti-depressant neurotransmitter – this also will aid our ability to sleep

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Cultured Vegetables

- Number one health benefit is making the vegetables more digestible and the nutrients more bioavailable
- Each vegetable has its own health benefits based on the vitamin, mineral and phytonutrient content
- There is very little research on the cultured vegetables themselves
- Fermented foods in a traditional diet also help keep blood sugar stable and low inflammation both in the gut and the body
- Phytonutrients also appear to help regulate how the good bacteria function



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Sourdough

- Sourdough is made from a starter – flour and water that has been fermented by wild yeasts and lactic acid bacteria
- A good starter or “sponge” can last for decades and can be passed down from one generation to another
- The fermentation process changes how the grain is used by the body



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Sourdough

- It makes the nutrients in the grains such as zinc, iron, magnesium, B vitamins and phytonutrients more available to be absorbed into the body and the yeast actually produces the B vitamins (even in white bread)
- It also breaks down the gluten and starches making the bread more digestible
- During fermentation, protease and peptidase enzymes act on the gliadin molecule
- Lactic acid bacteria lowers the pH of the sourdough to 3.5-4 which is the optimal pH for some protein enzymes to be active
- One study found that gluten, fully degraded by fermentation was safe for celiacs to consume

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Sourdough and The Gut

- Modulate dietary fibre complex, releasing the phytonutrients such as ferulic acid – a potent antioxidant that blocks nitrosamines and makes Vitamin C and E more potent
- Produces glucan, fructans and gluco- and fructo-oligosaccharides with prebiotic properties
- Provides metabolites from LAB fermentation which influence gut microbiota such as butyrate
- Lowers symptoms in IBS sufferers, who are bothered by wheat



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- Provides a lower blood sugar and insulin response
- One study found that sourdough in one meal positively affected blood sugar for that meal and the next (breakfast may be the best time)
- This effect was with white sourdough and was more effective for blood sugar than regular whole wheat
- One possible reason for low glucose response is that sourdough delays gastric emptying – it slows the uptake into the blood stream
- Fermenting lowers the phytic acid content, making minerals such as zinc, calcium and iron more available



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Purchasing Fermented Foods

- Unpasteurized fermented foods will always be in the refrigerator case in the store – not on a shelf
- Help the client understand where to buy them and what to look for
- Create a list of products in your area
- Source local sourdough bakers
- Discuss methods of incorporating fermented foods into the diet
- Serving size is between ¼ cup to ½ cup but start slow and work up

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Using Them In The Diet

- Use as a condiment, add it to dips, smoothies, top it onto soups, vegetable dishes or salads
- Can you cook with them – yes the digestibility and the extra bioavailability of the phytonutrients remains
- And there may be some remaining benefits from the bacteria
- The key point is to get them into the clients diet

