Welcome to the Manna Center Summer Institute for food security 2022

Prof. Nir Ohad

Head of the Manna Center for Food Security Tel Aviv University, Israel

https://foodsecurity.tau.ac.il/

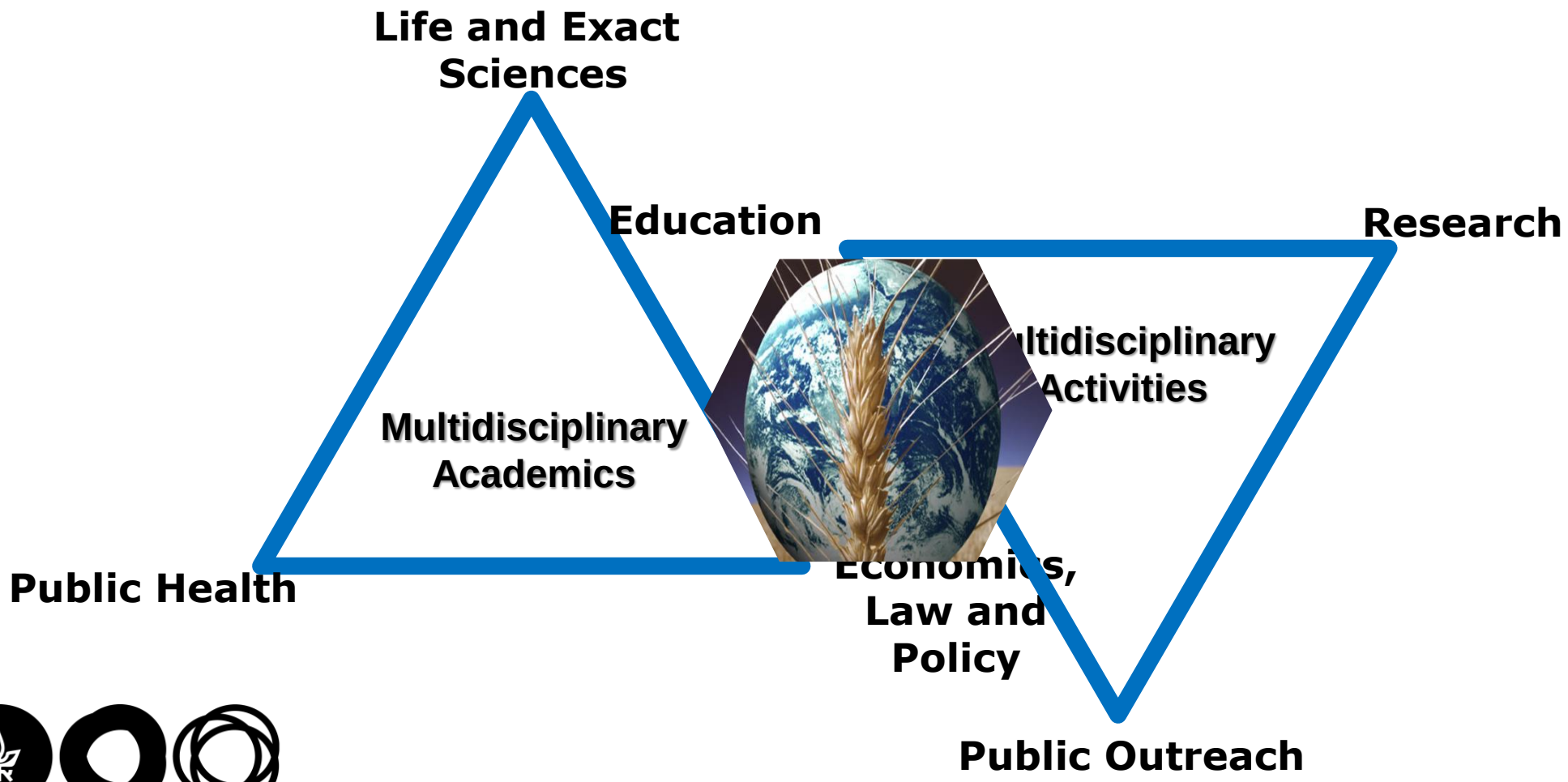
Manna Center Program Mission

PROVIDE STUDENTS, RESEARCHERS AND PRACTITIONERS **TOOLS TO IMPROVE THE STATE OF FOOD SECURITY** IN ISRAEL AND **ACROSS THE WORLD**

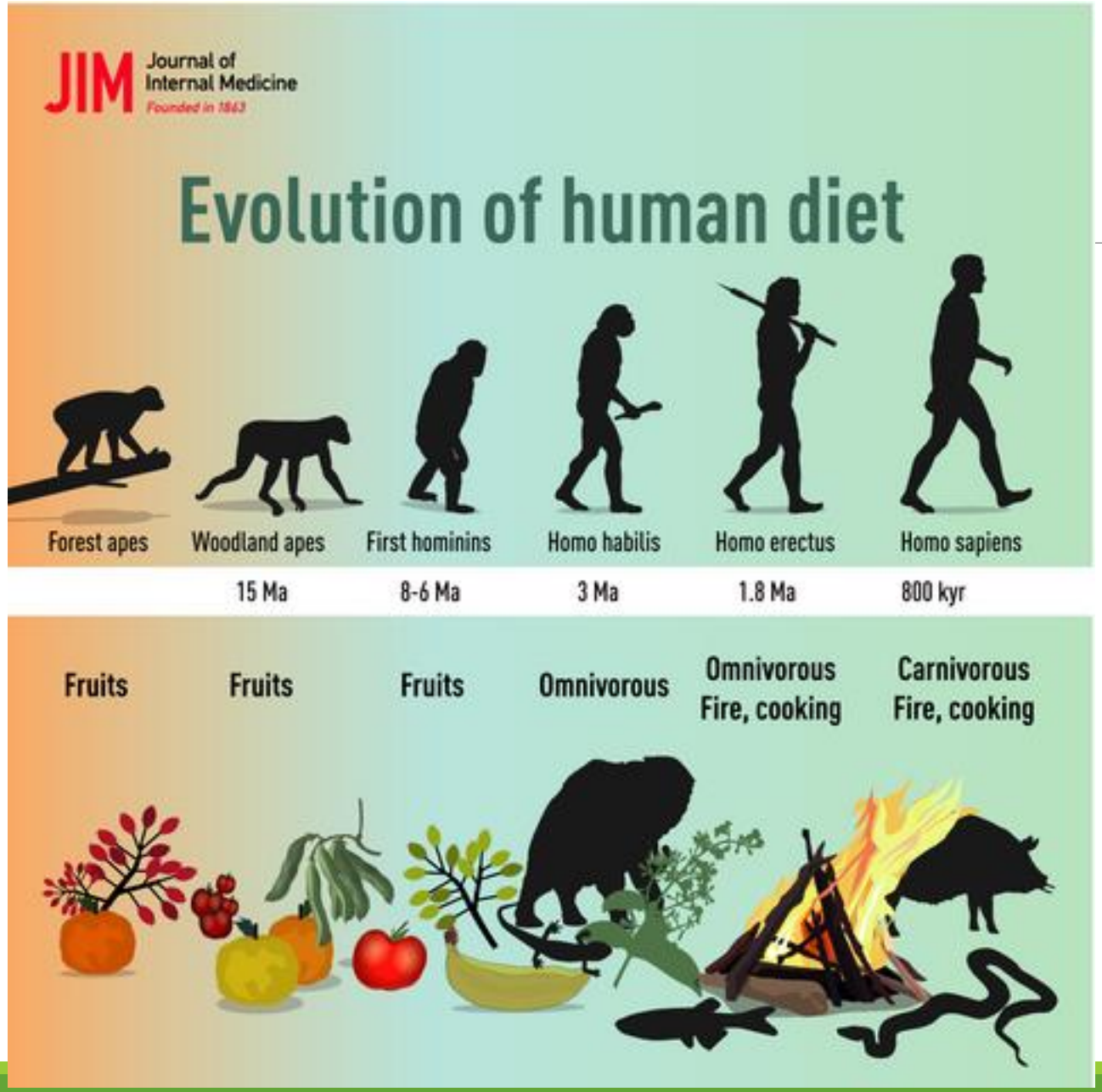
Research

Education

Outreach


Life and Exact Sciences
Education
Research
Multidisciplinary Academics
ltidisciplinary Activities
Public Health
Economics, Law and Policy
Public Outreach

What have you eaten this morning?



How many calories do you need ?

A small calorie (cal) is the amount of energy required to raise the temperature of **1 gram (g)** of water by 1º Celsius (º C).
A large calorie (kcal) is the amount of energy required to raise **1 kilogram (kg)** of water by 1º C. It is also known as a kilocalorie.
1 kcal is equal to 1,000 cal.

Recommendations in the United States are **2,600 for men and 2,000 kcal for women** between 31 and 35, at a physical activity level equivalent to walking about 2.5 to 5 km per day at 5 to 6 km/h (3 to 4 mph) in addition to the light physical activity associated with typical day-to-day life,

1 g of carbohydrates contains 4 kcal
1 g of protein contains 4 kcal
1 g of fat contains 9 kcal

What are the dietary needs

A person needs to consume all six types of essential nutrients:
Vitamins(B12), Minerals (Mg, I), Protein, Fats, Carbohydrates, Water.

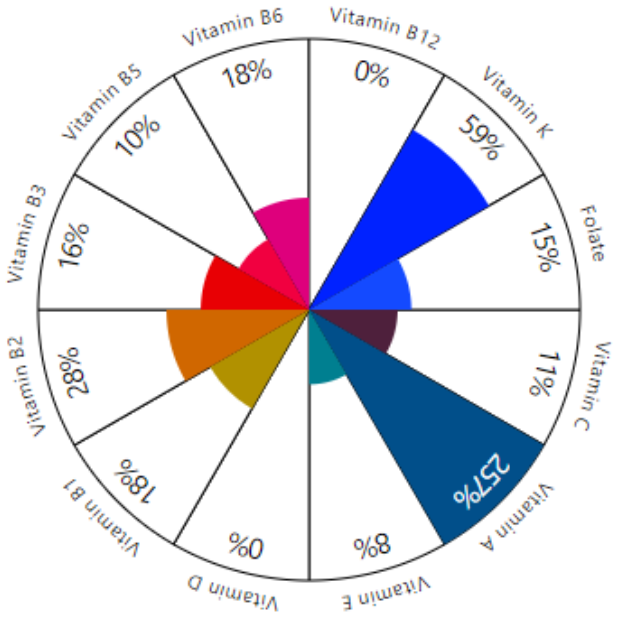
- **Vitamins(B12)**
- **Minerals (Mg, I, Zn)**
- **Protein**
- **Fats**
- **Carbohydrates**
- **Water**

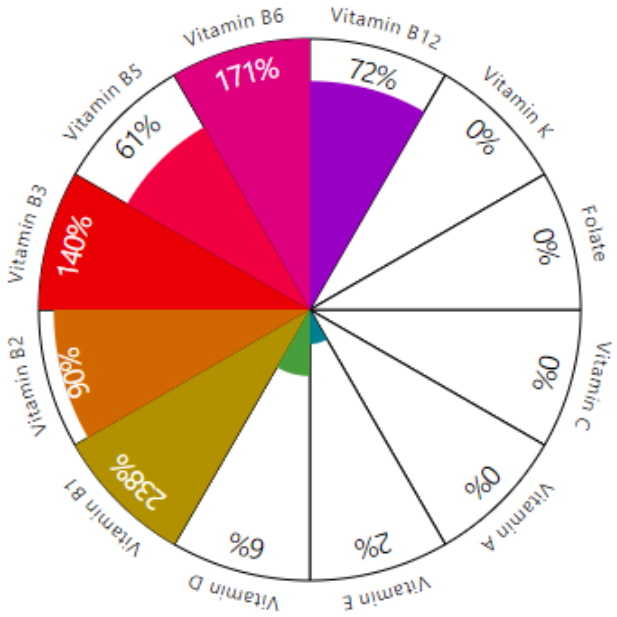
These will ensure the best possible health. These nutrients support vital functions, including growth, the immune, the central nervous system, and preventing disease.
Typically, a person who eats a healthful, balanced diet that includes:
Lean proteins, **Vegetables**, **Fruits**, **Complex carbohydrates**, and **Water,** will get the nutrients they need.

VITAMIN COMPARISON

Vitamin comparison score is based on the number of vitamins by which one or the other food is richer. The "coverage" chart below show how much of the daily needs can be covered by 300 grams of the food

Vegetable 5 : 7 Meat





Contains more **Vitamin C** **+∞%**

Contains more **Vitamin A** **+∞%**

Contains more **Vitamin E** **+375%**

Contains more **Vitamin K** **+∞%**

Contains more **Folate** **+∞%**

Contains more **Vitamin D** **+∞%**

Contains more **Vitamin B1** **+1238%**

Contains more **Vitamin B2** **+222.5%**

Contains more **Vitamin B3** **+773.3%**

Contains more **Vitamin B5** **+570.2%**

Contains more **Vitamin B6** **+898.6%**

Contains more **Vitamin B12** **+∞%**

9 ESSENTIAL AMINO ACIDS

Amino acids are the building blocks of human protein, the body uses 20 amino acids, 9 of which are essential*

*Essential amino acids must be part of your diet

FUNCTIONS OF AMINO ACIDS

ISOLEUCINE	LEUCINE	LYSINE	METHIONINE	PHENYLALANINE	THREONINE	TRYPTOPHAN	VALINE	HISTIDINE
blood-sugar regulation growth and repair of muscle tissue hemoglobin development energy regulation	blood-sugar regulation growth and repair of muscle tissue hormone production wound healing energy regulation	development and regulation of collagen, antibodies, hormones, and enzymes promotes calcium absorption growth and repair of muscle tissue	may prevent arterial fat buildup may act as an antioxidant promotes collagen synthesis	neurotransmitter function increases blood levels of norepinephrine, epinephrine, dopamine	antibody production	precursor for serotonin (aids sleep and combats anxiety) niacin production	growth and repair of muscle tissue energy regulation niacin production	growth tissue repair histamine development

PLANT SOURCES OF EACH AMINO ACID

sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi
-	-	beans	beans	-	beans	-	-	-
-	rice	-	-	-	-	rice	-	rice
-	-	-	-	peanuts	peanuts	peanuts	peanuts	-
almonds	almonds	-	-	almonds	almonds	-	almonds	-
soy	soy	soy	-	-	-	-	soy	-
wheat	wheat	-	-	-	-	-	-	wheat

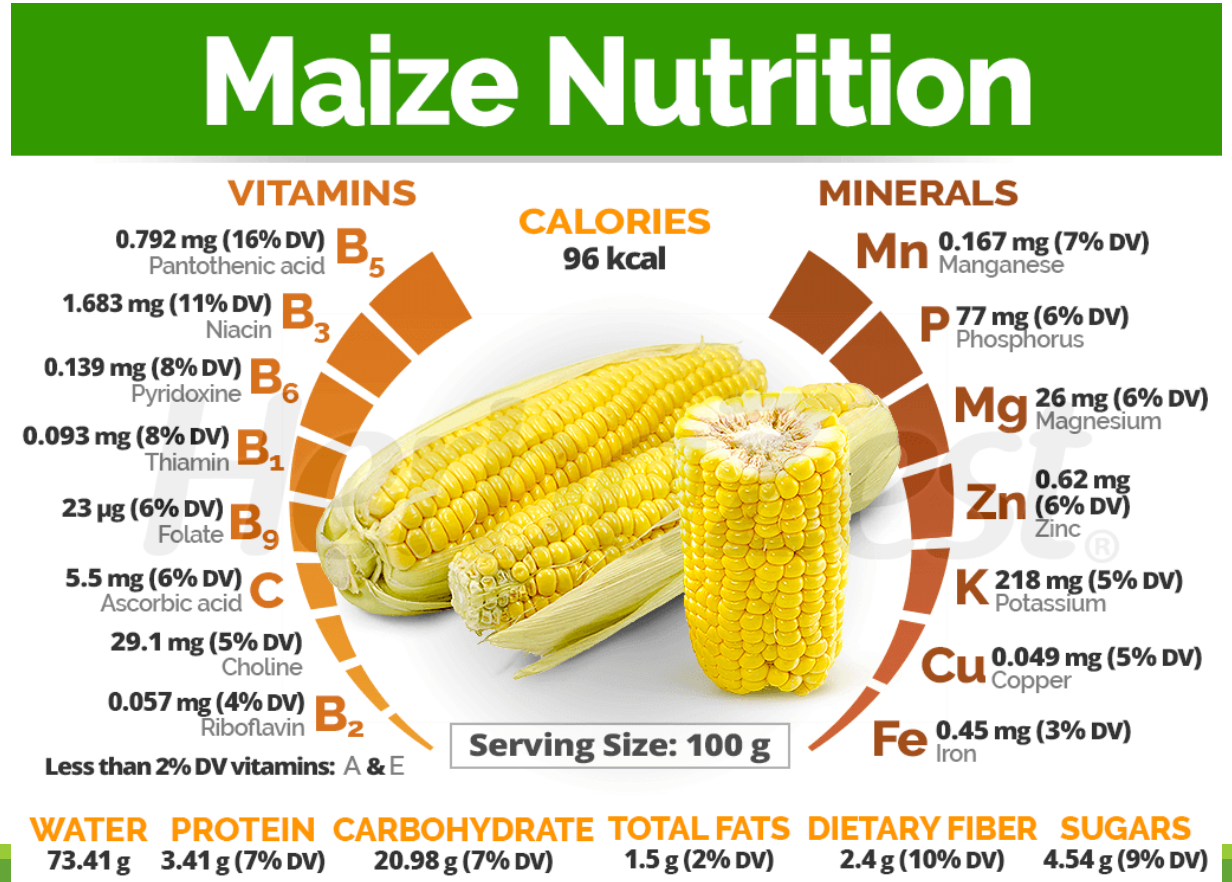
MEAT SOURCES OF EACH AMINO ACID

beef	beef	beef	beef	-	beef	beef	beef	-
dairy	dairy	dairy	dairy	dairy	dairy	dairy	dairy	-
eggs	eggs	eggs	eggs	-	eggs	-	eggs	-
fish	fish	fish	fish	-	-	fish	-	-
poultry	poultry	-	-	-	poultry	poultry	poultry	poultry

Information sourced from The Accidental Scientist - The Science of Cooking

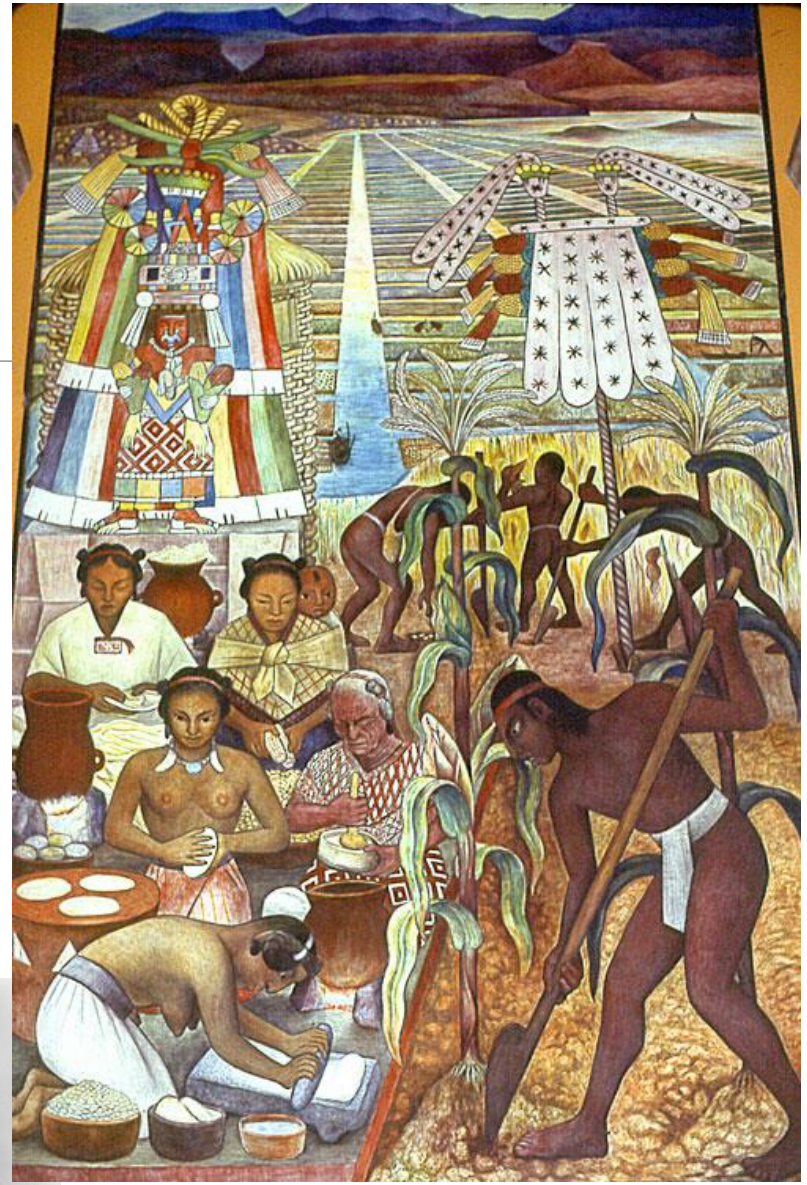
Zenda Life Foods 2017 www.zendalifefoods.com

Maize was introduced to Europe by **Christopher Columbus** in the 15th century, being grown in Spain as early as 1498. Due to its high yields, it quickly spread through Europe, and later to Africa and India. Portuguese colonists grew maize in the Congo as early as 1560, and maize became, and remains, a major food crop in parts of Africa.



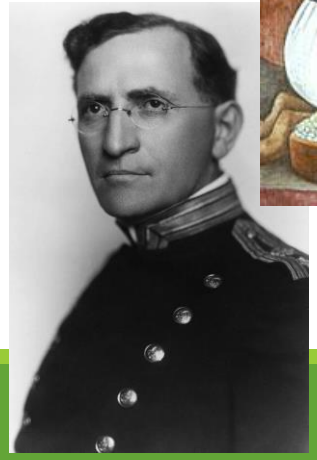
Nixtamalization is a process for the preparation of maize (corn), or other grain, in which the corn is soaked and cooked in an alkaline solution. This process removes up to 97%–100% of aflatoxins from mycotoxin-contaminated corn.[2] The term can also refer to the removal via an alkali process of the pericarp from other grains such as sorghum.

Nixtamalized maize has several benefits over unprocessed grain: It is more easily ground, its nutritional value is increased, flavor and aroma are improved, and mycotoxins are reduced. Lime and ash are highly alkaline: the alkalinity helps the dissolution of hemicellulose, the major glue-like component of the maize cell walls, and loosens the hulls from the kernels and softens the maize. Corn's hemicellulose-bound niacin is converted to free niacin (a form of vitamin B3), making it available for absorption into the body, thus helping to prevent pellagra.



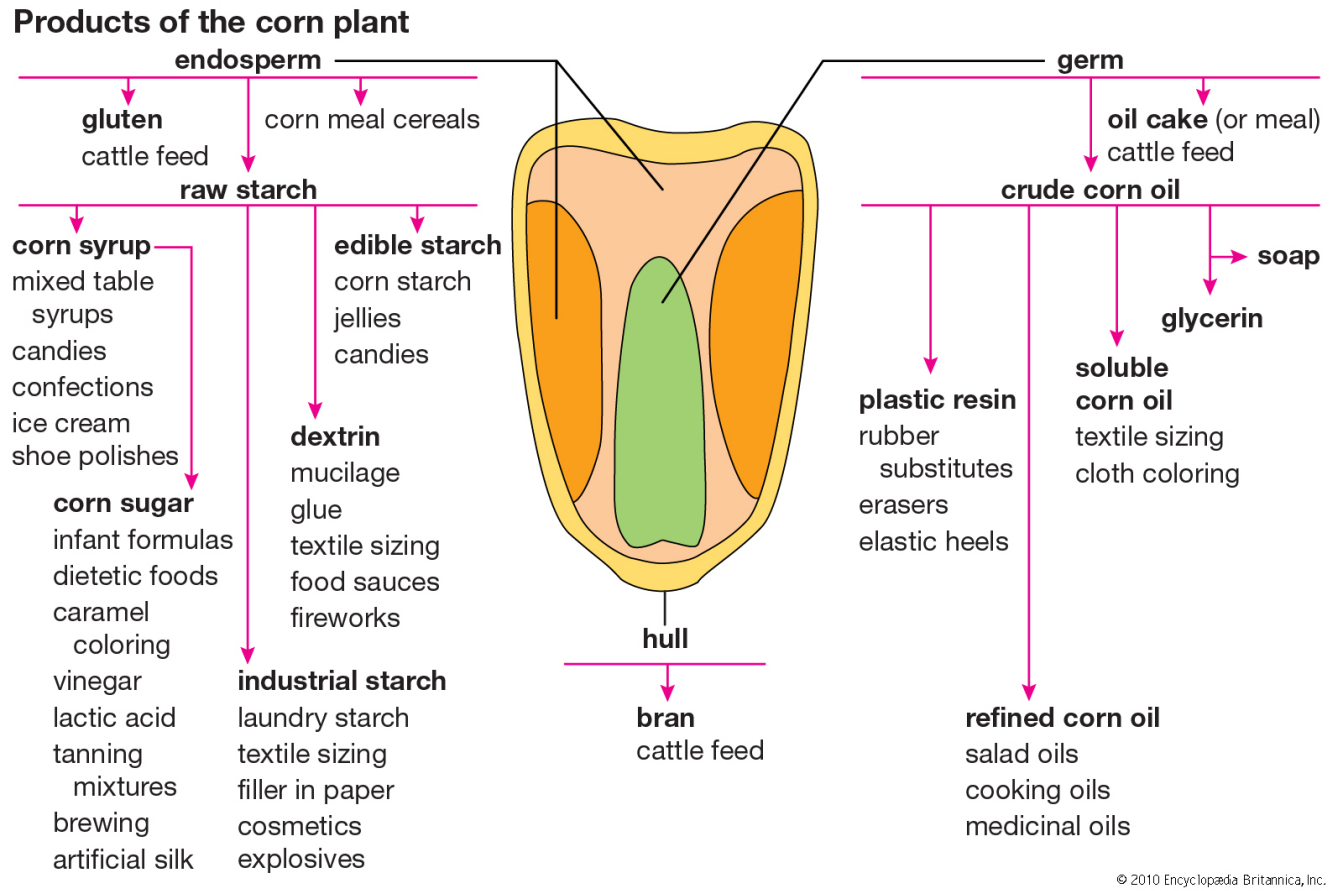
Diego Rivera Painting 1950 ('Cultura Huasteca') depicting ancient Mesoamerican culture

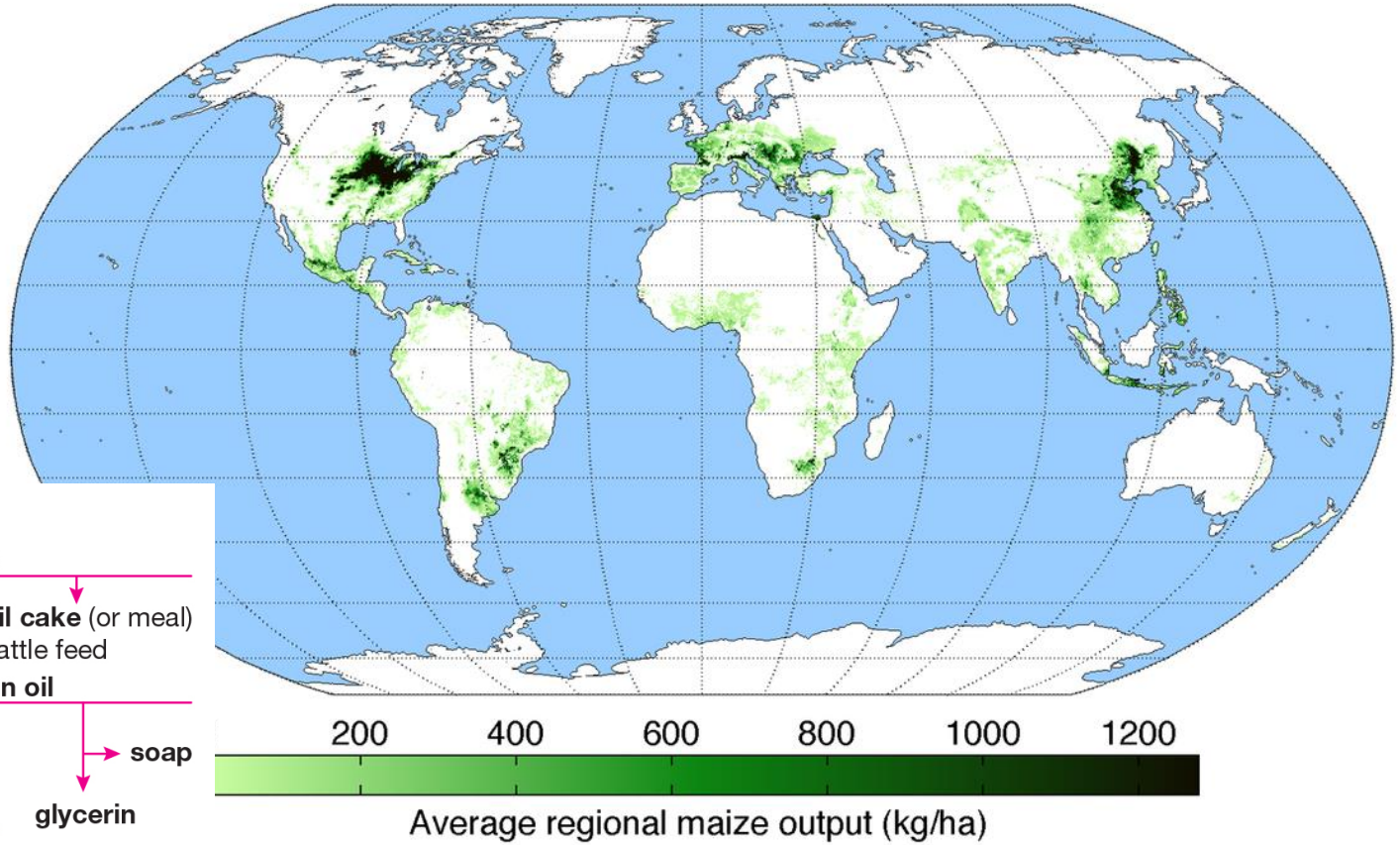
Pellagra is a disease caused by a lack of the vitamin niacin (vitamin B_3). In the early 1900s, pellagra reached epidemic proportions in the American South. Between 1906 and 1940 more than 3 million Americans were affected by pellagra with more than 100,000 deaths, yet the epidemic resolved itself right after dietary niacin fortification.



In 1915, **Joseph Goldberger**, assigned to study pellagra

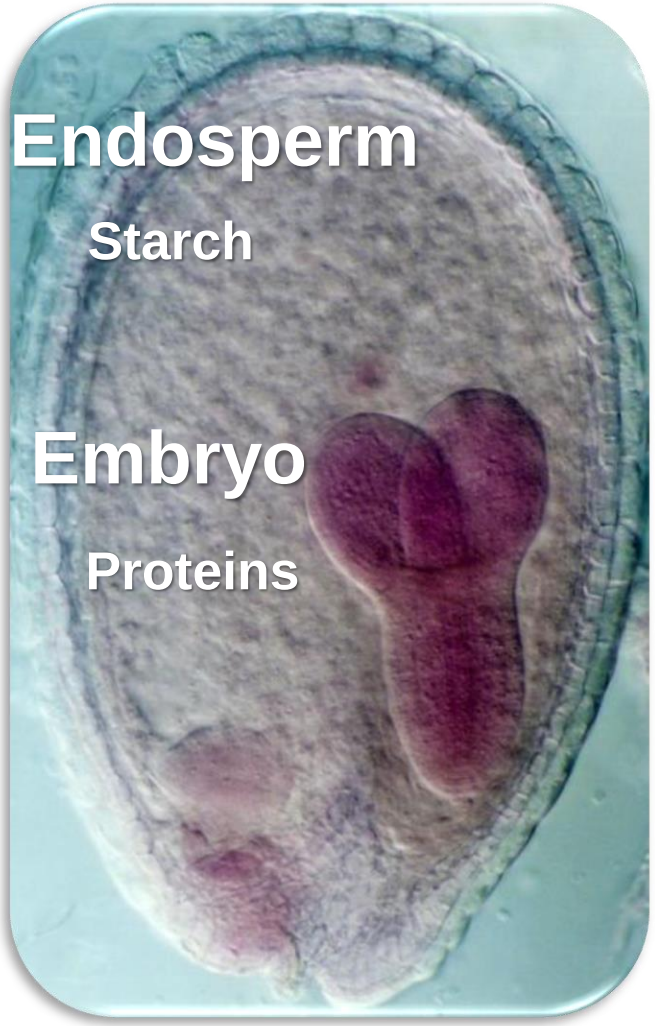
The use of Corn Today





Where dos our food come form?

Plant Reproduction



The Source of our Nutrition

South America

Middle East

Far East

The Source of our Nutrition

- **Agriculture**- More than 500 million family farms manage between 70 and **80 percent** of the world's agricultural land, the U.N.'s “The State of Food and Agriculture 2014”
- **Food From the Sea**- **Oceans** cover nearly 75% of the earth's surface. However, because **ocean** water is salty, most animals and plants living on land cannot drink it. 16% of world animal protein consumption by humans **comes** from fish.
    - Singapore
    - Venezuela
    - Israel

Venezuela 2017!

www.cdc.gov/foodsafety

CS280841-A

What is Food Security ?

UN World Food Summit 1996:

"Food security exists when all people, at all times, have physical, social, economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for <u>an active and healthy life</u>."

Pillars of Food Security

Food Security

Availability- **Adequate food production,**
or adequate food production

Accessibility- Economically, fiscally

Utilization- Non food resources: Child care, health car
clean water, and sanitation

->

Stability- Continuum of the three pillars over time

“Now there was a famine in the land”

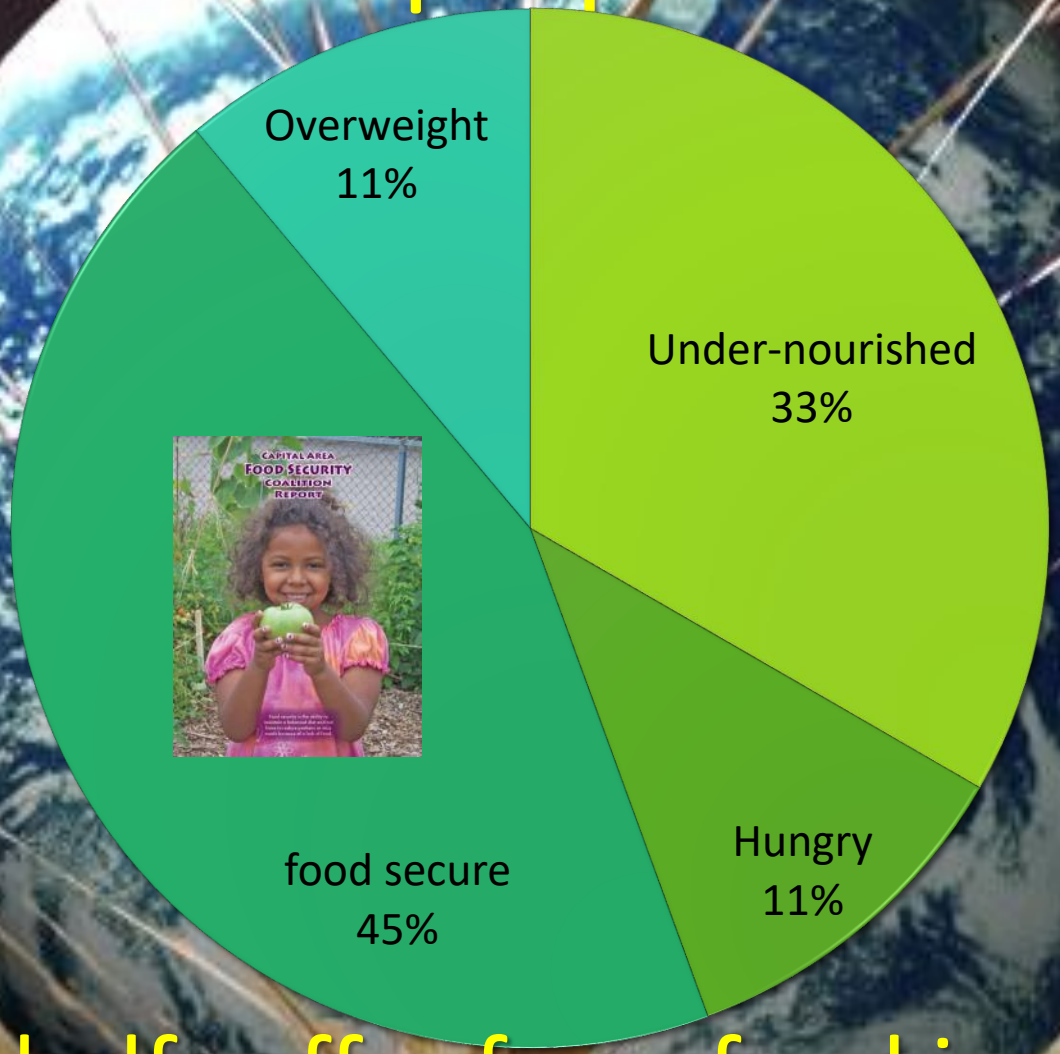
וַיְהִי רָעָב, בָּאָרֶץ; וַיֵּרֶד אַבְרָם מִצְרַיְמָה לָגוּר שָׁם, כִּי-כָבֵד הָרָעָב בָּאָרֶץ.

–ספר בראשית, פרק י"ב, פסוק י

“Now there was a famine in the land, and Abram went down to Egypt to live there for a while because the famine was severe”

Genesis 12:10-20

Out of 7 billion people in the world, …



Over half suffer from food insecurity!

Food and Agriculture Organization of the United Nations

FAO Hunger Map 2015

Millennium Development Goal 1 and World Food Summit Hunger Targets

Produced by the FAO Statistics Division

For additional information: http://www.fao.org/economic/ess

1 — About 793 million people in the world still lack sufficient food for conducting an active and healthy life.

2 — Yet progress has been made, even in the presence of significant population growth. Approximately 218 million fewer people suffer from undernourishment than 25 years ago and 169 million fewer than a decade ago.

3 — The year 2015 marks the end of the monitoring period for the Millennium Development Goal targets. Seventy-three out of 129 developing countries – more than half the countries monitored – have reached the MDG 1C hunger target of halving the proportion of the chronically undernourished.

4 — In developing regions the target was almost achieved, with the share of undernourished having decreased during the monitoring period from 23.3 to 12.9 percent.

5 — Some regions, such as Latin America, the east and southeastern regions of Asia, the Caucasus and Central Asia, and the northern and western regions of Africa, have made fast progress. Progress was also recorded in southern Asia, Oceania, the Caribbean and southern and eastern Africa, but at too slow a pace to reach the MDG 1C target.

6 — In many countries that have failed to reach the international hunger targets, natural and human-induced disasters or political instability have resulted in protracted crises, with increased vulnerability and food insecurity among large segments of the population.

ACHIEVEMENT OF THE MILLENNIUM DEVELOPMENT GOAL HUNGER TARGET

FROM 1990-92 TO 2014-16

SOURCES

Undernourishment data: FAO Statistics Division (ESS)
Political boundaries: FAO Global Administrative Unit Layers (GAUL)
Global relief: ETOPO1 (National Geophysical Data Center - NOAA)
Inland water bodies: FAO Land and Water Division (NRL)

GOALS

Millennium Development Goal 1, target 1C: halve, between 1990-92 and 2015, the proportion of people suffering from undernourishment, or reduce this proportion below 5 percent. The indicator measures the proportion of the population below the minimum level of dietary energy consumption (undernourishment). The assessment is not conducted for developed regions.

Prevalence of undernourishment: measures the probability that a randomly selected individual in the population is consuming an amount of dietary energy, which is insufficient to cover he/his requirements to lead an active and healthy life.

World Food Summit (WFS) goal: halve, between 1990-92 and 2015, the number of people undernourished.

500 250 0 500 1 000 1 500 2 000 2 500 3 000 Kilometers

The designations employed and the presentation of the material in the maps do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers.

LEGEND

- Target 1C achieved
- Target 1C not achieved, with slow progress
- Target 1C not achieved, with lack of progress or deterioration
- Missing or insufficient data
- Not assessed

NOTES

The latest global undernourishment estimates published in SOFI 2015 have been slightly revised due to a change in the underlying data of two countries. In particular:

1. New information on agricultural production in Senegal, provided by the Agence Nationale de Statistique et de la Démographie, has led to a revision of the national per capita availability of calories. Based on the updated data, new estimates of the Prevalence of Undernourishment and Number of Undernourished people for the periods from 2010-12 to 2014-16 were calculated.

2. Estimates on food losses at the retail level for Oman were modified, leading to a minor revision of the national per capita availability of calories. Based on the updated data, new estimates of the Prevalence of Undernourishment and the Number of Undernourished people were obtained for Oman.

As a result of these revisions, estimates for the relevant regional and global aggregates, as well as special country groups, have also been updated.

These revisions do not change the overall assessment of the state of global food insecurity described in SOFI 2015.

PREVALENCE OF UNDERNOURISHMENT IN THE POPULATION

(PERCENT) IN 2014-16

LEGEND

- <5% Very low
- 5% —◑14.9% - Moderately low
- 15% —◑24.9% - Moderately high
- 25% —◑34.9% - High
- 35% and over - Very high
- Missing or insufficient data

ACHIEVEMENT OF THE WORLD FOOD SUMMIT TARGET

FROM 1990-92 TO 2014-16

LEGEND

- Target achieved
- Target not achieved, with slow progress
- Target not achieved, with lack of progress or deterioration
- Missing or insufficient data
- Not assessed

Food and Agriculture Organization of the United Nations

LEGEND

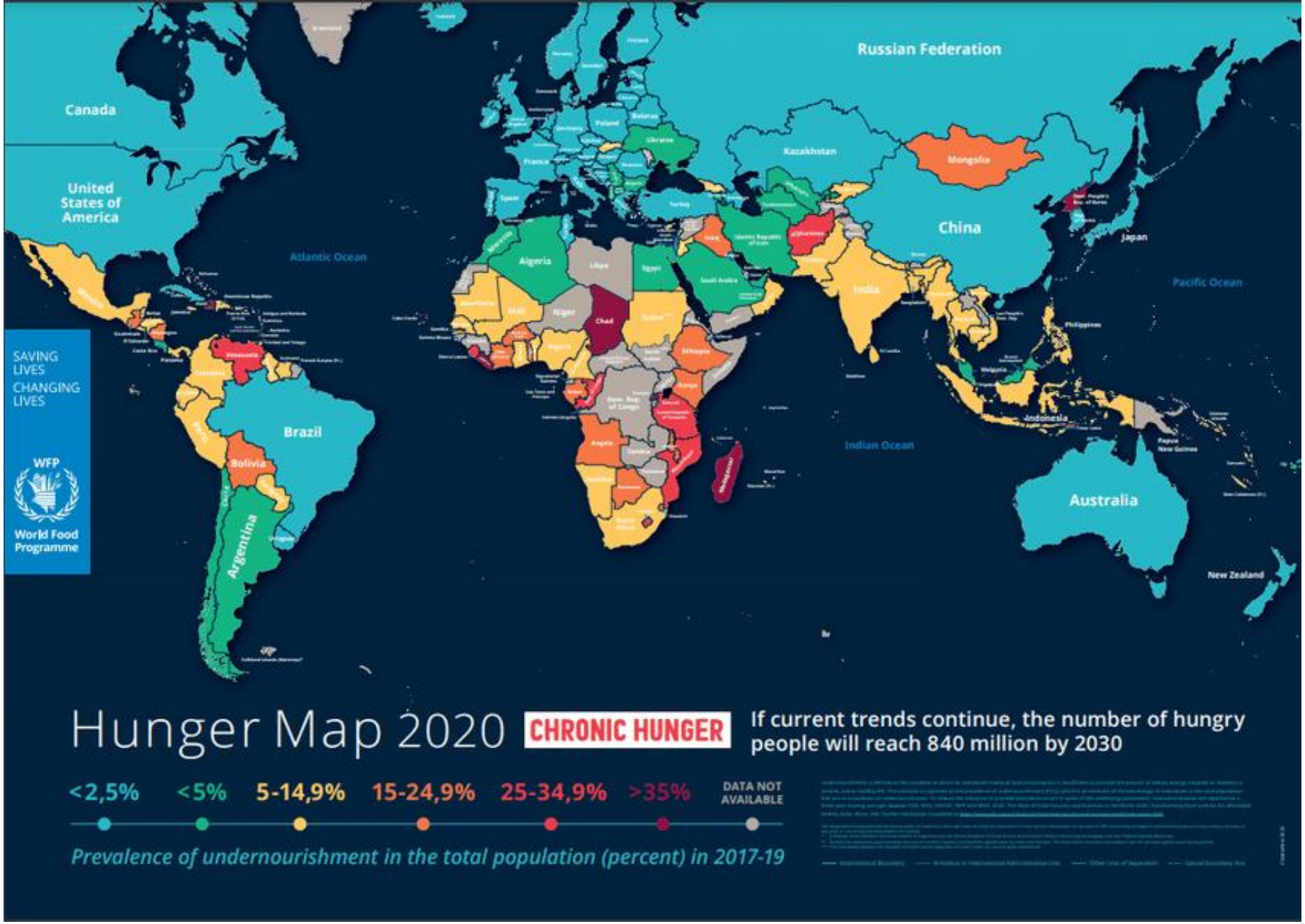
- Target 1C achieved
- Target 1C not achieved, with slow progress
- Target 1C not achieved, with lack of progress or deterioration
- Missing or insufficient data
- Not assessed

Food and Agriculture Organization of the United Nations

The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger.
Our goal is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. With 195 members - 194 countries and the European Union, FAO works in over 130 countries worldwide.

2020- The World Food Programme was awarded the Nobel Peace Prize for its efforts to combat hunger, promote peace in conflict-affected areas, and prevent the use of hunger as a weapon of war and conflict.

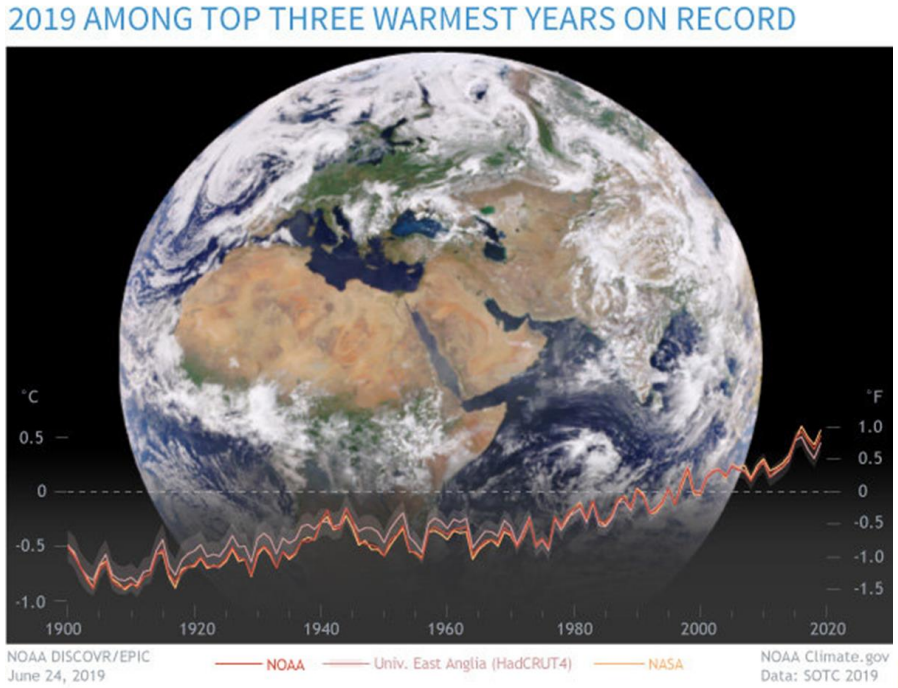
WFP World Food Programme

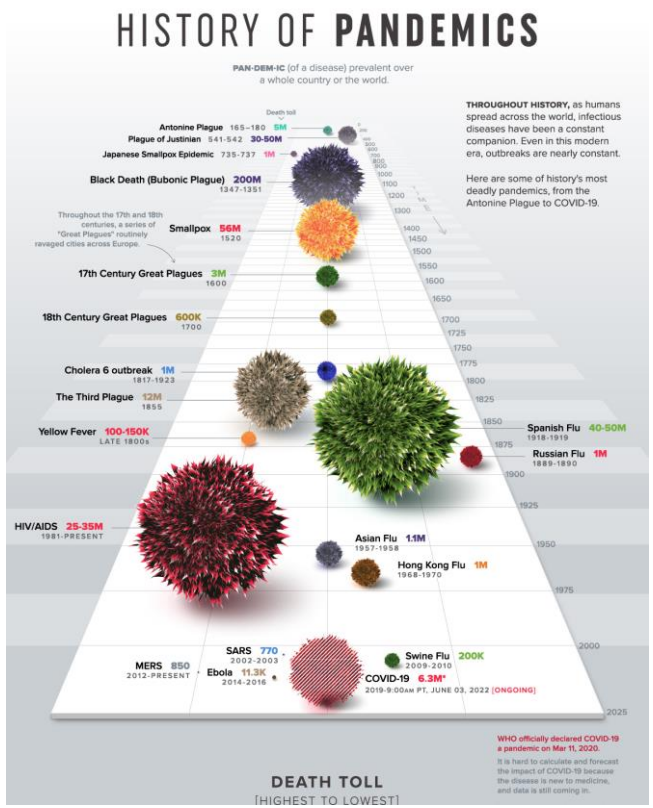


Food and Agriculture Organization of the United Nations

https://www.fao.org/worldfoodsituation/csdb/en/

What are the reasons for the Shortage Of basic Food?





Are we facing global food cruises?

Sustainable Development Goals SDG’s
היעדים של האו״ם לפיתוח בר קיימא 17

- In 2015 the United Nations Member States provides a shared blueprint for peace and prosperity for people and the planet, now and into the future.
- At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership.
- They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

SUSTAINABLE DEVELOPMENT GOALS

Agriculture and food frames sustainable development: food is far more than feeding people

1 NO POVERTY	• Secure access to land • Agricultural development
2 ZERO HUNGER	• Food production • Calories and nutrients
3 GOOD HEALTH AND WELL-BEING	• Diets underpin health • Agricultural pollution, AMR, zoonosis
5 GENDER EQUALITY	• Women agricultural labourers • Women's access to land
6 CLEAN WATER AND SANITATION	• 70% freshwater used for agriculture • Agricultural pollution of water
7 AFFORDABLE AND CLEAN ENERGY	• Land for bioenergy, solar, wind • Water (silt-free) for hydro
8 DECENT WORK AND ECONOMIC GROWTH	• >1 billion jobs in agriculture • Agricultural development
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	• Infrastructure drives land-use change • Bioeconomy and biomaterials
11 SUSTAINABLE CITIES AND COMMUNITIES	• Land for urbanisation • Urbanisation and dietary demand • Air quality and agricultural pollution
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	• Dietary choices – what is grown? • Over-consumption, food waste
13 CLIMATE ACTION	• Agriculture and land-use ~30% GHGs • Paris agreement: need to transform from source to sink
14 LIFE BELOW WATER	• Pollution from agricultural run-off • Crop feed for aquaculture
15 LIFE ON LAND	• Habitat destruction/degradation • Species loss, ecosystem services

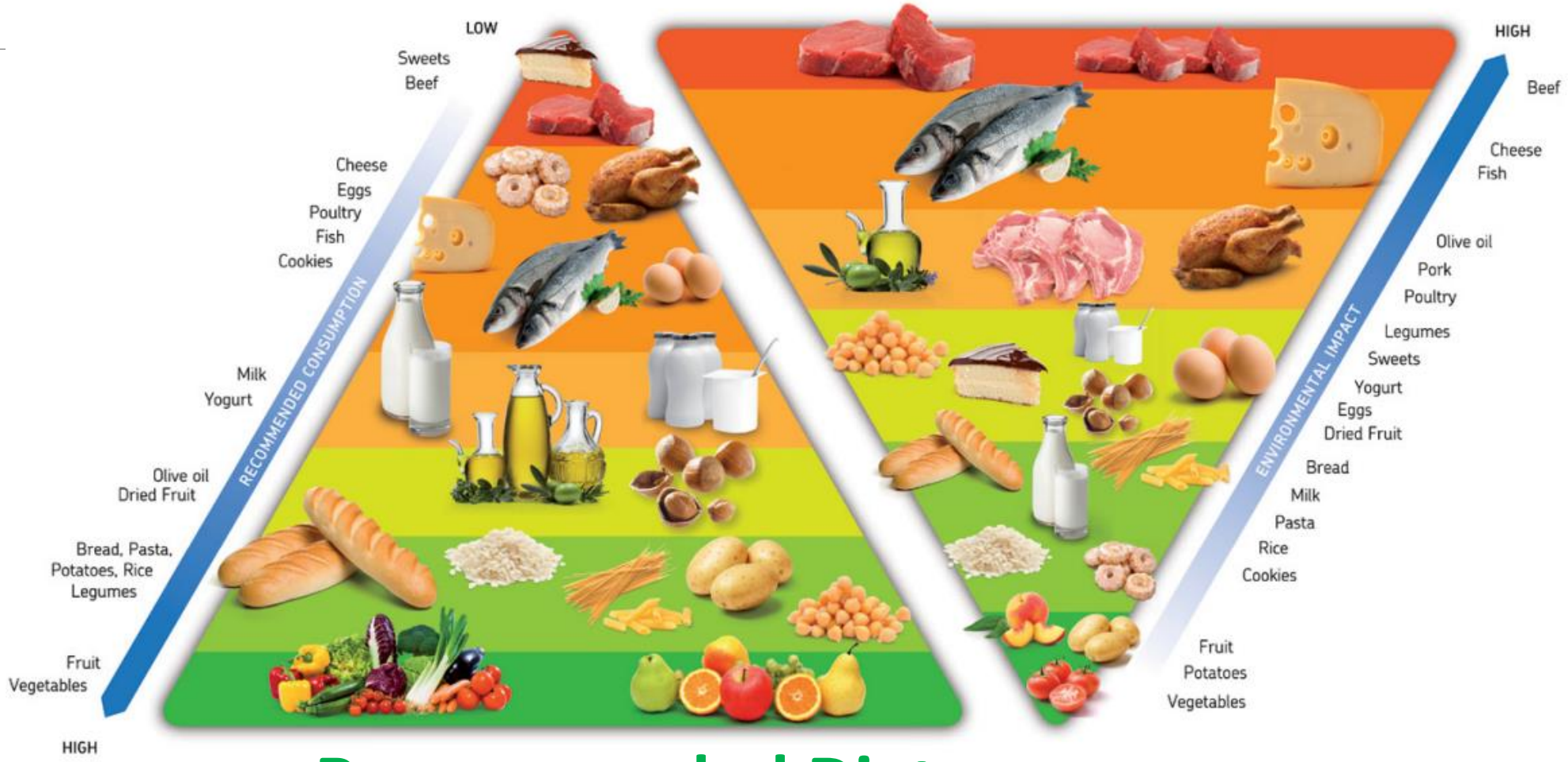
THE GLOBAL GOALS
For Sustainable Development

Healthy Nutrition Should be also good for the Environment

Low

Ecological Footprint

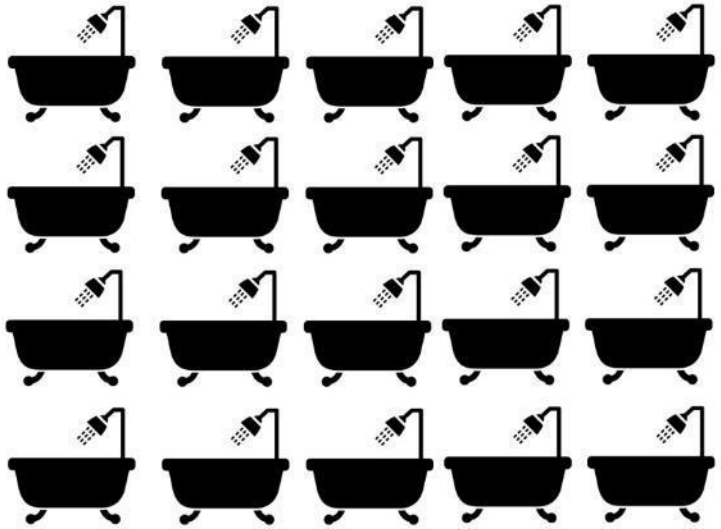
High



Recommended Diet

High

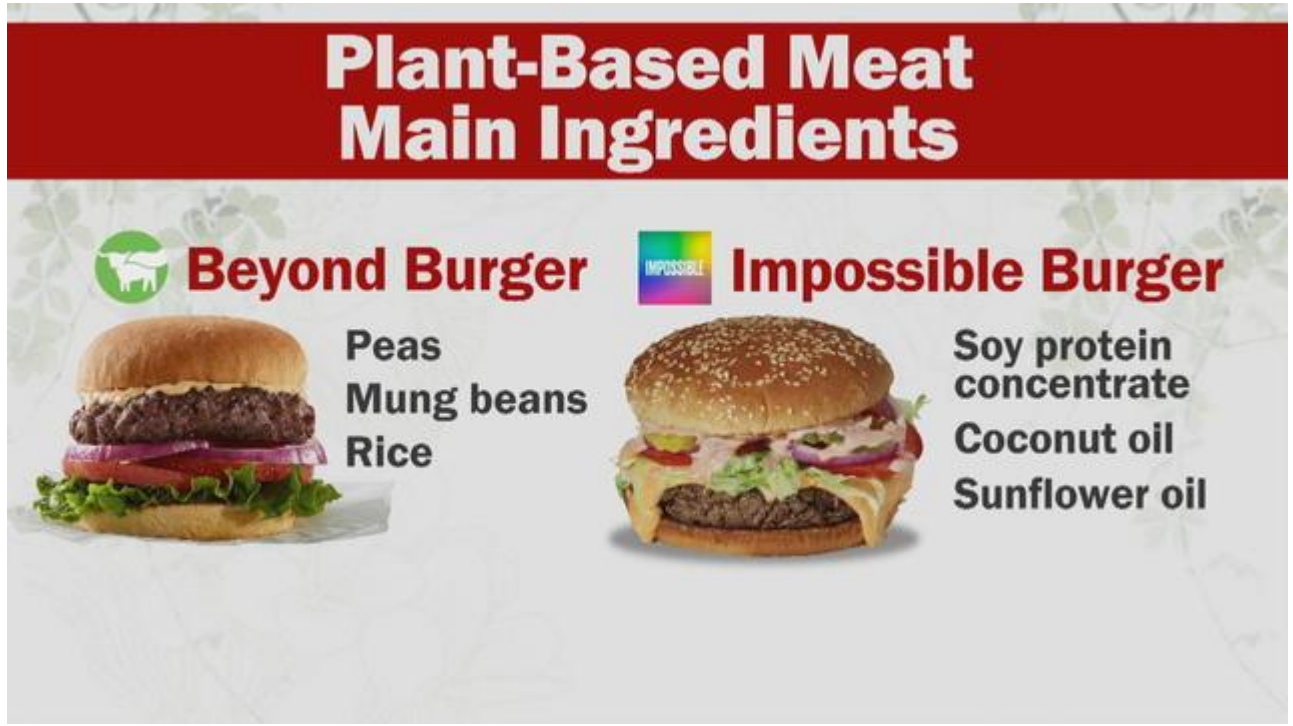
How much water is needed for 1 Hamburger?



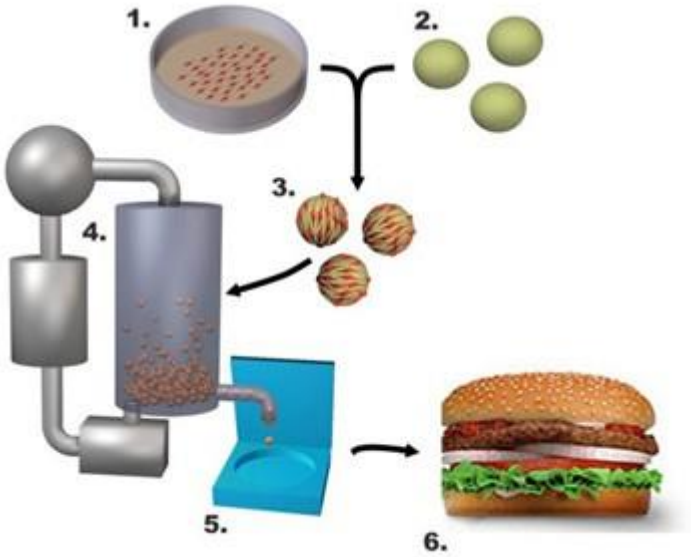
20 Bath = 2500 Litter 1 Hamburger

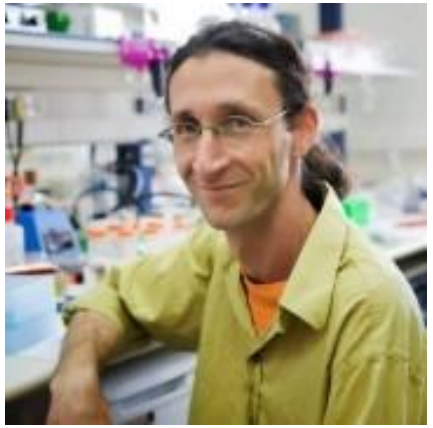
A 1/3-pound burger requires **660 gallons** of water. Most of this water is for producing beef
1 pound of beef requires **1,799 gallons** of water, which includes irrigation of the grains and grasses in feed, plus water for drinking and processing.
1 slice of bread requires 11 gallons of water.

The Alternatives



Prof. Iftach Nachman-
Understanding Differentiation at the Single Cell Level

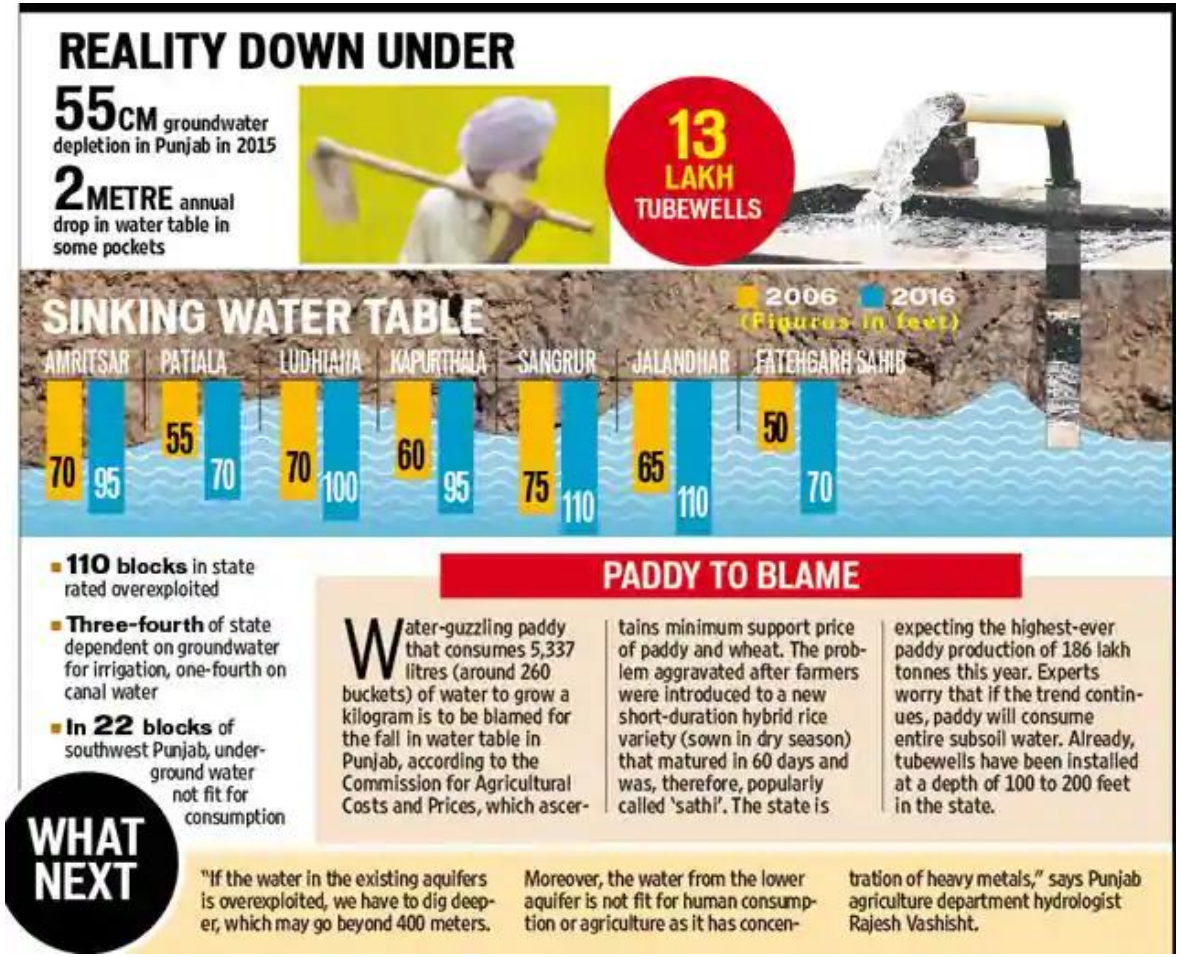




Water consumption in Israel / Punjab (breadbasket of India)

Area = 22,072 km^2(8,522 sq mi)

Population (2019) = 9 Million
Water-Agriculture - 550 Mm^3



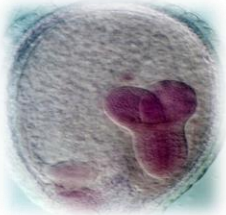
Area = 50,362 km^2 (19,445 sq mi)
28,000 km^2 for Rice

Population (2018) = ~30 Million
Water-Agriculture 300,000 Mm^3

From Field to Fork

- Nir Ohad(TAU) – Introduction
- Ram Fishman(TAU)- Food and Economics
- Marcelo Sternberg –(TAU) Effects of Global Change
- Aron Troen – Food Insecurity in a High Income Country-Nutrition
- Ron Porat – Global Food Crisis, Post Harvest
- Iftach Nachman(TAU) - Cultivated meat
- Alex Goldberg- (TAU) Alternative proteins
- Dror Avisar – Advanced Treatment for Water Reuse
- Ofer Mendelson- Water, agriculture & food
- Prof. Sharon Medal (Arizona), Water & Agriculture

- Natasha Michelin- The manna center
- Dr. Gefen Ronen-Eliraz
  Head of WASH Unit | Administrative Director
  The Water Research Center



TEL AVIV UNIVERSITY
INTERNATIONAL

Intro to Food Security Schedule Summer 2022

Manna Center Program for Food Safety & Security
Tel Aviv University

Sunday 3/7	Monday 4/7	Tuesday 5/7	Wednesday 6/7	Thursday 7/7	Friday 8/7
8:45 **Prof. Nir Ohad** Modern approaches to Crop Improvement	8:45 **Prof. Aron Troen** Food Insecurity in a high-income country: The Israel experience (food waste, food banks, and policy challenges)	9:00 **Prof. Iftach Nachman** Culture meet from basic science to application	8:45 **Prof. Dror Avisar** Water-type of sources, characterization of surface and groundwater resources	8:45 **Prof. Sharon Megdal, Arizona** Agriculture, food, and water policy: The case of the colorado river basin	9:30 Exam
9:30 **Dr. Ram Fishman** Food and Economics: Understanding the choices of producers and consumers	12:30 Lunch	12:30 Lunch	11:00 **Prof. Dror Avisar** Water contamination processes and mechanisms	9:30 **Prof. Dror Avisar** Advanced treatment for water reuse (contamination, reuse, case study)	
11:30 Lunch	13:30 **Dr. Ron Porat** Global food crisis + Food waste and food loss	13:30 **Prof. Alexander Golberg** Microalgae and Macroalgae, from basic research to application.	11:45 **Prof. Dror Avisar** Water and wastewater treatment	11:00 **Dr. Ofer Mendelson** Water, agriculture, and food 3rd world country	Prof. Sharon Me
12:30 **Prof. Marcelo Sternberg** Effects of global change on natural and agricultural ecosystems	15:00 Discussion	15:00 Discussion	12:30 Lunch	12:30 Lunch	
15:00 Discussion			13:30 **Dr. Gefen Ronan Eliraz** WASH	13:30 Panel Q&A	
			15:00 Discussion	15:00 Discussion	

We wish you a Significant and enjoyable Program

Manna Center Program
for Food Safety & Security
Tel Aviv University