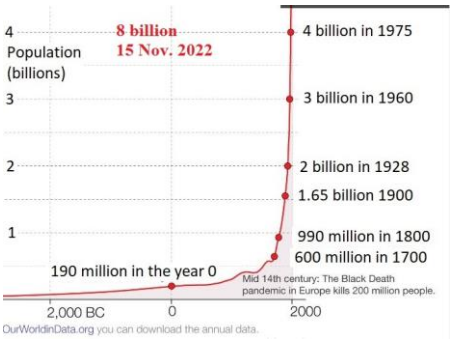
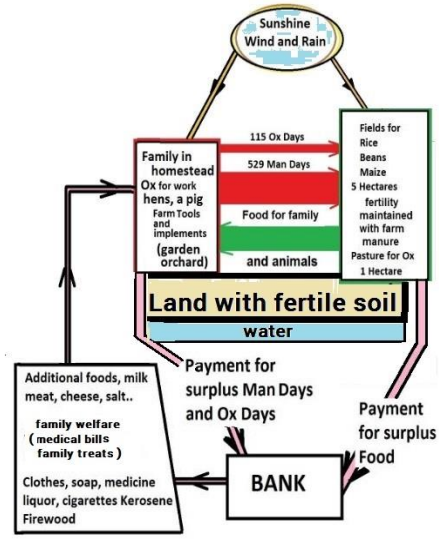
Since the Agricultural and Industrial Revolutions, our human population has experienced a period of explosive growth only in recent years. It reached 1 billion by the year 1800 and to date, at over 8 billion, we see that this extreme population threatens animal and plant life, ecosystems and the long-term sustainability of the Earth.



In 1968, Paul Ehrlich of Stanford University highlighted the problem of feeding this massive number of people. In his book "The Population Bomb" his first statement is:
"The battle to feed all of humanity is over –and humanity has lost".
So, we come to **farming**, the manner in which we produce food from the land, and this is crucial for human existence and, as the book suggests, it looks as if we may be losing the battle to provide enough food to feed each person on the planet.
Until the end of the 19th century most farming, at a global level, was what is know as "subsistence farming" and this is explained by the diagram below:



An example of a small farmstead in Hoduras, Central America.
(Scientific American magazine 1980)

From the diagram we see that crops are grown on a relatively small plot of land with most of the food being used to feed the animals and family. Any surplus food is sold to

provide an income for the family. Working away from the homestead will also generate income so that the farmer will be able to buy essential items for the well-being of the family.
This type of farming is almost 100% sustainable and the soil retains a high fertility as nutrients and essential elements are returned to the land through farm manure. Plant diseases, pests and weeds still prevailed in this system, but crop rotation helped to minimize their effects. During the WWII years almost 80% of our food was provided from farms not dissimilar to this, though the labour force was enhanced by prisoners of war and the Land Army girls.

With not too many modifications this was the farming method that my family used in North Yorkshire even up to the mid-1950's when I was growing up. The essential features are highlighted in the diagram:

(1) A plot of ground (land) and water.
(2) A workforce (labour) to till the soil and harvest the crops.
(3) Sunshine, wind and rain i.e. the weather.
(4) ***Commercial activity to supplement possible barter deals and make sure that the enterprise has a firm financial footing.***

(1) The farm in North Yorkshire was 24 hectares (60 acres) but had moor grazing for sheep of about 18 hectares (45 acres). A spring provided water for the house and farmyard and a beck provided more water for the summertime.
(2) Mechanical power was provided by two horses, and muscle power was used for many smaller tasks. A selection of implements enabled all the farming operations to be carried out.
(3) Controlling the ***weather*** eludes everyone but with experience, skill and a fair degree of wisdom (and luck), farm work was carried out in the right weather conditions. (Forecasting had been much improved over the WW II years as it needed to be accurate for flying sorties and battlefields)
(4) Farming records were beginning to be much more important than in pre-war years and banks were essential to facilitate transactions and provide loans.

Heating of the homestead was mainly by peat and waste wood but 5 tonnes of coal had to supplement these "free" fuels. Whereas in present days ENERGY is of major concern to families, on the farm at that time it was less so and FOOD was the prime commodity – fodder for the animals and food for the family which kept us all alive.

Milk from twelve cows was sold to the newly formed Milk Marketing Board and this was our main monthly income of money. Our staple diet was relatively varied, but we did consume a large proportion of potatoes and bread (calories) and a rather meager proportion of foods giving proteins and vitamins. Flour was an input to the farm as quality wheat, suitable for milling, could not be grown in that part of England. The garden and orchard were the main source of fruit and vegetables although the hedgerows gave an abundant source of berries in autumn. The penalty of relying on horse-power was that these animals had to be fed in winter-time when they are not providing any useful work; clearly, sustainable power with unavoidable costs.

Seasonal work is listed below:

January/ February/ March	April/ May/ June	July/ August/ September
Feed sheep	Lambing	Haymaking and harvest
Lead manure to fields	Cultivating land	Rickling peat
Collect hay from	sowing cerials	Farm shows
STACKS in field	Cutting peat	Potato picking
Hedging and ditching	on moors	after harvest
Repair tools and implements	Clipping sheep	Collect peat in
Stock sales		the late Sept. or Oct.

October/ November/ December
Fruit and berry picking
Pig killing
Threshing days
Bottling, preserving, jam making

Constant work involved milking cows twice a day and feeding the animals which were kept indoors (pigs, and poultry, for instance). In the winter months the cows and horses were kept indoors and had to be fed by hand but in the summer months they were outdoors in the pastures. As an additional supplement to the income, we had paying visitors during the summer month. The conurbation of Tees-side was relatively close to the farm and families enjoyed coming to the farm for a change of scenery and lifestyle.

Without going into too much detail, we see that the WW II farming methods had several attractions. Unlike Ireland in the 19 century which suffered a potato famine, we always had a mixture of turnips and potatoes as root crops and so were not totally reliant on one crop. Also, we had carbohydrates in the form of bread. Our heating energy supply was peat and waste wood collected from around the farm. The cutting of peat, and its collection, could be fitted around other more important activities on the farm. The peat was dried in the summer sun. A good harvest of hay was essential each year as fodder was needed for both the horses and cattle. If there was the likelihood of not having a sufficient supply of fodder, then two or three cattle would be sold, and re-stocking could occur in more favorable times. The storage of food was important. Potatoes and turnips were heaped into piles in the root crop field and then covered with straw and soil to preserve them through the winter, granneries were filled with grain and hay and straw were either stored in barns or built into stacks near to the buildings. There were many ways of storing fruit and vegetables so that households did not starve in the winter months.

Keeping weeds at bay is forever a concern to any grower but, by having a rotational system of farming, weeds were kept in check without the application of any chemicals. With this method of farming pests are also prevented from becoming a problem.

The path from farm to plate was ***instant – no packaging or transportation costs. Plastics had not been invented but we did enjoy the wonders of galvanizing iron with either zinc or tin to prevent rusting and enamel kitchen-ware looked attractive on the table.***

The farmyard was alive with hens, ducks, perhaps a pig, and always a pony was tied up near the house awaiting its need to transfer one of the family to distant fields on the farm. Maybe an elderly person, a grandfather in the family, would be carrying out one of the constant tasks of chopping wood for fuel for the fire. In his book "The lost farmyard", Harold Brighton laments that most farmyards of today are "ghosts" of the past. https://www.heritagesouthholland.co.uk/wp-content/uploads/2016/05/The-lost-Farmyard.pdf

Animal welfare was of utmost importance on those small farms of the past – the cows and horses were given names and so were treated as family – it would have been inhuman to treat "family" members with unnecessary antibiotics or growth hormones. ***The switch from WW II farming to industrial farming was to happen at an alarming rate (in my lifetime) as mechanization swept through the farmyard gate. It has to be admitted that there were many inefficiencies in this way of farming but it was generally thought of as a way of life.*** In the last few decades, Western farming, and indeed that of North Yorkshire, has been transformed ***in the latter half of the 20th century***. Far fewer people are now working on the land, and it is inevitable that machinery has had to be employed. In the UK at least 10% of good agricultural land has been lost for urban and roadway developments and half of our hedgerows and woodlands have been destroyed to accommodate "industrial" farming. This has been at the expense of wildlife. In the war years the necessity for high levels of food production was obvious and mechanization together with the copious use of chemicals and selective plant and animal breeding has resulted in very efficient farming with crop yields increasing FOUR-FOLD. The European Common Agricultural Policy (CAP), set up in 1962, originally welcomed these increases and paid subsidies to farmers on the ***amount*** of produce. We all know how this got out of hand and wine and milk lakes suddenly appeared together with butter, beef, and grain mountains. The CAP is presently trying to address farming in a more holistic way and offering grants for environmental initiatives.

So, what kind of farming do we plan to have in the future? There are basically three blocks to the diagram above – labour, land and weather. Worldwide, the reserve of labour in rural areas is diminishing rapidly as a drift to urban living intensifies. Good land is at a premium as urban sprawls are taking more land out of agricultural use and so the temptation to chop down virgin forests is very persuasive. The weather is presently being driven by **climate change** and has resulted in many cases of crops being destroyed by floods or drought or hurricane force winds. One may therefore ask "Are there solutions to these problems?" A more vegetarian diet is recommended as a solution, and intensive farming would help in cases of land shortage. Increasing mechanization and robotics could alleviate some of the shortages of labour and covering large areas with poly-tunnels would separate land cultivation from the weather; but is this farming? Or, should the world be manufacturing new foods like Solein? https://solarfoods.com/solein/ This is a protein produced in a factory. It is neither a plant nor an animal. It originates from a natural, non-modified, single-cell organism. It is nonetheless a completely natural protein, even though it is not grown traditionally. Solein offers endless possibilities for the food industry.