FARMAGEDDON – the true cost of cheap meat. By PHILIP LYMBERY
A SUMMARY

War and post-war intensification was based on the explosive ammonium nitrate becoming a fertiliser, nerve gases becoming pesticides, antibiotics being approved for use in farming, increased access to fossil fuels and globalisation. Farming in tune with nature seemed no longer to be necessary. Subsidies encouraged intensification, distorting the market - with most of them going to a small number of very large farms.

OLD MACDONALD

Mao tried to eliminate the sparrows and in so doing increased the numbers of other pests that were controlled by the sparrow. In UK we have done this with chemicals. 70 billion farm animals are produced each year worldwide, of which 2/3 are factory farmed producing poor quality, high-fat meat. They consume 1/3 of the world's grain, 90% of its soya meal, <30% of the global fish catch and 25% of the world's fresh water and use 50% of the world's antibiotics. BSE was caused by turning natural herbivores into carnivores - feeding meat and bone meal. What is space saving about a system that relies in millions of "ghost" acres to grow animal feed and ship it thousands of miles?

CALIFORNIA GIRLS

1.75 million dairy cows are raised in California producing manure and urine equivalent to 90 million people. Pushed to the limits with concentrated feed, growth hormones and antibiotics. Central Valley also produces much fruit and veg, dependent upon a cocktail of chemicals and irrigation. No grass for these animals. Lots of black flies. A fifth of children in Central Valley have asthma. In terms of manure, 1 cow = 50 people. 10,000 cows produce the same amount of shit as the population of Bristol. There is potential for health disasters with E. coli getting into the local water, which then has to be boiled. Mega-dairies are a repellent symbol of a grotesquely unnatural food production system. They are at risk of fluctuating input costs and milk prices. Humans, cattle and the environment are all just an asset to be milked dry.

SILENT SPRING

This chapter looks at the legacy of Rachel Carson's Silent Spring and thenfocuses on the overuse of chemicals and the effect of both chemicals and manure on watershed management and wildlife.

WILDLIFE

One fifth of all bird types in Europe are at risk. The population of farmland birds has more than halved since 1966. Acid fertilisers reduce earthworm populations. Organic soils contain 2- 4 times as many worms as conventional. The effect on bees as pollinators is well known. Industrial farming has robbed many wild pollinators of their varied habitats. Many beekeepers make more money from pollination services than from honey. 40 billion bees are transported to Central Valley every spring to pollinate 240,000 ha of almonds. Bees contribute £18.5 billion to European agriculture – under threat from loss of habitats and chemicals and less clover. 70% of crops that provide 90% of our food supplies depend upon bee pollination (FAO). Experiments in India

demonstrate the benefits of mixed farming and cropping. Intensive farming means more mono cropping and chemicals and more loss of biodiversity. It also affects migration patterns.

FISH

In 2009 the world produced just over 80 million of chicken meat from an estimated 55 billion chickens; fish farming now produces about 70% of that amount using twice the number of animals. Intensive farming requires smaller fish fed to carnivorous farmed fish like salmon and trout. It takes between three and 5 tons of small fish to produce one ton of farmed fish.

In 2008, 23% of the total global fish catch was small pelagic fish from the open ocean used to make fishmeal and fish oil - largely for farmed fish. Around one third of this is being used for other farm animals – usually chickens and pigs. Fishmeal does not come largely from offcuts and processing waste. Most fishmeal is made from nutritious fish that could be eaten by people. There is now a crisis in feedstock for farmed fish where they are looking for other sources including chicken manure.

Fish farming involves keeping animals in intense confinement with high rates of mortality. By 2009, nearly half of the total supply of fish on the global market came from fishponds. They are hotbeds of sea lice and are to blame for the catastrophic decline of wild fish stocks. Fish farms represent another major threat to wild stocks: escapees, which compete with wild stocks for limited food and places to spawn.

There are also worries about interbreeding – known as genetic pollution. Farmed salmon contains significantly more fat than wild alternatives and are exposed to worrying levels of contaminants. Chemicals are also used to make farmed fish and attractive colour. A system known as triploidy is used to make fish infertile. It has the advantage that any escapees can't breed. However, triploids fish have higher levels of deformities and other unnatural characteristics.

Fishmeal which involves sucking millions of tonnes of small fish out of the sea and crushing them into fish oil and dry feed for farmed fish, pigs and chickens. This process deprives fish birds and marine mammals of their natural prey and also pumps fatty waste into ocean bays, creating dead zones. It diverts what could be a highly valuable source of nutrition for people to industrially farmed animals. The concentration of activity is focused on a single species of fish – the anchovy. Peru exports more than 1 million metric tons per year. Birdlife has been devastated and marine life sacrificed for factory farms.

The fish is steam heated to sterilise it then the oil is separated and the remaining fishmeal is dried. This is very energy intensive. The blood and guts, scales and fat are discarded – often directly into the sea. Caustic soda is used to clean out the pipes at the end of each fishing season, which also flows into the sea. Fishmeal production causes asthma, acute diarrhea, malnutrition and parasitic diseases. Ironically, malnutrition is widespread around the fishmeal plants. The local fishing industry has been virtually destroyed.

ANIMAL CARE
This chapter discusses whether vets have lost the plot and become beholden to the industrial farming industry where their role is simply to prevent stressed animals becoming sick.

BUGS N DRUGS
The use of antibiotics in farming goes back to a piece of legislation policy - the Therapeutic Substance (prevention of misuse) Bill in 1953. Some MPs felt that allowing farmers to give the animals antibiotics to promote growth was entering into unknown country. Such concerns were ignored. However in 2008 the U.K.'s Chief Medical Officer warned that: "In some diseases…the last line of defence has been reached". Enquiries into the implications of antibiotic use have made little progress, with government caving to industry pressure. UK remains the only country in the EU to allow direct advertising of antibiotics for farmers. Approximately half of all antibiotics produced in the world are used for animals. 80% of antibiotic use in America is on farms, 70% of the total being to boost growth or prevent disease rather than treat it.

Industrial farms provide an endless supply of hosts for diseases amongst stressed animals. In slaughterhouses, pathogens can migrate to meat. Farmers become more and more reliant on antibiotics to prop up the system – pigs receive more than any other farmed animal and are a likely source of "superbugs". In 2009 Mexico confirmed cases of infection with the newly named H1N1 influenza virus. There is a measured effect on the health of people living near factory farms.

EXPANDING WAISTLINES
The intensification of animal farming has virtually destroyed the nutritional quality of our food. Research shows that the ratio of bad to good fats in farmed animals has gone from a ratio of 3:1 to 50:1. Fresh forage has 12 times more ALA than grain. The amount of fat in a serving of meat is highly dependent upon the feeding regime. Beef cattle fed on fresh grass have a much more omega 3 than cattle fed on silage and much more than when fed grain. Compared with factory-farmed produce, pasture-reared beef has 25-50% less fat and free-range and organic chicken up to 50% less fat.

Chickens are no longer as healthy a food as they used to be. Up to a fifth of the weight of a broiler chickens is now fat. This means that a portion of chicken today contains 50% more calories than it did in 1970. Such chickens are no longer getting protein rich food, but a fat rich food. The explanation is simple - they are fed largely on cereals.

The conversion of potential human food, like grain, to meat in factory farms remains fundamentally inefficient; more calories go into the farm animal than come out in the form of meat milk or eggs. When farm animals were first domesticated, ruminants like cows and sheep would eat grass that people didn't eat and turn it into food. The conversion rate didn't matter because the animals weren't competing with people for food. Similarly, pigs and poultry were kept to eat scraps and leftovers and to forage; again, providing a useful service which didn't compete with people for food. On the factory farm, potential human food – grain – is now fed to animals in a process that produces unhealthy meat and other products.

HAPPY AS A PIG - tales of pollution

This chapter begins with a description of algal pollution on the beaches of Brittany. Commonly known as sea lettuce, the weed-like algae are naturally present in small quantities all along the coast. Spurred by excess nitrogen carried downstream by polluted rivers and waterways, the algae flourish and mass on the beaches where they decay and release hydrogen sulphide. Both animals and people have been killed by the gases produced by these algae.

Brittany produces 14 million pigs a year industrially. Crops are converted into animal feed for pigs and the cornfields become a dumping ground for pig manure. As a result, massive quantities of phosphate and nitrate sweep into the waterways and into the Atlantic. The pig manure has also been found to contain traces of pesticide and Cadmium as well as residues of the antibiotics routinely given.

North Carolina has 2.2 million pigs, which generate as much untreated manure as central New York City creates sewage. There are more than 3,000 lagoons of pig sewage in North Carolina, holding vast quantities of faecal matter, urine and other by-products including blood, excrement, afterbirth and stillborn piglets. This inevitably escapes into waterways and the excessive nutrients create the ideal conditions for algae to flourish, sapping oxygen levels in the water. This results in dead zones in lakes and sea.

On traditional mixed farms, manure is a valuable fertiliser. The trouble with factory farms is that they produce far too much manure, too far away from land that could benefit from it. By buying in grain from outside they produce manure far in excess of the land that would normally be associated with that number of animals. Releases of phosphate into the environment now exceed planetary boundaries - ironic when phosphate is expected to be in short supply in the future.

SOUTHERN DISCOMFORT - the rise of industrial chicken

Worldwide, 55 billion chickens are reared for meat each year; nearly 3/4 are factory farmed. The US produces nearly 9 billion broiler chickens per year on some 27,000 farms. A typical farm raises 600,000 birds a year. The chickens in Maryland and Delaware alone generate 42 million ft.^{3} of litter.

Georgia is the largest producer of meat chickens in the US, raising 1.4 billion every year. If it were a country it would be the sixth largest poultry producer in the world. Just a few companies dominate the industry. Most of these chickens are produced by contract farmers who are under constant threat of being cut loose by their sole customer. Growers have little negotiating power and 99% of broiler chickens in the US are reared on contract. A typical chicken house is 15 m wide and 150 m long and contains more than 30,000 chickens. Not surprisingly, an estimated 42 million chickens in Georgia every year die before they get to slaughter weight. Catchers are required to grab and crate birds at the rate of 1,000 an hour. Poultry processing is among the industries with the highest rate of non-fatal occupational illness. Catching is a fly by night business and around one in seven poultry processing workers are injured on the job. Most are believed to be illegal immigrants.

LAND - how factory farms use more not less

20 years ago 2.5 million live animals were shipped abroad from UK. This has now been reduced to 100,000. Yet in ports across the globe another trade linked to the questionable treatment of animals is booming. This is the import and export of grain and soya for animal feed, much of it destined to feed animals on factory farms. Over the coming decades the world's livestock population is set to near double in the face of rising global demand for meat. But it comes at a price. Much of the predicted increase is from industrial farms that use vast quantities of water, oil and land to produce meat milk and eggs of dubious quality.

The chapter begins with the sad tale of the Qom people in Argentina who have been removed from their traditional forestlands, which is now growing soya bean. In a disturbing form of modern colonialism, land in developing countries is being carved up by richer nations to guarantee a steady supply of cheap meat. However producing chickens free range is not as crazy an idea as it might seem. If all the chickens in UK were reared for meat on a free-range basis they would take up an area around a third the size of the Isle of Wight. Factory farmed animals already require a third of the world's entire cropland! Intensive farming of animals is fuelled by the industrial production of animal feed crops. A third of the entire global cereal harvest goes to livestock; up to 70% in rich countries. Every year, an area of forest equal to half the UK is cleared, largely to grow animal feed or for cattle ranching.

Factory farming uses a vast amount of **ghost acres**. One chicken shed measuring 892 m^2 and producing 150,000 chickens and requires 90 ha of arable land to produce the cereal to feed the chickens. Ghost acres describe the difference between the amount of food a country consumes and the amount grown on its own land - the gap filled by imports. There is a limited amount of land available in the world and rising population, urbanisation and erosion are swallowing up fertile land at a ferocious pace. This has led to a new global land grab.

In Argentina 200,000 ha of woodland are lost each year to make way for soya. GM now covers 19,000,000 ha of the country – 60% of the entire farmland. However, yields are stagnating due to high inflation and a lack of crop rotation needed to maintain healthy soils. In Argentina it takes only one person to work 500 ha of soya so 20 million ha of soya requires only 40,000 people. The impact on biodiversity and public health has been huge and the poorest and most disempowered people in the world are being cast aside to ensure a steady supply of artificially cheap meat for people thousands of miles away.

Those in the land grab business call the land that they are requiring in the developing world a "new asset class". The reality is that local people have lost control of their land and with it their destinies, perhaps for the sake of cheap burgers thousands if miles away.

In Argentina, exports of soya meal are worth US$7 billion in 2008. But animals have been moved off the land that they used to graze and forced into intensive farming systems. Rosario is the centre of the soya industry because of its location on the

Parana River. There are plans to widen and deepen the river at 23 points to allow the passage of barge convoys. But this will cause huge environmental damage and loss of biodiversity in the process. This is in danger of being disregarded as all that seems to matter is that it will ease the flow of agricultural and other commodities from South America to China and Europe. The soya meal market is controlled by a handful of multinational operators.

Around Rosario, the incidence of testicular and gastric cancer in males is three times higher than the national average, of liver cancer 10 times higher and of pancreas and lung cancer two times. Soya is sprayed in the field then it is sprayed again before being unloaded, again when it is put into storage and again before being loaded onto the ship. 90% of health problems in the neighbourhood are respiratory or due to allergies. The entire soya crop in Argentina is GM. Although there were yield increases, they did not last. As the weeds grew resistant to the chemicals, farmers are having to use even stronger chemicals to produce the same harvest. In 1990 Argentina used 35 million litres of chemicals on crops a year. By 2010 the figure had reached 300 million litres. 12 million Argentinians are affected by the agrotoxins every year as aerial and land-based sprayers douse houses, schools, parks, water sources and work areas. Hypothyroidism is one of the top health issues in these areas.

Climate change will also reduce the amount of land available as land is lost and as people move from flooded cities onto former agricultural land.

THICKER THAN WATER - draining rivers, lakes and oil wells

Conventional crop production in America uses the equivalent of 6.3 barrels of oil per hectare. Of this, two thirds is used for petrochemicals like fertilisers, pesticides and other inputs. One ton of US maize, the staple feed crop for intensive livestock, takes a barrel of oil to produce, while modern farming methods globally use two barrels of oil on average to produce enough fertiliser and pesticide for 1 ha of crops.

Agriculture for food production accounts for 7% of America's entire energy usage. Modern agriculture uses land to convert petroleum into food! As energy becomes more difficult to extract, oil prices will rise - reflected in rising food prices. Organic farming is less oil-dependent – consuming around 30% less energy than conventional crops. Cornell University has looked at the input of energy taken to produce maize and wheat relative to the output (calories) in the end product. For harvested maize the ratio is 4 to 1, for harvested wheat 2 to 1, for industrial beef production 40 to 1, for pig production 14 to 1 and for chicken meat production 4 to 1. Organic milk production uses 38% less energy than non-organic; organic beef uses 35% less; organic lamb 20% less and organic pig meat 13% less.

Rearing animals is a thirsty business. Worldwide, around a quarter of freshwater use relates to producing meat and milk. On average meat needs around 10 times the amount of water per calorie to produce as vegetables and other plants. The water footprint of the concentrated feed given to industrial livestock is more than five times greater than the footprint of the food eaten by animals kept on pasture. Reared in barns, the sheds also need to be hosed down.

Lakes and rivers are drained to supply these animals and their manure pollutes the same rivers and lakes. 70 major rivers around the world are near maximum extraction levels and water is being sucked out of aquifers at a faster rate than they can be refilled. Since the early 1960s, rising meat consumption has resulted in a 3.4 fold increase in the amount of water needed per person for food in China. FAO predicts that the livestock population will almost double by 2050 from the current 70 billion animals slaughtered a year to 120 billion – with obvious implications for food and water.

THE HUNDRED DOLLAR HAMBURGER

If a chicken costs £2 in a supermarket, someone else is paying the price. Food prices are rocketing as global food production fails to keep pace with soaring demand. A third of the world's entire cereal harvest and 90% of its soya now feeds industrially reared livestock. Millions of hectares of fertile land are also been turned over to biofuels. These pressures are limiting the supply of cereal crops for human consumption, pushing prices beyond the reach of many. There is now a danger of competition between crops for people, for industrial farms and for cars. The UK Foresight report warned that soaring demand for grain-fed meats is likely to lead to substantially higher food prices. Were all the cereals currently fed to factory-farmed animals offered directly to people instead of being converted to meat it could feed up to 3 billion people.

If meat consumption increases as expected, in 2050 Asians will consume around 200 billion birds. This will lead to a collapse in ecological systems. As production costs rise because of energy prices, and pressure on other resources, profit margins will fall and often the only way to keep making money is to rear more animals.

There is a section on the "predatory commercialisation of the countryside in India" and the corporate hijack of every major sector of agriculture, including and especially seed. There is also reference to the introduction of GM crops and the large number of farmers who have committed suicide. There is also a section on the disastrous impact of introducing the industrialisation of agriculture into the developing world. The growing **human** population is in increasing competition for food with a burgeoning **farm animal** population.

GM

This section begins with a review of "golden rice", a GM crop that has been waiting for approval for more than 25 years. Despite what has been achieved in increasing the vitamin A content of this rice, many scientists have raised questions about the safety of it. Others have said that it will encourage a diet based on a single industrial staple food rather than a balanced diet and the WHO argues that there are simpler solutions to vitamin A deficiency. The section continues about the limited benefits from GM, about terminator genes and the legalistic approach taken by Monsanto and others. There is also a section on cloning, which is described as the most extreme example of

the scientific wizardry being employed by companies in the hope of creating farm animals that can produce even more for less. The GM story has not benefited from the very recent report by USAID, which suggests that very few, if any, long term commercial benefits have been derived from GM.

CHINA

Half of the world's pigs are in China. Although many are still reared on traditional smallholdings, big players are importing the most intensive pig rearing techniques they can find in the West. There is a huge surge in demand for meat to feed China's growing middle classes. There is no word for animal welfare in the Chinese language. Major scandals with baby milk and with pigs have increased awareness of the need for food safety, but there is still a long way to go. Melamine was added to baby milk and Clenbuterol (a steroid that prevented pigs getting fat) was fed to pigs - both with disastrous results on human health.

One company alone (Muyuan – financed by the International Finance Corporation) produces 1 million pigs per annum, with a huge impact on the pollution of the groundwater and an increase in mosquitoes. By 2017 the same company will rear up to 9 million pigs. Lagoons of filth, mosquitoes, villages deprived of land, and no doubt desperate pigs crushed into cages built with the help of western technology will be the future. These Chinese pigs are fed on imported soya, fishmeal from Peru, Chinese wheat and added vitamins, minerals and amino acids. This is the ultimate factory farm, inhumane and utterly divorced from nature. Further, it isn't cheap. The company admits that it is not reducing the cost of meat for the average consumer because it is supplying the high-end and export market. Antibiotics are widely used. No licence or vet's prescription is needed to use antibiotics. An unhappy pig is an unhealthy one and an unhealthy pig makes unhealthy food.

KINGS, COMMONERS AND SUPERMARKETS- where the power lies.

This section is about the relative impact of regulation and of consumer power. The US and European agricultural system has been geared towards intensification since the postwar years. However, figures from Canada show that whilst gross farm revenues nearly doubled, the actual net income in the farmers' pockets fell by more than half – with the balance going mainly to suppliers of inputs, equipment and technology.

4/5 of Europe's farm animals are now reared on industrial farms. In the battle for change, it is possible to achieve more immediate change by winning over retailers rather than regulators? Consumer views are a powerful means of change. However consumer power is limited by lack of information whilst vested interests work hard to keep people in the dark. The case for better labeling of meat and milk products has never been more important.

NEW INGREDIENTS - rethinking our food.

At present one third to half of the world's food is wasted. In UK about a quarter of our food gets tossed into the bin. Food is now wasted all along the food supply chain, from farm to processor to retailer to consumer. The irrigation water used globally to grow wasted food would be enough for the domestic needs of 9 billion people. There are

alternatives within farming as well as emerging new approaches. We only need 360,000 km² of seaweed farming to produce the protein requirements of 10 billion people. That is an area of sea four times the size of Portugal. With **ocean ranching**, juvenile fish are hatched and reared in captivity before being released into the sea. Liberated fish then live naturally in the wild before returning to their imprinted release point as adults where they can be caught for harvest. Artificial beef from stem cells of cattle is on the cards. Reducing consumption of meat is also essential for reasons of health, environment and animal welfare.

THE SOLUTION - how to avert the coming food crisis.

Grain feeding of confined animals uses significantly more food than it produces. To feed the world without factory farming we need to put people first, reduce food waste and farm as if tomorrow matters. Traditionally, rearing animals was a land-based business. They grazed your forage for food or, in the case of pigs and poultry, ate scraps from the kitchen. The system was based on diversity, maximising resources, working with natural processes and avoiding waste. The animals provided manure and food as part of the natural rhythm of farm life. The rise of industrial agriculture has turned the entire rationale of animal agriculture on its head by feeding them foods that humans could eat and wasting the food waste that we should be feeding to them.

In the UK alone, householders waste the meat equivalent of 50 million chickens, 1.5 million pigs and 100,000 beef cattle every year. 28% of the world's agricultural land is used to produce food that is wasted at an economic cost of about $750 billion. We need to:

1. Raise Ruminants on pasture not in sheds and feed fish to people not to livestock.
2. Feed pigs and poultry on food waste and encourage foraging, invest in waste reduction and avoid overeating meat.
3. We need to move back to the natural cycle in which sun and rain fed grass, which fed animals, whose manure enriched the soil. This has been replaced by a system dependent on fossil fuel-based, synthetic fertilisers. We need to produce food from mixed farms of crops and animals to enhance soil sustainability.

CONSUMER POWER - what you can do (a summary of the main points).

- Eat meat and lamb - which is largely pasture-based
- Eat pasture-fed beef
- Drink organic milk or that raised under the Freedom Foods banner
- Eat free range eggs
- Eat free range chicken, which contains 50% less fat
- Eat organic or free range pork
- Avoid farmed fish
- Buy local
- Love leftovers and waste nothing
- Avoid over-eating meat

In summary, buy products from animals reared on the land (free range, organic), favour local producers or retailers that we trust, eat what we buy and thereby reduce food waste, and avoid overeating meat. In this way we can fill our plates and benefit the countryside, health and animal welfare.

One of the key thoughts that has remained with me is the imbalance that results from factory farms. Whereas previously animals were raised on land that could feed them and accept their manure, now large numbers of animals are kept in a small areas fuelled by feed from ghost acres and producing vast amounts of manure for which there is no land to accept it – resulting in waste and pollution; whilst the ghost acres that provided the feed no longer benefit from such manure.

One of the most powerful phrases in this book is that: "Behind everything we eat there is a story" .....and that story needs to be told.

The book is written by Philip Lymbery with Isabel Oakshott and is published by Bloomsbury with ISBN 978-1-4088-4644-5

This summary has been written by John Meadley – to be read by friends and to encourage others to read the original book. This has been done with the agreement of the author. April 2014.