

Compassion in World Farming Trust

THE GLOBAL BENEFITS OF EATING LESS MEAT



A report by
Compassion in World Farming Trust
2004





Compassion in World Farming Trust is an educational charity working internationally to advance the welfare of farm animals. We carry out detailed research using academic literature and publish educational resources for use by schools, universities and the general public on farm animal welfare and associated environmental, social and ethical issues. Our publications include reports, books, videos, factsheets and teaching materials.

CIWF Trust cooperates with organisations and individuals in many countries. Our current key issues include animal sentience and an assessment of the impact of the World Trade Organisation on farm animal welfare globally. The Trustees are grateful to several grant-making Charitable Trusts and members of the public who have made work in these areas possible. A complete list of our available materials and downloadable versions can be found at www.ciwf.org.

THE GLOBAL BENEFITS OF EATING LESS MEAT

A REPORT FOR COMPASSION IN WORLD FARMING TRUST

Report compiled and written by **Mark Gold**

Foreword by **Jonathon Porritt**

2004

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FOREWORD



By Jonathon Porritt

There's no real logic in the way we address critical resource issues these days. Particular causes rise suddenly up the agenda, and then fall back again into obscurity, as happened with the phenomenon of acid rain through the 1980s, and the plight of the rain forests in the 1990s. Understandably, campaigners tried to pick off "winnable issues", which are usually the ones the media are most likely to get behind – regardless of whether or not they are the most significant issues in ecological or health terms. Policy-makers scurry around dealing with one damaging environmental symptom after another, with barely a moment for reflecting on what

the causes of these endless symptoms might actually be. Meanwhile, the world continues to fall gradually to pieces around us as some of the gravest threats to the long-term sustainability of humankind remain all but ignored.

I would put the excessive consumption of meat right up there in that category. And though I understand only too well why it is that politicians continue to ignore this particular aspect of food and farming today, I despair at their selective blindness. And once you've read this report, I would be astonished if you didn't feel something of that same despair, having been exposed to the full gamut of consequences of the seemingly unstoppable growth in meat consumption.

I write these words as a meat-eater. I've never been a vegetarian, and as a prominent exponent of all things sustainable, have often been attacked by vegetarians for what they see as inconsistency at best and outright hypocrisy at worst. I don't see it that way, though I'm aware that my own personal response to this dilemma (which is to try and eat a lot less meat and buy almost all the meat we consume as a family from organic suppliers) is not available to most people for reasons of price, availability and so on. I am therefore, by definition, "compromised" in this debate, stuck in that tricky grey area between the moral elegance of vegetarianism on the one hand and the outright indifference of hamburger-guzzling carnivores on the other.

And that may explain why I intend to focus my comments in this Foreword on the resource issues behind meat consumption, rather than on the welfare issues. Whilst I will always continue to campaign actively to improve the welfare of farm animals, and to eliminate all forms of cruelty from the food chain, I'm reconciled - with those caveats – to the moral acceptability of the human species using other animal species for their own benefit.

By contrast, I'm far from reconciled to the grotesque misuse of the earth's resources that our current pattern of meat-eating demands. There's only one realistic framework within which to try and make sense of these issues, and that's to assess what needs to be done today to secure sustainable, dignified livelihoods for the 9 billion or so people with whom we will be sharing this planet by the middle of this century. Right now, it's not looking good. All the earth's major life-support systems are increasingly stressed by the ever-heavier "footprint" of humankind, and whilst local environmental conditions in most OECD countries have indeed improved over the last couple of decades, the big global resource problems just go on getting worse.

Yet “business-as-usual” mindsets are still in the ascendancy. Our continuing failure, for instance, to ratify the Kyoto Protocol (the sole international measure available to us to start cutting back seriously on emissions of carbon dioxide and other greenhouse gases) demonstrates conclusively the lengths to which we will go to deny today’s planetary reality. Do the sums, objectively, and only one conclusion emerges: if all 6 billion of us were to live at the same level of material well being as the world’s richest 1 billion currently enjoy, then we’d need at least another three planet earths to provide the resources and absorb the pollution and waste. Faced with such a surreal projection, it’s surely time for the concept of “One Planet Living” to become the foundation stone of literally every new policy in every area of human endeavour.

As far as food is concerned, the key determinant of sustainability is the overall efficiency with which we use our natural capital (soil, water, energy and so on) to produce the food that we need. As is now well understood, the more meat we eat, the less efficient that ratio becomes. Although there’s some controversy about the different ways in which the calculations are done, the basic rule of thumb is that it takes two kilograms of feed to produce every kilogram of chicken, four for pork, and at least seven for beef. The more meat we eat, the more grain, soya and other feedstuffs we need. So when we hear that total global meat demand is expected to grow from 209 million tons in 1997 to around 327 million tons in 2020, what we have to hold in our mind is all the extra hectares of land required, all the extra water consumed, the extra energy burned and the extra chemicals applied, to grow the requisite amount of feed to produce 327 million tonnes of meat.

Very few people in farming today (let alone amongst agricultural policy makers) are thinking this through in terms of total resource flows – what goes into the production process and what comes out. If we did any kind of serious “mass balance analysis “ of these resource flows, we’d begin to see far more clearly just how unsustainable contemporary agriculture really is. At the moment, the full balance sheet is closed to us, and we can’t begin to distinguish between sustainable and unsustainable livestock systems. As Colin Tudge points out in his powerful new book, *So Shall We Reap*:

‘When livestock are raised according to the tenets of good husbandry (the ruminants to eat the grass on the hills and wet meadows, the pigs and poultry to clear up the leftovers) they hugely increase the overall economy of farming. Agriculture that includes the appropriate number of animals judiciously deployed is more efficient, not less, than an all-plant agriculture. But when livestock is produced in vast (and ever increasing) numbers, needing correspondingly vast inputs of cereal, they compete with the human species. If present trends of meat-eating continue, then by 2050 the world’s livestock will be consuming as much as 4 billion people do: an increase equivalent to the total world population of around 1970, when many were doubting whether such human numbers could be fed at all.’

Much of that growth will come in China, where a burgeoning middle class is rapidly “moving up the food chain” in terms of increasing per capita levels of meat consumption of every kind. As Lester Brown of the Earth Policy Institute has been arguing for more than a decade, this is going to have huge implications for global food markets. China’s own grain production fell from 392 million tons in 1999 to 340 million tons in 2003. The higher the proportion of that declining harvest that is required for livestock production, the more China will have to start trading on the global markets, which must inevitably lead to substantial price increases all around the world.

In fact (as you’ll see in Part two), it is the impact on China’s desperately overstretched water supplies that is likely to

pose an even greater problem. Water tables are now declining steeply throughout the northern half of China, and with lakes disappearing and springs and rivers drying up, some now argue that Northern China is literally drying out. And that's where much of China's grain harvest comes from.

These resource constraints remain invisible to the vast majority of consumers, whatever part of the world we're talking about. We're only just waking up to the fact that climate change is going to have a serious impact on all our lives, and we still don't factor this into our individual purchasing decisions. We've absolutely no idea about how much energy is needed to put any particular piece of meat on our plate, or how much water, or how much feed. The "embedded energy" and "embedded water" are just abstractions to most people. Yet if easy access to fossil fuels or ready supplies of water were taken out of the equation, then the whole "business model" that lies behind today's intensive meat production systems would collapse.

And that day is not so far away. There is now a growing consensus that global oil extraction (in absolute terms) will peak at some stage over the next decade – it peaked more than twenty years ago in terms of the amount of oil extracted per person on Planet Earth! From that point on, the laws of supply and demand will assuredly kick in, with the gap between the two growing every year, putting an end to the utterly unsustainable fiction of "cheap meat".

And this is where the reality behind the huge growth in meat consumption begins to kick in. Up until this point in the argument, few politicians would dissent from the underlying analysis, though they would probably harbour some sad residual belief that technological progress will get it all sorted out somehow sometime in the future. But to suggest that the sacred cow of cheap meat (which has been a 50-year, cross-party policy priority) should be not just reappraised, but humanely put down, would have them all spinning in mock populist alarm.

But put down it must be. Hardly any of the meat we eat today is as "cheap" as the price on the pack might lead us to believe. It's just that its true costs are hidden, both in terms of the unsustainable drawing down of our natural capital and of the intolerable levels of cruelty to which so many of the 22 billion farmed animals in the world today are subjected. Factor in all the health and food safety impacts of excessive meat consumption, and the notion of cheap meat is revealed as the sick joke that it really is. The truth of it is that we should all be eating a lot less meat and we should all be paying a lot more for it.

So why are our politicians so obstinately attached to the concept of cheap meat? They would of course be reluctant to find themselves accused of the kind of "elitism" which I will assuredly be accused of for writing the paragraph above, but there has to be more to it than that.

Nutritionally speaking, after all, it's clear that people actually need far less meat than they consume today. Most adults get all the protein they need from cereals and pulses, with meat adding a little bit of extra "high quality" protein, some special fats (not the saturated fats that cause such serious health problems), and other trace vitamins and minerals. Fine, but it's self-evident that one actually needs very little meat to provide those benefits.

So most of the meat we eat provides very little nutritional benefit – and massive nutritional impacts, as Mark Gold explains in Part one. So is our putative "need for meat" based more on taste than nutrition? After all, people wouldn't be eating all those hamburgers and bacon butties if they didn't taste good. True enough, but most people find they have a "saturation point" beyond which the thought of any more meat becomes unpleasant – and in different circumstances, with different incentives and different media messages, there's little reason to suppose that

peoples' saturation point couldn't be set a great deal lower.

Which leaves us with the tricky issue of status. Because meat was so expensive (and relatively unattainable) for most people since the start of the Industrial Revolution, it became a powerful status symbol testimony to a person or family "getting on" in life, a convenient proxy for social and economic success. The novels of both Charles Dickens and Gustave Flaubert, for instance, dwell with unconcealed delight on the privilege of easy access to every conceivable kind of meat, providing a sensory feast from which the poor were almost entirely excluded.

But things have changed. Most meat now is really very cheap indeed in terms of the actual price we pay, excluding very few in our much more affluent (though still hardly equal) society. Yet the "cachet" attached to meat eating seems to linger on. Again, it's hard to imagine that this somewhat spurious social and cultural proxy value would persist in an environment where meat eating was exposed for what it really is: fine in much more limited moderation, but otherwise a moral outrage and a threat to ourselves, our planet's life support systems, and to future generations.

Can you imagine a world in which meat was discussed in such terms? Where every pack of meat carried either the same kind of warning as now appears on cigarette packets, or the equivalent of the emerging marketing motif ("enjoy responsibly") of those alcohol companies that are beginning to accept the horrific health and social externalities caused by the excessive consumption of their products?

Inconceivable? Today, for sure, but for how much longer? In *So Shall We Reap*, Colin Tudge develops an eloquent argument demonstrating that contemporary food and farming policy has very little to do with meeting human needs, guaranteeing food security, providing high and consistent levels of nutrition and food safety, underpinning rural economies, or supporting farmers' livelihoods (as we are constantly told), let alone minimising cruelty to animals or optimising resources efficiently. Much more simply, it's all about profit: squeezing the maximum financial yield out of every link in the food chain to benefit a tiny number of an already inconceivably rich minority of citizens in the world's richest countries. He qualifies this blazing critique with some wise reflections:

'I do not suggest that the rise in meat-eating these past few decades has been a conspiracy, or a simple confidence trick. The farmers who have striven to raise their output of meat have in the main responded, as farmers in every age must always do, to the economic pressures of their day. The nutritionists who urged greater intake were sincere. Politicians concluded that the increase in livestock was good for people, and was in line with people's desires, and was also good for farmers and hence for the economy as a whole – and what else are politicians supposed to do? Yet the whole enterprise has been at least as damaging in the long term, as, say, the arms industry.'

Such an analogy will of course outrage most people involved in food and farming today. Let alone the politicians that preside so inadequately over their economic well being. Yet their denial of the cumulative impacts of excessive meat consumption is a major part of the problem. So too is the reluctance of most environmental or conservation organisations to take up some of the issues so powerfully presented in this report, on the grounds (I presume) that they are either not "winnable" or are likely to cause great offence to their own donors and supporters.

Be you a vegetarian or a conflicted carnivore (such as myself), the very least we can all do is to challenge that denial, both as consumers (through our purchasing power) and as citizens. Without such a transformation in our attitudes and behaviour, any prospect of a sustainable, secure and compassionate future for humankind is pure moonshine.

EXECUTIVE SUMMARY

In the second half of the 20th Century, worldwide meat production increased roughly fivefold; per capita consumption more than doubled. Even though the industrialisation of farming has allowed vast numbers of animals to be reared in relatively small areas, those kept in factory farms cannot forage for their own food or live on scraps or waste products - as was traditionally largely the case.

Consequently, massive areas of land are given over to growing crops to feed them. Livestock production has become the world's largest user of agricultural land.

The farm animal population has expanded dramatically to meet demand. Today, the growing human population - already in excess of 6 billion - shares the planet and its resources at any one time with nearly 1 billion pigs, 1.3 billion cows, 1.8 billion sheep and goats and 15.4 billion chickens. As the intensive poultry industry (in particular) spreads to and within many areas of the world, there are already twice as many chickens as there are humans on earth to eat them. Consumption of dairy produce, eggs and seafood have also increased rapidly.

Before the 1990s, the vast majority of animal products were consumed in rich countries, yet in the last decade many in developing nations have also adopted what was once known as the Western diet. Even though per capita consumption of beef, pork and chicken remains at only a third of the quantities eaten in the industrial world, it has doubled in poorer countries in little more than a decade. All indications are that this trend will continue apace for the foreseeable future, encouraged by governments and large-scale international agricultural interests.

0.1 Current policies are unsustainable

The scale of this expansion is unsustainable and will reduce the future prospects of healthily feeding an expanding human population. The main problems can be summarised as follows:

- In the developed world, inappropriate diet is increasingly accepted as a cause of ill-health and morbidity. Meat, meat products and dairy foods make up the greatest percentage of saturated fat intake and there is now general consensus among nutritionists that this contributes significantly to several diseases which have reached epidemic proportions. All informed opinion stresses the desirability of reduced consumption of animal products and increased intake of fibre-rich carbohydrates, fresh fruit and vegetables in order to minimise risk of heart disease, mature onset diabetes, obesity and (possibly) some cancers.
- Rather than adding to our capacity to feed the world's human population, putting animal products at the centre of food policy diminishes the possibility of doing so. Just as growth in the human population inevitably puts a strain on the earth's resources, (leading many experts to cite control of numbers as crucial to the fight against human hunger), so a spiralling farm animal population is also threatening stability. Apart from those who feed predominantly on pasture where it is difficult to grow crops, and others who feed on scraps and waste products as part of rotational mixed farming, farm animals utilise considerably more food calories than they produce in the form of meat. Meat is the most resource costly form of food because livestock waste

most of the energy and protein value of their feed in digestion and bodily maintenance. More food can be obtained by using land to grow crops for direct human consumption.

Farm animals also compete with people for other precious resources, notably water. Lack of water is now recognised as the greatest single threat to yields from arable farms, making it vital to develop food production systems which minimise water reliance. Each calorie of meat takes far more water to produce than a calorie of grain, so one of the simplest ways to increase the ratio of food produced to water consumed is to reduce dependence upon meat.

- The unsustainably large livestock population is having a devastating environmental impact. Often overlooked as a contributor to global warming, livestock herds account for 10 per cent of all greenhouse gases, including approximately 25 per cent of emissions of methane - considered to be among the most potent.

A further major problem is created by the sheer volume of waste produced by the farm animal population - estimated at thirteen billion tonnes every year. Even in countries where relatively strict anti-pollution measures are imposed, this causes high levels of ammonia and nitrate pollution of land, water and air. The excessive use of chemical fertilisers and pesticides to grow crops for animal feed creates further environmental damage.

Other ecological problems are specific to individual areas. Among the most spectacular have been rainforest destruction in Central and South America caused by the felling of forests in order to rear cattle for the hamburger trade or to grow soya for animal feed, and desertification from overgrazing in parts of Africa.

- The massive increase in meat production would not have been possible without the development of industrialised methods of farming, allowing far more animals to be fattened than would have been possible via traditional systems. Production methods have ignored the rights and needs of animals by depriving them of the opportunity to fulfil natural behaviour patterns. Exercise, fresh air and social interaction have all been considered unnecessary. Selective breeding for unnaturally rapid growth has created numerous endemic health problems, particularly from leg deformities and heart weakness.

Since 1997, the EU has recognised farm animals as sentient beings, capable of suffering and feeling pain. It should, therefore, be incumbent upon policy makers to outlaw methods of production which, by their very nature, severely compromise basic welfare standards. This can only be achieved by reducing the number of animals bred, reared and slaughtered - and consequently by reducing the amount of meat produced and consumed.

0.2 The predicted future for global food production

Whether on grounds of human health, sustainable use of resources, environmental protection or animal welfare, it is imperative that the human population decreases its dependence upon animal products. Yet according to predictions by leading agencies, there is little sign that the warning is being heeded. According to a November 2001 report by the World Bank, *Livestock Development - Implications for Rural Poverty, the Environment, and Global Food Security*:

‘total global meat demand is expected to grow from 209 million tons in 1997 to 327 million tons in 2020 (56%). Over the same period global milk consumption is expected to increase from about 422 million tons to 648 million tons (54%).’¹

This is approximately the same massive rate of increase as we have seen in the last 40 years, forecast to occur within only two further decades. It is anticipated that most of this increase will come from animals bred in intensive farms, the majority of them in the developing world. According to the World Bank report:

'per capita meat consumption in the developing world will increase from 25 kilograms to 35 kilograms, compared to an increase from 75 kilograms to 84 kilograms in the industrial world.'²

If this prediction proves accurate, some 80 per cent of the total worldwide increase by 2020 will occur in developing nations, by which time they will be responsible for 65 per cent of global output. The World Bank also suggests that 95 per cent of increased milk production will come from developing nations, leaving them with some 57 per cent of worldwide consumption.³

While the authors of *Livestock Development* acknowledge that this projected expansion 'could severely affect global food security, the natural resource base, and rural equity' they dismiss the logical response - to curb demand for meat and milk - as 'not a viable option'.⁴ ('Global food security' is defined by them as 'the individual's access to enough food to maintain a healthy and active life'.)

0.3 A planet-saving alternative

Historically there seems to have been a direct correlation between rising affluence and increased consumption of animal produce. This suggests that it will prove extremely difficult to discourage developing nations from emulating the food production and consumption patterns followed in the industrial world since the end of the Second World War. **Yet rather than accepting that the current trend towards a high-meat diet is inescapable, this report suggests that an alternative approach is essential.** Unless we begin to rely less upon animal products in the human diet we will place a catastrophic strain upon the earth's resources, with potentially disastrous consequences for human health and hunger, the natural environment and animal needs.

This report summarises the case for reduced dependence upon livestock to feed the human population and suggests ways in which change can be achieved. **It is aimed primarily at both decision makers and individuals in the developed world.** While developing countries must also review, as a matter of urgency, the implications of their increased reliance upon meat and dairy foods, it would be presumptuous to attempt to impose food policy upon them - particularly when the vast majority of animal products are still consumed within the industrial world. The hope is, nonetheless, that those with influence in the developing world may accept the logic of the case presented here. Meanwhile, one of the most powerful ways in which the North can encourage the South not to follow the predicted massive dependence upon meat eating is to set an example worthy of imitation. Moving towards a more plant-based diet in the developed world - however belatedly - is probably also the best way of promoting sustainable food policy in developing nations.

0.4 How can change be achieved?

There are two principal ways in which change in food policy can be achieved:

Firstly, through the power of individuals to inspire progress by the actions they take as consumers and/or as active citizens and campaigners.

Secondly, by the decisions of policy makers.

In some parts of the industrial world, many individuals have radically altered their eating habits over the last two decades. In the UK, some consumers have reduced their consumption of meat (particularly red meat) or made a decision only to eat organic or free-range produce. The vegetarian population has grown significantly and now stands at roughly 5 per cent of the population. The number of vegans has also risen sharply from approximately 70,000 in 1985 to an estimated 250,000. Part of the purpose of this report is to encourage more people to support these initiatives.

Thus far, however, politicians have barely recognised levels of meat consumption as an issue worthy of serious debate, let alone introduced the type of programmes that might bring about progress. A primary function of this report is to gain acceptance of the need for radical reform at the political level, suggesting measures that will promote food policies that are healthier, more humane and sustainable. **For the sake of people, animals and the planet, meat must now become an urgent political issue. As an initial step, we recommend that governments in the developed world pursue a target of 15 per cent reduction in meat consumption by the year 2020. Rather than an extreme measure, this should be viewed as a moderate response to the latest findings on healthy and sustainable food production methods from many respected organisations - notably the World Health Organisation (WHO) and the Food and Agriculture Organisation of the United Nations (FAO).**

0.5 Defining agricultural sustainability

Sustainability has become a key concept for environmentalists and human rights activists. What does it mean for food production? Dr Jules Pretty of the University of Essex gives the following definition:

'It is farming that makes the best use of nature's goods and services while not damaging the environment. Sustainable farming does this by integrating natural processes, such as nutrient cycling, nitrogen fixation, soil regeneration and natural pest control, within food production processes. It also minimises the use of non-renewable inputs that damage the environment or harm the health of farmers and consumers.'⁵

In pursuit of this goal, many proponents envisage an agricultural system where intensive production is abandoned in favour of traditional methods in which relatively small numbers of animals are reared extensively. Animal produce is seen as a relative luxury to supplement a largely plant-based diet. Decent standards of animal welfare attempt to ensure that livestock enjoy a relatively natural life and as quick and painless a death as possible. Their wastes are returned to the soil, playing an essential role in maintaining soil fertility and environmental biodiversity as part of mixed organic rotational systems, or by grazing on marginal pasture lands.

Although the tendency worldwide is away from sustainable agriculture towards industrial production dominated by powerful conglomerates, many small-scale farmers across the globe still produce food in this traditional way. For example, intensive poultry farming is the fastest growing form of intensive farming throughout the world, yet still some 80 per cent of farmers in Asia and Africa raise small flocks of chickens who survive by scavenging.⁶

What makes current levels of meat consumption a particular danger to food security is both the number of animals reared and the fact that they are grain and soya-fed (i.e. land is devoted primarily to feeding them rather than people directly). It is these trends that must be reversed if sustainable levels of production are to be achieved.

PART ONE

Eating for good health

There is now widespread agreement that poor diet has become a major cause of death and disease in the industrialised world. Heart disease, cancer, obesity and diabetes are health problems of epidemic proportions in which inappropriate eating habits play a significant role.

Equally as important as the negative impact of poor diet upon human health is the positive improvement that can be achieved by eating good food. In their draft consultation paper, *Diet, Nutrition and the Prevention of Chronic Diseases*, the World Health Organisation (WHO) and Food and Agriculture Organisation of the United Nations (FAO) stress that:

'dietary adjustments can not only influence present health, but determine whether or not an individual will develop diseases such as cancer, cardiovascular disease, and diabetes much later in life.'⁷

Consequently, the two organisations propose:

'action placing nutrition, together with the other principal risk factors for chronic disease (tobacco use, physical inactivity, and alcohol), at the forefront of public health programmes and policies.'⁸

1.1 General advice on diet - consistent findings over recent decades

There has been a general perception among both decision makers and the general public that nutritional advice tends to undergo changes of fashion. As a result, recommendations are often dismissed as 'faddish'. Yet what is particularly striking about independent nutritional research over the past 25 years is the consistency both of findings and proposals for reform. In survey after survey, saturated fat and unrefined sugar consumption are the ingredients most frequently associated with ill-health, while dietary fibre and fresh fruit and vegetables are widely promoted as foods that should be eaten in greater quantities.

The recent comprehensive report by the WHO and FAO concludes that changes in diet in the second half of the 20th Century have seen 'traditional, more plant-based diets... swiftly replaced by high-fat, energy-dense diets with a substantial content of animal foods'.⁹ This, they conclude, has played a 'key role' in the upsurge in diet-related preventable diseases. To counteract the trend, nutritional experts from the two organisations make the same dietary recommendations as many others before them: reduce consumption of saturated fats (particularly from red meat and dairy foods) and increase consumption of fruit and vegetables to at least 400 grams per day - an amount currently eaten by 'only a small/negligible minority of the world's population'.¹⁰

1.2 Heart disease and fat consumption

Official investigations into ischaemic heart disease (IHD) have concluded consistently that there is compelling evidence that a plant-rich diet reduces risk substantially. Almost twenty years ago the UK government's Committee on Medical Aspects of Food Policy (COMA) examined ways to decrease what was considered to be a heart disease

epidemic and suggested reductions in the amounts of saturated fat and increases in fibre-rich carbohydrates. Its report added that animal protein is often associated with fat that is rich in saturated fatty acids whereas vegetable protein may be associated with dietary fibre. ¹¹ A discussion paper published during roughly the same period by the then UK government-sponsored National Committee on Nutrition Education (NACNE) reached a similar conclusion. It stated that meat and dairy products make up about 60% of our total consumption of fat and should be reduced substantially. Instead, it advised that we should eat more cereal products, beans and other vegetables. ¹²

Publication of these two documents in the early 1980s sparked vigorous interest in the effect of diet upon heart disease, encouraging several studies which compared the incidence of disease among vegetarians and meat eaters. Five major projects offering what is now regarded as statistically significant findings have been conducted, each of them showing lower mortality rates for ischaemic heart disease among vegetarians. In 1999, The American Journal of Clinical Nutrition published a paper which assimilated information from all five studies, combining data on a total of 76,172 vegetarian and non-vegetarian men and women from comparable backgrounds. After adjustments for other possible factors such as alcohol use, education level and smoking, the conclusions previously reached by the individual studies 'were strongly confirmed'. The evidence 'that vegetarians have a lower risk of dying from IHD than comparable non-vegetarians' was interpreted as 'strong'. Subsequently, two of the authors of the paper pointed out that 'there are currently 165,000 deaths each year in Britain from heart disease, and that conversion to a vegetarian diet could lead to 24% lower death rates', preventing 'about 40,000 deaths each year in this country alone'. They also stated that 'a lower dietary intake of saturated fat and cholesterol' offers protection against heart disease, while 'consumption of cheese, eggs, total animal fat and dietary cholesterol were strongly associated with IHD mortality'. ¹³

The American Dietetic Association is another widely respected organisation which recognises the benefits of vegetarianism in the fight against heart disease. Its 1998 position paper states that 'not only is mortality from coronary artery disease lower in vegetarians than in non-vegetarians, but vegetarian diets have also been successful in arresting coronary artery disease'. ¹⁴

The most encouraging feature of the link between heart disease and diet is that in many cases changes in eating patterns can make a swift positive impact upon health. Acting on epidemiological studies which indicate the advantages of a Mediterranean-style diet (low in red meat, relatively high in vegetables, carbohydrates and fruit, with some fish consumption) in reducing coronary heart disease, researchers in Lyon placed 302 heart disease patients on a diet based on grains, vegetables, fruit and fish - plus added fats from olive oil, rapeseed (canola) oil, and rapeseed-based margarines. The results over a two year period were startling, with an enormously reduced risk of further heart attacks. Interestingly, this study indicates that it is the type of fat that is crucial to reduced risk rather than the quantity. ¹⁵ Saturated and trans fats are unhealthy, but unsaturated fats actually reduce cholesterol levels and protect against heart disease and strokes. The Mediterranean diet is low in saturated fats, trans-fatty acids, cholesterol, and animal protein, but high in vitamin and mineral rich monounsaturated fats and omega-3 fatty acids. Revealingly, Italians eat less than half the amount of beef and poultry consumed by Americans, yet enjoy a longer life expectancy. ¹⁶

Figure 1

COMMON SOURCES OF DIETARY FAT IN THE HUMAN DIET OF DEVELOPED NATIONS**Saturated fat (unhealthy in all but very small quantities)**

Whole milk, butter, cheese and ice cream, red meat, chocolate, coconuts, coconut oil and coconut milk.

Trans fats (unhealthy in all but very small quantities)

Most margarines, vegetable shortening, partially hydrogenated vegetable oil, deep-fried chips, many fast foods, most commercially baked goods.

Monounsaturated fats (healthy)

Olives and olive oil, canola oil, peanut oil, cashews, almonds, peanuts and most other nuts, peanut butter, avocados.

Polyunsaturated fats (healthy)

Corn, soybean, safflower and cottonseed oil, fish.

Source: *Eat, Drink and be Healthy*. Walter C. Willett, M.D. (the Harvard School of Public Health). Simon and Schuster, 2001.

In *Diet, Nutrition and the Prevention of Chronic Diseases* (2002), the WHO/FAO recommend that saturated fats should make up no more than 7 per cent of calories.¹⁷

1.3 The health benefits of Mediterranean diets

The Mediterranean diet has come to be viewed by most recognised nutritionists as 'a good blueprint for healthy eating'.¹⁸ Professor Walter Willett from the Harvard School of Public Health summarises its main features as follows:

'Plenty of vegetables and whole grains and relatively little meat means a relatively low energy density. The abundance of vegetables and whole grains, as well as the relatively high percentage of fat (30 to 45 per cent of calories, mainly from olive and other vegetable oils) make for mild effects on blood sugar. Just as important, this kind of diet is open to creative interpretation.'¹⁹

1.4 The success of low-fat treatments for heart disease

Although the advice for healthy people is to worry more about the type of fat than the quantity, two US doctors report great success treating heart disease patients on a near-vegan diet particularly low in fat. In 1990, Dr Dean Ornish, Clinical Professor of Medicine at the University of California, put patients on a predominantly plant-food regime with less than 10 per cent fat in a programme which also included stress management, aerobic exercise and group therapy. After only a year, 82 per cent of his patients experienced 'regression' of their condition. According to Dr Claude L'Enfant, then Director of the US government's mainstream National Heart, Lung and Blood Institute, Dr Ornish's work 'offers strong scientific evidence that lifestyle changes alone can actually reverse [clogging of the coronary arteries]... without the use of cholesterol-lowering drugs'.²⁰ In 1999, Dr Caldwell Esselstyn, Preventative Cardiology Consultant at the Cleveland Clinic, reported on a 12-year study he had conducted with 11 patients who suffered from severe heart conditions. In the eight years before research began the group

had between them experienced 48 'cardiac events'. Yet in the decade of the trial - in which each consumed a low-fat vegan diet plus cholesterol-lowering medication - only one patient experienced a heart attack or serious illness (and he admitted to not having complied with the recommended diet). Approximately 70 per cent of patients experienced reversal of disease. In Esselstyn's own words patients became 'essentially heart-attack proof'.²¹

1.5 General advice on heart disease and diet - latest findings

The WHO/FAO draft consultation paper on diet and nutrition (2002) is the latest key document to advocate the power of dietary reform in minimising risk of heart disease. After a comprehensive survey of existing information it identifies unhealthy dietary practices such as 'the high consumption of saturated fats, salt and refined carbohydrates, as well as low consumption of fruit and vegetables'²² as leading causes of cardiovascular disease. It also notes that few people are following suggested dietary advice. The percentage of British adults achieving national dietary guidelines is 'a discouraging 2%-4% for saturated fat, and 5%-25% for dietary fibre', the report states, adding that 'the figures would not be dissimilar for most developed countries'.²³

In conclusion, the latest guidelines are remarkably similar to those of the COMA and NACNE reports of the 1980s. Unequivocally, the advice is that to reduce risk of heart disease - the leading killer in developed nations and predicted to become the same in the developing world over the next two decades - we should eat less animal fats and more dietary fibre, fruit and vegetables.

1.6 The obesity epidemic and poor diet

The WHO/FAO believe that obesity is probably the fastest emerging health problem in both developed and developing countries because 'it has several major downstream health consequences in terms of diabetes, cardiovascular disease, several cancers, and arthritis that are very common and expensive to treat'. The organisations also state that 'no country has a track record in terms of attenuating and reversing the epidemic'.²⁴

According to the US Worldwatch Institute, for the first time in human history 'the number of overweight people rivals the number of underweight people'²⁵ at roughly 1.1 billion. In the US, a massive 23 per cent of adults are considered obese.²⁶ According to the Danish National Board of Health between 10 per cent and 20 per cent of the male population in the EU, and between 10 per cent and 25 per cent of women, suffer from obesity.²⁷ The same problems are also being experienced in many developing countries across different continents, ranging from China to Brazil.²⁸

There is convincing evidence that poor diet (together with a sedentary lifestyle) is the principal cause of obesity. The trend towards eating out more often (restaurants tend to serve food high in sugar and fat) and the popularity of cheap fast food are also recognised as significant factors. The WHO/FAO report concludes that a 'high intake of energy-dense foods' (i.e. high in fat and/or sugar) is an important risk factor while 'high dietary NSP (fibre) intake'²⁹ most decreases obesity risk.

Although it is impossible to be specific about the contribution of animal products to levels of obesity, it is clear that a high percentage of the saturated fat content of the average Western diet is obtained from animal sources. One study has identified meat, dairy foods, eggs and table fats and oils as contributing 63 per cent of the total fat, 77 per cent of the saturated fat and 100 per cent of the cholesterol consumed by Americans.³⁰

Conversely, 'numerous studies have consistently found that vegetarians are on average thinner than comparable non-vegetarians' with 'a substantially lower prevalence of obesity'.³¹ The main explanation offered is that vegetarians generally consume a diet lower in saturated fat and higher in starch, NSP dietary fibre, fruits and vegetables. The recommended source of dietary fibre is unrefined grains, whereas eating refined carbohydrates (white rice, pasta and bread, for example) should be limited.

In addition to suffering commonly from psychological distress, obese people are also at greater risk from other health problems, notably diabetes and heart disease. The WHO/FAO conclude that being overweight and obese also increase the risk of developing cancers of the oesophagus, colorectum, breast, endometrium and kidney. Conversely, a diet high in fruit, vegetables and fibre, and lower in saturated fats is likely to have a positive impact in reducing risk.³²

1.7 The rise in adult-onset diabetes

Another disease reaching epidemic proportions is adult-onset diabetes mellitus (also known as type 2 or non-insulin dependent diabetes). In 2000 there were approximately 150 million cases diagnosed worldwide, with numbers anticipated to double by 2025.³³ According to the WHO it has become the fourth or fifth leading cause of death in most developed countries and there is now growing evidence that it has also 'reached epidemic proportions in many developing and newly industrialised countries'.³⁴ The condition is becoming increasingly common among younger people.

Heart disease and obesity are both closely linked with the rising problem of diabetes, which is recognised as a powerful predictor of their development. Death rates associated with diabetes are mainly due to cardiovascular disease.

Given the close relationship between these three common causes of ill-health - heart disease, obesity and diabetes - it is unsurprising that the dietary advice on how to minimise risk is remarkably similar. The WHO/FAO conclude that there is 'probable evidence' that high intake of saturated fats increase risk, while 'non-starch polysaccharides' (dietary fibre) decrease the chances of developing the condition.³⁵

1.8 Diet and cancer

Seminal research published in 1981 by world-renowned epidemiologists Sir Richard Doll, Sir Richard Peto and others, indicated that approximately 30 per cent of cancers are diet related - second only to smoking as a principal cause. This research has been followed by numerous further studies examining a possible link between different types of cancer and diet. The ensuing recommendations have been remarkably similar to those given to prevent heart disease: more consumption of fruit, vegetable and dietary fibre and reduced intake of saturated fat, particularly from red meat.

One of the largest projects undertaken was the Oxford Vegetarian Study - a comparison of 6,000 vegetarians and 5,000 meat eaters from comparable backgrounds. Initial findings pointed to considerably lower risk of certain cancers among vegetarians.³⁶ This was later followed in the mid-1990s by a comprehensive study from the World Cancer Research Fund (WCRF) and the American Institute for Cancer Research, who appointed a panel of the world's leading experts to summarise all existing research. Its findings were published in 1997 in a weighty volume entitled *Food, Nutrition and the Prevention of Cancer: a global perspective*. The study suggests that diets

containing 'substantial and varied amounts of vegetables will prevent 20% or more of all cases of cancer'. It concludes further that 'diets containing substantial amounts of red meat probably increase the risk of colorectal cancer. The panel also notes that such diets possibly increase the risk of pancreatic, breast, prostate and renal cancers'. By contrast, the experts found that 'varied vegetarian diets may decrease the risk of oral, nasopharyngeal, stomach, pancreatic, colorectal, breast, ovarian and bladder cancer'.³⁷ Summarising this exhaustive enquiry, the Director of Science at the WCRF advised that to protect from cancer we should 'choose predominantly plant-based diets rich in a variety of vegetables and fruits, pulses (legumes) and minimally processed starchy staple foods'.³⁸

While still acknowledging a significant link between diet and cancer, there has been a more cautious tone amongst more recent commentators. Further analysis of data from the five most significant epidemiological studies of Western vegetarians and comparable non-vegetarians found 'no significant differences' over a longer period in death rates between the two groups for each of five common cancers.³⁹ In the 2002 WHO/FAO draft paper summarising the latest evidence from cancer experts around the world, the emphasis is upon the particular difficulties that remain in isolating diet from other lifestyle factors. Yet although the authors believe that the association between diet and cancer may be lower than the 30 per cent figure previously suggested, they still assert that 'the international variations in diet and cancer rates continue to suggest that diet is an important risk factor for many common cancers, and therefore that cancer may be partly preventable by dietary changes'.⁴⁰ Furthermore, while stating that previous findings should be viewed with 'some caution', they uphold the view that there is a 'probable' increased risk of colorectal cancer associated with red meat and preserved meats.⁴¹ (Colorectal cancer is the third most common, with an estimated 945,000 cases and 492,000 deaths worldwide in 2000. There is approximately tenfold greater incidence in the developed world.) The report also suggests a probable modest protective element against cancers in fruit and vegetables and recommends eating 'at least 400g/day'. It adds that 'those who are not vegetarian are advised to moderate consumption of preserved meat (e.g. sausages, salami, bacon, ham etc) and red meat (e.g. beef, pork, lamb)'.⁴²

In conclusion, the WHO/FAO are now more tentative about asserting any direct dietary implications for cancers, partly because researchers have become more aware of the complexities of isolating different factors. Nevertheless, they are prepared to state unequivocally that 'avoiding overweight/obesity' is one of the actions that will reduce probability (together with limiting alcohol intake and increasing physical activity), while 'risk will probably be decreased by increasing the average intake of fresh fruit and vegetables and by limiting intake of preserved and red meat' (along with salt preserved foods, salt and very hot food and drinks). 'Public health policy', the authors state, 'should therefore be focused on these issues'.⁴³

1.9 The role of meat in healthy diets

In spite of repeated calls to reduce red meat and dairy intake, there is still a widespread perception that animal foods are necessary to human health. It is easy to see why. Meat does have some positive nutritional qualities. It contains good protein and is a major source of several readily available minerals (such as iron, zinc, potassium, phosphorus and magnesium) and some vitamins (particularly among the B group). Because these nutrients are accessible in a concentrated form, some commentators regard its consumption as important, particularly for children and in the fight against malnutrition because 'plant-based diets do not provide high-quality energy, protein and micro-nutrients'.⁴⁴

One of the principal reasons why meat has been championed is for its high and easily accessible iron content and the fear that children in particular may become iron-deficient on a vegetarian diet. But the evidence does not support this. While non-meat eaters do tend to have lower iron stores than omnivores, several studies have indicated that this does not cause greater incidences of iron deficiency.⁴⁶ Absorption of iron from foods rich in vitamin C actually increases in efficiency when stores are lower, so vegetarians can easily compensate by consuming a varied, vitamin C rich, plant-food diet. There is also some concern that high meat consumption may cause excessive iron intake, associated with higher risk of coronary heart disease, colorectal cancer and type 2 diabetes.⁴⁵

The saturated fat content of red meat means that, whatever its positive qualities, consumption should always be limited. The World Cancer Research Fund and American Institute for Cancer Research have recommended that intake should be no greater than 80 grams (3 oz) daily, which they estimate at less than one portion per day.⁴⁶

While it is certainly necessary to eat a range of plant foods to ensure intake of the nutrients provided by meat, it is perfectly possible to do so. (See Appendix 2)

1.10 Changing patterns in meat consumption

Not all meat has the same fat content. Poultry eaten without the skin is relatively low in fat (though there are other problems associated to be discussed in a later chapter). In the developed world, the types of meat consumed have altered significantly in the last twenty years, with falls in beef and veal balanced by rapid increases in chicken, turkey, ready meals and frozen convenience products.⁴⁷ People also eat out more often. While growth rates may have declined recently for fast food outlets such as Kentucky Fried Chicken, Burger King and McDonalds, they still enjoy enormous popularity, particularly amongst the young and less affluent. Foods produced by such enterprises are routinely extremely high in saturated fat (and salt), leaving those who rely largely upon these and similarly cheap meat products at greater risk from diet-related disease. The same poorer people are likely to consume lower levels of fresh fruit and vegetables.

1.11 The role of fish

The WHO/FAO promote fish as a healthy food, low in saturated fats and containing beneficial oils. It believes that increased consumption could make a positive contribution to health. It accepts, however, that other factors limit the potential for growth. Less than 1% of the world's food is provided by aquatic protein and 'dietary recommendations need to be balanced against concerns for the depletion of the seas and oceans of the world'.⁴⁸

One of the leading health benefits of fish is the presence of alpha-linolenic acid (ALNA) long-chain Omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) - widely believed to have a positive impact on cardiovascular condition. These fatty acids can also be obtained by conversion from alpha-linolenic acid (ALNA) found in some vegetable oils, notably from walnut, flaxseed (linseed), mustard and rapeseed (canola) oil.⁴⁹

While most leading nutritionists promote fish as a healthy food, there have been some reservations expressed about the effects of pollution in many of the world's oceans. Fish and shellfish contain toxic chemicals at concentrations as high as nine million times those found in the water in which they swim.⁵⁰ A particular concern is that fish can contain high levels of methylmercury contamination, associated with rises in blood pressure, impaired neurological function in infants and reduced fertility in adults.⁵¹

1.12 The role of dairy foods

Some assert that the calcium content of cow's milk makes it an essential food to prevent brittle bones, particularly for children. The problem is that even though milk may be an efficient way to get calcium from food, it also comes with a lot of negatives; particularly high saturated fat content. As Professor Walter Willett points out, 'drinking three (eight ounce) glasses a day would be the equivalent of eating twelve strips of bacon or a Big Mac and an order of fries'.⁵² Skimmed still includes roughly half the amount of fat of whole milk,⁵³ while the saturated fat content of most cheeses is equal to one glass of whole milk for every one ounce serving.⁵⁴ These figures indicate that on health grounds, dairy foods should play no more than a minor role in the human diet. Humans are the only free-living animals that consume milk beyond weaning and three quarters of adults in the world are lactose intolerant.⁵⁵

Some evidence suggests that high milk consumption may, in fact, be associated with a higher risk of bone fractures. The most likely explanation is that the calcium absorbed from dairy products is used to neutralise the acid created by the animal protein content of the same products. It is speculated further that calcium is best assimilated when magnesium is also present - a mineral largely absent from dairy foods.⁵⁶

The high prevalence of osteoporosis in some countries where dairy consumption is high would indicate further its ineffectiveness as a counter to brittle bones. Although the World Health Organisation/Food and Agriculture Organisation's summary of the latest evidence on osteoporosis suggests that those populations with a high fracture rate should increase their calcium intake (and also vitamin D), it also states that for most people there appears to be no correlation between increased calcium intake and a decreased risk of bone fractures.⁵⁷

The dietary recommendation from the WHO/FAO is to eat more fruit and vegetables rather than dairy foods to ensure good bone health. Other research indicates that calcium is available in a more beneficially assimilated form in broccoli, kale and other green leafy vegetables, and that, most of all, adequate weight-bearing exercise is also vital for bone health.⁵⁸

1.13 The monetary costs of poor diet

In addition to the misery that diet-related diseases create for those who suffer from them, there is a high monetary burden paid in the price of treating preventable disease. At a time when publicly-funded health services are under increasing pressure, the escalating monetary costs associated with cardiovascular disease, obesity and type 2 diabetes are depleting already too overstretched health resources.

Limited available figures give some indication of the size of the problem. In the US, the 23 per cent of adults considered obese by international standards cost 12 per cent of the national health budget.⁵⁹ By the late 1990s the actual figure stood at \$118 billion - more than double the amount attributed to smoking.⁶⁰ Heart disease costs had risen to in excess of \$180 billion by 2001 and this figure excludes lost productivity because sufferers are unable to work.⁶¹ Animal foods are not the only cause, of course, but the size of the problem has led some commentators to speculate that on health costs alone, the massive US meat industry - worth roughly \$100 billion a year - may be a net drain on the economy.⁶²

In the UK, a recent newspaper study puts the financial burden of major secondary diseases attributable to obesity - hypertension, coronary heart disease and type 2 diabetes - at £386 million. Related incidences of osteoarthritis, cancers and strokes add a further £71 million to the account.⁶³ The government estimates that if current trends

continue half the population will be clinically overweight within twenty years, potentially adding astronomically to costs already estimated at £2 billion per annum. ⁶⁴ In total, the treatment of heart disease - including the economic deficit from loss of working time plus the cost of sickness benefits paid to sufferers and the impact in terms of reduced economic production - costs the UK economy approximately £10 billion per annum. ⁶⁵ While poor diet is far from the sole cause of these disease epidemics, its contribution is well enough established to be certain that its social and economic costs are immense.

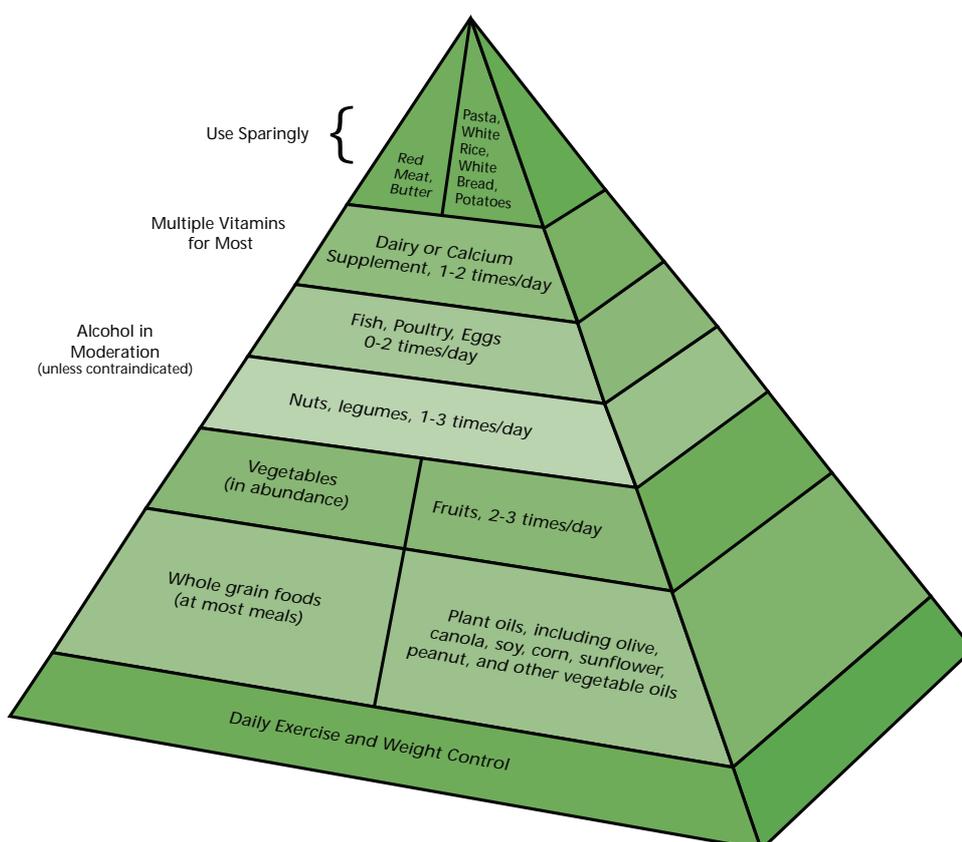
Heart disease - the condition on which dietary reform can make the most radical impact - was alone responsible for nearly 30 per cent of the 55.7 million total reported deaths in the world in 2000. ⁶⁶ It has long been the leading cause of death in the developed world, but now the switch towards a Western style diet is having an impact in developing nations, too. It been projected by the WHO/FAO that by 2020, 71 per cent of deaths from ischaemic heart disease and 75 per cent of strokes will occur in developing countries. ⁶⁷ It is a similar picture for diabetes and obesity. Both the public health and the economic implications of such largely preventable levels of disease are staggering.

1.14 The food pyramid - a plausible blueprint

Among the plethora of nutritional guides currently available, one that has received considerable praise for balance and independence is by Walter C. Willett, Chairman of the Department of Nutrition at the Harvard School of Public Health and a professor of medicine at the Harvard Medical School. Willett has also been a leading contributor on reports on cancer and diet for the World Cancer Research Fund/American Institute of Cancer Research, the World Health Organisation and the Food and Agriculture Organisation. In his book *Eat, Drink and Be Healthy* (2001), Professor Willett re-writes 'the food pyramid', previously issued by the US Department of Agriculture, basing it upon the latest available evidence.

Figure 2

FOOD GUIDE PYRAMID - A GUIDE TO DAILY FOOD CHOICES



Source: *Eat, Drink and be Healthy*, Walter C. Willett, M.D. (the Harvard School of Public Health), Simon and Schuster, 2001.

There are elements here that individual commentators will disagree with. But the point is that Professor Willett is likely to win broad approval from most disinterested nutritionists as being generally faithful to the most up-to-date information. Moreover, his dietary recommendations contain a degree of flexibility, reflecting some continuing uncertainties about optimum diet and allowing individuals considerable choice. For instance, he approves fish, poultry and egg consumption twice per day, which many may find excessive. On the other hand, he accepts equally a totally plant-based diet in which they are not eaten at all. And within these comparatively extreme options, he emphasises the overall importance of a predominance of plant foods at the expense of animal products. (In June 2003, the Journal of The American Dietetic Association produced another version of the food pyramid, focused exclusively on vegetarian foods. See Appendix 4.)

1.15 Summary

- Diet related illness is increasing rapidly in both developed and developing nations and is a major source of ill-health and morbidity - in particular heart disease, obesity, type 2 diabetes and some cancers.
- Forecasts indicate that these trends are set to continue over the next twenty years, adding damagingly to the already high social and economic costs.
- The evidence linking diets high in saturated fats and low in beneficial carbohydrates, fresh fruit and vegetables is convincingly established for cardiovascular disease, obesity, type 2 diabetes and to a lesser extent some cancers. Animal fats are the primary source of saturated fats in the diet.
- Disinterested nutritional advice recommends reductions in red meat and dairy fat and increases in unrefined carbohydrate, fruit and vegetables as major health-enhancing steps towards disease prevention.

PART TWO

Feeding the world

We are in the midst of what has become known as the 'livestock revolution' in the developing world*. Meat consumption is projected to rise there by a massive 3 per cent per annum until 2020, by which time 63 per cent of global meat production and slightly more than half (50.3 per cent) of global milk production are expected to be from the South. ⁶⁸

Rather than helping to alleviate world hunger, this 'revolution' is likely to prove detrimental to the task of feeding a growing human population. Other than in areas where animals are fattened predominantly on grazing land that could not easily grow food crops for direct human consumption, or else where they eat primarily crop residues or other waste products, livestock farming actually wastes resources. This is because grain-fattened animals take more energy and protein from their feed than they return in the form of food for humans. Much of the food value of the grain is wasted in bodily repair and maintenance.

2.1 The inefficiency of animal foods - food conversion rates

Commentators differ in their assessment of the efficiency of animal farming because they apply different criteria to their calculations. Those sympathetic to the livestock industry might omit some factors - perhaps losses through disease or transport costs for feed - that a more critical observer might include. It also depends upon the type of diet on which animals are fed and the proportion of their lives in which they consume high protein feeds. For example, a vested interest organisation such as the US National Cattlemen's Beef Association has claimed that it takes only 4.5 kg of grain to produce 1 kg of beef raised intensively in a US feedlot. ⁶⁹ On the other hand, the US Department of Agricultural Economic Research Service puts the figure at 16 kg of grain to produce 1 kg of beef. ⁷⁰

Similarly, the UK poultry industry claims that through selective breeding it has improved feed efficiency to the point where it takes only 1.6 kg of feed to produce 1 kg of weight gain per animal, but this takes no account of the fact that by its own calculation the total edible meat yield from each bird is only 33.7 per cent of the total carcass. ⁷¹ Once the inedible part of the dead animal is taken into account, the ratio of grain to meat becomes considerably higher.

Given that there is no such thing as **the** ultimate accurate scientific calculation, the following assessment by the US Council for Agricultural Science and Technology (CAST) - an organisation that would claim to have no bias - gives a useful indication. The statistics, based upon a survey of several other studies, are particularly relevant since they include conversion rates for feed to finished product, as well as the more often quoted feed to weight of animal when slaughtered.

* The developing world is used as a necessary, if rather unsatisfactory, title for a vast area of the world. It covers Asia, Africa and South America. One African country alone, Ethiopia, covers an area greater than Holland, France, Germany, Austria and Switzerland combined: therefore, to suggest food production policies for the whole of the developing world inevitably involves sweeping generalisations. Economic circumstances vary enormously, with a minority in developing countries far wealthier than many in the developed world. Neither is acute poverty confined to the former.

For a minority, the best solution to poverty may, in specific circumstances, differ from the 'norm' offered here. It is only possible to suggest policies that will prove beneficial in the majority of circumstances.

Figure 3

FOOD CONVERSION FOR MAIN SPECIES

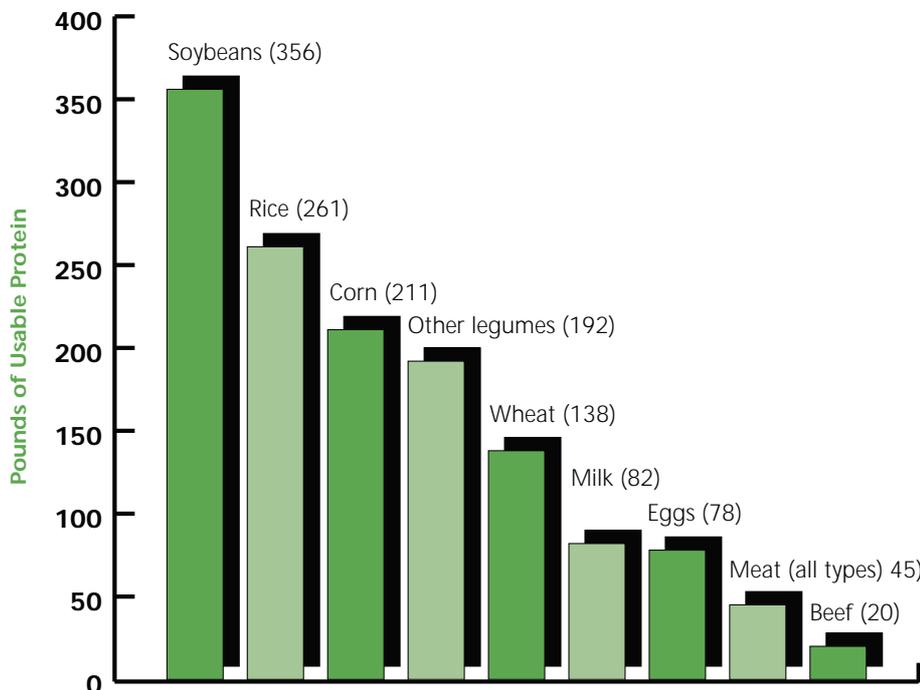
Species	Kilos feed per kg liveweight gain	Kilo feed per kilo product
Aquaculture	1.2-1.6	1.5-2.0
Poultry Meat	1.8-2.4	2.1-3.0
Pork	3.2-4.0	4.0-5.5
Beef	7	10

Source: CAST (Council for Agricultural Science and Technology), 1999. *Contribution of Animal Agriculture to Meeting Global Human Food Demand*.

From figure 3 it is evident that to promote vast increases in meat production as an answer to world hunger has one overriding limitation - it depends upon an inefficient (and also a relatively expensive) product for people devoid of resources and lacking the means to afford even the most basic foods.

Once again, assessments vary as to exactly how much more land it takes to produce meat than it does to provide the equivalent amount of calories by growing food directly for human consumption. According to the World Health Organisation (WHO) and the Food and Agriculture Organisation of the United Nations (FAO), 'the number of people fed in a year per hectare ranges from 22 for potatoes and 19 for rice down to 1 and 2 people respectively for beef and lamb'.⁷² While it would be wrong to conclude that a restricted diet of rice or potatoes alone will provide all the necessary micronutrients for human health, this can be taken, nevertheless, as another clear indication of how the answer to feeding hungry people is not to move towards a largely meat-based diet. A more sensible policy would be to base dietary goals on the traditional eating patterns of those populations in developing countries who, despite relative poverty, do have enough food to maintain good health. It would be unusual for livestock products to play more than a minor part in such diets, which consist for the most part of grains, legumes, fruits, vegetables and other plant products. Improving their quality and variety offers a more rational approach to world food production than attempting to emulate the unsustainable model practised in the developed world.

Figure 4 LAND USE EFFICIENCY - USABLE PROTEIN YIELDS PER ACRE FROM DIFFERENT FOODS



Source: USDA; FAO/WHO/UNICEF Protein Advisory Group.

2.2 The global water crisis and animal products

Probably even more crucial than the inefficient feed conversion ratios for animal products is their drain on the world's water resources. For there is now widespread acceptance that water scarcity will become at least as important a constraint on future food production as lack of available land. Demand has tripled in the past two decades and is expected to accelerate further in the next two - considerably more so if predictions for growth in the livestock population prove accurate. Water from dwindling supplies will have to serve both a growing human population and an explosion in the number of livestock.

Recent projections by the International Food Policy Research Centre (IFPRI) indicate that if current trends in water management continue, we can expect a combined rise of 62 per cent in consumption for domestic, industrial and livestock use in the period 1995-2025. Figures for livestock production, while lower than for industry and domestic use, are predicted to rise by 71 per cent in the same period - 19 per cent in the developed world and more than double in developing nations. ⁷³ This in a world where (for a number of reasons) more than 1 billion people 'lack enough safe water to meet minimum levels of health and income' and many environmentalists warn of an impending crisis in supply. ⁷⁴ The IFPRI report suggests further that unless radical new policies are introduced a further 50 per cent withdrawal of current groundwater supplies for all purposes will occur by 2025. Already it is estimated that worldwide we are over-pumping some 160 billion cubic metres of water each year. Water tables are falling dramatically in China, India and the USA, between them responsible for producing half of the world's food. In India, the pumping of underground water is estimated to be double the rate of aquifer recharge from rainfall. ⁷⁵ A potentially catastrophic crisis is looming for a country whose human population is already greater than 1 billion.

Minimising the amount of water taken to produce food must now become a priority of global food policy. According to Sandra Postel, Director of the Global Water Policy Project in the US, 'the only option is to squeeze more nutritional value out of each drop'. ⁷⁶ Since livestock take a far heavier toll on water than plant foods, limiting their numbers is an obvious effective measure towards conservation of resources. To the quantities consumed by animals in their daily lives have to be added the amounts taken to grow feed crops, plus the considerable volume necessary to operate slaughterhouses and processing factories. In Brazil, for example, one of the biggest pig slaughterhouses at Concordia, Santa Catarina, alone uses 10,000 cubic metres of water every working day. ⁷⁷ Poultry slaughterhouses in the same country use roughly 14 litres in the processing of a single chicken ⁷⁸ - a figure that has to be multiplied by an annual slaughter figure of 3.325 billion to calculate the vast amounts taken by the Brazilian poultry industry. At the same time one quarter of the nation's human population does not have access to safe drinking water. ⁷⁹

Worldwide, there are 46 billion meat chickens produced annually, with numbers still accelerating rapidly. ⁸⁰

As with food conversion rates, there is no definitive statistic on the volume of water needed to produce different animal foods, but no informed observer would deny that it is far greater than the quantities required to grow crops for direct human consumption. In his book, *Cadillac Desert: the American West and its disappearing water*, Marc Reisner argues that a pound of beef requires 20 to 80 times more water than the 100 to 250 gallons needed to produce 1 lb of corn. ⁸¹ New Scientist (18 May 2002) quotes a 1998 study in Forbes magazine stating that it takes 50,000 litres of water to produce 1 kg of beefsteak. ⁸² David Pimentel, a water resource specialist at Cornell University, believes this to be a considerable underestimate and puts the figure at 100,000 litres of water per kilo of beef. Pimentel's evaluation is as follows:

Figure 5

LITRES OF WATER REQUIRED TO PRODUCE 1 KG OF FOOD:

Potatoes	500
Wheat	900
Alfalfa	900
Sorghum	1100
Maize	1400
Rice	1910
Soya beans	2000
Chicken	3500
Beef	100,000

Source: Pimentel D *et al.*, 1997. *Bioscience* 42: 97-106.

An urgent task for policy makers is to make conservation of water supplies a pillar of environmental reform. Some 40 per cent of irrigated supplies do not find their way to agricultural land because of poor efficiency, so improved irrigation methods (in the case of many poor small farmers this often means simply providing foot-operated pumps) must become a priority.⁸³ Alongside such simple improvements should go reallocation of research funds to develop new strains of grains, starches, fruits and legumes which maximise water-efficiency and/or drought resistance. Such foods will become increasingly vital in the struggle against human hunger. To conclude in the words of Sandra Postel:

'By moving down the food chain, Americans could get twice as much nutritional benefit out of each litre of water consumed in food production. Stated otherwise, the same volume of water could feed two people instead of one...'⁸⁴

2.3 The value of livestock to poor communities

If meat is so inefficient why do both aid organisations and governments from developed countries actively pursue policies which promote livestock production? Sometimes the motives may be questionable, based more upon the business interests of the rich than the needs of the deprived. The UK Meat and Livestock Commission, for example, sees 'projected increases in meat consumption over the next 18 years in developing nations' simply as a means for 'trade opportunities'.⁸⁵ Yet it is also true that increased and more efficient livestock agriculture can be beneficial to poor people in some areas of the world.

Roughly 650 million of the world's 800 million poorest people live in rural areas where whatever meagre living they are able to extract comes from agriculture.⁸⁶ Most are either pastoralists or smallholder families trying to survive where land potential is low and natural resources are poor. Such populations generally eat very little meat or none at all, though this does not mean that animals are necessarily unimportant to them. On the contrary, they are a vital component of household income for an estimated 600 million of the world's poor.⁸⁷ More than a food source, they are still the source of power for one half of the world's arable land, and may be used as 'chattel' - credit and

currency. They are also vital for transport and clothing in many countries. In India, for instance, life traditionally exists upon what has been described as 'a dung economy',⁸⁸ dependent upon animal wastes for soil fertility, fuel, transport and building materials. According to India's former Minister for the Environment, Maneka Gandhi:

'I do not think that India can be seen in terms of capitalists or communists, it is instead a cowdung economy. If you take the cow or its cowdung away, we are done for.'⁸⁹

Neither can it be argued that livestock farming is necessarily a drain on resources because of feed and water conversion ratios. Increased efficiency of traditional mixed rural farming could create greater quantities of food. Problems mount where livestock are envisaged as a primary source of food, reliant upon feed grains.

Statistically, consumption of livestock products by the very poor is insignificant. The amounts involved are, in world production terms, negligible. Such relatively small quantities have played only a very minor role in the recent escalation in meat and dairy consumption in developing nations, nor are they likely to play a much greater role in the rapid increases predicted up until 2020. The perceived livestock revolution has had, and will continue to have, little direct impact upon those suffering from acute poverty. The 150 million hungry people living in cities will not have the means to purchase its products. The World Bank acknowledges that the high price of animal products means that, 'except for small quantities, milk and meat would probably remain out of reach for the urban poor'. It adds that, 'the contribution of the livestock sector to poverty reduction, therefore, would be mostly for poor livestock producers rather than for poor rural and urban non-livestock-producing consumers'.⁹⁰

Even the capacity for 'poor livestock producers' is limited, since most live in remote areas and lack the means to reach significant markets with perishable livestock products. Furthermore, although sometimes a source of security, the dependence of poor people upon livestock for non-food purposes can also prove hazardous. While animals are often an insurance against disasters when they can be sold to purchase grain, in times of severe weather they also carry 'much more risk than crop production'. The World Bank accepts that, 'it takes longer to restore its productive capacity after a drought because rebuilding the herd requires several years, whereas crop production can be restored after one good year'.⁹¹

Summarising a limited possible positive role for livestock production in poverty alleviation, Environmental Adviser to the World Bank, Robert Goodland, writes:

'On lands too dry or unirrigable for grains or fruit or other trees, pastoral cattle may serve as the main means of converting marginal-land vegetation into useful food for the poor... In general, a role may exist to invest in projects that support a family cow, buffalo, pig, or a small number of chickens, in order to recycle household wastes, as savings for lean harvest times, or to buffer occasional surpluses; or a small-scale livestock enterprise not involving grain feeding.'⁹²

The author goes on to consider a 'cut off figure' below ten head of cattle as the maximum number that could be defined as 'a small-scale livestock enterprise' - and therefore worthy of possible support.

2.4 The diminishing availability of land for food production

In reality the scope for large-scale development of livestock production through traditional methods - pasture rearing and mixed farming - is undermined anyway by lack of available agricultural land. In several parts of the

world, acreage available for agriculture is diminishing apace. According to the World Bank, 'in Asia, almost all suitable land is already under cultivation, cities are encroaching and land degradation is becoming a serious problem'.⁹³ In total, about one quarter of the developing world's crop land is being degraded. Apart from Sub-Saharan Africa (forecast to bring another 20 million hectares into cereal production before 2020), the developing world is projected to cultivate only a further 21 million hectares in total⁹⁴ - nowhere near enough to sustain the projected increases in livestock population.

Given this shortage and other restrictions, the only feasible way for the meat industry in the South to expand as dramatically as is forecast is for producers to model methods on those employed in the North since the Second World War. This means confining vast numbers of animals in small areas and increasing productivity through ruthless application of genetic science, pharmaceuticals and regimented feed regimes. It is the species 'factory farmed' in the North that will provide scope for expansion in the South. This is a scenario readily confirmed by the international meat trade. According to the UK Meat and Livestock Commission's Senior Economic Analyst, Tony Fowler, 'considerable growth' in demand will come for poultry and pigmeat 'because of their relatively low production prices compared with beef and lamb' and also because 'there is not so much land base required to produce these meats'.⁹⁵ The poultry industry, having already expanded enormously since the 1980s in most areas of the world, is forecast to increase by almost a further 80 per cent in developing nations during the period 1997-2020.⁹⁶

2.5 The inappropriateness of industrialised livestock production in the fight against human hunger

Intensively produced meat cannot possibly feed the world's poor. If nations cannot provide even the basic foodstuffs (grains) to sustain their poorest people, how can they utilise land to grow feed grains for animals who then waste most of the food value of the original grain? It makes no sense. Given that the hungry are hungry because they cannot even grow or afford to buy enough low-priced grain for sustenance, (at least one million people currently survive on less than the equivalent of one US dollar per day), it is far-fetched to suppose that they will suddenly be able to afford relatively high priced pork and chicken.

The example of the Indian broiler chicken industry is one of many that exemplifies the problem. It has grown phenomenally from 31 million birds slaughtered per annum in 1981 to 300 million in 1992 and roughly 800 million by the turn of the century.⁹⁷ Consumption has tripled in the past decade. Yet as the industry itself acknowledges, this has had no impact upon human hunger. Anuradha Desai, Indian Branch President of the World Poultry Science Association, states that the target audience for the Indian broiler market is 'the fast growing middle class of over 250 million potential customers'.⁹⁸ No mention of the poor, for whom the waste of low priced grain on chicken feed means that there is even less potential food. Neither is it as if intensive poultry and pig farming is likely to create many of the employment opportunities so desperately needed to help people out of poverty, since they are both predominantly capital dependent systems which replace human labour with energy-intensive industrialised methods.

2.6 How the rich world is fed

Roughly 70 per cent of UK agricultural land is utilised for livestock production - a figure matched in most areas of the developed world. A proportion of this is grassland or marginal land where (mostly) cattle and sheep at least feed from land that could not easily be used for any other productive purposes, but the vast majority is used for growing grain to be fed to animals farmed intensively. Various estimates put the amount of the world's harvest fed to animals between one third and almost 50 per cent.⁹⁹

In addition to utilising the majority of productive agricultural land in their own nations for animal feed, the livestock industries of the richer parts of the world scour the globe in search of cheap sources of protein for the same purpose from elsewhere. Vast areas of arable acreage in developing nations also fuel meat eating in the North. Vandana Shiva, Director of India's Research Foundation for Science, Technology and Resource Policy, has estimated that 'the livestock of Europe require an area of vegetation seven times the size of the EU to meet their feed requirements'.¹⁰⁰ Bizarrely, at the height of the same 1984 famine which inspired the historic Band Aid concert, Ethiopia exported feed crops to the UK. Similarly, in 1997, during times of extreme food shortages, North Korea exported 1,000 tonnes of maize to Japan for poultry feed.¹⁰¹ These are spectacular examples of the kind of transactions that take place daily, with thousands of hectares in developing nations used for similar purposes. For example, Brazil's soyabean harvest was negligible in the 1970s, but it has now become the country's leading export crop, with vast areas devoted to its production. The vast majority of Brazil's soya feeds Japanese and European livestock.¹⁰² This results in enormous new tracts of virgin rainforest being destroyed annually. (See Part 3 for more detail)

Globally, 90% of the ever-increasing soyabean harvest goes for animal feed.¹⁰³

2.7 The global consequences if the developing world imitates the developed world

Meat production from industrialised systems grew twice as fast as mixed farming and more than six times as fast as from grazing systems in the period 1983-93.¹⁰⁴ This trend continues to accelerate. The developed world's model of food production - rapid growth in meat consumption fuelled by grain and soya fed animals - is already being imitated far and wide. Demand for grain to feed livestock in developing nations is projected to double in the period 1993-2020.¹⁰⁵

Already the impact of this meat boom can be seen in the number of developing countries who have become newly dependent upon imported grain. Twenty years ago Egypt was self-sufficient, with only 10 per cent of its grain harvest fed to livestock. Now the country imports 8 million tonnes every year and livestock account for 36 per cent of total consumption.¹⁰⁶ Even in Thailand, where meat intake remains relatively low, the share of grain fed to livestock surged from less than 1 per cent in 1960 to 30 per cent in 1997.¹⁰⁷ In Mexico, the share has jumped from 5 per cent to 45 per cent over the last quarter of a century.¹⁰⁸ Ethiopia, Nigeria, Iran, Pakistan and Indonesia are amongst a host of other nations which have become net importers of grain, fuelled largely by the growth of their livestock sectors.¹⁰⁹ Most dramatically, China's consumption of meat products rose by 85 per cent between 1995 and 2001 and is forecast to be responsible for 40 per cent of the total world increase up until 2020.¹¹⁰ This development has already helped to transform the country from a net exporter of grain only ten years ago to the second largest importer in the world. China, once the leading producer of soyabeans in the world, is now the leading importer - mostly from the US.¹¹¹

Essentially, the world is becoming ever more reliant upon the US, already responsible for more than half of the world's grain exports.¹¹² If harvests fail or prices rise, the outlook for the poorest nations will be particularly bleak.

2.8 Will the world's grain harvest keep pace with global demand for animal products?

Even amongst those offering widely differing solutions to the problem of feeding an expanding human population, there is some agreement about the nature of the problem. Given lack of land availability, current knowledge of genetic breeding and the existing capacity of fertilisers and other chemicals to maximise yields, the world's grain harvest does not have the capacity to increase at the same level as demand. Under these circumstances, how can food production almost be tripled to provide for a human population forecast to rise above 8 billion by 2020-25?

There are two conflicting responses. Pessimistic commentators argue that, 'in country after country, farmers have discovered that they are already using the maximum amount of fertiliser that existing crop varieties can effectively use'.¹¹³ Therefore, it is argued that there must be grave doubts whether the world's grain harvest can keep pace with even relatively small increases in demand, let alone produce sufficient food by greater dependence upon inefficient methods of industrial animal farming.

Opposing this view are those who either voice unreserved faith in science and technology, or else have a more direct interest in its promotion. Thus far, they assert, grain harvests have always more or less kept pace with demand, despite constant fears from sceptics that they would not do so. With the development of genetically modified (GM) crops they assure us that this can continue to be the case.

The evidence so far does not appear to support the confidence in GM. In the words of a senior spokesperson for the UK Consumers' Association: 'biotechnology's promise to solve the world's food problems raises false hopes that a mere technological fix can solve a complex economic, social and political malaise'.¹¹⁴ The facts are these:

1. Rather than producing the promised crops for hunger alleviation, the vast majority of the 100 million acres of agricultural land so far given over to GM production has been devoted to soyabeans and maize, almost exclusively for animal feed.¹¹⁵
2. Genetically modified crops have yet to produce the promised massive increase in yields. Indeed, in some comparative studies conducted in the US, harvests from soyabeans grown by traditional methods have been considerably higher - up to 11 per cent greater - than from genetically modified varieties.¹¹⁶
3. Considerable public resistance to GM products is not confined to the developed world. There is also a significant protest movement in developing nations among those who see the technology as inappropriate. Delegates from 18 African countries at an international meeting of the FAO issued a statement in which they 'strongly object that the images of poor and hungry from our countries are being used by giant multinational corporations to push a technology that is neither safe, environmentally friendly, nor economically beneficial to us'.¹¹⁷
4. The promise that herbicide-resistant genetically modified crops will kill all weeds is itself inappropriate for the rural poor. Vandana Shiva writes that a significant proportion of their nutrition comes from 'what the agricultural industry terms "weeds". [Agribusiness] has this attitude that the weeds are stealing from them, so they spray (Roundup or other herbicides) on a field which has sometimes 200 species that the women of the area would normally use in various ways as food, medicinal plants, or fodder'.¹¹⁸

So even before any wider debate about possibly more extreme threats posed by GM crops - doubts about safety, cross contamination, loss of biodiversity and human health risks to consumers - its promise as a solution to world hunger seems grossly exaggerated. Rather than an answer to poverty, critics see the genetic revolution as part of an unashamed attempt by multinational corporations to increase profits by gaining control over all areas of food production on a global scale. There are now identifiable direct commercial links between the grain trade, livestock industry, marketers of genetically modified crops and other agricultural sectors:

'Control of the "food-chain" is being concentrated in ever-fewer hands. According to Bill Hefferman, Rural Sociologist at the University of Missouri, in some cases there is "seamless and fully integrated control of the food system from gene to supermarket shelf". When the two giant corporations Monsanto and Cargill went into partnership they controlled seed, fertiliser, pesticides, farm finance, grain collection, grain processing, livestock

feed-processing, livestock production and slaughtering, as well as several processed food brands. This system, developed in the US, is being exported to other countries in the name of globalisation.’¹¹⁹

A far more convincing and less dangerous way to ensure that the world’s grain harvest can feed more people than through biotechnology is for the human population to eat lower on the food chain. The UN World Food Council has estimated that transferring ‘ten to fifteen percent of cereals now fed to livestock is enough to raise the world’s food supply to feed current levels’¹²⁰ of the human population. One major obstacle to such an approach would appear to be that it would be less profitable to the multinational interests who seek a controlling influence on world agriculture.

2.9 Factory farming and developing nations (1) - Brazil’s poultry industry

The attraction of industrialised production to the governments of developing nations is that in the near-term it can increase GDP (Gross Domestic Product). Countries such as Brazil and Thailand, which have built up massive poultry markets over a short period, can point to apparent economic success. In less than 30 years, Brazil’s intensive poultry industry has risen to become one of the biggest in the world, part of the same vast agricultural modernisation policy that has led to the escalation of soyabean production for animal feed exports. Development has been encouraged and partly financed by the World Bank and the International Monetary Fund under structural adjustment programmes (these tend to result in any ensuing profits going more towards debt repayment rather than poverty alleviation). In the 1990s Brazilian poultry exports tripled - mainly to South East Asia, Argentina, and the EU - making it the second largest exporter in the world.¹²¹ Superficially, it sounds like a great achievement. But already probable long-term consequences are emerging. The nature of intensive farming means that it always favours large companies, capable of cutting costs by integrating feed and stock supply, equipment, transport, processing and marketing. At best small producers have little independence, running poultry fattening units for big companies. In time, small-scale operations tend to be squeezed out of the market. This has already happened to Perdigao, a Brazilian family-owned company which grew astronomically in the early years of the poultry boom, but eventually found itself in difficulty and was taken over by financial interest groups.¹²² It became caught up in the spiral of vertical integration which is an inevitable feature of the industry. In the interest of competitiveness there is a seemingly endless battle to cut costs. Brazil’s feed mills have now been sold to US based multinational specialised companies such as ADM and Cargill, streamlining operations, but taking money out of the national economy. Four integrated companies cover 40 per cent of the Brazilian broiler chicken market.¹²³

Despite this vast integration towards multinational enterprise and rising consumption of poultry and other meats among the middle classes, the impact upon poverty in Brazil has been nil. While the number of chickens slaughtered has more than doubled from 1.5 billion at the end of the 1980s to 3.325 billion a decade later, the percentage of people officially considered malnourished has also risen - hardly a ringing endorsement of the capacity of industrialised animal production to fight human hunger.¹²⁴

2.10 Factory farming and developing nations (2) - Sri Lanka's experience in the 1990s

Mainly due to its considerable natural resources (particularly the scope for home-grown animal feed), Brazil's remains so far a relatively profitable poultry industry. But when the same process of industrial vertical integration affects a less fortunate nation the results can be considerably more alarming. Sri Lanka's experience in the 1990s illustrates the dangers. Like many other developing nations it established an intensive poultry industry in the late 1970s, also typically importing stock, equipment and veterinary products from Europe and the US. At first, results were economically impressive. The country became self-sufficient in poultry meat and profits were made by all of the relatively small scale producers. A boom period followed, but expansion was then limited by lack of available home-grown grain for feed. At that stage, 'a foreign entrepreneur' stepped in, facilitating further growth by supplying grain-based feed from overseas. This enabled 'large scale farmers, especially the multinational entrepreneurs', to expand their enterprises 'immeasurably'. When the cost of feed and drugs increased dramatically in the mid-1990s, the smaller producers were thrown into 'a serious crisis... causing great hardship'. They were unable to compete with 'the large scale poultry farming entrepreneurs who may dominate the industry'.¹²⁵

While it is outside the scope of this report to enter far into a debate about the effects of the globalised economy, some comment is essential, for the rise of industrialised animal farming in poorer nations is a potent example of the kind of perverse economic logic which has created such a vigorous anti-globalisation movement against it. Current free trade rules operated by the World Trade Organisation (WTO) under the General Agreement on Tariffs and Trade (GATT) encourage policies which, while they may raise GNP (Gross National Product) for poorer nations in the short term, do so in ways that encourage unsustainable policies which penalise small producers. As Barry Coates of the World Development Movement has pointed out, 'a free trade system is rarely a fair trade system. As a result, social, environmental, health, animal welfare and other considerations are systematically excluded and the interests of developing nations are ignored. The current trading system serves the interests of a small minority'.¹²⁶

2.11 Factory farming, globalisation and food security

In the introduction to this report, the World Bank definition of food security was quoted as, 'the individual's access to enough food to maintain a healthy and active life'.¹²⁷ A more comprehensive definition was offered in a Non-Governmental Organisation (NGO) declaration at the Rio conference in 1992:

'Food security is having the means as an individual, family, community, region or country to adequately meet nutritional needs on a daily and annual basis. It includes freedom from both famine and chronic malnutrition. Food security is best assured when food is locally produced, processed, stored and distributed, and is available on a continuous basis regardless of the climate and other variations.'¹²⁸

The NGOs are surely correct in asserting that while trade in food between nations is sometimes beneficial to enrich and vary diet, the primary purpose of production should be to feed as many people as possible from healthy food grown locally. As soon as such common-sense principles are applied, it becomes obvious that for countries such as Brazil (second biggest broiler chicken exporter) and Thailand (sixth largest) to focus food policy upon selling to rich areas of the world such as Japan and Europe is illogical. The export market for poultry exists neither because the selling nations have well fed local populations and excess food production, nor because they are providing a product that cannot be obtained easily in other areas of the world. Intensive broiler chicken systems can be operated anywhere, so the only reason that developing countries have found a market in richer parts is that, for a

period at least, they can sell more cheaply than their competitors. They are able to do this only because labour is cheap and both animal welfare and public health may take lower priority than in Europe.

The eventual problem with this reductive free trade philosophy is that another nation is always likely to take over the market by producing the same goods even more cheaply. In the case of poultry and other meats, this is eventually almost certain to be China (already the tenth biggest exporter of broiler chickens in the world). Overall meat consumption in China increased by 85 per cent between 1995 and 2001 and, with its economy growing at a phenomenal rate, both production and consumption will almost certainly continue to rocket there.¹²⁹ All the large industrialised nations are fighting for an interest in their emerging market.

In spite of the enthusiasm among poorer countries to enter the international trade in animal products, it defies all logic for them to import grain to feed animals which they then export to richer nations. As the International Fund for Agricultural Development (a United Nations advisory organisation) has concluded, 'broiler chickens should not be included as a livestock enterprise in projects supporting poor farmers because of the evidence that in the long-term, small semi-intensive, group-operated poultry units can never compete with the large industrial enterprises which eventually control the market'.¹³⁰

2.12 The double burden of disease in the developing world - hunger and obesity

The argument is sometimes advanced that even though the development of intensive farming cannot feed the poor directly, the benefits to the GNP achieved by increased consumption among the (mainly) urban middle classes might 'trickle down' to help the poor. But in addition to historical evidence which suggests that this is unlikely to happen, the health problems created for those 'new' middle-class consumers who aspire to a 'Western diet' high in animal products has also to be taken into account. A relatively new phenomenon in the developing world is what has been labelled, 'the double burden of disease'.¹³¹ While the hungry continue to suffer stunted mental and physical growth, disability and death as a result of lack of adequate food, those affluent enough to afford an animal fat-rich diet become part of what WHO/FAO describe as, 'the global epidemic of obesity, with its attendant co-morbidities - heart disease, hypertension, stroke and diabetes'. Obesity has already 'become a serious problem throughout Asia, Latin America and parts of Africa'. Incidences of what were once health problems largely confined to the North are escalating so rapidly that by the year 2020 it is projected that, '71% of ischaemic heart disease deaths, 75% of stroke deaths, and 70% of diabetic deaths will occur in developing countries'. Evidence that diet is a key factor is uncontested, with the WHO/FAO asserting that, 'the public health approach of primary prevention is considered to be the most cost-effective, affordable, and sustainable course of action to cope with the NCD epidemic worldwide'.¹³² (NCD stands for non-communicable diseases, the generic title given to non-infectious illness such as heart disease, obesity and diabetes.)

What makes the contribution of poor diet to the rise in NCDs particularly severe in the developing world is that a significant percentage of the increased consumption of animal products is derived from high-fat junk food. US multinational fast food outlets are particularly popular in urban areas. Decrying these effects of globalisation, Maneka Gandhi argues that:

'The companies coming in to supposedly help strengthen India are not making roads or schools or any key projects. Instead, Kentucky Fried Chicken, McDonald's and Pizza Hut are the first fruits of liberalisation.'¹³³

In spite of a recent slowdown in its worldwide expansion programme, McDonald's operates 30,000 restaurants in 118 countries, including many in developing nations. ¹³⁴

By contrast to the growing threat from NCDs to the health of developing nations, the WHO/FAO cites South Korea as one positive example of a nation which is 'notable since the community has largely maintained its traditional high-vegetable diet despite major social and economic change'. It is no coincidence that it also has 'lower rates of NCDs and higher life expectancy than other industrialised countries'. ¹³⁵

The cost of diet-related illness to health services in richer countries is in itself alarming, but in developing nations the effects are potentially devastating. **Not only does industrial farming produce food that the poor are unable to afford, the probability remains that it will put such a strain on fragile health care systems that it may actually take valuable resources away from the fight against poverty.**

2.13 The positive aspects of traditional diets in the developing world

Despite the health risks associated with diets based upon animal products, some commentators argue that increases in meat consumption for the very poor have particular health benefits. For all the negative associations with 'diseases of affluence', animal products do, as we have already noted, provide an immediately accessible source of protein, zinc, calcium and iron that is often lacking from the grossly limited (predominantly) vegetarian diet of the severely malnourished. This has prompted the World Bank, for example, to champion the potential of meat and dairy produce in the fight against human hunger on the basis that 'when confronting chronic malnutrition and micronutrient deficiencies, supplementing traditional diets of maize and cassava with animal foods can make an important difference'. ¹³⁶ Despite stressing the overall advantages of a diet high in vegetables and fruit and low in animal foods, the WHO/FAO report raises a comparable point, when it acknowledges that 'the question arises as to the feasibility and sustainability of horticultural production which would allow such a large part of the world's population to achieve the recommendations for healthy diets'. ¹³⁷

While improving the efficiency of small-scale mixed farming to allow greater meat consumption would benefit the malnourished, several other factors also have to be considered. Firstly, 'supplementing traditional diets of cassava and maize' with **any** nutritional foods would 'make an important difference' to the diet of the poor. The fact that animal products do offer easily accessible nutrition does not mean that large-scale dependence on them is the best long-term solution - on the contrary, too much reliance will bring with it massive health costs and a break with the positive basis of many traditional diets. While there are no magic answers to the problems of world famine, the most rational and health-enhancing long-term plan is to develop and improve the traditional diets of most poorer people in developing nations, rather than to destroy them. The World Health Organisation/Food and Agriculture Organisation confirms this view:

'Marketing practices commonly displace local or ethnic dietary patterns. Global marketing in particular has wide-ranging effects on both consumer appetite for goods and perception of their value. While some traditional diets could benefit from thoughtful modification, research has shown that many are particularly protective of health and clearly environmentally sustainable.'

Diet, Nutrition and the Prevention of Chronic Diseases, Final Report of a Joint FAO/WHO Expert Consultation, WHO Technical Report Series 916, March 2003.

Since rice, maize and wheat are the staple foods of around four billion people (two-thirds of the world's population), improvements in diet should be based securely upon these crops (other cereals such as millet, sorghum and rye are also important). Moreover, the environmental sustainability of many traditional food producing systems is illustrated by the fact that 80 per cent of farmers in developing countries do not need to change their methods to be certified organic (Millstone & Lang. *The Atlas of Food*, 2003). Clearly, a rush towards intensive animal production would threaten these positive aspects of traditional diets.

2.14 The effect of diet in the developed world upon the developing world

If we in the developed world reduce our meat consumption on grounds that it might help to alleviate world hunger, would it actually make any difference to those without enough food? Opinions vary, ranging from isolationists who can see no connection whatsoever between our diet and the lives of those on the other side of the world, to some vegetarians who claim a non-meat diet as a complete answer to world hunger. Both viewpoints fail to take account of other complex geographical, political and economic factors.

In 2001, the US-based International Food Policy Research Institute published a report on 'sustainable options for ending hunger and poverty' entitled *2020 Global Food Outlook*. Using IMPACT, the most advanced available computer programme, it posed the question whether a 50 per cent reduction in meat eating in the developed world by 2020 would have any effect upon the world's most malnourished children. It concluded that:

'The number of malnourished children in developing countries would decline by 3.6 million children in 2020 and by 1.2 million in Sub-Saharan Africa.'¹³⁸

Although the authors conclude that this 'is much smaller than many observers have predicted', a number of points emerge from their study:

1. Even though 3.6 million lives out of a projected 129 million undernourished children is only 2.8 per cent of the total, it is in itself a good enough reason to justify the reduction.
2. Why restrict the calculation only to children? Roughly 1.2 billion people currently live in absolute poverty (Vital Signs 2003: The Worldwatch Institute), so the same 2.8 per cent would relieve 33.6 million people in total. Even in the extremely unlikely event that the World Food Summit achieves its target to reduce the undernourished to 400 million by 2015, it would mean a saving of 11.2 million people from hunger. While these figures can only offer an estimate, they at least give an indication of the considerable impact that meat reduction could have on global hunger.
3. Decreases in meat eating in excess of 50 per cent would save even more lives.
4. There are several reasons why the International Food Policy Research Institute (IFPRI) report could well be an underestimate. The organisation - whose influence on the policies of major development agencies is significant - bases its report upon the supply and demand economic model currently in operation in the globalised economy. Its calculation is essentially based upon the consequences of less meat eating on international grain harvests and prices. Even the World Bank points out that the IFPRI prediction 'does not account for eventual resource constraints such as water, land and significant increases in energy costs'.¹³⁹ All of these could significantly alter market forces. International food policy may have to be reformed by withdrawing subsidies and taxes on unsustainable practices. It is likely that such policies would lead to reduced meat consumption in the North which could be beneficial in the fight against world hunger.

5. A concerted effort to reduce meat eating in richer parts of the world might possibly cause some developing nations to reconsider the benefits of the 'livestock revolution'. It is theoretically possible that developing nations might instead pursue greater food self-sufficiency based on increasing the range and nutritional value of plant foods. While there is comparatively scant finance committed to the development of suitable products, research into micronutrient-dense staple food crops (rice, wheat, maize, beans and cassava) is already taking place. Using conventional breeding techniques contained in international germ-plasm banks, researchers are looking to produce 'fortified' plants as a low-cost and sustainable way to reduce micronutrient malnutrition. These could go some way to overcoming the difficulties in providing a varied plant-based diet for the hungry. ¹⁴⁰

2.15 Summary

For several reasons an increase in meat production through intensive methods cannot be a rational response to human hunger because:

1. It can only be achieved on any significant scale through industrialised farming methods.
2. Its produce cannot be afforded by the poor.
3. It is inescapable that, using industrialised methods, more food in the form of grain has to be fed to animals than can ever be recovered in the form of meat. Together with its greater use of water resources, this dictates its ultimate inappropriateness in maximising food production.
4. The increase in grain demand to sustain higher levels of meat production threatens global food security.
5. The nature of industrial farming favours vertical integration, demanding that small producers cannot long compete in the market and thereby marginalising the very people most in need.
6. The globalisation of intensive meat production cannot offer a long-term rational solution to problems of human hunger.
7. According to very conservative estimates, a 50 per cent reduction in meat eating in developed nations could save 3.6 million children from malnutrition.

PART THREE

Poisoning the planet

Animal farming is having a detrimental effect upon the environment for precisely the same reasons as it is diminishing the world's food producing potential. Far too many animals are being bred, and as a result, unsustainable pressure is put upon land, water and the atmosphere. Not only are livestock consuming too much water and grain, they are producing too much effluent, emitting too many greenhouse gases, and degrading too much pasture. Meat production has become a serious environmental hazard.

Under traditional methods, animal wastes are considered to be of great benefit - a key ingredient in rotational systems which produce a variety of foods and maintain the health of soil. In mixed rotational farming, dung is used as fertiliser/soil conditioner and, as we have seen, it can also be used as a fuel source. While non-animal manure can also be used as a source of soil fertility, it remains beyond dispute that integrated mixed farming has been practised for centuries as an ecologically sound method of food production. Problems emerge principally when the number of animals reared becomes too great for the surrounding environment to cope with. It is this point that has already been greatly exceeded in many areas of the world.

3.1 Water pollution and livestock farming

It has already been noted how an excessive population of farm animals is placing an intolerable strain upon dwindling water resources. A further problem is that it is also polluting water supplies. Worldwide, livestock produce an estimated 13 billion tons of waste every year, and the problem of what to do with it is increasing. In a revealing comment by the UK Meat Trades Journal, 'the list of companies which have been prosecuted by the National Rivers Authority for pollution offences reads like a who's who of the meat and food industry'.¹⁴¹ Liquid slurry from livestock oozes into watercourses and waterways and the excess nitrogen and phosphorous levels it contains can ruin groundwater quality and damage aquatic and wetland ecosystems. The reason that levels of nitrogen and phosphorous are so high is that farm animals can only absorb a limited proportion of the amounts contained in their feed. Roughly 70-80 per cent of dietary nitrogen fed to cattle, pigs and laying hens, and 60 per cent fed to broiler chickens, is excreted in faeces and urine.¹⁴²

Each species of farm animal is creating its own set of problems. Dairy farming, for example, produces silage effluent, slurry, and dirty water from parlour and yard washings. According to UK government figures, dairy cows produce an average 57 litres of excreta every day and utilise 18-35 litres of cleaning water. The liquid waste from dairy farms is hundreds of times more polluting than human sewage.¹⁴³

Roughly two thirds of litter from UK poultry houses is spread on agricultural land and most of the remainder burnt in power stations, leading to claims by the industry that it produces an environmentally-friendly product. Yet there remains serious concern that poultry litter is responsible for nitrate, phosphate and pathogen pollution of both ground and surface water.¹⁴⁴

In the US, North Carolina has become a centre of intensive pig farming, with a population of 7 million animals. These pigs produce four times more waste than the state's 6.5 million people. The result has been massive fish

deaths from oxygen depletion caused by pollution and dramatic increases in human illnesses, particularly those caused by the toxic microbe *pfisteria piscicada*.¹⁴⁵ The North Carolina experience is being repeated on a smaller scale in other areas of the world where intensive pig farming dominates. The Humberside area of the UK has suffered serious water pollution from intensive pig production, while the most striking European example of the way in which pig slurry can devastate the local environment is in the Netherlands. The country has nitrates in its groundwater at more than double the maximum allowable level.¹⁴⁶ The problem of disposal has become so intense there that the government saw no choice other than to demand a 25 per cent reduction in the nation's pig production.

By promoting industrial farming, developing nations are inevitably inheriting similar pollution problems. Ninety-two per cent of surface water in the western part of the Brazilian state of Santa Catarina is said to be contaminated by intensive pig production.¹⁴⁷ In Taiwan, an estimated two-thirds of water pollution is from hog manure dumped into the country's waterways.¹⁴⁸ According to the World Bank, 'a rough estimate indicates that about 100,000 square kilometres in the developing world are already threatened by severe nutrient loading causing eutrophication of waterways and subsequent damage to aquatic ecosystems'.¹⁴⁹ In developed countries, where there is at least some legislation to control contamination of water supplies from livestock farms and slaughterhouses, the problems remain acute. In developing nations, where environmental protection is normally still less of an issue, the effects are likely to be far worse. According to one report, 'slaughterhouses in developing countries release large amounts of waste into the environment, polluting land and surface waters... In some slaughterhouses there is not even running water for cleaning'.¹⁵⁰

It is not only effluent and blood that are polluting water supplies. The vast areas of agricultural land devoted to the growth of fodder for animals demand particularly high inputs of fertilisers, pesticides, herbicides, insecticides and fungicides. At best this poses a high monetary cost in water treatment, at worse, in developing countries without sophisticated cleaning plants, pollution and nitrate levels in freshwater have reached the point where human consumption is severely threatened.

3.2 Land pollution and livestock farming

Similar pollution problems are affecting soil condition. High quantities of nutrient rich manure (nutrient rich because of the high protein feed) cannot be safely absorbed within limited areas. The same nitrate, phosphate and pathogen packed poultry manure that is a risk to waterways can also contaminate soil. The additional presence of metals such as copper, arsenic, iron and manganese causes further pollution.¹⁵¹ Similarly, the same pig and cattle effluent that has become such a problem to water supplies through leaching is also having a damaging impact upon the soil.¹⁵² As with other negative impacts of industrialised livestock production, problems seen at their most extreme in the eastern United States and north-west Europe are now becoming commonplace in those parts of the developing world that have enthusiastically adopted its model - notably East Asia and Latin America. In some areas of the former the capacity of plants to use the nutrient supplied by animal waste is sometimes exceeded by a massive 1,000 kilograms of nitrogen per hectare.¹⁵³

Another environmental problem in developing nations is the propensity for new industrial farming enterprises to be located relatively close to urban areas. Without strict planning and environmental laws this can cause particularly acute human health hazards.

3.3 The contribution of animal waste to acid rain and global warming

A further consequence of the massive amount of animal wastes is air pollution. The high ammonia content is a significant cause of 'acid rain and the destruction of marginal landscapes and habitats'.¹⁵⁴ Greenhouse gases produced by farm animals are a major contributor to global warming. These include nitrous oxide - described by the World Bank as 'one of the most aggressive greenhouse gases'¹⁵⁵ - carbon dioxide and methane.

The industrial farming industry itself acknowledges the problem:

'Livestock buildings are a major anthropogenic [caused by human activity] source of atmospheric pollutants, such as ammonia, nitrous oxide, methane and carbon dioxide, which contributes to soil acidification and global warming.'¹⁵⁶

Although all food production which uses energy derived from fossil fuels releases some carbon dioxide back into the atmosphere, there are significant differences in the amounts produced. To produce one calorie of protein from soyabeans takes an estimated two calories of fossil fuel, compared to three calories to produce a calorie of corn or wheat. For beef it takes 54 calories of fuel to make only one calorie of protein.¹⁵⁷

Research in the UK indicates that cattle and sheep fermentation is responsible for 95 per cent of methane produced from farming, with the rest created from slurry and manure. The same study showed that one third of nitrous oxide emissions come from slurry and manure, while 39 per cent of the nation's ammonia is also derived from animal farms.¹⁵⁸

Worldwide, animal manure is responsible for 15-20 per cent of annual methane emissions,¹⁵⁹ 7 per cent of nitrous oxide,¹⁶⁰ and 10 per cent of total greenhouse gases¹⁶¹ - contributing tellingly to what is now widely recognised as probably the greatest global environmental threat.

3.4 The effects of overgrazing and animal feeds on wildlife and soil

Even where animals are not industrially farmed there are severe limits to the capacity for environmentally sustainable production. Once these limits are exceeded the effects are severely detrimental. This can be seen both locally and globally. The concentration of animals kept in many areas of Europe (encouraged by an EU subsidy system which rewards hill farming) has caused considerable damage. In the period 1947-80 some 20 per cent of the UK's natural heather was destroyed by sheep, as was much of the natural oak and alder vegetation in the upper reaches of many rivers.¹⁶² This has caused banks to collapse, streams to widen and gravel to be washed down by floods, thus destroying the spawning grounds of salmon and trout. Increasing numbers of sheep per hectare has also resulted in the ploughing and draining of vast tracts of previously unspoilt land and hedgerows - as has the intensification of dairy farming. Overstocking of heavily subsidised sheep at one of the Three Peaks in Yorkshire has created what Friends of the Earth described as an 'ecological disaster'. Destruction over several thousands of acres has resulted in the loss of several rare plant species.¹⁶³

Internationally, severe problems of soil compaction, erosion and decreased soil fertility are being experienced in many cattle-ranching areas. These include the American West, Central and South America, Australia and Sub-Saharan Africa. The United Nations Environmental Programme (UNEP) estimates that 20 per cent of the world's grazing lands have been significantly degraded since 1945, with the pace of destruction increasing.¹⁶⁴ Desertification - where land is no longer capable of sustaining food production - affects roughly 50 million acres of

the world's available agricultural land every year, with overgrazing (particularly of beef cattle) a leading cause.¹⁶⁵ In many parts of the famed American West, overgrazing from the Great Plains to the Pacific Ocean has ground down native grasses and trampled streams (much of the destruction is subsidised by more than \$100 million of public money). 3.2 million cattle are grazed on public lands covering 254 million acres in 17 Western states.¹⁶⁶

A 1999 investigation by a local newspaper, The San Jose Mercury News, summarises the environmental impact: 'The lifeblood of the arid West, streams, make up only 1 per cent of the acreage in the 11 Westernmost states. Yet scientists say at least 70 per cent of wildlife there depends on them for survival... Largely because of cattle, only 36 per cent of streams surveyed by the Bureau of Land Management on its public lands in the Lower 48 states are classified as "proper functioning" or healthy... Severely overgrazed streams have trampled banks and little vegetation. Murky, warm water is choked with sediment, algae and manure.'¹⁶⁷

Comparable desertification is also occurring in many poverty stricken areas of the world, where effects on the rural poor are most critical. Larger livestock populations - partly created by subsidised feed concentrates from wealthier nations - are degrading grazing in many areas, including 'the semi arid Sahel, West Asia and North Africa, and the Southern Cone of the Americas'.¹⁶⁸

It is also the rural poor who are most threatened by the changes in global climate to which industrial animal farming contributes significantly. Drought caused by the failure of life-sustaining rainy seasons and other natural disasters have become the chief cause (alongside war) of extreme human famine - a pattern likely to accelerate. Furthermore, climatic change may well turn out to limit even further the grain producing capacity of many regions across the planet. The Australian 2002 drought which threatened to reduce the annual grain harvest by 40 per cent seems unlikely to prove an isolated example.¹⁶⁹

3.5 The pollution problems of overfishing

As we have seen, leading health agencies see fish as a healthy food. It is the main source of animal protein for approximately 1 billion people (WHO, 2003). But while the oceans are a valuable food for many of the world's poor communities, the capacity for increased food production from them is limited, principally by lack of available stocks, but also because of pollution and destruction of estuaries, mangroves, wetlands and other fish habitats. Fish currently provide only 1 per cent of global food supply and 5 per cent of protein and the probability is that consumption will fall in the next two decades because of dwindling availability.¹⁷⁰ In December 2002, the EU agreed to cut cod quotas by 45 per cent in a desperate bid to conserve supplies. Other white fish stocks were also reduced. The story of diminishing reserves is similar in many oceans of the world. Intensive fish farming is no answer either, as keeping large numbers concentrated in one area causes pollution from wastes, excess feed and chemicals used in production. Soluble wastes can raise levels of nitrates, phosphates and other nitrogenous chemicals, leading at worse to toxic algae blooms and the deaths of marine life on the seabed.¹⁷¹ It is the same problem as with livestock production. Once numbers exceed the capacity of the local environment to cope, pollution and degradation are an inevitable result.

3.6 Intensive animal farming - impact upon biodiversity

In an attempt to increase food production, habitats rich in wildlife are constantly being eroded. Once again this is a problem that exists both locally and (more dangerously) globally. According to the Council for the Protection of Rural England, England lost an area of grassland the size of Bedfordshire in the period 1992-99 - the equivalent to

100 football pitches every day.¹⁷² The main causes of the disappearing meadows were intensive dairy farming and the growing of cereals and other subsidised crops, mostly for animal feed (too much potato production was a third major reason). Since the Second World War, the UK has lost most of its wildlife-rich meadows, one half of heathland, lowland fens and valley and basin mires, and one third to one half of ancient woodlands and hedgerows, while increased use of fertilisers and drainage has contributed further to severe losses of species diversity.¹⁷³ Livestock farming is not the sole cause, but overgrazing and the devotion of vast acreage to the growing of animal feed play a major role.

Returning to the example of the impact of cattle grazing in the American West, a 1994 report by the US Forest Service named it as 'the No 1 cause of species being put on the endangered species list in the Southwest and fourth major cause nationwide'.¹⁷⁴ Species adversely affected include fish, songbirds, ducks, deer, insects, molluscs and crustaceans.

Worldwide, approximately 200 million hectares of tropical forest have been lost since the 1960s, much of it cleared for cropland and cattle grazing.¹⁷⁵ While the areas of forest destroyed in Central and South America for 'hamburgerisation' - the fattening of cattle for the burger trade - has largely been limited by an overdue end to subsidised production, valuable areas of forest continue to be destroyed in many areas, with livestock production still a major cause.

The Brazilian soya crop offers a potent example of how dependence upon growing animal feed for export can affect adversely both local diet and environment. It has caused devastation of the ecosystem of the Cerrados plateau. Vast areas of forest filled with valuable species have disappeared; soil has been eroded; intensive chemical farming has led to the growth of disease and pests. Soyabean cultivation has been blamed for an epidemic in the whitefly pest, which has seriously undermined traditional areas which once grew beans for human consumption. In the period 1981-94, while soyabeans took over immense tracts of Brazilian land, consumption of beans by the local population almost halved. Now it seems that Amazonian deforestation is escalating. According to Brazil's National Institute for Space Research, in the year up to August 2002, 25,500 square kilometres of rainforest – an area roughly the size of Belgium – was destroyed. This is the second highest annual total in 30 years and a 40 per cent increase over the previous year. The main reason for the deforestation has been to create new areas of soyabean cultivation for industrial animal feed – much of it for export to Europe.¹⁷⁶

Deforestation and degradation will be the inevitable outcome of further significant increases in the number of grazing animals.¹⁷⁷ This will cause habitat loss for wildlife and plants, a rise in carbon dioxide emissions and a growing threat of drought, since the forests play a crucial role in regulating rainfall.

3.7 Summary

1. Under traditional organic systems animals played an important part in maintaining soil fertility and conserving the environment and biodiversity. They were farmed in relatively small and sustainable numbers as part of a mixed rotation system, or on pasture where crops could not easily be grown.
2. Once the number of animals farmed goes beyond the capacity of the land to sustain them, their impact upon the natural environment is destructive.
3. The explosion in livestock numbers means that in many areas of the world they have become a major source of land, water and air pollution, acid rain and global warming. Overgrazing has become a threat to biodiversity and soil. The number of animals reared exceeds the earth's capacity.
4. Since there is so little new land available to allow increases in sustainable methods of production, greater reliance upon livestock production will come mostly from industrialised methods, intensifying the environmental problems that have already occurred.

PART FOUR

Food safety - from *Salmonella* to BSE

'Food scandals' associated with methods of production have become increasingly common in recent years. These range from Foot and Mouth Disease (FMD) and BSE to dangerous epidemics of food poisoning and fears of antibiotic resistance amongst the human population. Industrialised methods of production are placing a heavy burden upon both public health and the public purse. The globalisation of the meat industry adds to the scale of the problem.

The most recent UK farming crisis was the 2001 outbreak of FMD. While the exact cause remains unclear (infected imported meat is the most favoured suspect), there can be no doubt that intensive methods and the density of animals kept in closely confined areas helped to spread the disease far and wide. In particular, livestock markets created a perfect environment for the spread of FMD (as it does other pathogens). Animals who are often already stressed and exhausted by long journeys are regularly confronted by inhospitable conditions and heartless treatment. This lowers their already fragile resistance to infection. In the House of Commons, Prime Minister Blair admitted that there were a staggering 1.3-1.6 million 'sheep movements' in the month before the FMD virus was recognised.

More than five million animals were condemned during the FMD epidemic. This cost the government more than £2 billion in direct payments to farmers alone. The total deficit to the nation - including the losses sustained by the tourist industry - was estimated at £9 billion.

Given its huge negative impact on animal welfare and the economy, it is ironic that FMD is one of the few recent agricultural crises that did not actually pose any danger to human health. The previous major scandal - bovine spongiform encephalopathy (BSE) - was (and remains) far more perilous. Recent reports suggest that twice as many UK cattle may have been infected as was previously suspected, bringing the total to more than 2 million. The new calculations are based on biochemical testing of some 14,000 cattle slaughtered between 1999-2000.

Although it now seems that the number of cases of variant Creutzfeldt-Jakob Disease (vCJD) - the human equivalent of BSE - is unlikely to reach the epidemic levels once feared, there is still no certainty about actual levels of infection. In November 2002 there were new reports suggesting that the figures might be considerably higher than recent statistics had indicated. For the first time it was suggested that BSE might be responsible for cases of Creutzfeldt-Jakob Disease other than those attributed to the new variant form of the disease previously associated with infected meat. Final casualty figures will not be known for many years because of the long incubation period of the disease, but by January 2004, 139 people in the UK had died from vCJD. ¹⁷⁸

There is little doubt that BSE was caused by the process of recycling the remains of livestock into animal feed, turning natural herbivores into carnivores. Although the UK eventually outlawed such practice (other than permitting the use of fishmeal for non-ruminants) it is still common for many countries to utilise meat, bone and feather meal in animal feeds.

4.1 The increase in *Campylobacter* and *Salmonella* poisoning

While a small number of food poisoning incidents are caused by plant foods (particularly pathogens spread in salads kept above refrigerator temperature and also poisonous fungi), the vast majority are attributable to animal products. Broiler chickens are the most potent source. The World Health Organisation states that, '*Campylobacter*

species are now the commonest cause of bacterial gastroenteritis in developed countries, and cases are predominantly associated with consumption of poultry'.¹⁷⁹ Some 90 per cent of US chickens¹⁸⁰ and 50-75 per cent in the UK are infected with *Campylobacter*,¹⁸¹ now the most common cause of food borne disease in those countries. Symptoms in humans can include nausea, vomiting, diarrhoea and, in extreme cases, severe illness and death. More than 750 people die from *Campylobacter* infection every year in the US.¹⁸²

A majority of turkeys also carry *Campylobacter* pathogens, while pigmeat is a further source. A recent survey shows that 87 per cent of live pigs carry the same strain of *Campylobacter* which affects humans, with around 5 per cent of pig carcasses in laboratory tests still carrying pathogens in the meat after slaughter.¹⁸³ This supports findings by researchers showing infection in 90 per cent of Dutch pig herds.¹⁸⁴

The second most common food borne disease is *Salmonella* poisoning. Again poultry meat is the main cause, with the illness in humans taking a comparable course to infection from *Campylobacter*. The US Department of Agriculture assesses that *Salmonella* affects 20-30 per cent of broiler chickens and turkeys.¹⁸⁵

A UK survey by Which magazine in 1996 demonstrated that 30 per cent of the chickens sold in supermarkets should have been declared 'unfit for human consumption' according to the nation's meat hygiene regulations.¹⁸⁶

Other serious recent food scandals have been particularly associated with the fast food industry. The emergence in the 1990s of E.coli 0157 in the US became known as 'the hamburger disease'. According to official figures, 200 people are reportedly becoming ill with the disease in the US every day, though the actual figure is likely to be considerably higher.¹⁸⁷ It is caused by faeces coming into contact with the carcass during the slaughter process. In the UK, outbreaks have led to severe illness and even death among vulnerable groups.¹⁸⁸

The total impact of food borne disease is chilling. According to the WHO, 130 million European citizens are affected each year,¹⁸⁹ while in the US 76 million fall ill annually, with 5,000 deaths.¹⁹⁰

4.2 Emerging diseases and the risk to human health

New diseases are emerging in the livestock industry all the time, many of them posing either an actual or a potential threat to human health. Swine fever outbreaks both in Asia and Europe have been amongst the most widely publicised scares, leading to draconian animal slaughter measures. Other dangerous recent epidemics include an outbreak in Malaysia of Nipah disease. The virus killed over 100 pig farm workers and a further 150 developed non-fatal encephalitis. One million animals were slaughtered to control the newly-emerged Nipah strain.¹⁹¹

In 2002 in the UK, meningitis in pigs became the latest zoonotic disease to hit the headlines. Dr David Taylor, a Professor of Veterinary Bacteriology and Public Health, revealed that the infection was jumping the species barrier from pigs to humans. By the end of 2001 - he announced - 38 human victims had been recorded. Most victims are believed to have contracted the disease from handling infected meat, but consumption could not be ruled out as a cause in some cases. A further concern is that once the disease crosses species from pigs to people, it can then be passed on from human to human.¹⁹²

Another new disease sweeping through the pig herds of the world is Post-Weaning Multisystemic Wasting Syndrome (PMWS). In November 2002, a newsletter from the industry's own Pig Disease Information Centre reported that the disease was not only rampant, but also had links to *Salmonella* pathogens:

'Like many other pig-producing countries, [the UK] has experienced an alarming epidemic ... over the past two years... Now a report 'Salmonella in Livestock Production in GB' published by the Veterinary Laboratories Agency (VLA) records that a case-control study by the VLA has found an association (probably not a direct causal link) between the occurrence of PMWS and salmonella infection on pig production farms.'¹⁹³

Poultry farms are equally disease ridden. An epidemic of avian flu virus in Hong Kong and more recent outbreaks across east Asia have led to mass slaughter of the flocks. But the virus is not confined to Asia. In 2002, an outbreak of a (fortunately) weak strain devastated Virginia's poultry industry. During the spring and summer, 4.7 million Virginia chickens and turkeys were killed in an attempt to control the disease, subsidised by nearly \$70 million in indemnity payments to farmers. It was reported that 23,000 birds are sold daily in the live markets of the north-eastern US, 40 per cent of which are positive for specific avian influenza viruses at any given time.¹⁹⁴

In Poultry Industry magazine (July 2002), Dr. Jean-Pierre Vaillancourt, North Carolina State University veterinarian, writes that, 'high biosecurity and proper monitoring are still wishful thinking in many areas of intensive poultry production'.¹⁹⁵ He explains how the industry has created an environment very favourable to highly contagious agents. Intensive selection for high productivity has left birds' immune systems compromised, with scientists discovering more and more immuno-suppressive microbes.

The SARS outbreak in 2003 has been linked to the breeding of civet cats for meat and their sale in live markets in southern China.

While the public health risks associated with industrial farming may vary from infection to infection, they are all the result of an overall philosophy that ignores the interests of animals in an obsession with productivity. The sheer number of animals reared, transported, slaughtered and processed creates perfect environments for dangerous pathogens to develop, thrive and spread during all stages of production. Rearing conditions routinely place animals in overcrowded sheds or pens in contact with faeces and urine. The litter in broiler chicken production remains unchanged throughout the six-week fattening period (in the US it is often changed only once every year). The outbreak of meningitis in pigs is attributed largely to dirty, damp and overcrowded pens filled with slurry. Similar problems are created among intensively reared beef cattle, with many animals confined in small areas, living amid pools of manure. Additionally, animals fattened in intensive units are bred to put on weight at unnaturally rapid rates, weakening immune systems and leaving them particularly susceptible to infection.

It isn't only during fattening that poor conditions encourage the spread of infection. Markets, transport, slaughter and meat processing systems all add to the risk. When dangerous pathogens are present in the guts of animals, there remains a real possibility that they may spill onto the carcass in abattoirs. This leaves humans at risk when faecal material remains on meat. The speed and mechanisation of the slaughter process - for instance up to 6,000 chickens are killed in an hour routinely¹⁹⁶ - add to the probability of cross-faecal contamination. This is particularly so when meat is minced together in giant grinding machines to produce the animal content of convenience foods such as sausages, mince and burgers.

4.3 The global problem of animal diseases

As the trade in meat and animals becomes increasingly a global enterprise, so the spread of disease becomes more likely. Take the example of BSE. Although the EU eventually added many new regulations to control feed and slaughter after the link with Creutzfeldt-Jakob Disease was established, it did not do so before many infected cattle had been exported. The ban on all meat and bone meal in feed, and on the use of Mechanically Recovered Meat

(MRM) - meat extracted from the previously stripped bones by grinding the bones to a paste and forcing it through small holes in a stainless steel drum - were not introduced until the infection was well established in the UK herd. ¹⁹⁷ Reports indicate that BSE has been exported to many other nations, with infection levels in Greece, Italy and Belgium all on the increase in 2002. Concern over the possibility of outbreaks of vCJD exist worldwide. According to Dr David Heymann, Executive Director of the Communicable Diseases Programme at The World Health Organisation, 'despite high-level political posturing at the start of this (mad cow) epidemic among many, many countries there's no denial today that potentially infected live animals and potentially infected products have been distributed widely'. ¹⁹⁸ In developing nations it seems inevitable that the risks may be even more acute because the same measures to protect public health are unlikely to be in place. Until the recent cases of BSE in both Canada and the US, feed for cattle in the US continued to include pig, horse and poultry remains. ¹⁹⁹

Farming interests in developed nations tend to be particularly concerned about cheap imports of animal products, blaming them not only for destroying livelihoods, but also for producing food of low quality. For example, production of UK turkeys has declined by 35 per cent over the past ten years. The National Farmers' Union (NFU) claim that roughly nine million turkeys were imported in 2002, whereas a decade ago all turkeys for home consumption were produced in the UK. 'Large numbers of turkeys are now coming into the country from Hungary and Brazil, where animal welfare standards and restrictions on drug use are not as strict as here', ²⁰⁰ according to Charles Bourns, Chairman of the NFU's Poultry Division. He cites the use of Furazolidone, an antibiotic banned from use on animals in the EU because of links with cancer, but permitted in Brazilian production.

4.4 The use of antibiotics and the threat of transferable resistance to humans

To reduce the threat of disease among intensively reared animals, cocktails of veterinary products are injected or added to feed routinely - including antibiotics. Without them the industry would be likely to collapse in epidemics of uncontrolled infectious diseases.

Originally, pharmaceuticals were applied solely to control the levels of disease in intensive units, but their use became even more widespread after the discovery that they also act as 'growth promoters', speeding up the animals' rate of fattening. Eighty per cent of the 11,000 tonnes of antibiotics fed to animals in the US are administered as growth promoters rather than to treat disease. ²⁰¹

Since the 1960s there has been considerable controversy over the application of such substances, mainly because of the fear that overuse might reduce the effectiveness of medicines used in the treatment of human illness. Hence - in the UK and the rest of the EU at least - laws have been introduced based on the principle that antibiotics prescribed in human medicine cannot be applied to animals. Yet in spite of these measures, antibiotic resistant human disease has increased substantially in recent decades, leading EU authorities eventually to ban from 'animal health' products a number of drugs previously considered safe because they are not prescribed for people. One example is the antibiotic Zinc Bacitracin, which had been added to standard broiler chicken feeds for decades before the EU intervened to forbid its use, along with other drugs such as avoparcin. The EU now intends to ban all antibiotic growth promoters.

What has emerged is that it is insufficient simply to separate human and veterinary medicines because the problem is more complex than was first perceived. It is not only that overuse of drugs in animals might make the same treatment ineffective for people - serious though this possibility is. Of even greater concern is the risk of dangerous pathogens living in the gut of livestock developing increased resistance to **groups** of drugs. These then become what are known as 'superbugs'. If they are then passed on to humans who eat infected produce, it can result in the emergence of strains of infection previously unknown in people and resistant to a whole range of antibiotics that might have been expected to cure similar illness. According to a UK House of Lords Select Committee:

'There is a continuing threat to human health from the imprudent use of antibiotics in animals...we may face the dire prospect of revisiting the pre-antibiotic era.'²⁰²

One recent British example is VRE (vancomycin resistant enterococci), which is immune to all established antibiotics and tends to attack hospital patients, particularly the vulnerable old and young. It can lead to death. The virus emerged in farm animals who had been routinely fed growth promoting veterinary antibiotics - substances banned only after the threat from VRE was established.²⁰³ Here again there was a possible association between a widely used veterinary antibiotic – avoparcin – closely related to vancomycin.

Despite the ever-lengthening list of banned veterinary substances, drug treatment for animals remains a thriving industry. In 1996, it was revealed that 62 different antibiotics and other antimicrobial substances were licensed for use in feed and water for dairy cows and lactating animals alone - this in the UK, which claims to have among the strictest laws in the world.²⁰⁴ While Denmark has taken the most stringent steps and prides itself on having reduced the average amount of antibiotics to under 4 gms per pig produced, it admits that this is as little as one-tenth of the usage in some other countries.²⁰⁵

There is further concern that the potential problem of antibiotic resistance may be considerably more acute than has been recorded so far. In the US a number of scientists have complained that research into pollution risks associated with livestock farming has been suppressed by superiors who are afraid to offend the powerful agricultural industry. Notable amongst these is microbiologist James Zahn, whose bosses at the USDA's Agricultural Research Service in Ames refused to let him submit a paper for publication on his groundbreaking work on antibiotic-resistant bacteria that grow in pig factory farms. Zahn, a respected scientist who has won several major research awards, including one from the American Society for Microbiology, showed that emissions from Iowa and Missouri pig farms routinely violate federal pollution limits. The study of air emissions nearby found dangerous antibiotic-resistant bacteria. If confirmed, this would prove that such germs can escape from farms into surrounding water and air.²⁰⁶

Antibiotics are not only used for growth promotion, but are also used for prevention and treatment of disease. In spite of the ban on a series of antibiotic growth promoters, the overall amount of antibiotics given to farm animals has not changed significantly.

4.5 The drugs trade - a worldwide threat

The problem of overuse of drugs on farms is another global problem. A study of *Campylobacter* infections in Minnesota between 1992 and 1998 reported that there had been an eightfold increase in antibiotic resistant bacteria infections to some drugs in humans. Along with foreign travel, increased use of antibiotics in chicken farming was cited as the main cause.²⁰⁷ Almost half of the 23,000 tonnes of antibiotics sold in the US is fed to animals. In the UK 30 per cent of 1,200 tonnes, of antibiotics are used for the same purpose.²⁰⁸ And as industrial farming spreads across the globe, so the 'animal health' industry inevitably accompanies the stock suppliers and equipment manufacturers. For example, the use of antibiotics in Mexican poultry farming has quadrupled in recent years. By 1995, some 2,700 tonnes of antibiotics were incorporated into chicken feed. A further 5,400 tonnes went into pig feed.²⁰⁹

In 1997, rising fears over the possible effects of animal drug use on people led members of the World Health Organisation to call for a worldwide prohibition on the routine use of antibiotics as growth promoters in livestock. But a ban has not yet followed.²¹⁰

4.6 Growth promoting hormones

The use of growth promoting hormones has been banned completely by the EU since 1988. This followed mounting evidence of a link between some of the steroids implanted in beef cattle and certain cancers. In the US, however, cattle are still routinely implanted with sex hormones to promote rapid weight gain.

Not only does the US insist that such substances are safe for its own citizens, it has attempted to impose its position upon everybody else. It contests that the EU ban is an illegal attempt to undermine free trade rules and has taken a legal case under the World Trade Organisation's (WTO) GATT agreement. The WTO ruled in favour of the US and ordered that the EU should pay \$150 million per annum compensation for loss of profit. ²¹¹

Although legal challenges and counter challenges are still in progress, the US hormone controversy raises some disturbing issues surrounding the globalised meat industry.

1. It demonstrates how current free trade rules make it difficult to restrict imports on grounds of either health, compassion or sustainability. As the trade in animal products expands, so the potential risks increase dramatically.
2. The globalisation of the meat trade makes policing increasingly difficult. When the EU ran spot checks on meat produced under the US Hormone Free Cattle scheme (and therefore allowed it to be imported) it found residues of sex hormones in 12 per cent of samples. ²¹² Such casual abuse of rules is likely to become progressively easier as import and export become even more commonplace.

4.7 The dangers of chemical overuse

Part of the livestock industry's contribution to contamination of air, water and soil comes from the enormous quantities of chemicals applied to crops grown for animal feed. Even though the risks posed to humans, wildlife and the natural environment have been argued vehemently since Rachel Carson's seminal book, *Silent Spring*, was published in the 1960s, both the quantity and the range of agricultural chemicals available have continued to multiply. Since 1993, the area of UK fodder crops treated with pesticides has increased by 56 per cent. ²¹³ Globally, the two crops responsible for the highest percentages of herbicide sales are also the main components of animal feed - soya and maize. ²¹⁴

It could be argued that the use of chemicals in crop production is an issue of farming methods rather than the amount of meat in the diet, and to an extent such a view would be justified. The problem is largely one of monoculture, with over-production of **any** crop likely to cause environmental degradation. For instance, the EU currently spends £1.4 billion annually subsidising olive production - a nutritious crop whose oil has acknowledged health benefits. But with growers currently paid according to how much they produce, regardless of markets or environmental impact, the result has been over-cultivation. This has caused soil erosion, habitat loss, and heavy pesticide use. ²¹⁵ So it is vital not to rely too heavily on any particular product, regardless of whether it is nutritious, or if food production is animal or plant centred. In practice, however, reductions in animal produce should lead also to reduced application of agricultural chemicals, because animal feed production has become a notably destructive worldwide monoculture. Its main ingredients are particularly chemical-intensive. Moreover, lower levels of meat should enable production from more extensive systems, allowing the fewer animals reared to forage for greater quantities of their own food. Or, in the case of mixed farms, manure could be utilised to reduce or replace artificial fertilisers. In addition, land growing for feed crops should be substituted with a wide range of plant

products for direct consumption grown by less chemical-intensive methods. Diversity is the key.

It is also worth noting that unless meat is certified as organically produced (in which case there should be a guarantee that animal feed is chemical free), it is likely to contain greater amounts of pesticide residues than plant foods. This is because the chemical levels concentrate in the digestive system of the animal. Eventually, consumers themselves ingest the chemicals in a more concentrated form.

A further health concern associated with meat is the presence of GM foods. Many consumers who boycott genetically modified products on health grounds remain unaware that they are consuming significant quantities through animal products. Soyabeans account for more than 50 per cent of the total area devoted to transgenic crops worldwide, almost all of it grown as the major protein ingredient of livestock feed. Non-organic animal products almost always come from animals fattened with feed containing GM crops.

4.8 The financial burden of food-borne disease

A World Health Organisation report published in 2000 confirmed that food-borne diseases are a 'widespread and growing health problem both in developed and developing countries'.²¹⁶ It estimated that almost a third of the entire population of industrialised nations suffer from such illnesses annually. The financial burden in medical costs and lost productivity is put at anything between \$34 billion and \$110 billion.²¹⁷

UK figures put economic loss at £400 million per annum, with the problem getting worse.²¹⁸ The number of reported cases of UK food poisoning incidents has increased by a staggering 600 percent in the last fifteen years, to five million.²¹⁹ These are probably only the tip of the iceberg.

As for the developing world, the World Bank suggests that, 'increased intensification is leading to the emergence of new diseases' and 'food-borne illness is likely to present a significant problem in developing countries in the future'.²²⁰

4.9 Summary

1. It is true that all food has the potential to cause disease and that high levels of hygiene and careful cooking can alleviate many of the dangers. Animal products do, however, create a unique problem because of the likelihood of faecal material finding its way onto the finished product.
2. When meat is produced at the unsustainable levels of today's global trade, risks accumulate rapidly. Keeping large numbers of animals closely confined in intensive farms creates the perfect conditions for the spread of infection; factory methods and the scale of slaughter and processing ensures that there is a considerable possibility of infection being passed on to the consumer.
3. Widespread use of drugs to control disease (without which it is hard to imagine the survival of industrialised methods) and to quicken growth rates causes further human health hazards, particularly of antibiotic resistance. The experience of the last fifty years suggests that such dangers are insurmountable where mass production is the goal.
4. The globalisation of the meat trade is intensifying risk from the spread of dangerous pathogens.
5. Growing feed for industrially reared animals has become a monoculture dependent upon vast amounts of chemical inputs. Making farming sustainable requires a reversal of policy.

PART FIVE

Animal welfare - it can no longer be ignored

Under the original Treaty of Rome - the legal document which established the rules of the European Community - farm animals were classified as 'agricultural products'. They had no more legal protection than cabbages or cauliflowers.

In 1988, Compassion In World Farming (CIWF) had to surmount considerable scepticism in the EU when it launched a campaign to win greater protection for live animals by improving their status. Yet by 1997, the EU's 15 heads of government had agreed to the main principle of CIWF's demands. A legally binding protocol was introduced which recognised animals as 'sentient beings'. It was accepted further that this had to be taken into account in all Union policies on agriculture (and elsewhere). This decision followed a petition of support signed by more than one million citizens - at that time the largest ever presented to the European Parliament.

Since the protocol, several other influential international agencies have begun to accept that humans have a responsibility towards farm animals and that animal welfare should no longer be ignored in food production policy. Since the beginning of the new century both the World Bank and the Food and Agriculture Organisation of the United Nations have produced reports recognising the need to take welfare issues into account. Slowly, officials are beginning to accept what many have argued for decades: that farm animals are individual living creatures capable of suffering pain and fear comparable to people. Any difference is in degree and not in kind.

Despite this revolution in *ideas*, in *practice* millions of farm animals are still treated without regard for their acknowledged sentience. Industrialised farming, on the scale now practised, rules out any possibility of care or respect for individuality.

The suffering and deprivation inflicted upon farm animals by different methods of production has been well documented elsewhere, so what follows is only a brief summary, highlighting both the size of the industry and the most pressing welfare problems associated with factory farming.

5.1 Meat chickens ('broilers')

The total number killed in the UK in 2002 exceeded 800 million. 99 per cent were factory farmed. Worldwide the figure is already an estimated 46 billion per annum and rising fast. ²²¹

It is common for each broiler shed to contain up to 40,000 birds at densities of 18-19 per square metre, denying the possibility of individual attention. Birds are bred to grow at astonishingly rapid rates. Fed on high-energy cereal grains they reach slaughter weight of 2-2.5 kg in only 41 days. Back in the early 1960s, it took more than twice as long - 84 days - for them to reach the same weight. They are juvenile giants. By the end of their short lives, overcrowding in the sheds becomes a problem, making it impossible for some to find feed and water troughs. Mortality rates (the number who die even before they are six weeks old), stand at about 6 per cent (i.e. 48 million per annum in the UK alone).

Selective breeding for rapid body weight puts enormous pressure on legs, with lameness and other health problems common. Often birds squat in litter to relieve the pressure on their limbs. This causes hock burns - painful skin abrasions - through contact with excrement containing high levels of ammonia.

Heart failure is also endemic among broiler chickens because of the strain caused by unnatural speedy growth rates.

Transport and slaughter are other major welfare issues. Birds are grabbed by the legs in the sheds and carried upside down to be loaded into small crates and transferred by lorry for slaughter. Injuries and even death rates are high.

At the slaughterhouse itself, chickens are shackled by the legs and hung upside down on a moving conveyor belt for up to three minutes before they are stunned (i.e. rendered insensitive to pain, usually by the head coming into contact with an electrically charged water bath). They are then killed by having their throats cut by an automatic knife. After the death-cut they are plunged into a scalding tank to loosen feathers.

In practice, neither stunning nor slaughter is as efficient as it should be. Some birds are either improperly stunned (meaning they are fully conscious when the throat is cut), or improperly slaughtered (meaning that they enter the scalding tank while still alive). The EU has legislation on the welfare of poultry at slaughter – many countries do not.

5.2 Battery hens

In battery cages for laying hens several birds are kept in a narrow wire cage. They are confined from the time they begin to lay eggs regularly at about five months of age to the time that productivity drops to the point that they are no longer considered economic. They are then taken away for slaughter. This occurs after one or two years, when they are still relatively young. Standard cages allow very little space, with birds unable to spread their wings or fulfil any of their natural behaviour patterns - nesting, scratching, dust-bathing, pecking the ground and so on. A typical battery cage shed may contain up to 70,000 caged birds.

Such deprivation creates endemic welfare difficulties. Bones deteriorate because of lack of exercise; broken legs and other injuries from brittle bones are a particular problem. Damage to feet is also frequent, especially when they become entangled around the wire mesh cage floor.

Frustrated by the impoverished conditions and unable to build a natural pecking order, birds can become aggressive and attack cage-mates. Feather pecking and cannibalism are common. De-beaking - a painful mutilation in which the end of the beak is removed to restrict potential damage - is commonplace.

Male chicks are killed as soon as they have been sexed, since it is considered uneconomic to fatten for meat the breeds genetically selected for egg-laying productivity. Mechanical destruction in a mincing machine is the favoured method in the UK; in the US, 'the majority are culled by a vacuum system', making it 'impossible to assess exactly when the chicks were killed'. ²²²

5.3 Pig farming

Breeding sows are the pigs that give birth to piglets that are fattened for pork, ham and bacon. Under the most extreme close confinement systems, they are kept indoors on cold concrete floors throughout repeated pregnancies, either tethered or in narrow individual stalls. Although the UK has now banned this method of production, the EU as a whole is not set to follow until 2013. More than half of the 13 million breeding sows in the EU are still kept in confinement stalls, unable to turn around or lie down comfortably at any stage of their pregnancies. Similar stalls are the norm in North America and becoming commonplace throughout the world. Florida is the only US state to vote to outlaw this system.

Sow crates are responsible for both physical injury and stress. Bare concrete and slatted floors cause lameness. Lack of social contact or ability to fulfil natural instincts - rooting in particular - prompts what is known as stereotypical behaviour. Animals bite the bars of their crate, weave their heads or roll their tongues because the need for exercise and stimulation is thwarted by the barren conditions.

Pregnancies last 16.5 weeks. Piglets are taken away at 3-4 weeks, denying mother pigs opportunity to fulfil deeply developed maternal instincts. Early weaning enables sows to produce five litters in two years. At this stage they are usually slaughtered for processed meats - sausages, pies etc.

Fattening

Early weaning also creates problems for piglets, because in nature they are dependent upon the sow's colostrum and early milk for the first six weeks of life. Failure to receive it leaves them particularly susceptible to infection. The pig industry attempts to compensate by routine application of a host of drugs - including antibiotics, probiotics and gut acidifying agents.

Fattening pigs live for roughly six months. Conditions vary, but cold, bare, overcrowded concrete or slatted pens are considered normal. These frustrate rooting behaviour and cause lameness. Impoverished conditions can also lead to fighting and tail-biting. Routine mutilations such as teeth clipping and tail docking are practised to reduce potential damage. Males grown to heavier weights are often castrated. All of these procedures are normally practised without anaesthetic, causing considerable pain. New EU rules requiring provision of 'manipulable material' are being undermined or ignored.

As with other species of farm animals, industrially farmed pigs are selectively bred for rapid weight gain. As a result they are particularly prone to leg and heart problems. According to a report by the European Union's Scientific Veterinary Committee:

'Selection for large muscle blocks and fast growth has led to leg problems, cardiovascular inadequacy during periods of high metabolism and increased risk of mortality and poor welfare during handling and transport.'²²³

Globally, 1.2 billion pigs are slaughtered for meat every year.²²⁴

5.4 Dairy cattle

Some of the welfare implications of dairy farming have much in common with the pig and poultry industries. Selective breeding for high productivity has created abnormalities that result in pain and suffering. Milk yields have doubled over the last fifty years owing to the application of reproductive techniques and high energy feed regimes. As a result, mastitis (painful inflammation of the udder), lameness, milk fever and calving problems have reached epidemic proportions. In the UK, studies have shown that 50 per cent of dairy cows suffer from foot or leg problems and 35-40 per cent from mastitis.

Early weaning is once again practised in the interest of productivity. Calves are separated at an early age so that their mothers can be rushed back into milk production - an emotionally painful separation for both parent and young. The pressure put upon the dairy cow to give more milk means that many are worn out after two to four pregnancies and are then sent off to slaughter and processing. Their natural lifespan is around 20 years. Their meat goes into convenience products such as pies or hamburgers.

Like prematurely-weaned piglets, calves who endure early separation from their mothers are often more susceptible to disease than those allowed to suckle. Outbreaks of calf pneumonia are particularly common.

5.5 Beef cattle

While some beef is produced from suckler herds - where calves spend at least one summer suckling from their mothers and grazing naturally with the rest of the herd until they are killed at 1-2 years old - the majority of beef cattle are the 'by-products' of the dairy industry. In the UK some 50 per cent of beef comes from the calves of dairy cows. The latter must give birth every year in order to produce milk, so the problem of what to do with the calf is inescapable. A minority of females are reared to replace their mothers in the dairy herd; the weakest calves are slaughtered almost immediately for pet food; others are fattened for veal. Although illegal in the UK, the cruel veal crate system - in which animals are fattened on a roughage-free milk substitute diet and kept in solitary confinement in narrow crates with wooden slatted floors - remains in use in many countries, including some members of the EU. It is scheduled to be banned in the EU completely in 2006. Veal crates are common in the US.

Many calves, however, are reared intensively for beef. After separation from their mothers they are usually kept in buildings and yards throughout the fattening period, normally lasting roughly one year. Initially they are fed on 'milk-replacers', before being switched to a high energy cereal based diet. They rarely graze. Concrete or slatted floors are common. The most common injuries and diseases are predictable, including lameness and abnormal posture. Routine mutilations include branding, ear-tagging, tail docking, castration, spaying and dehorning.

In the US in particular, raising cattle in feedlots is also common. This is a method of industrialised farming in which thousands of cattle are kept in a confined area and fed almost exclusively upon grain. The method is spreading to other countries, too, including Australia, Brazil, China, India and the Philippines. ²²⁵

5.6 Sheep

At first sight, sheep would appear the most stress-free of farm animal species, yet the welfare problems they experience indicate that extensive methods of production are not necessarily compatible with good welfare. Even though the industry has been heavily subsidised in the EU under the Common Agricultural Policy, sheep reared on hills and uplands have low monetary value. Often large numbers are neglected, left to roam inhospitable areas where there is insufficient food. Painful conditions such as foot rot also occur frequently. Some estimates put the number of lambs who die each year from cold, exposure and starvation at 3-4 million in the UK alone. ²²⁶

Breeding for maximum profit has also had its implications for sheep welfare. Ewes are designed to produce one lamb in the spring. But the development of selective breeding, intensive feeding, drugs and hormonal implants have enabled twin births to become common. Triplets are also becoming more so. The drive is on to manipulate reproduction to the point where three lamb 'crops' can be produced every two years.

On lowland farms, indoor lambing in winter months has now become the norm. Like intensively farmed cattle, the animals may be crowded into sheds.

Other species are fattened intensively, too. Turkeys and ducks are bred in their millions using methods similar to those described for broiler chickens. Caged rabbits are another victim of intensive farming.

5.7 Markets, transport and slaughter

This brief résumé of the worst excesses of modern farming does little more than scratch the surface of the suffering that animals can endure. Livestock markets and transportation create enormous welfare problems; notably rough handling, long distances without adequate food and water (if any at all), injuries caused by poorly designed ramps and pens, human brutality, overcrowding, and exposure to extreme weather conditions. In some countries many trucks have no ramps and animals are dragged on and off and tied up during the journey.

Every stage of production is likely to add new welfare problems, up to the point where the animal is killed. As with markets and transportation, official reports by the UK government's own advisory body, the Farm Animal Welfare Council, have proved damning for the slaughter industry. Apart from the pain caused by incompetent killing and faulty or inadequate equipment, the sheer volume of slaughter is often too great to allow the attention that might ensure that each individual is killed with the least possible stress and pain.

5.8 Genetically modified animals

The same scientific obsession which is presenting GM crops as an answer to world hunger is, perhaps even more disturbingly, looking at genetically modified livestock as a potential saviour for agriculture. The claim is that such animals will be more efficient converters of grain to flesh, milk and eggs. There are even those who insist that it will be possible 'to make creatures which will be bred not to notice if they are raised in tiny boxes in factory farming and are too weak and heavy to stand up'. ²²⁷

Two points need to be made:

Firstly, such developments are highly questionable morally due to the suffering and waste of animals' lives they entail.

Secondly, biotechnology applied to farm animals has so far proved not only particularly cruel and wasteful but also unsuccessful with only a very small proportion of genetically modified or cloned embryos resulting in healthy, living young. Take cloning for example. Despite the massive publicity afforded to Dolly, the first successfully cloned sheep, Dr Harry Griffin, Assistant Director of the responsible Roslin Institute, has admitted that progress in this field is non-existent, 'the success rate with animal cloning is about one to two per cent in the published results, and I think lower than that on average. I don't know anyone working in this area who thinks the rate will easily be improved. There are many cases where the cloned animal dies late in pregnancy or soon after birth'. ²²⁸ And apart from its failure as a science, cloning also causes massive suffering. Many cloned animals experience a bewildering array of defects to both limbs and internal organs, while the successes fare little better. Arthritis struck Dolly (the only cloned sheep to survive out of 227 attempts by the research team) and she died in March 2003, aged six - still young for a sheep allowed to live out her natural life. Cloned calves have been born with weak limbs, hypothermia and hypoglycaemia. Genetic engineering of animals has proved scarcely more successful and no less cruel.

PART SIX

Good food policies

Unsustainable levels of meat production and consumption should be viewed as a major cause for social and political concern in the developed world because of the negative impact upon human health, the environment, hunger and animal welfare. Without considerable revision in agricultural policies both nationally and globally, the predicted growth in the livestock population is likely to become a significant threat in many parts of the world. Already in many areas, unsustainable levels of meat consumption are having serious social consequences. The misguided perception that eating greater quantities of animal produce is somehow a measure of national economic success and individual human affluence needs to be confronted urgently. **A new concept of 'good food' needs to be introduced, based upon the following first principles.**

6.1 Principles of good food policy

Governments and international agencies should ensure that:

- Everyone has a right to food which should be safe, sufficient, nutritious, affordable and which meets World Health Organisation recommendations for daily intake of vegetables and fruit (400 grams per person).
- Farmers, farm workers and food industry employees should earn a reasonable income and have safe and healthy working and living conditions.
- Food should be produced from sustainable systems, such as organic systems, which enhance soil fertility over time and which do not degrade the environment or the habitat of wild animals.
- Food production should involve the least amount of transport (food miles), encourage local production (and local slaughter avoiding long distance transport of live animals). Long distance trade should be confined primarily to products which cannot be produced locally or regionally.
- Where animals are farmed, production systems should ensure that they are kept in systems which recognise their sentience and allow for the fullest possible expression of natural behaviour, whilst maintaining high standards of animal health. The use of breeds selected for fast growth/high productivity should be phased out in favour of constitutionally sound dual-purpose animals, such as more traditional or regional breeds.
- The concept of sustainability should be applied from a global perspective. What is produced and consumed in developed nations should take into account its impact upon the world's resources.

On these criteria, current food policies and eating habits fail dismally. More than a billion of the most poverty stricken people in the world are suffering and in some cases dying from lack of enough food: roughly the same number of the wealthiest endure debilitating disease and death partly caused by consuming too much of the wrong kinds of food. ²²⁹ Rather than aspiring towards a healthy and sustainable diet, the vast majority of humanity in the middle of these two extremes aim only to move as far away as they can from the diet of the poor to imitate the unhealthy and unsustainable diet of the rich.

6.1.1 Redefining the idea of 'cheap food'

Just as we need to re-evaluate our ideas about 'good food', so we need also to think again about what we mean by cheap. Modern food production claims to be governed by the idea of providing affordable produce for all, but how cheap is the beefburger so high in saturated fat that it contributes to heart disease and obesity? How cheap are intensively farmed chickens who spread antibiotic resistant bacterial infections? To produce food that as many people as possible can afford is an admirable goal (though the vast disparities between the diet of poor and rich around the world suggests this is rarely achieved), but it cannot simply be measured by the monetary cost of production, nor by the price paid by the consumer. Impact upon human health, global resources and the environment need also to be taken into account. In the words of Professor Jules Pretty of Essex University:

'Food is not cheap. It only appears cheap in the shop because we are not encouraged to think of the hidden costs, in terms of damage to the environment and to human health as a result of agricultural production. Thus, we actually pay three times for our food - once at the till in the shop, a second time through taxes that are used to subsidise farmers or support agricultural development, and a third time to clean up the environmental and health side effects.'²³⁰

Professor Pretty and his colleagues have developed a strategy to measure these 'external costs' of UK agriculture and have calculated between £1.5 billion and £2 billion per annum. This includes damage to the atmosphere (£316 million), to water (£231 million), to biodiversity and landscapes (UK £126 million), to soils (UK £96 million) and to human health (UK £77 million).²³¹

While not all of these external costs of agriculture can be attributed to livestock farming, its contribution to them is enormous. As we have seen, 70 per cent of UK agricultural land is devoted either directly to livestock or to growing feed for them (75 per cent for the EU as a whole) and there are also the high pollution costs and human health hazards of intensive production to be considered.

In addition, beef, sheep and dairy farmers take a large proportion of the £3 billion UK farmers receive in EU subsidies each year. Poultry and pig farmers, while claiming that they receive no financial support, benefit from advantages such as non-rateable value on agricultural buildings. Broiler chicken units, which fatten 40,000 birds by intensive methods, benefit from exemption on taxes paid by all other industrial enterprises. Prime Minister Tony Blair pointed out during the Foot and Mouth Disease crisis that farming receives more state aid than all other industries added together: he could have added that, when the growth of feed crops is included, livestock production is granted by far the largest proportion.²³²

A similar scenario exists all across the developed world. Professor Pretty and his team estimate the external costs of US agriculture at £13 billion per annum. This figure excludes enormous subsidies.

6.1.2 The ethical cost of industrialised animal production

Another consideration which cannot be quantified is the ethical cost of industrialised animal production. Not only is the environment damaged by such production, but it seems we commit millions of living creatures to lives of deprivation and, often, suffering in intensive farms. Given our understanding of animal sentience, is this in itself sufficient reason for a revolution in food production methods? Can food that causes so much suffering be considered 'good'? Another ethical consideration must surely be the small farmers unable to compete or the farm labourers rendered jobless as machines take over the care of farm animals from people. What of the failure of governments to put in place real dietary health policies for their own citizens?

6.2 The urgency of reform

To achieve the principles of good food policy, decision makers need to consider radical reform in three main areas: policies by which food is traded, taxed and subsidised; the type of food we eat; the methods by which food is produced. Additionally, both the methods of distribution and the overall food culture need to be addressed.

While health education and promotion are important factors, we also favour reform by means of the tax and incentive system, which should reflect more closely the true cost of production. Agricultural subsidies should be switched to support food that is healthy for the consumer and benign to both animals and the environment; and conversely, to penalise systems that contribute towards ill-health and pollution. Adopting these principles would dramatically alter the definition of which foods can be considered 'cheap'.

6.2.1 How we trade

Food security must take precedence over international trade and this means the establishment of policies where the primary aim is for nations to produce enough local food for local need. Earlier in this report, a joint declaration by non-governmental organisations at their conference held during the 1992 Earth Summit in Rio was quoted:

'Food security is having the means as an individual, family, community, region or country to adequately meet nutritional needs on a daily and annual basis. It includes freedom from both famine and chronic malnutrition. Food security is best assured when food is locally produced, processed, stored and distributed, and is available on a continuous basis regardless of the climate and other variations.'²³³

These principles are increasingly recognised as desirable for both developing and developed nations. Indian food and trade policy writer, Devinder Sharma, speaking at the World Food and Farming Congress in November 2002, states:

'The right kind of policies, both national and international, which actually help encourage self-sufficiency and by sustainable means, are the only answer to future needs.'²³⁴

If greater self-reliance were to become the pivotal aim, the likely result would be dramatic decreases in animal production. For instance, a report by the SAFE Alliance (now renamed Sustain) - a coalition of groups working together to research and promote sustainable agriculture - has shown how the UK could feed its own population entirely from its own land, provided that there was 'more efficient use of our resources, involving new consumption patterns - **in particular eating less meat**'. [*emphasis added*]²³⁵

Tax advantages should also be implemented to favour local production. The principle would be straightforward. As much food as possible should be supplied:

1. at best within local regions
2. nationally
3. regionally (i.e. within trading alliances - for the UK this would mean the EU)

International trade in food should be restricted primarily to products that cannot be grown in more local climates. It is an anomaly that in the last decade the UK has, to give only one example, imported vast amounts of poultry from Brazil and Thailand, while exporting to Russia, Hong Kong and South Africa. Under current free trade rules, it is not uncommon for the UK to be exporting similar amounts of the same food as we are importing. In 1998, we imported 61,400 tonnes of poultry meat from the Netherlands and exported 33,100 tonnes of the same commodity to the same country.²³⁶ We also exported 102,000 tonnes of lamb and imported 125,000 tonnes.²³⁷

The introduction of a 'carbon tax' which reflects more accurately the environmental damage caused by unnecessary transportation would mitigate against such trade and give a natural impetus to localised production. While the emphasis on local food applies not only to livestock products, it is particularly pertinent to animal welfare concerns, and would help to negate the cruel trend towards long-distance transport of live animals for slaughter. It would also have public health benefits, reducing the risk of food-borne zoonotic diseases being transferred across the globe.

In addition to the much-publicised live animal export trade between nations, the EU has also in recent years exported up to 300,000 live cattle for slaughter per annum to nations outside the Union. Although the EU Commission did introduce a new regulation in January 2003 to reduce the cases for which payments can be granted, it still allowed the main trade to continue.²³⁸ This practice is currently subsidised by taxpayers under the Common Agricultural Policy (CAP) to encourage reduction in surplus beef stocks in the EU. Farmers are paid 'export refunds' to compensate for the lower prices they receive. These payments - also paid for other agricultural products - unbalance world markets. For example, the EU still produces far more milk than it consumes. It is bought and placed in store under the CAP. Some goes to feed veal calves and considerable quantities are 'dumped' on developing countries at heavily subsidised prices. Far from helping to relieve human hunger, this destroys the livelihood of local producers, who can not compete financially with the subsidised imports. Meanwhile, the EU supports the dairy industry by an estimated £11 billion a year - about £1.40 per cow per day.²³⁹ As the aid agency CAFOD points out, each European dairy cow is subsidised by a greater amount than the average wage of half the world's population!²⁴⁰

Export refunds of all food products are another example of the wrong kind of subsidy incentives producing the wrong results both for the world's poor and in the producing nations. And once again, the obvious solution is for financial support to favour localised production of healthy foods. As suggested by development organisation Action Aid, policy makers should:

- Phase out, as soon as possible, those agricultural subsidies in developed countries that distort production and trade (and which lead to dumping).
- Redirect remaining subsidies in the developed world towards conserving the environment and promoting rural development, and target them primarily at small-scale farmers and more sustainable agricultural policies.²⁴¹

6.2.2 The polluter pays principle

According to an adviser to the World Bank, Robert Goodland, direct or indirect subsidies enjoyed by the livestock sector include:

'full social and environmental costs of topsoil loss, erosion, siltation, biodiversity loss, and deforestation due to cattle; water prices (removal of water prices, it is said, would increase the cost of one pound of protein from steak to \$89); sewage disposal from feedlots; medical costs associated with diets rich in animal products; the evolution of antibiotic resistant infections caused by routine antibiotic feeding to cattle; transport costs; and internalization of GHG (greenhouse gases) costs in transport, diesel, and fertilisers used for cattle feed production.'²⁴²

Withdrawal of production subsidies for the beef, dairy and sheep sectors and the introduction of business rates for intensive poultry and pig farming would discourage industrial-scale rearing of animals. Moreover, taxing livestock farming to reflect its true external costs - with the burden becoming progressively higher according to the levels of environmental pollution and wasted resources - would soon impact upon levels of public consumption. Figures so far collected on the environmental cost of industrial production units 'point to a 10-15 per cent direct surcharge to mitigate water and soil pollution and abate gaseous emissions alone'.²⁴³

6.2.3 Introducing financial incentives for 'good food'

Hand in hand with penalties for foods which have a negative impact should go financial incentives for those which are nutritionally beneficial. Tax concessions could ensure that edible grains, legumes, fruits and other vegetables are widely available at affordable cost, particularly where they are grown locally and by environmentally friendly methods. It is vital that those on low incomes in affluent nations can afford these foods.

As far as the UK is concerned, the extremely low levels of self-sufficiency in fruit production are a particular indictment of current systems. The country has lost 60 per cent of apple and 50 per cent of pear orchards since 1970. ²⁴⁴ So irrational have been EU food subsidies under the Common Agricultural Policy (CAP), that horticulturalists are not only denied support to produce fruit, in some nations they have actually been paid **not** to do so. UK apple producers are among those who have received financial payment to destroy orchards in order to reduce overall production in Europe. Fruit is grown in such small quantities that even if all that is harvested were consumed by its own population, the UK would only be 5 per cent self-sufficient. It now imports nearly three times as many apples - a fruit perfectly suited to its temperate climate - as in 1950. ²⁴⁵ The EU as a whole has a trade deficit in fruit. ²⁴⁶

The UK also produces little more than half of the vegetables it consumes. ²⁴⁷

In total, the EU is self-sufficient in vegetables at current levels of consumption and 80% self-sufficient in fruit, ²⁴⁸ though substantial increases would be necessary to bring consumption into line with dietary recommendations. The vast majority of this is grown in Mediterranean countries. Yet shamefully, under CAP rules a percentage of the harvest is withdrawn every year to maintain price levels. 1.4 per cent of total EU production was taken out of the market in 2001 at a cost of 117 million Euros, mostly for compensation payments. 70-80 per cent of this produce was destroyed. At the same time, the WHO has recommended that fruit and vegetable intake should increase by factor two to four in central and northern EU countries. To do so - it states - would lower the disease burden by 4.3 per cent for men and 3.4 per cent for women. ²⁴⁹

While there is considerable scope for increased production of a wide variety of produce throughout the European Union, care needs also to be taken to ensure that any revised system of agricultural subsidies is tied to quotas. The aim should be to ensure self-reliance with a bit to spare, but not to produce massive surpluses that are dumped onto world markets and distort local prices - as has been the case with the dairy industry especially.

In its 2003 investigation, *Public Health Aspects of the EU Common Agricultural Policy*, the Swedish National Institute of Health examined in detail the contrast between the production limits on fruit and vegetables determined by CAP policy and its enormous support to the dairy industry. 'The dairy sector', concludes the author, 'is one of the most subsidised and regulated in the CAP, with a wide range of measures including export subsidies, import duties, intervention-buying, quotas and aids to promote consumption'. These economic advantages lead to a production surplus of roughly 20 per cent. ²⁵⁰

Here we have a classic example of the way in which current taxes and subsidies promote unhealthy food while undermining consumption of those which could help to reduce the cost of disease - both in terms of preventable human suffering and impact on health budgets. Condemning this CAP 'population approach to increase the intake of animal fat (and alcohol) and to decrease fruit and vegetable consumption', the Swedish study concludes that it 'is clearly not to the benefit of the common good, in this case public health'. ²⁵¹ It supports the recommendation of this report that the tax system should be used to encourage better diet, believing that while 'production should be determined by consumption', nevertheless, 'taxation policy (positive or negative) is seen as an acceptable way of

influencing consumer behaviour, e.g. for public health reasons'. It suggests further that 'as long as Europe relies on heavily subsidised agriculture...health arguments should play a decisive role in the placing of subsidies'. More specifically, the Swedish National Institute of Public Health report emphasises that:

'instruments of the CAP, if used in an optimum way, could lead to increased fruit and vegetable consumption by stopping withdrawal of classified produce and letting prices fall. Consumer prices could be further decreased by eliminating taxes on these products, which would be decided at the national level. This together with the suspension of the aided consumption of butter, currently about 30 per cent of total butter consumption, could lead to favourable dietary changes in the population, which could decrease the prevalence of chronic diseases and obesity.'²⁵²

6.2.4 A new emphasis for agricultural research

To expand the variety of crops available for direct human consumption, much could also be achieved by redirecting research away from improved productivity of livestock farming and other high-tech agriculture towards sustainable development of plant-based foods. Currently, financial investment - mostly from private sources - continues to be focused primarily on biotechnological and other potentially financially profitable enterprises - regardless of their social consequences.

'The application of science to agriculture is now seen as the domain of the market-led private sector, with research focusing largely on the needs of capital-intensive farming.'²⁵³

Genetically modified crops and interference with the reproductive systems of animals are two particularly well financed areas. Meanwhile the type of socially responsible research projects which are urgently needed, such as improved traditional techniques to develop a variety of drought-resistant micronutrient crops, remains severely under funded. Wayne Meyer, a researcher with Australia's National Agricultural Organisation, gives some indication of the importance of the latter when he states that crops which improve water efficiency should now 'be seen as the equivalent of putting a man on the Moon'.²⁵⁴

Education also has a vital part to play in revolutionising diet. There still remains a widespread misconception that plant-based diets are somehow inadequate or inferior. A concerted campaign aimed at all ages would do much to alleviate this, including recognition in schools of the importance of nutrition and the ability to cook health-enhancing meals.

Summarising the necessary approach, a recent report, *Why Health is the Key to the Future of Food and Farming*, states that:

'In collaboration with the research councils, government departments will need to articulate, implement and invest in a new type of research and development strategy that will provide incentives for progress towards safer foods and healthier diets.

Research is also required into actions in local settings often prompted by national initiatives, such as the National School Fruit Scheme* and a Five a Day programme (five helpings of vegetables/fruit per day).'²⁵⁵

* a scheme to provide free fruit for school pupils

6.2.5 Changing methods of production

A significant reduction in the amount of meat produced and consumed would help to facilitate important changes in methods of production. Alongside support for local consumption should go financial benefits for environmentally benign farming, particularly during the conversion period from conventional methods. Organic

methods minimise the requirements for external inputs (i.e. chemicals) and maximise the recycling of wastes, with maintenance of soil fertility a primary aim. In the UK, only 3 per cent of agricultural land is farmed organically, below the levels in most other EU countries, though in 2000 Prime Minister Blair stated that 'our plans envisage a trebling of the area... by 2006'.²⁵⁶ Both Sweden and Austria have set more ambitious targets for organic production by 2005: 20 per cent for the former and 10 per cent for the latter. Because the emphasis is upon high quality safe food and environmental protection, it has been estimated that the hidden external costs of organic farming are 'no more than a third'²⁵⁷ of conventional methods.

Even though some aspects of organic production are more expensive - for one thing it is more labour intensive - changes to a subsidy system which reflect the lower external costs could offset any financial disadvantages. In its report, *The biodiversity benefits of organic farming* (G. Azeez, 2000), The Soil Association claims that, 'it would cost about £1.2 billion a year over five years to convert the whole of the UK agricultural area (18,600,000 ha)'. But its authors add that, 'because organic farmers receive lower CAP subsidies (about £40/ha less), maintenance payments thereafter of, say, £40/ha could be made at no extra cost'.²⁵⁸ Once again, the financial cost of food is dependent upon the ways in which the tax and subsidy system operates.

There is evidence that organic produce is better for the environment (improved water quality, richer diversity of wild plants, animals and birds) and healthier for consumers (lower nitrate content and pesticide residues).²⁵⁹ Animal welfare standards are also higher than under conventional methods. According to the Principles of the International Federation of Organic Agricultural Movements, livestock conditions must 'conform to their physiological needs and be in accordance with humanitarian principle'.²⁶⁰ An inevitable consequence of a switch to organic methods would also be a reduction in the livestock population and meat consumption, since limitations on stocking densities are part of the organic ethos. It would simply be impossible to conform to the environmental and animal welfare standards demanded by organic standards and to keep anything approaching the current population of farm animals.

Although animals currently play a central role on most organic farms, research at the UK's Elm Farm Research Centre indicates that stockless organic methods can produce comparable yields. A ten year study has 'demonstrated that stockless organic farming is a viable option in the UK. The potential constraints of nutrient supply, maintenance of soil fertility and structure, weed, pest and disease control can all be satisfactorily achieved. The yields are comparable with other viable organic farms and under current economic conditions organic stockless systems are economically viable'.²⁶¹ This suggests further scope for a combination of increased dependence on organic methods and reduced dependence upon livestock. Education and research are vital, the former especially to ensure the higher quality of stewardship which organic farming requires.

Other areas of food production deserving greater encouragement are allotments and urban plots. Significant quantities of fruit and vegetables can be provided, particularly for less affluent city dwellers who may otherwise find them difficult to obtain or afford. Around 800 million people worldwide obtain nourishment from urban gardens. 'In Accra, 90 per cent of vegetables consumed are grown within the city. In Poland, about 30 per cent of urban families farm almost a million plots, and in the Netherlands 33 per cent of total agricultural production is from urban lands.'²⁶² Even in London, 30,000 still rent small plots of land on which they grow vegetables and fruit.²⁶³ Despite growing competition for land, most cities in the world still contain abandoned and derelict areas that can be transformed into food producing plots.

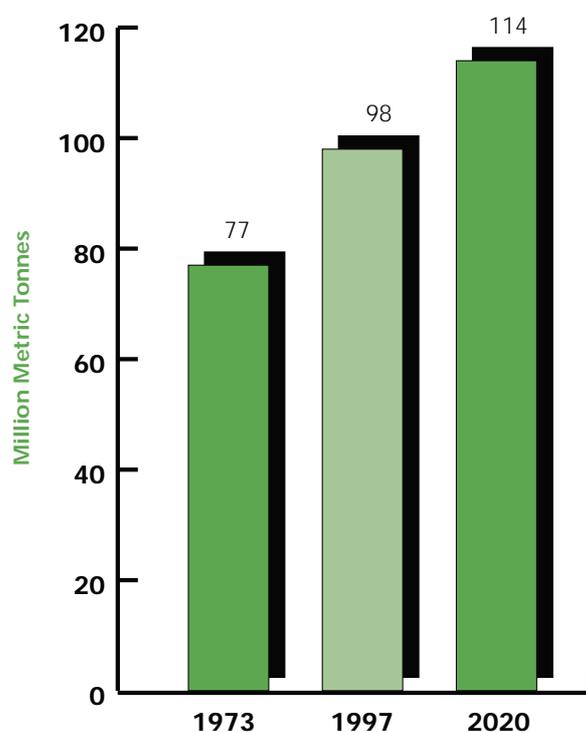
6.3 Moving towards good food policies - further suggestions

To encourage sustainable food production, governments in developed countries must actively pursue targets to reduce meat consumption. Since the amounts of meat eaten vary from country to country it is difficult to set a single objective for every individual nation, but as a first step the UK should aim for **a minimum 15 per cent reduction in meat consumption by 2020** (a figure that would also be an appropriate start for most other “Western” governments and for the EU as a whole). The 15 per cent target is consistent with the figure which the United Nations World Food Council has identified as (in theory at least) the amount of cereals now fed to livestock that would be sufficient to raise world food supplies to adequate levels. ²⁶⁴

6.3.1 The introduction of meat reduction targets

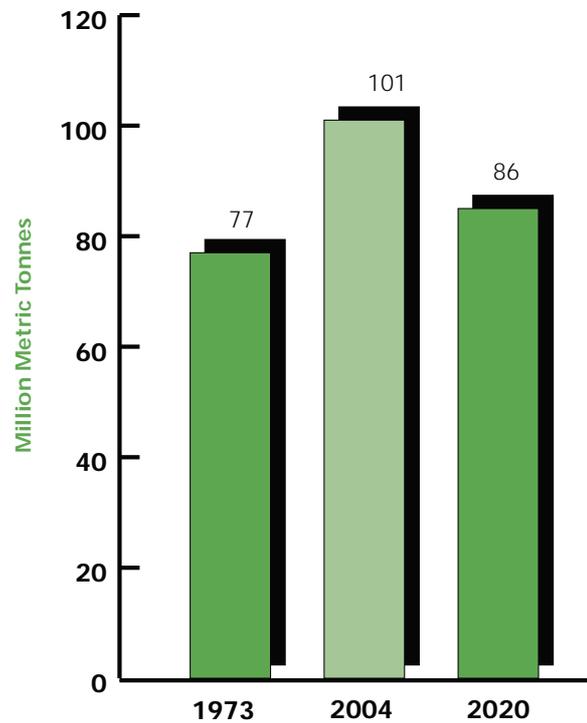
Figure 6a and 6b contrast the rise in meat consumption in the developed world predicted by the International Food Policy Research Institute (IFPRI) with the aims of our campaign for reduction.

Figure 6a. Demand for meat in developed nations, 1973, 1997 and 2020 according to International Food Policy Research Institute (IFPRI) projections



Source: IFPRI IMPACT projections, June 2001, Global Food Outlook, Trends, Alternatives and Choices.

Figure 6b. Demand for meat in developed nations, 1973, 2004* and 2020 if Compassion in World Farming Trust meat reduction targets achieved



1973 figure taken from FAO statistics

* 2004 figure taken from IFPRI estimate for 1997, plus World Bank projection of rise of 0.5 per cent per annum for period 1997-2004.

2020 figure assumes 15 per cent minimum reduction in period 2004-2020

Although there will be those who would dismiss the feasibility of drastic reductions in animal produce and the globalised trade in food, both are achievable with sufficient political will. In the last fifty years livestock production has increased fivefold, so a consumption-led comparable reversal should be feasible. Globalisation is an even more recent phenomenon. Export of animal produce from EU member states increased by 311 per cent in the period 1968-98, while at the same time imports rose by 248 per cent. ²⁶⁵

6.4 Further evidence for radical reform

Admittedly, the ideas expressed in this report mark a radical departure from post-Second World War agricultural policy throughout the developed world, but they are, nevertheless, in line with all progressive thinking on the relationship between diet, health and environmental protection. Increasingly, mainstream organisations are taking the importance of meat reduction on board. Most notably, in their March 2003 joint final paper, *Diet, Nutrition and the Prevention of Chronic Diseases*, both the World Health Organisation and the Food and Agriculture Organisation emphasise its importance as part of any strategy for sustainable development:

'Increasing global consumption of intensively produced animal foods, as well as tobacco, is undermining health gains from reducing infectious diseases. For example, the low efficiency of food conversion and high water needs of cattle production poses a significant threat to the world's ability to feed the very poorest people, and also severely threatens many ecosystems. In contrast, increased production and consumption of a more diverse range of plant foods (from vegetables and legumes), ideally closer to consumers' homes, can yield potent health and environmental gains.' ²⁶⁶

Their report goes on to re-iterate the concerns about current tax and subsidy policies expressed earlier in this section of *The Global Benefits of Eating Less Meat*:

'Agricultural policies often primarily respond to commercial farming concerns, for example, farm subsidies for the production of dairy products and cattle, rather than being influenced by health considerations. There is also an apparent disregard for environmental sustainability.' ²⁶⁷

The WHO/FAO conclusions are strikingly similar to the findings of a group of leading UK health experts in a 2002 report, *Why Health is the Key to the Future of Farming and Food*:

'Animals, for instance, are notoriously problematic converters of energy... In order for the food and farming sector to produce food in a way that does not irreversibly effect the environment, various changes need to be implemented. These include a reduction of inputs - pesticides, fertilisers, energy from fossil fuels and water - per kJ of food for human consumption. There are various ways of achieving this. The simplest way would be to increase the production of plant-based foods for human consumption and to reduce the high level of meat and dairy production. This would be beneficial for environmental sustainability and human health.' ²⁶⁸

Another recent Swedish study (published in 2003) adds weight to the above. Examining ways in which the nation's food and farming sector could cut its energy demands and fertiliser inputs, the Swedish Environmental Protection Agency (SEPA) concludes that one way would be to reduce the dietary intake of animal products and to increase intake of plant-based products. ²⁶⁹ Combining its findings on energy inputs with information on healthy diet supplied by the Swedish Food Administration, SEPA has proposed what it considers to be a healthier and more environmentally sustainable diet for the country (see figure 7). **The recommendations are for a 50 per cent decrease in animal produce. To do so - SEPA suggest - would not only produce a healthier population (and reduce health costs), but would also lead to a 30 per cent reduction in energy consumption and a decrease in artificial fertiliser of between 20 and 40 per cent. SEPA also states that the acreage needed to produce food would be lower.** ²⁷⁰

As the Swedish study indicates, CIWF Trust's own core proposal for an initial 15 per cent reduction in meat consumption by 2020 should be viewed neither as too radical nor politically unobtainable. Rather, it should be seen as a modest yet vital first step towards a truly sustainable and health enhancing diet for the human population.

Figure 7 - CURRENT FOOD INTAKE AND A HEALTHIER AND MORE SUSTAINABLE DIET FOR SWEDEN

	Current daily intake (g per person per day)	Improved diet (g per person per day)
Bread	100	200
Cereals	15	45
Potatoes	140	270
Vegetables	150	190
Root vegetables	25	100
Dried legumes	5	50
Fruit	150	175
Snacks/sweets	200	140
Soft drinks	150	80
Margarine, butter, oil	50	50
Milk products	400	300
Cheese	45	20
Eggs	25	10
Fish	30	30
Meat, poultry, sausage	145	35

Source: Dr Mike Rayner, British Heart Foundation Health Promotion Research Group, Oxford University, 2001.

This table is taken from *Why Health is the Key to the Future of Food and Farming - A Report on the Future of Farming and Food*, edited by Tim Lang and Geof Rayner, 2002.

6.5 Summary

1. As a first step towards meat reduction, we propose that governments in the developed world set themselves targets of at least a 15 per cent reduction in meat consumption by 2020 as part of national health promotion policies.
2. Localised production should be supported, with emphasis upon self-sufficiency in fruit, vegetables and grains. Where animals are reared, localised production should include minimal journey times for transport to slaughter.
3. Agricultural research should prioritise the development of a wide range of nutritious plant foods suitable for local climates.
4. Organic farming and other environmentally friendly systems should benefit from agricultural subsidies and generous research grants. Conversely, taxation according to the polluter pays principle should discourage industrial animal production.
5. Urban food production should also be encouraged.

6.6 How the individual consumer can help - some choices

Individuals often feel discouraged from taking personal initiatives because they feel that they are futile. 'It makes no difference what I do', it is argued, 'so why should I bother?' But as the late E.F. Schumacher suggested, this is the wrong question to ask ourselves. 'We must do what we perceive to be the right thing', he wrote, 'and not bother our heads or burden our souls with whether we're going to be successful. Because if we don't do the right thing, we'll be doing the wrong thing, and we'll just be part of the disease and not a part of the cure'. ²⁷¹

By lobbying politicians at local and national level, every citizen has the opportunity to be part of a campaign for more humane, healthy and sustainable food.

Yet valuable and necessary as it is to pursue political reform, it is always slower and more difficult to achieve than changes in our own lives. It is also possible to influence the future by accepting personal responsibility for the way we live and the products we consume. What follows are measures that every individual can consider in the campaign for a more sustainable and humane diet, ranging from small to radical steps:

1. Having at least one meatless day every week in support of the principle of meat reduction.
2. Committing yourself to a 15 per cent reduction in your current meat consumption in line with the political targets set for our campaign.
3. Cutting meat consumption by at least 50 per cent. As discussed earlier, a reduction at this level would, according to predictions by the International Food Policy Research Institute, save at least 3.6 children from malnourishment by the year 2020. (See Part two of this report.) It would also conform to the findings of the Swedish Environmental Protection Agency on meat reduction targets.
4. Boycotting all intensively produced meat, eggs and dairy products.
5. If buying meat, choosing animal welfare-friendly produce. Organic standards should ensure animals benefit from higher standards of welfare during rearing and slaughter and that the methods used are environmentally friendly. Free-range is the next best option.
6. Increasing consumption of fruit and vegetables to at least 400 gms per day in keeping with the recommendation of the World Health Organisation.
7. Trying to ensure that your diet conforms to the Principles of Good Food Policy laid down in this report. (See beginning of Part six)
8. Consider adopting a vegetarian or vegan diet. One person's 100 per cent reduction can help to 'subsidise' 6 people who haven't yet reduced their meat consumption at all.
9. Supporting Compassion In World Farming Trust's campaign for a reduction in meat consumption and production by explaining to others how necessary it is and sending for further information materials. or visiting our campaign web site www.eatlessmeat.org.

APPENDIX 1

An integrated approach to dietary reform

Compassion in World Farming Trust's proposals for meat reduction is one of many current initiatives for reform in food policy to create a healthier and more sustainable diet for the human population. It should, therefore, be seen as part of a global campaign for change rather than an isolated issue. As the World Health Organisation/Food and Agriculture Organisation suggest:

'Approaches to promoting healthy diets call for comprehensive strategies that cut across many sectors and involve the different groups within countries concerned with food, nutrition, agriculture, education, transport and other relevant policies. They should involve alliances that encourage the adequate production and domestic supply of fruits, vegetables and wholegrain cereals, at affordable prices to all segments of the population, and opportunities for all to access them regularly...' ²⁷²

In a wider context, our aims can be seen as complementary with 'a new set of national principles and strategies for farming and food policy', as drawn up in *Why Health is the Key to the Future of Food and Farming*:

- Farming and food strategy should put health for all as a central tenet.
- Farming and food should give equal weight to both human and environmental health.
- Policy and practice should encourage diversity of foods and biodiversity in fields.
- The food supply chain should decrease its reliance on non-renewable energy over and above global, European and UK commitments.
- Food costs should more fully reflect their real costs of production, distribution and mal-consumption.
- Geo-spatial planning - particularly for retailing and transport - should facilitate physical activity in line with national health strategies and to reduce social exclusion.
- Food supply chain should be as local and as short as possible.
- The revitalisation of food culture in England should be supported in schools, local partnerships and provision.
- Encouragement should be given to local food providers and suppliers to rebuild local economies.
- A reduction of diet-related inequalities to tackle social exclusion and poor access should be at the heart of farming and food systems. ²⁷³

From a governmental point of view, the achievement of healthy and sustainable food policy will require a multi-departmental approach. For the UK, it means that the Department of Health (DH) should be more closely involved in the decision-making process alongside the Food Standards Agency (FSA) and the Department of Environment, Food and Rural Affairs (DEFRA). The DH is currently almost exclusively concerned with NHS costs, yet one of the most significant ways of producing a less expensive and more efficient health service is to prevent disease successfully. This was acknowledged in a report commissioned by the Chancellor of the Exchequer and published in 2002. *Securing our Future Health: Taking a Long-term View* (also known as the Wanless Report) which calls for 'a substantially larger positive impact on health needs from the focus on health promotion and disease prevention'. ²⁷⁴ In particular, Wanless acknowledges the potential of dietary reform, increases in exercise and decreases in smoking, in providing a healthier population.

APPENDIX 2

Vegetarian and vegan diets and human health

For those who wish to eliminate meat from their diet on moral grounds, the question of whether it is possible to obtain all necessary nutrients needs to be answered.

Roughly one billion of the world's human population is estimated to be vegetarian, or virtually vegetarian,²⁷⁵ so their very existence offers proof enough that meat is not necessary for human survival. But there are a couple of provisos. Vegetarian diets can vary enormously. For many poor people in the developing world they remain a matter of necessity rather than choice. Their diet often lacks many of the nutrients or energy value thought vital to good health, with a common dependence upon one staple food of limited value, such as maize or cassava. Even in developed nations, where vegetarianism is usually a matter of choice, some who avoid meat eat an unhealthy diet, either lacking in essential vitamins and minerals or too full of unhealthy fats. Lacto-vegetarian diets based predominantly upon dairy foods or convenience products are likely to be particularly high in saturated fat. Vegans must be sure to obtain a sufficient intake of vitamin B12, calcium, iodine and zinc - nutrients more readily available from a single source in animal foods.²⁷⁶

Given these qualifications, a varied vegetarian diet can easily provide all the required nutrients and there is nothing beneficial found in animal products that cannot be obtained from alternative sources. When compared to meat eaters, vegetarians are likely to consume more unrefined carbohydrate and less saturated fat. They also tend to eat greater quantities of fruit and vegetables, so have a higher intake of antioxidant nutrients such as carotene, vitamins C and E, plus other phytochemicals associated with lower chronic disease risk.²⁷⁷

The American Dietetic Association and Dieticians of Canada advise that 'appropriately planned vegetarian diets are healthful, are nutritionally adequate and provide health benefits in the prevention and treatment of certain diseases'.²⁷⁸ In addition to lower rates of death from heart disease, the organisations state that 'vegetarians also show lower blood cholesterol, lower blood pressure, and lower rates of hypertension, type 2 diabetes, and prostate and colon cancer'.²⁷⁹ They also draw attention to the possibility of a lower risk of dementia amongst vegetarians, quoting US research which indicates that, 'those who ate meat were more than twice as likely to develop dementia'.²⁸⁰ Margaret Thorogood - one of the leading epidemiologists involved in the long-term Oxford comparative study of vegetarians and non-vegetarians - concurs with the general position. In a paper published in the *Nutrition Research Reviews* she concludes that 'a diet high in fruit and vegetables and low in saturated fatty acids brings with it substantial health benefits'²⁸¹ (though this comment does not, of course, preclude the possibility of some meat consumption). She goes on to express uncertainty whether the cause is 'higher intake of some foods in the vegetarian diet, or whether this is due to the absence of others' and concludes that 'an apple a day (along with one or two other things) does indeed keep the doctor away'.²⁸²

Available evidence also points to the adequacy of strictly vegan diets (i.e. exclusively plant-based). In a summary of existing evidence, Professor Tom Sanders of Kings College, London states that they are 'nutritionally adequate providing they are not restricted in variety or quality'.²⁸³ While warning that deficiencies in protein, vitamin A, iodine, iron, zinc, vitamin B12, selenium, taurine and long-chain polyunsaturated fatty acids can be a problem if

variety of foods is restricted, Professor Sanders goes on to state that in practice, the typical plant-food diet enjoyed in developed nations is often more nutritionally satisfying than that consumed by meat eaters. Vegans are 'more likely to consume unrefined carbohydrate foods, salads, fruit, nuts and pulses on a regular basis. Consequently, the intake of several nutrients, notably thiamin, folate, vitamin C, carotene, potassium and vitamin E, are higher in vegetarians than in the general population'.²⁸⁴ The author also states that there is no evidence associating a well-balanced plant-based diet with increased risk of any serious disease. This view is confirmed by the American Dietetic Associations and Dieticians of Canada in their joint position statement on vegetarian diets:

'Well-planned vegan and other types of vegetarian diets are appropriate for all stages of the life-cycle, including during pregnancy, lactation, infancy, childhood, and adolescence.'²⁸⁵

APPENDIX 3

Dietary choice and its potential impact in the fight against human hunger

There are many causes of world hunger, so clearly there is no single solution. Theoretically, there is still enough food produced to feed the current human population, so one of the greatest problems is finding the will and resources to transport it to where it is most urgently needed. There are many other political, climatic and geographical reasons why people starve in a world of plenty.

It is also true that in some stages of human evolution there appears little choice other than for some human communities to depend upon animal products - the Inuits and other hunting 'primitive' tribes being extreme contemporary examples. Furthermore, 'in areas as diverse as southern Africa, the Middle East, Mongolia and Central Asia',²⁸⁶ the livelihoods of herder populations and cultures revolve around animal husbandry, (though overgrazing threatens many of these).

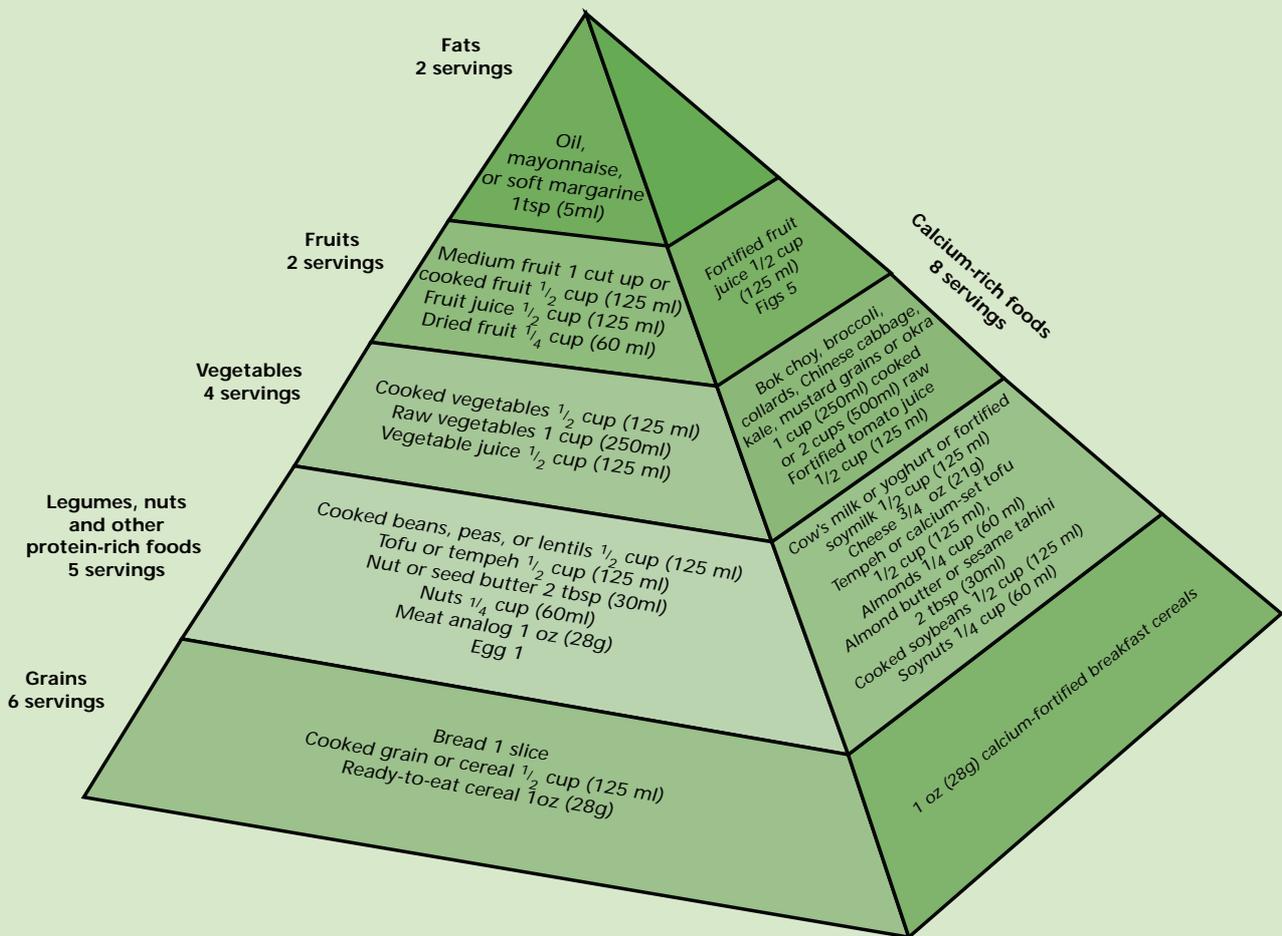
Nevertheless, as shown in figure 4 of this report, it is factually indisputable that eating lower on the food chain enables more people to be fed. Given an expanding human population and a probable limit to our food producing potential, this should become an increasingly important consideration for future generations.

Perversely, one of the most convincing testaments to the possible benefits of a plant-based diet in the fight against human hunger comes from Dennis Avery, Director of the Center for Global Food Issues at the Hudson Institute, USA. Avery, who was the Senior Agricultural Analyst in the US Department of State, is one of the world's most prominent proponents of biotechnology and other high-tech solutions to food production, including its use to facilitate massive increases in meat consumption. Yet even this most outspoken advocate of meat and GM foods acknowledges an alternative to his vision. Avery writes, 'the world must create five billion vegans in the next several decades, or triple its total farm output without using more land'.²⁸⁷

With some justification, Avery adds that 'the prospects for creating all those vegans are poor', but the fact that it seems the remotest of possibilities should not detract from the relevance of his statement to any serious debate about feeding the world.

APPENDIX 4

The vegetarian food guide pyramid



Source: *A New Food Guide for North American Vegetarians*, Virginia Messina, Vesanto Melina, Ann Reed Mangels, Journal of The American Dietetic Association, June 2003.

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CIWF Trust's '*Eat Less Meat*' Campaign

CIWF Trust has become increasingly concerned at the global proliferation of intensive livestock systems to meet the growing demand for meat. Rather than offering a solution to human hunger, we believe this increasing dependence on industrial animal production poses a massive threat to global food security and environmental sustainability. In addition, in the high meat-consuming regions, such as North America and Europe, high levels of animal fats pose a real threat to human health.

In response to this threat to the future of humanity and the planet, CIWF Trust is running a campaign to encourage a reduction in meat consumption. We are asking individuals to eat less meat and to choose organic or free-range meat. We urge 'Western' governments to adopt targets for a reduction in meat consumption and we urge relevant international agencies to incorporate this concept into their policies.

CIWF Trust encourages NGOs to endorse the *Eat Less Meat* campaign in principle. The following NGOs have already done so:

The Soil Association

The GAIA Foundation

The Biodynamic Agriculture Association

The Research Foundation for Science, Technology and Ecology (India)

Campaign patrons include:

Jonathon Porritt

Colin Tudge

Professor Tim Lang

Dr Vandana Shiva

Joanna Lumley

Jerome Flynn

An 18-minute video – '*Eat Less Meat – It's Costing the Earth*' is also available from CIWF Trust.

A four-page colour brochure, based on this report's executive summary is also available. It is titled '*Reducing Meat Consumption – The Case For Urgent Reform*'.

To pledge individual support for the campaign, contact www.eatlessmeat.org.

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