sustain
the alliance for
better food and farming

Fowl deeds

The impact of chicken production and consumption on people and the environment

Food Facts No 9

A SUSTAIN PUBLICATION

What are 'Food Facts'?

There is growing concern about the quality of the food we eat and drink - a recent poll[1] showed that a majority of people now believe that food safety is deteriorating. People are also worried about the environment and farming practices, and how our food production and distribution systems may be contributing to problems such as transport pollution, global warming and the loss of wildlife. The buoyant market for healthier foods, and exponentially growing sales for organically produced foods show that many of us are prepared to make positive choices to help tackle these problems. But our ability to do so depends, among other things, on having the facts. This report is the ninth in a planned series of twelve, all of which aim to provide information about the positive and negative effects of food production methods on our environment and society. To date the topics in the series have included: milk, beef, apples, pears, soya, carrots, beer, lettuce and chicken meat. Sustain Food Facts are not comprehensive dossiers, they are "sign-posting" documents, indicating the current scope of the debate and offering sources of further information. Many organisations in the Sustain membership (see inside back cover) provide some of the best sources of such information, and the Food Facts series is guided by a working party (listed below) to whom we are indebted. However, the views expressed here do not necessarily represent those of every member of the working party, or of the Sustain membership as a whole. We are grateful to the following organisations for supporting the production of the Food Facts series: Government's Environmental Action Fund, the Esmée Fairbairn Charitable Trust, the Cobb Charity, the Cecil Pilkington Charitable Trust and the Chapman Charitable Trust. For more information about Food Facts please contact us at the address on the back cover, or see the Sustain website at *www.sustainweb.org*

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by Alexis Vaughan

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Contents

Foreword

by Professor John Webster

Once upon a time, not such a very long time ago, we knew how our food was produced. Even if we were not directly involved, we saw the crops growing in the fields, we saw the animals being fed, milked, killed and butchered. We may not have thought very deeply about, for example, the health, environmental and animal welfare implications of what we saw but, at least, we had some facts to go on when forming judgements about what to eat.

The intensification of agriculture has undoubtedly brought cheaper food to more people. However, by destroying the direct, day-to-day association between producer and consumer it has also created new problems. It is easier for producers to disguise practices which would deter consumers from buying their products. It is also easier to hoodwink the consumer with false propaganda in support of any extreme opinion or vested interest. Nowhere are these problems more acute than in that most intensive and hidden form of 'factory farming', the broiler chicken industry.

If we are to make sound and honourable decisions about the food we eat, we need food facts. It is the business of *Sustain* to do just that. This report on the industry that produces broiler chickens has been well researched; it is honest and understandable. While I do not necessarily go along with all the conclusions and value judgements, I commend without reservation the aim, which is to bring the facts into the open. The broiler industry won't like it but it raises issues which they cannot dodge. Indeed, they must agree that the pressure of informed public opinion has been a powerful force for positive developments within the industry; most conspicuously in the drive to reduce lameness and antibiotic use through improvements to husbandry.

In the future, the broiler industry, like any other, must accept independent quality control to ensure they meet acceptable standards in relation to health, animal welfare and pollution. Only in this way can we bring back trust to the consumer and pride to the producer. This report can do much to set the agenda for this brighter future.

John Webster is Professor of Animal Husbandry at The University of Bristol Veterinary School and Chairman of the Independent Food Ethics Council. His most recent book is *'Animal Welfare: A Cool Eye towards Eden'* **BSP Oxford.**

Summary

- Between 700 and 750 million broiler chickens (chickens bred for their meat) are reared and slaughtered each year in the UK.
- 98% of all broiler chickens are reared in intensive indoor systems and less than 2% are free-range or organic.
- Broilers live for around 43 days in one shed at stocking densities of around 34 kg / m2. In their last week of life this is equivalent to each bird having the space of a piece of paper the size of this page to live on.
- A report in 1992 showed that 90% of broilers (at slaughter age) had leg problems. Over 1 in 4 birds "suffered an abnormality of sufficient severity that their welfare was compromised" and over 1 in 20 birds had such poor legs, they would normally be destroyed.
- Broilers are kept in sheds with low levels of light. Access to natural daylight is rare.
- On arrival at the processing plant, the chickens are shackled upside down on a moving line.
- The chickens are stunned in an electric water bath. The stunning is not always effective, so some birds are still conscious when their necks are cut. If both arteries are not cut in the neck, some birds survive long enough to enter the scalding tank alive. Over 8,000 birds can be processed every hour in one plant.
- Many academics, government bodies and non government organisations believe that the chickens suffer excessively throughout their lives. Breeding broilers also suffer from serious welfare problems. The economics of the broiler industry are always placed before the welfare of the birds. There is no specific legislation to protect the welfare of broiler chickens. In 1997, Justice Bell found that McDonalds Restaurants and their supplier used cruel practices when broiler chickens were reared and slaughtered.
- The spread of disease is a common problem, both in the rearing sheds and at all levels of the processing plant. The most common bacteria to cause food poisoning in the UK is *Campylobacter* which causes 400,000 incidences a year, of which over one-third may be attributable to chicken meat. *Salmonella* infects over one-third of all chickens.
- Raw chicken is dangerous to eat and should always be prepared correctly. Barbecued chicken should always be pre-cooked.
- One third of all broiler litter waste is burnt for power generation and the rest is spread on agricultural land. Broiler litter can pollute the environment from nutrient leachate, heavy metals and pathogens.
- Organophosphate insecticides are frequently used by contract workers when cleaning out sheds. This has led to serious incidences of health and environmental pollution.
- Air pollution in broiler houses creates unacceptable levels of ammonia and dust which can cause problems for the broilers, workers, and the local environment.
- Supermarkets dominate the retailing of broiler chickens. Surprisingly, some of the supermarkets did not have a policy on the welfare of chickens during production, on genetically modified ingredients in chicken feed, or on a strategy to reduce bacterial contamination of chicken meat.
- Imports of chicken increased from under 22,000 tonnes in 1980 to over 300,000 tonnes in 1998. The most recent increases in imports have come from Thailand and Brazil, which appear to have lower standards of both hygiene and animal welfare.
- There are many alternatives to intensive broiler chicken meat. These include, RSPCA Freedom Foods, Free-Range and Organic systems which are detailed in the table *Comparison of broiler systems.*

Introduction

Chickens are descended from the wild red jungle fowl of India *(Gallus gallus).* The jungle fowl lived in small, stable flocks, spending the day foraging on the ground amongst leaves searching for food and, at night, roosting on low branches (to avoid attacks on the ground). Hens would, if left to their own devices, lay one or two clutches of eggs each year, in nests built for this purpose, and protect their offspring during the first vulnerable weeks of their lives. Hens are social animals, naturally choosing to live in small flocks where a stable 'pecking order' can be maintained. They have a powerful inborn motivation to build a nest in which to lay eggs, and are driven to dust bathe, scratch, spread their wings, preen, forage for food and to perch.[2]

Chickens have been domesticated for at least 4000 years, though it was only relatively recently that chickens were mass produced as broilers. Broiler chickens *(Gallus domesticus)* are bred solely to be eaten and their production is separate from egg-laying chickens. The word broiler developed from two traditional methods for cooking chickens: either boiled or roasted. The modern broiler is a little different from its ancestors with a smaller brain and thinner legs. Broilers also eat much more than their ancestors and with a small intestine that is three times longer than the wild fowl, broilers are able to absorb more nutrients.[3]

Production and consumption

Production of broilers has become more intensive in the past 50 years. In 1957, the average growth period for broiler chickens was 63 days and just under 3kg of feed was required for each kilogram of weight. By 1992, the number of days had been reduced to 43 and little over half the feed was required (1.74 kg per 1 kg body weight).[4] Today the vast majority of all edible broilers (around 98%) are reared intensively indoors in broiler sheds.

As a result, broilers are one of the cheapest forms of meat available to the consumer in the UK and consumption continues to rise. Between 1988 and 1998 household consumption of chicken per person per week increased from 229 grams to 251 grams.[5]

Much of this demand is met by UK producers. In the UK, between 700 and 750 million broiler chickens are reared and slaughtered each year. However, imports are increasing, with over 300 thousand tonnes imported in 1998. European Union (EU) production is around 9 million tonnes of which 1 million tonnes is exported, half of which is sold to the United States of America (USA). World production is around 63 million tonnes.[6]

Broiler farmers work within tight financial margins. Profit per bird is around 20 pence,[7] though many consider this profit margin is currently much less.[8] A chick costing only 26 pence is grown for 43 days before being sold for just over a pound sterling.[9] This small profit margin encourages the intensification of broiler production.

Transgenic broilers?

Transgenic broilers are those chickens which are genetically modified to help disease prevention or weight gain to increase profits. One line of study is to produce virus-resistant chickens. However research has been hampered as the inserted genes often combine with existing viruses resulting in lymphoid leukosis. More likely is the development of marker genes within poultry. By identifying certain features, such as fatness or feed and reproductive efficiency, the breeding of poultry could become more efficient. These features are known as Quantitative Trait Loci (QTL) which can be cloned and patented when identified. The QTLs could also be used in the development of transgenic chickens, though it seems unlikely these will be developed in the next few years.[11] Similarly, although it has been reported that scientists in the USA have developed a four legged chicken it is not likely to be used for meat production in the near future in the UK.[12]

The Five Freedoms

To provide a basis for assessing the welfare status of farmed animals by FAWC, a framework has been developed known as the Five Freedoms. ● Freedom from hunger and thirst ● Freedom from discomfort ● Freedom from pain, injury and disease ● Freedom to express normal behaviour ● Freedom from fear and distress. The Five Freedoms, however, have been criticised for being wholly inadequate to the task of improving the welfare of broiler chickens.

Broiler selection

In the UK, at any one time, there are around six million broiler breeder hens in the UK producing fertile eggs to produce table broilers (chickens reared for human consumption). Over 90% of the birds originate from just a few UK primary breeding companies who have elite stock (also known as pedigree or great grandparents).

Hungry chickens

Little thought has previously been given to the breeding chickens which make up a small percentage of all the broilers chickens. One of the main welfare concerns with broiler breeders is their restricted diets. Broilers have been mainly bred for maximum growth and feed conversion (converting food into energy for growth). If the birds are allowed to feed *ad libtum* (access to an unlimited food supply) the laying hens will suffer from poor health, obesity and poor reproductive performance so their rations are restricted. However, experiments have shown that severe feed restrictions lead to behavioural changes, such as stereotyped pecking and increased drinking. Broilers have a tremendous appetite and broiler breeders will therefore suffer from hunger for most of their lives. Restricted feed in broiler breeders contravenes the first of the Five Freedoms as developed by the Farm Animal Welfare Council (FAWC): "Freedom from thirst, hunger and mulnutrition" (see FAWC in *Contacts*). In a 1998 report [15] on broiler breeders FAWC suggested that "it is necessary to establish, as a matter of urgency, the point at which feed restriction creates a situation when the bird cannot cope with the hunger which results".

Broiler breeders

The great grandparents: The great grandparents are at the top of the breeding cycle and only make up 1% of all the breeding birds. A selection of birds are reared on full feed for six weeks, at which point some are placed in rearing accommodation and the others are culled. The surviving birds are selected for certain characteristics such as improved growth rate and feed conversion. This therefore requires the birds to be fed *ad libitum* during the first six weeks to ensure that broiler breeders grow at their maximum rate. Once selected however, it is necessary to restrict severely the amount of feed for 2 to 3 weeks to guarantee that these birds are fit enough to breed (see *Hungry chickens* above). The rationing is much more severe than with the grandparents.

Penguin chicken

There are many complications for breeding broilers. For example at the University of Alberta, Canada, one chicken was found to be *"excessively heavy and had a peculiar penguin-like gait".* At autopsy, the hen was found to have a total of 26 eggs in its body cavity.[15A]

The grandparents: Breeders are fed a controlled diet from the age of 15 days to achieve a steady bodyweight increase of about 7% per week. At 18 weeks the birds weigh about 2 kilograms. This is the same weight as a table broiler at only 43 days (6 weeks), even though they are the same genotype of bird. At 18 weeks the hens and around 10% of the cocks are transferred to the breeding area to start the mass production of broilers.

The parents: These hens are kept for 60 weeks and will each produce over 120 broiler chicks. On average a breeding station will produce about 2.5 chicks per hen each week. Up to 750 million broiler chicks are produced each year in the UK - see *The 43 day life of a chicken*. The broiler chicks never see their mothers and, as a result, lack the gut microflora of their parents. The chicks are then very susceptible to contamination and colonisation by foodborne pathogens which can lead to illness and reduced growth.

Mutilations

Breeding broilers are frequently mutilated, even though mutilations are often unnecessary and can themselves cause considerable problems.[10]

- Beak trimming is common among male breeding chicks which is performed to lessen the likelihood of aggressive pecking when the birds are older.
- Dubbing, the removal of all or part of the male comb, is still sometimes performed, even though there are no welfare benefits.
- Declawing, in which the dew or pivot claw from male breeders is removed, is also still conducted. The reason for declawing is to avoid damage to females when mating. However, with different management techniques, this can be avoided.
- Toe removal is sometimes practised on a number of elite birds, merely for identification purposes.

The 43 day life of a chicken

A chicken destined for human food has a short life. Each broiler house splits the year into eight week periods (known as a crop) of which six weeks is filled with chicks growing into chicken meat. The rest of the time is used to clean and disinfect the broiler house for the next batch of chicks - see *Cleaning and disinfecting.* At around 43 days the chickens are loaded into lorries and sent to the abattoir.

The broiler house

> ***"If the keeper of broiler chickens resists appeals to demonstrate these systems to the public…on the grounds that first impressions might convey the 'wrong' message, then it is at least, fair to ask if he has something to hide".*** Professor John Webster: Professor of Animal Husbandry and Head of the Veterinary School at the University of Bristol

An average shed will hold around 30,000 birds. The floor, which is only cleaned after every crop, is covered with litter and woodshavings but after a few weeks can be covered predominantly with poultry manure. Mortality rates are around 6% in broiler houses, (meaning around 45 million chickens die each year before they are six weeks old).

Stocking density

The photograph shows that the stocking density in broiler sheds is very high, mainly for financial reasons. As the chickens grow the amount of space becomes more and more restrictive and inhibits the chickens from exercising. This in turn contributes to leg weaknesses (see below).[13] The Ministry of Agriculture, Fisheries and Food (MAFF) has set guidelines (not legally enforceable) for the maximum stocking density at 34 kilograms per square metre. This guideline would mean that chickens in their last week of life would have an area smaller than a telephone directory to exercise, spread their wings, and feed. In a 1992 report [14] by the Farm Animal Welfare Council (see *Contacts*) many broiler units had stocking densities above these guidelines. The industry claims that stocking density is not a good indicator of welfare as different environmental conditions will allow for lower or higher stocking densities than those recommended by FAWC. Nevertheless, the stocking density is still led by economic criteria rather than by any consideration for the welfare of the chicken.

Healthy chicken?

The main health problems are with chickens' legs. The immobility associated with leg problems is contrary to four of the Five Freedoms[16] as identified by FAWC (see

Stocking densities can be very high

Perliminary results of the FAWC / BPMF Broiler Gait Survey - Years 1 - 4

	Year 1	Year 2	Year 3	Year 4
Number of birds examined	10,937	6,858	6,625	5,756
Average examination age (days)	34	37	34	36
Average slaughter age (days)	43	43	41	42
Gait score - 0	55.6%	60.8%	80.8%	45.6%
Gait score - 1	31.8%	29.2%`	15.0%	41.6%
Gait score - 2	9.4%	7.3%	2.7%	11.0%
Gait score - 3	2.4%	1.6%	0.8%	1.6%
Gait score - 4	0.5%	0.7%	0.4%	0.2%
Gait score - 5	0.3%	0.3%	0.3%	0.0%

Contacts). In the 1992 FAWC report, every single broiler shed visited had chickens with leg problems of varying degrees of severity. A major cause of these problems is the rapid increase in body weight which cannot be properly supported by the relatively under-developed legs. This increase in body weight is achieved through selective breeding (see *Broiler breeders*), a high protein diet and growth promoting drugs (see *What's in the broiler feed?*). As the chicken outgrows its skeletal strength, severe abnormalities of bone development are evident. A report was published in 1992 by the University of Bristol and Ross Breeders Ltd which showed that an estimated 90% of broiler chickens have leg problems.[17] The study gave a number of broiler chickens a 'gait' score of between zero (excellent) and five (unable to walk) which assessed walking ability. The main conclusions of the study found that:

- Only 10% of intensive broiler flocks had a 'normal' gait
- Over 1 in 4 birds "suffered an abnormality of sufficient severity that their welfare was compromised"
- Over 1 in 20 birds had such poor legs, they would normally be destroyed
- There was a definite genetic basis to the problem of leg weakness
- Free-range flocks reduced, but did not eliminate, leg weakness

The study has been criticised by the broiler industry and in 1995, the British Poultry Meat Federation (BPMF) launched their own five year study in partnership with FAWC. The results for the first four years are shown in the table *Preliminary results of the FAWC / BPMF Broiler Gait Survey.* Although the results do look promising, it should be noted that the average broiler age when examined in this study is around 36 days old

Looking for hock burns

Buying a chicken in a shop reveals little of the short and uncomfortable life it has led. Hock burns, as shown in the photo, are a clear sign how a bird suffered. Hock burns are small areas of dark discoloration on the leg around the knee joint. Due to the leg problems described above, the birds often squat on the ground. The high concentrations of ammonia (from the urine and faeces) found in the floor litter burn the chickens' breasts and legs.

So if you decide to buy chicken, look out for the hock burns. If you do find these burns, then report it to the retail manager. In a national survey in 1996, conducted by Compassion in World Farming (CIWF), it was found that all the major supermarkets stocked chickens with hock burns. They still do, so do check.

(5 weeks ie. 1 week before slaughter). For the 1992 study, birds were examined at between 42 and 49 days old (6 - 7 weeks ie. at the time of slaughter and, therefore at their heaviest). For more details about the FAWC / BPMF Broiler Gait Survey please contact BPMF (see *Contacts*).

Types of leg deformities can include:

- tibial dyschondroplasia (malformation of the bone and cartilage of the lower leg)
- septic arthritis (problems with the joints)
- perosis (problems with the tendons)
- hock burn (see *Looking for hock burns*)

The lungs (see *Dirty air*) and hearts of chickens also suffer in these production systems. Many birds develop congestive heart failure which causes ascites (a pooling of body fluids in the abdomen) which kills 1% of broilers. This is equivalent to seven million chickens each year or 19,000 chickens a day dying from heart failure before they are adults.

If the birds were allowed to live beyond their 43 days and allowed to feed *ad libitum*, only 20% of birds would still be alive at 18 weeks (126 days) old, the age of puberty.[18] The chicken industry does not see this as a problem as the birds have not been bred to live beyond this age on an *ad libtum* diet, with the exception of the elite breeders.

Lighting

Broiler houses tend to have very low levels of light, mainly to keep the broiler chickens quiet and reduce aggression. Light levels tend to be around 10 lux which is equivalent to candlelight; a room or office would normally be lit at between 300 and 500 lux. Low lighting has been found to cause several welfare problems for chickens, such as damage to eyesight, and decreased activity. In 1992, FAWC recommended a minimum of 20 lux for broiler houses, but even this is a very low level of light. In 1998 FAWC recommended a range of light intensities for breeder broilers ranging from 10 to 60 lux depending on age. FAWC also recommended a minimum of eight hours uninterrupted light and a period of darkness. See the table *Comparison of broiler systems* to see standards set by other systems.

Inspections

Under the 1994 legislation, *Welfare of Livestock Regulations,* all animals must be inspected at least once a day. FAWC recommends that inspections are carried out at least twice a day, especially at feeding times, as this is when it is most apparent that birds are unhealthy. Compassion in World Farming (CIWF) estimates that in an intensive broiler system a stockman would need to inspect eleven birds every second. CIWF claims that this is clearly impossible, which results in diseased or injured chickens not being removed from the main flock to receive treatment.[19]

Transport to the abattoir

The day before being taken to the abattoir, the chickens are often given extra food to compensate for the lack of feed when transported. Chickens are not fed before going to the abattoir to reduce the risk of contamination from intestinal contents.[20] This is potentially one of the most stressful periods of the chickens' life, and when they are most prone to damage through careless handling. A study in 1992 found that 0.19% of all broilers were dead on arrival (DOA) at the slaughterhouse, equivalent to over 1 million birds each year. Half of the DOAs died of heart failure, and a third died of ascites. The process of catching, loading and transportation can be too much for the birds' cardiovascular system. Stuffing the birds into crates or modules had also killed birds through the dislocation of the neck, which made up 3% of the DOAs. Other deaths were due to crushed heads and ruptured livers.[21]

Clearing the broiler house

Clearing the broiler house is known as "harvesting" or "depopulating" in the industry and is usually carried out at night time or during the early morning. For a first hand account see *Catching chickens*.

One of the main problems has been damage to the hips from carrying chickens with one leg. Up to one-third of all dislocated hip cases had forced the femur into the bird's abdominal cavity.[22] FAWC recommends that birds should be picked up by both legs and there should be a maximum of two chickens for each hand.

Catching chickens

Mr Bruton, a bird catcher for Sun Valley between 1987 and 1993, said catchers would pick birds up by the legs, wings or the back of the neck, but generally they were picked up by one leg. A catcher usually carried six birds in each hand: more if he had big hands; less if he had small hands. They were thrown into the drawers. This did not happen at first, but a time came when catching teams were made larger with more loads to do in a shift. These teams were cut and there was greater pressure to work fast. If a man was off, no one replaced him. The team still had to catch the same number of chickens in the same time given to load the lorry. The number of loads which a team was given to do in a night varied. The more loads the faster the work. Injured birds with broken legs or wings or scabs were loaded for slaughter because the farmers said: "They are all part of our crop; it goes to the factory". Only dead birds were left behind. On occasions birds' heads were injured by closing a drawer quickly after the last handful of birds was thrown in. Supervisors did sometimes complain when birds with trapped heads arrived at the plant. The catching team would say that it would not happen if they had more time, but they did not get more time.

Extract from Justice Bell's Final Verdit (see *The McLibel Case*)

Transportation

The journey time to the abattoir can vary significantly, with many chickens transported for over 4 hours in very stressful conditions. This is the first time, since being a one day old chick, that the chickens leave the shed where temperature, light and ventilation have all been controlled. The vibrations, sudden jolting movements, loud noises, sudden changes in air temperature and humidity and inadequate ventilation of transportation stresses the birds. No food or water is available and movement is severely restricted. When the birds arrive at the slaughterhouse they are kept in their modules until ready for unloading. Many abattoirs often leave modules for a period of time to allow the chickens to calm down after transportation. If the chickens arrive too late, they sometimes stay overnight in the modules.

Processing chickens

The slaughter of poultry is highly mechanised and produces high quantities of waste. Some of the waste, such as blood and feathers, can be used lucratively. Cross-contamination between chickens is a big problem, as shown in this section, and has been responsible for many of the health risks of eating chicken (see *Is it safe to eat chicken?*).

These chickens are over 70 days old: Bigger, stronger and tastier too

Reality in the 'gulag'

John Vidal, the award winning *Guardian* reporter worked in a chicken slaughter house and processing factory. Here are a few quotes from his article:[29]

"Two hundred of us work nights in 'the gulag'…Thousands and thousands of footless, headless, empty, shorn chickens, each hung by a leg stump from a steel shackle on a 400 yard long line, lurch towards us in a macabre dance….This factory supplies about 700,000 chickens a week to Sainsbury, Tesco, Somerfield, Asda and other supermarkets…I am employed for £4.60 an hour at Grampian Country Food's factory at Eye in Suffolk…This is Night One. Five new recruits and I have had two minutes' on-the-job training, been warned about repetitive strain injury and backache, been told by a video how bugs breed and why personal hygiene is vital. But no one has mentioned diseased birds or what to look for…The chickens are coming fast now and some carcasses fall on the floor. Most are chucked into sinks for washing but one or two go straight back on the belt…The line manager tells us to speed up…[when the chickens arrive] many panic and defecate when put on the line…From there, they move to the 'Killing Room', a noisy, smelly and bloody place where giant blades shear off heads…They are dunked in a scalding tank…Invariably, facaes and dirt wash out and by 2am the birds are passing through a vile-smelling chocolate brown stew. As in other factories it's a quite legal *'cauldron of potential cross-contamination',* says one meat hygiene inspector."

The killing process is very intensive, with some plants processing over 8,000 birds per hour, and therefore birds are hung close together. As a result the chickens frequently touch each other increasing the frequency of cross contamination. The problem is also exacerbated by difficulties in cleaning the machinery.[23]

When the chickens are unloaded from the modules they are immediately hung upside down by their legs from a shackle attached to a moving line (see photo). This shackling process is done quickly and can be painful for the bird, especially if they have suffered during transit from broken bones or dislocated femurs.

Killing

Electric stun: The shackles carrying the upside down birds then move along the line towards the electrically-charged water bath. Here the line dips to drag the head, neck and upper thorax through the water, five or six birds at a time. This is meant to stun the bird unconscious so it cannot feel pain. The bird is only stunned and not killed to avoid carcass damage. Electrocution, however, is an imprecise technology which leaves some birds dead, the majority stunned unconscious and some still conscious.

Welfare organisations believe that the stunner should be used to kill the bird. It is generally agreed that the quickest way to kill a bird is through electrocution and hence cardiac arrest. A current of at least 120 mA (milliamperes) is required for this and even if the bird is not killed it will not regain consciousness.[24] Although MAFF's Code of Practice recommends that 105 mA per bird should be used, even this minimum level is often not used. Many slaughterhouses only stun at 75 mA or 90 mA to help reduce kills through stunning and therefore reduce carcass damage.

Gas-stun: An alternative to stunning with electricity is to stun with a mixture of gases such as carbon dioxide and argon. After unloading from the lorry, the birds are kept in their modules which then pass through a gas tunnel. In 1998 one plant was gas-stunning 650,000 broilers a week.[25] Welfare improvements include the lack of shackling upside down whilst still conscious and a higher probability of the bird being unconscious before neck cutting. However, the chicken needs to be gassed for a minimum of two unpleasant minutes. There are economic advantages, such as fewer broken bones, reduced blood splash in the breast and an increase in yield of at least 1% which covers the extra costs of the gas plant.[26] Gas stunning may also reduce cross contamination between birds.[27]

Neck cutting: Next the line moves up out of the stunning bath and towards the automatic neck cutters. As some birds are still conscious and others will regain consciousness, the neck cutting needs to be very accurate. The neck is cut for two reasons:

- to kill the bird
- to drain the body of most of the blood

The neck cutters try to cut one of the two cartoid arteries between the body and head. Only one artery is cut to avoid damaging the rest of the neck so that the head is not wrenched off in the automatic feather plucking machine and mixed up with the feathers (a commercial output). Furthermore slaughterhouses claim that the automatic gutting machines would not work efficiently if too much of the neck is cut. Research shows that of all the neck cutting methods, the severing of both cartoid arteries is the quickest method of inducing death. When only one cartoid artery is cut, then it can take an extra two minutes for the chicken to die. Unfortunately there is evidence that up to a quarter of all birds are still not dead on entering the scalding tank after the neck cutting process as their necks were not cut properly.[28]

Legally the birds need to be bled for a minimum of 90 seconds before proceeding to the scalding tanks. However, one study found that death (brain failure) after neck cutting usually occurred between 163 and 349 seconds.

Processing

Scalding: The tanks contain hot water usually above 50°C which softens the skin so that the feathers can be removed. A hard scald for frozen chickens operates at between 56-58°C and soft scalds tend to be lower at 50-52°C (to avoid skin discoloration). This an ideal environment for *Salmonella*, *Campylobacters* and other organisms to survive and therefore cross contaminate chickens. Additionally, involuntary defecation leads to an accumulation of faecal material in the tank which keeps the pH at around 6; the same pH as when *Salmonella* are most heat resistant. Although new technology, such as multi-stage scalding,[30] has tried to address these problems, there is still a risk of contamination. [31]

Defeathering: The feather-plucking machines are equipped with rubber fingers which beat off the feathers. The carcass moves through a variety of machines, each of which removes different sets of feathers. Defeathering machines are a major site for cross contamination,[32] though new technology can reduce this.

Shackled chickens: These chickens can remain in this position for up to three minutes before neck cutting

Head and leg removal: The heads are automatically pulled off and the lower part of the legs are cut off with a rotary knife. The headless and legless chicken drops to the ground. The carcass is then re-hung onto the eviscerating shackle line.

Evisceration and inspection: The preen gland is removed from the tail and the internal organs (viscera) are removed. Most evisceration (the removal of internal organs) is automatic and 70 birds per minute can be processed.[33] Cross contamination can occur when the internal organs are removed.[34]

Chilling: After the carcass has been washed, it is chilled to 4°C or less. There are two main methods of chilling poultry: water chilling and air chilling. Water chilling, used predominantly overseas including in the USA, has been shown to cause 60% of carcasses to be contaminated, whereas air chilling (used predominantly in Europe) has a contamination rate of around 20%.[35]

The Hygiene Assessment System (HAS): The HAS score has been set up by the Official Veterinary Surgeon (OVS) to look at the various hygiene aspects of a plant's structure, equipment and operation. The OVS awards points between 0 and 100 for each plant. A plant receiving 70 points has complied "*satisfactorily with all statutory hygiene requirements".* In November 1999 average annual scores were published for poultry meat slaughterhouses (including chickens, turkeys and other fowl).[38] Over 40% of all the big plants and 37% of the smaller plants scored under 70 points. Eight plants (8%) had scores below 60 points indicating very poor hygiene standards. One plant in Manchester scored only 44 points. Although HAS has been criticised for being slightly subjective, scores under 60 points are still inexcusable and pose a danger to the consumer.

Spent hens

When egg laying hens become economically inefficient they will enter the food chain in the same way as the broilers at the abattoir. The difference is that their meat is not offered for sale as a whole chicken, but instead is used for processed food [36] or even in Indian restaurants (where cooking times are longer). [37]

The end of the chicken chain

What's in broiler feed?

There are many concerns, expressed by consumers and animal welfare groups, about the content of animal feed. Wheat and soya are the two predominant ingredients used. Interestingly maize is not used at all in the UK even though it has been found to be easily digested by younger birds which are then less likely to suffer from diseases such as *Necrotic enteritis.*[39] The pie-chart *Broiler chicken feed* gives a breakdown of what broiler chickens eat.

Feed is also an important potential vehicle for the transmission of *Salmonella* infection. In 1994, between 2% and 4% of all poultry feed was infected with *Salmonella* [41] (see *Chicken chains*).

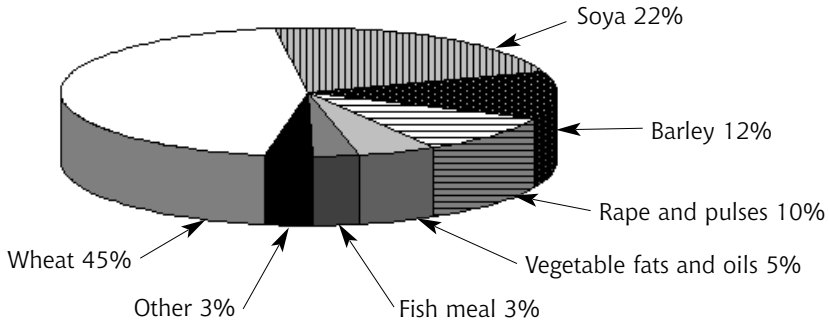
Soya

The large part of the broiler diet is soya. For more details about the environmental and economic impact of soya production see Food Facts number 5: *Soya: the ubiquitous bean.* [42] Over 2 million tonnes of soyameal was used in the UK in 1997 for animal feed and it has become one of the most important protein-rich feeds. As the USA is the largest producer of soya in the world, and half of all the soya from the USA is genetically modified (GM), it is now estimated that most broiler feed will contain genetically modified soya. A survey was carried out in January 1999 by the Food Facts series [43] to gauge the amount of animal feed which was genetically modified, as shown in the table *GM soya in chicken feed?*. A more recent survey asked a range of supermakets what their policy was on GM soya in broiler feed - see *Is chicken healthy?* Unless stated on the label, it is likely that the chicken has been fed GM soya feed.

GM soya in chicken feed?[44]

Organisation	What they said
Food and Drink Federation	*"no safety concerns about the use of genetically engineered soya in chicken feeds"*
Birds' Eye Walls	*"not looking into this [GM soya] at the moment"*
British Egg Federation	*"members not concerned"*
British Poultry Meat Federation	*"likely that most chickens eat GM soya, in general members were not concerned about this and it is unlikely that members would try to source GM free soya feed for their birds"*
Sainsbury's	*"setting up alternative sources of non-GM soya to be used to feed their own brand poultry"*
Waitrose	*"own-brand chickens have a GM-free diet"*
Tesco's	no information
Safeways	no information

Broiler chicken feed[40]



Meat and bone-meal

The UK operates a ban on the use of meat and bone meal (MBM), though MBM is still currently fed to chickens throughout Europe and the rest of the world. Legally poultry offal meal (POM) can be used but in the aftermath of the BSE crisis, the UK industry has imposed a voluntary ban. Thus, since 1996 all UK broiler producers do not use POM, but it is still used in imported chicken.

Testing broiler meat in the UK

In 1998, the Veterinary Medicines Directorate (VMD) tested for a range of veterinary residues in broiler chickens and other farmed animals. Although the publication claims that *"residues of veterinary residues occur in very few foods and at concentrations that are unlikely to pose a health risk to consumers",* this was certainly not the case for broiler feed or meat.

From 249 broiler liver samples, 58 (nearly a quarter) were found to have detectable levels of an anticoccidial called *Nicarbazin.* This is the first year that the VMD has tested broiler residues for nicarbazin. Some of these samples contained very high residue levels, including one liver sample which had 36 times the maximum limit set by the Joint FAO/WHO Expert Committee on Food Additives (JECFA). Indeed, 44 samples had residues above the maximum levels set by the JECFA, equivalent to nearly 1 in 20 chickens having illegal residues of nicarbazin. The VMD states that, if used correctly, no nicarbazin should be found in broiler liver, but its response to the problem is that it is *"taking this up with industry and fully expect to see a reduction in the numbers of positive samples found in 1999".*

Dimetridazole (DMZ) was also found in high levels in broiler feed. DMZ is only authorised for use with turkeys and guinea fowl. The withdrawal period for this antibiotic is 6 days. From 168 samples of broiler feed taken, 13% of samples were above the detection level of 100mg/kg, with one sample as high as 6100mg/kg. It would appear that contamination occurred in the feed plants, even though DMZ is not allowed to be used in broiler feed. DMZ is an antibiotic which could cause potentially serious problems

Antibiotics

Antibiotics were first used in the 1940s to protect animals against bacterial infections. However, farmers also found, for reasons still not clearly understood today, that the antibiotics also increased the productivity of the animal. In 1953 the British government passed the Therapeutic Substances Bill which extended the use of antibiotics to poultry feed for growth promotion. Today, antibiotics are still used within broiler systems for growth promotion and are now known, under EC law, as zootechnical feed additives (see box ZFA).

Zootechnical feed additives (ZFAs)[45]

- Substances which increase digestibility (enzymes)
- Substances which improve nutrient absorption from the intestine
- Substances which manipulate fermentation

Antibiotics are used in poultry in three ways:
1) Growth promoting - added in low concentrations to water and feed to reduce feed costs and encourage the absorption of food
2) Prophylactic - given to chickens to prevent or reduce the incidence of disease
3) Therapeutic - as a medicine to treat bacterial diseases

Over 453 tonnes of antibiotics are used in the UK on farm animals each year,[46] much of it for broilers and pigs. Nearly the same amount of antibiotics is used in human medicines. In the 1968 Medicines Act a distinction was made between therapeutic and feed (growth promoting) antibiotics. As a result antibiotics and other synthetic antimicrobial agents are sometimes used therapeutically to suppress or kill harmful organisms in the intestine (see the section *Probiotics below*). ZFAs are also subject to the EU Directive 70/542/EEC (amended) which includes the criterion that ZFAs should have no adverse effects on human health, animal health, or the environment. In 1997, an antibiotic called avoparcin was banned because of the likely development of resistance in humans to the antibiotic vancomycin. Since then six other ZFAs have been banned (olaquindox, carbadox,

bacitracin zinc, spiramycin, tylosin phosphate and virginiamycin). At the time of writing only four ZFAs may now be used in the EU: avilamycin (similar to a new antibiotic for human use called everninomycin[47]), flavophospholipol, monensin sodium and salinomycin sodium. Sweden, on its joining the EU, was also entitled to maintain its ban on all ZFAs see the box *Scandinavia and antibiotics*). In July 1999, the *Scientific Committee on Medicinal Products and Medical Devices* recommended that the prophylactic use of antibiotics constitutes misuse and should be banned.[48]

The evidence showing that antibiotics used in farming cause problems in human health can be found in a number of publications [49 50 51 52] and will not be pursued here (for a summary see the box *Problems with antibiotics*). Many hope that all growth promoting and prophylactic antibiotics in poultry feed will be removed in the near future both in the UK and EU. Unfortunately this may be more difficult to implement for imported poultry as some argue that a ban may be contrary to World Trade Organisation regulations.

The evidence against the use of growth promoting antibiotics is accepted by some in the UK broiler industry. Grampian Country Food Group (GCFG), which produces nearly one-third of all UK-reared chickens, recently announced that growth promoting antibiotics would be phased out.[53] This decision was taken after an antibiotic-free trial with 1.5 million birds showed no deterioration in their welfare or health. The supermarket Marks and Spencers (M&S) followed suit and on the 19 November 1999 announced the withdrawal of growth promoting antibiotics in their broiler meat. It is likely that other supermarkets will follow with similar bans on growth

Scandinavia and antibiotics [56]

In 1986 Sweden banned all ZFAs. Veterinary surgeons were unprepared and some pigs and poultry did suffer health problems. At first the amount of antibiotics used was not reduced though today 55% less antibiotics are used mainly through:

- Reducing stocking density
- Improving hygiene and housing systems to reduce stress
- Changing feed composition and strategies

Denmark adopted a voluntary ban on the use of ZFAs. Studies on broiler houses revealed that 16 months later there was no increase in morbidity or therapeutic use of antibiotics. However some flocks did have increasing problems with necrotic enteritis and chronic hepatitis.

Problems with antibiotics

According to the World Health Organisation, more than half of the total production of anti-microbials is used on farm animals, mainly for growth promotion. Problems with the use of antibiotics in broiler systems include the following:

- Antibiotics encourage persistent and multi-resistant strains of bacteria. These bacteria can spread to humans, who use similar antibiotics, which could result in uncontrollable epidemics. In a report by the United States General Accounting Office,[55] three disease-causing organisms have been linked to antibiotic resistance from antibiotics used in agriculture: *Salmonella*, *Campylobacter* and *Escherichia coli,* of which two are associated with poultry:
  - **Salmonella:** One strain in particular (*Salmonella DT-104)* is known to be resistant to ampicillin, chloramphenicol, streptomycin, sulfonamides, tetracycline and most recently, and worryingly, fluoroquinolones (an important class of antibiotics for treating diseases in humans).
  - **Campylobacter:** Prior to the use of fluoroquinolones in poultry in the USA in 1996, there were no cases of *Campylobacter* resistance in humans. This provides evidence that antibiotic resistant strains of *Campylobacter* are transmitted to humans.
- Antibiotics for growth promotion can increase the animals' susceptibility to diseases such as *Salmonella*. Antibiotics can kill beneficial bacteria which usually keep pathogens in check.
- Horizontal transmission of genes between different bacteria has been shown to exist in intensive livestock systems where antibiotics have been applied. The consequences of any resultant bacterial resistance to the antibiotics is unknown.
- Antibiotics are able to mask poor welfare standards such as poor hygiene and overcrowding. Antibiotics allow broiler chickens to outgrow their skeletal strength in an environment where a lack of exercise prevents chickens

promoting antibiotics. Peter Bradnock, of the BPMF, said "The days of antibiotic growth promoters are numbered".[54]

Unfortunately the distinction between therapeutic, prophylactic and growth promoting is not always clear. Even though growth promoting antibiotics may not be used, antibiotics can still be used prophylactically for medicinal reasons. This can still cause the same problems as the growth promoting antibiotics (see box *Problems with antibiotics*). A reduction in the use of antibiotics would therefore need to be coupled with a less intensive poultry system: better lighting, feeding, watering, litter removal, ventilation, temperature control and an improvement in chicken welfare.

Probiotics

'Probiotic' is derived from the Greek meaning *pro-life* and can be defined as: *"a live microbial feed supplement which beneficially affects the host animal by improving its microbial balance".*[57]

In the USA the term now used is *direct-fed microbial* (DFM) which is defined as a source of viable, naturally occurring micro-organisms.

Throughout the 1990s there has been growing interest in the use of probiotics as a substitute for antibiotics in the broiler industry. This has become especially important as antibiotics are being forced, or phased out of use as shown above. The benefits of probiotics were first discovered by Metchnikoff in 1907 who found that Bulgarian peasants who drank large amounts of a milk fermented with *Lactobacillus acidophilius* lived longer. He then surmised, correctly, that *L. acidophilius* was neutralising the detrimental microbials in the intestinal tract. Today, *L. acidophilius* can now be found in certain yoghurts, and is the equivalent of the probiotics fed to poultry. A study in 1973 showed the use of probiotics in poultry gave results similar to antibiotics in terms of weight gain, better feed conversion and reduced mortality. Probiotics also have other benefits for broiler chickens. For example, probiotics suppress ammonia production and urease activity which can be beneficial for the welfare and growth of the chicken. Probiotics can also neutralise pathogenic bacteria and stimulate the immune system.[58] Probiotics are generally recommended (eg.[59 60 61 62]) as an alternative to antibiotics for therapeutic, prophylactic and growth-promotion use in broiler systems. However, scientists dispute the effectiveness of probiotics in broiler systems though and consequently their use is patchy.

Other feed additives

Anticoccidials

These are added to feed to protect birds from a disease caused by protozoan parasites. All birds, including organic chicks, will receive anticoccidials. In 1998 the VMD found very high levels of the anticoccidial nicarbazin in broiler liver (see *Testing broiler meat in the UK*).

Metals

Iron and copper are added to prevent anaemia, selenium is added to prevent oxidative damage to cells and zinc and manganese are added to ensure proper eggshell deposition and feather development. These metals can end up in the environment (see *Broiler litter - where does it go?*)

Tranquilizers

Tranquilizers have been used to keep flocks quiet, though it is not believed these are currently used in the UK.

Advisory Committee on Animal Feedingstuffs

In June 1999 the government set up the Advisory Committee on Animal Feedingstuffs (ACAF) - see *Contacts.* ACAF will advise health and agriculture ministers, and the Food Standards Agency, on the safety and use of animal feeds and feeding practices, with a particular emphasis on protecting human health. It will also cover animal health and a wide range of topical issues including advice to UK negotiators on new EC proposals, on animal feed ingredients including genetically modified organisms, labelling and information for consumers. In a meeting on the 24 September 1999, ACAF agreed that the following issues were a priority:

- Labelling of animal feed (including GM material)
- Alternatives to the banned antibiotic growth promoters
- ACAF's role in relation to new feed additives and bio-proteins

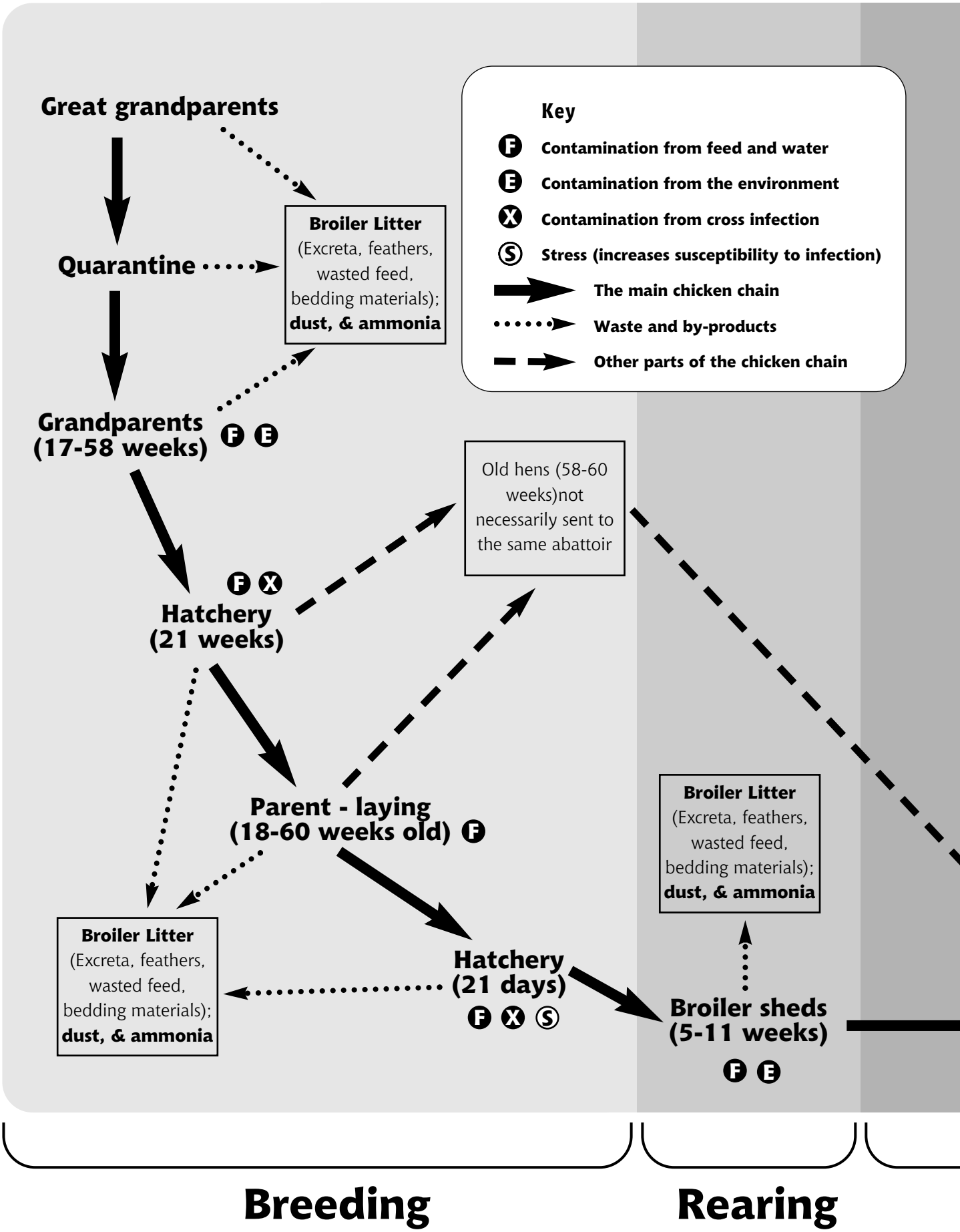
The Dioxin problem in Belgium

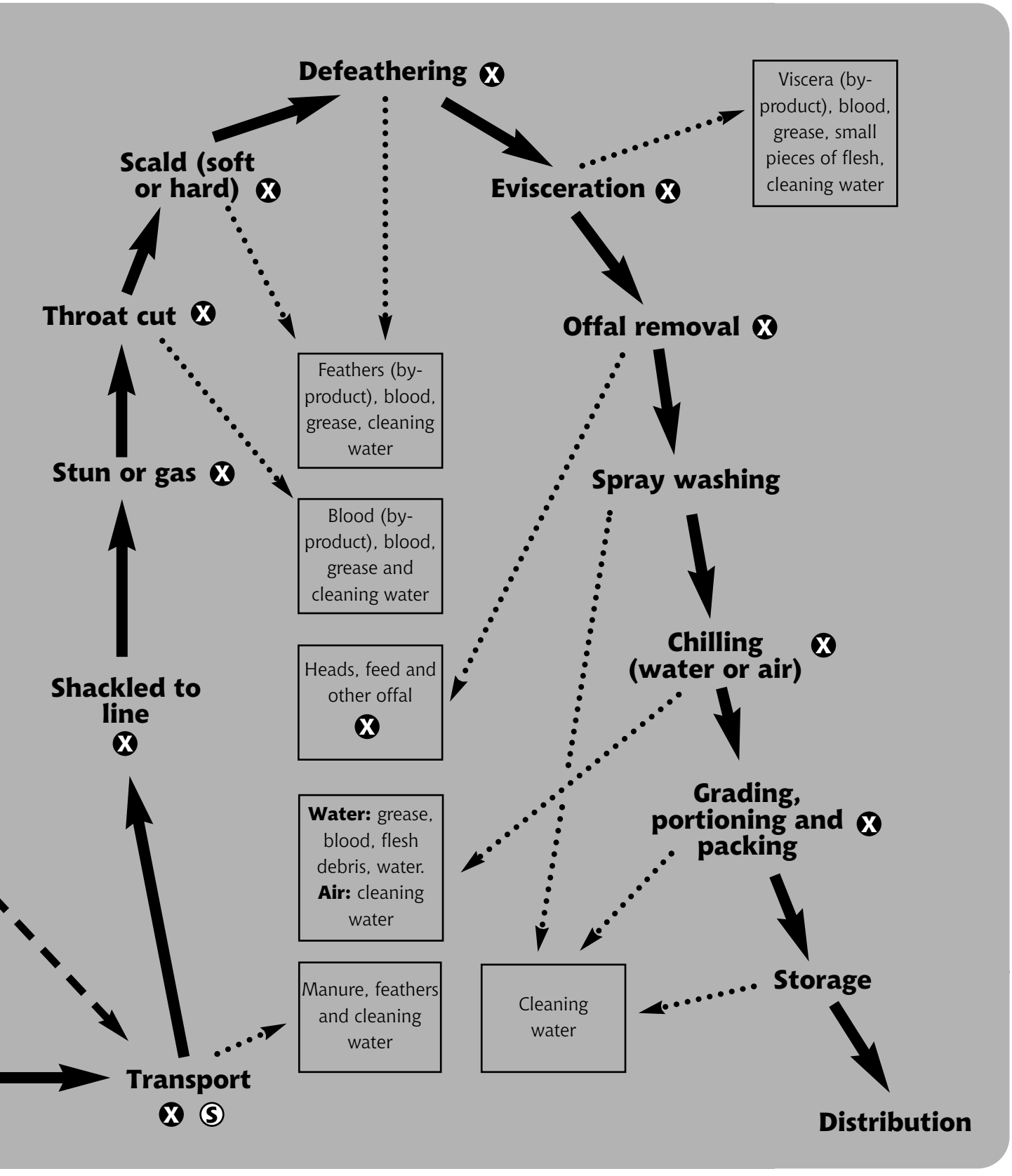
In 1997 Belgium produced over 330 thousand tonnes of chicken meat, equivalent to 224 billion slaughtered chickens. Over 78,000 chickens were exported.[102] In February 1999, chicken farmers noticed signs of acute poisoning in their flocks manifested by increased death rates and severe nervous disorders. A veterinary inspector sent samples of feed and a dead hen for analysis. The samples were found to contain an assortment of dioxin and polychlorinated biphenyl (PCB) products. It is now believed that 8 litres of used PCB oil was mixed with an 80 tonne batch of recycled fats used mainly for chicken feed. The Belgian government was informed in April 1999 and on the 26 May 1999 the government informed the European Commission (EC), as required by law (the EC has taken legal action against the Belgian government for the delay in the notification). As a result, all chicken, eggs, pork and beef were removed from the market. Milk was also banned by the EC from being sold abroad.

What are dioxins? Dioxins are a group of unwanted chemical by-products whenever chlorinated hydrocarbons are processed or burned (such as in an incinerator). Chlorinated hydrocarbons (mixing petroleum with chlorine) has given rise to the manufacture of plastics, solvents, pesticides, and oils. Dioxins are extremely persistent and bio-accumulative and are most commonly found in human fatty tissues. Until recently governments and industry have been reluctant to admit the health implications of dioxins in the environment. However the recent ban on many Belgian products by European countries does show that its dangers are known. Very small amounts of dioxins in humans are all that is needed to cause cancer, disrupt reproduction, disrupt the nervous system, and cause serious skin diseases. Once dioxins enter the human body, it is unlikely they will ever leave. Most dioxins are spread through incineration plants, but there have been cases of dioxin contamination occurring through the food chain. There is no legal requirement in the UK to test animal feed for dioxins, though the VMD is known to test for PCBs.

The use of antibiotics can mask poor welfare standards such as high stocking densities

The chicken chain




Defeathering X
Viscera (by-product), blood, grease, small pieces of flesh, cleaning water
Scald (soft or hard) X
Evisceration X
Throat cut X
Offal removal X
Feathers (by-product), blood, grease, cleaning water
Stun or gas X
Spray washing
Blood (by-product), blood, grease and cleaning water
Chilling (water or air) X
Heads, feed and other offal X
Shackled to line X
Grading, portioning and packing X
Water: grease, blood, flesh debris, water. Air: cleaning water
Storage
Manure, feathers and cleaning water
Cleaning water
Transport X S
Distribution

Processing

Broilers and the environment

Broiler litter - where does it go?

Broiler litter is a mixture of excreta, feathers, wasted feed and bedding materials, and is a valuable by-product of the broiler industry. However it is also considered the most toxic animal waste and can be a serious problem to dispose of in large amounts. In the UK around two-thirds is spread on agricultural fields and one-third incincerated in power stations.

Fertilising fields

Poultry litter is an excellent source of nutrients for a farmer as it is very high in nitrogen, phosphorous, and potassium. Only one tonne of litter is needed for over 10 hectares of pastureland. However, if applied incorrectly, this can lead to several problems: [63]

- Nutrient runoff, especially nitrogen and phosphorous, can cause pollution to surface and ground water. [64]
- Pathogens from poultry waste may contaminate soil and water. E. coli (known as fecal coliforms) are good indicators of enteric bacterial pathogens in fecal poultry wastes found in water. In Kentucky, USA, where nearly all the broiler waste is spread onto agricultural fields, a study found that there was a high risk of poultry waste pathogens entering groundwater. [65]
- Broiler feed often contains fairly high concentrations of heavy metals such as arsenic, copper, iron, manganese, selium and zinc. These metals come from the feed, most of which passes through the bird leading to the high concentrations in broiler manure. Copper is of most concern, as it is extremely toxic to algae.
- The leaching of the hormone 17b-Estradiol from poultry manure can cause considerable disruption to wildlife and ecosystems. [66]
- Other sources of contaminants include feed additives such as antibiotics, metabolic wastes, pesticides and bedding toxicants. [67]

Organic farmers often use poulty litter on their land but only after it has been composted. However, according to one report, composting does not reduce the toxicity of the leachate. [68]

Broiler litter has also been fed to livestock, especially beef cattle. The reason for this is the high levels of protein which can replace feed such as alfalfa. Although the feed needs to be processed (heat treated to remove harmful pathogens) and was considered by many not to be a health hazard,[69] this practice has now stopped in the UK following the BSE crisis. However, beef in many other countries, including those in the EU, are still fed poultry litter.

From manure to power

Broiler manure is now also used to generate electricity and in the UK one company, Fibrowatt, dominates the industry. The company burns broiler manure at three sites: Eye in Suffolk, Scunthorpe in North Lincolnshire, and Thetford in Norfolk. The environmental impact of burning broiler litter is not known. The industry claims that there are many environmental benefits including the following: [70]

- Pollution from existing disposal methods is reduced (e.g. nitrate leaching)
- The ash produced by the process is marketed as an environmentally friendly, nitrogen-free fertiliser, rich in phosphate and potash
- Gaseous emissions are cleaner than from traditional power stations. The chemical composition of poultry litter ensures that the level of noxious gases released, such as sulphur dioxide and nitrogen oxides, are a small fraction of those emitted by the coal-fired generation process, and are well within the UK and EU statutory limits. This helps reduce the "greenhouse effect", since it adds no new CO_2 to the natural carbon cycle.

Broiler manure has now started to be imported from the Netherlands by ship and lorry, where broiler houses are happy to pay for the disposal of their manure.

All the broiler manure comes from intensive systems. Power generation therefore tends to support, indirectly, those systems which provide few benefits for the welfare of chickens or a reduction in the contamination of chicken meat.

Cleaning and disinfecting

Once the broiler chickens have been transported to the abattoir, the broiler house (including the floor, feeders, drinkers and the ventilation system) has to be

disinfected before the next crop of chicks can enter. Sometimes the whole broiler house is sealed from the external environment and sprayed with an approved insecticide. As the insecticides do not come into contact with any animal, they are approved by the Health and Safety Executive (HSE). Four products are currently approved as shown in the table *Approved pesticides for use in broiler houses,* three of which are organophosphates and one is a synthetic pyrethroid. Using such dangerous active ingredients requires the highest of application standards and these may not always be adhered to (see *One spray and eight dead sheep later*).

One spray and eight dead sheep later

On the 29 November 1998 Breeches Chicken Farm, owned by Grampian Country Food Group (see *Contacts*), sprayed their broiler house an organophosphate (OP) insecticide containing fenitrothion. Within three weeks, eight sheep in a neighbouring field were dead, probably as a result of the OP spraying. However, no action has been taken by the HSE or by MAFF, though the Grampian Country Food Group did sack the spray contractors.[71]

Accidents have occurred where the broiler chickens themselves have suffered and died. For example in the Netherlands in December 1997, over 16% of a flock died in one shed which had recently been sprayed with a fenitrothion insecticide. [72]

Dirty air

Within a broiler unit, the air *"seethes with a disease miasma of gases, dusts and micro-organisms that arise from the birds themselves, their feed, droppings and the litter".* [73] This air pollution from the broiler unit can affect the health of the chicken, cause respiratory ill health in stockmen and is a serious source of environmental pollution. The cause of the high concentrations of air pollutants is a direct consequence of high stocking densities and slow ventilation rates, which help maintain a warm building.

There are therefore two aspects to air pollution in broiler houses: the concentration of pollutants and the rate of emissions. The table *Concentrations and emissions of air pollutants in Europe* gives relevant details of broiler houses in four countries. In 1998 a report concluded that, using the figures in this table, concentrations of ammonia would exceed the UK recommended occupational exposure limit (OEL) which, it has been argued, have been set too high in any case.[74] The report also notes that if emission rates are to be reduced through ventilation systems, then much faster ventilation systems are needed than those currently used. However, this approach would increase air pollution in the environment outside the broiler house.

Broilers: Chickens are affected by air pollution mainly through respiratory diseases, but it can also increase the virulence and proliferation of pathogens. High ammonia levels, especially over 25 ppm, increases susceptibility to respiratory infection. Poultry diseases, such as *Salmonella enteritidis* and *Escherichia coli,* are often transmitted aerially even between different broiler houses unless they are many kilometres apart. Studies have also shown that chickens are uncomfortable in polluted air, mainly because of disruption to their sense of smell.

Occupational health: Stockmen are similarly affected by air pollution within a broiler house, though of course the time they spend there is much less than that of the chickens. However, the regular exposure to air pollutants is shown by increased occupational respiratory diseases. Broiler dust has

Approved pesticides for use in broiler houses

Company	Name	Active Ingredient	Type of pesticide
Forax Ltd	Littac	a-cypermethrin	synthetic pyrethroid
Kill Germ Chemicals	Kill Germ 40 WP	fenitrothion	Organophosphate
Zeneca	Actellic 25 EC	pirmiphos-methyl	Organophosphate
Vetraepharm	Fumithion 40 WP	fenitrothion	Organophosphate

been implicated in chronic bronchitis, hysensitivity pnemonitis and toxic fever, though it is not known how extensive the problem is amongst broiler stockmen.[75]

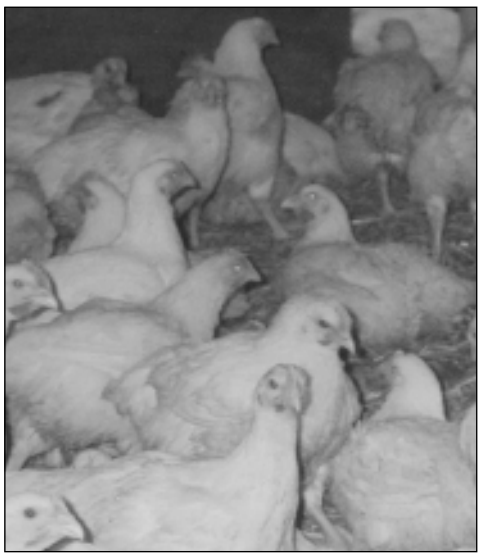
Environment: Nearly all air pollutants mentioned above are released into the environment at some point though no studies have been done to gauge the effect this is having. The use of pesticides can also be a problem (e.g. see *One spray and eight dead sheep later*). Broiler houses emit a number of gases, especially ammonia, methane and nitrous oxide (a powerful greenhouse gas that also affects the ozone layer). Broiler houses can also smell very bad, and for local residents this can be disagreeable. In 1994/5, 3,646 poultry houses were subject to a complaint about the smell.

Reducing environmental pollution: Many abatement and control techniques have been identified such as the use of rapeseed oil to control airborne dust and cleaning the ventilation systems on a regular basis. However these changes do not tackle the underlying cause of airborne pollution: the large number of chickens in a small area.

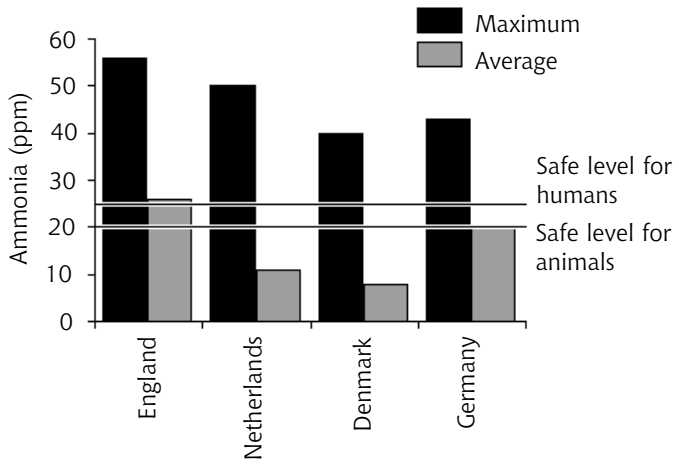
Concentrations and emissions of air pollutants in Europe [76]

	Denmark	England	Germany	Netherlands
Concentration				
Inhalable dust (mg/m3)	3.8	9.9	4.5	10.4
Respirable dust (mg/m3)	0.4	1.1	0.6	1.1
Inhalable endotoxin (mg/m3)	70.0	128.0	6000.0	381.0
Respirable endotoxin (mg/m3)	6.0	42.0	239.0	41.0
Average ammonia (ppm)	8.0	27.1	20.8	11.2
Emission rate				
Inhalable dust (mg/h/500kg)	1856.0	6218.0	2805.0	4984.0
Respirable dust (mg/h/500kg)	245.0	706.0	394.0	725.0
Ammonia emission (mg/h/500kg)	2208.0	8294.0	7499.0	4179.0

Free range chickens can always escape high ammonia levels during the day



Ammonia levels in air of broiler houses [77]



Is it safe to eat chicken meat?

Broiler meat has earned itself a bad name in the past few years. With up to 41% of chickens on retail sale in the UK contaminated with *Salmonella*, 48% infected with *Campylobacter* and 66% infected with *Listeria,*[78] there is a serious health risk to eating chicken unless it is prepared correctly. In 1993 The Public Health Food Surveillance Group found that 18% of raw chicken from Britain and 64% of imported poultry was contaminated with *Salmonella*.[79] Another study in 1996 found more than half of UK-bred chickens purchased from retail outlets contained *Campylobacters,* and 1 in 37 of these samples was resistant to ciprofloxacin (see the section *Antibiotics*).[80]

Campylobacter is the most commonly reported cause of food poisoning in England and Wales with over 40,000 incidences reported each year[81] and in the USA between two and four million cases[82] are reported every year. *Salmonella* is the second most common cause of food poisoning and the number of cases has more than doubled in the 1990s to over 30,000 cases a year,[83] and in the USA may be as high as 4 million cases a year.[84] In 1996 *Which?*[85] bought a range of chickens from large supermarkets to be tested by the Royal College of Veterinary Surgeons. The results showed that over a third chickens were 'unfit for human consumption' as defined by the Poultry Meat (Hygiene) Regulations 1995. In a separate test by *Which?* 160 samples of chicken were tested for bacterial infection, of which 20% had *Salmonella* and 37% had *Campylobacter*.[85]

All the supermarkets questioned for this report stated that the levels of *Salmonella* had been reduced in broiler meat, though were unable to provide evidence. However, levels of *Campylobacter* and listeria had generally remained unchanged (see *Supermarkets*). There were also few differences in bacterial contamination between free-range and intensive systems.

To see at which stages contamination can occur see the diagram *Chicken chain*.

How to avoid food poisoning from chicken meat[88]

- Don't buy chickens which show problems such as incomplete plucking or bruises
- Separate raw chicken from other foods. Store at the bottom of the fridge to avoid juices dripping onto other food
- Cook all poultry thoroughly to ensure all bacteria are killed. The meat should be white and the juices should run clear
- Pre-cook all chicken before barbecuing
- If a chicken looks damaged let the retailer know

The big three contaminants

1) *Salmonella*

Salmonella are able to grow best between 10°C and 50°C with or without oxygen. They can survive refrigeration and freezing, but are killed at temperatures over 60°C. The most common in the UK are *S. enteritidis, S. typhimurium,* and *S. virchow.* Salmonellosis in humans leads to fever, abdominal pain and diarrhoea and 20% of cases lead to hospital treatment. Transmission occurs in three ways:

- Direct contact with contaminated animals
- Consumption of contaminated feed or water
- Contamination from the environment such as buildings, pasture, wild birds and rodents

The Advisory Committee on the Microbiological Safety of Food (ACMSF) has estimated that up to 35% of all *Salmonella* poisoning is due to poultry meat.[86]

2) *Campylobacter*

Campylobacter need a reduced oxygen atmosphere to grow. The two most common species in humans are *Campylobacter jejuni* (most common) and *C. coli* both of which stop growing below 28°C and prefer temperatures of around 42°C. They therefore do not grow readily on food, especially as numbers will decrease when refrigerated or frozen. In humans the bacteria cause enterocolitis, a gastointestinal infectious disease with symptons including fever, diarrhoea and blood and mucus in stools. Contamination is through contact, and is particularly prevalent in broiler meat,

Three-quarters chicken!

In 1993 Sainsbury's self-basting frozen chicken with a 'southern flavour' was described as containing only 75% meat. Other ingredients were water, sunflower oil, salt, sugar, lactose, flavouring and hydrolysed vegetable protein. The chicken had been frozen by immersion, which adds water to the bird. Fat was then injected under the skin to make the chicken self-basting.[91]

though it can contaminate other foods. *Campylobacter* has been found to survive on frozen chickens for over three months.[87] Although the effects on human health are not very serious, it is still considered an important public health problem because of the large number of infections.

3) ***Listeria***

Listeria monocytogenes grows in temperatures between 0°C and 42°C. The organism will multiply slowly on food at temperatures between 1°C and 8°C. Up to 30% of people contracting *L. monocytogenes* die. Incubation periods on food can be as long as 90 days and *L. monocytogenes* does not respond in the same way as other bacteria to storage and cooking. *L. monocytogenes* proliferates more in vacuum packed food than air-packed food or food stored at low temperatures.

Fatty food?

Since the last century, the carcass fat content of the typical chicken has risen by 1000%.[89] A typical 100 gram portion of raw chicken meat will contain 4.3 grams of fat, though this rises to 17.6 grams with skin. This compares with a beef steak having 10.6 grams, bacon with 28.9 grams, a lamb chop with 34.6 grams and fish (white cod) with 0.7 grams.[90] All these figures are for raw meat and fish, and, depending on the cooking method used, will rise to much higher levels. Fat content will also be dependant on the species of chicken used.

Contamination of chicken meat can occur as soon as the chicks are born...

...through to poor handling by the retailer and consumer - see the diagram Chicken chain.

Supermarkets

Supermarkets dominate the retailing of broiler meat. Sustain carried out a survey of several supermarkets and one fast-food chain in the UK and asked them if they had any policies on: genetically modified feed, contamination of chicken meat and welfare standards:

Supermarket	Do you have a policy on GM feed?	What is being done about Salmonella, Campylobacter and Listeria contamination?	How do you ensure that all broiler chickens receive the highest welfare standards?	Other comments
Marks and Spencer	• Will remove all GM soya from feed. • All free-range broilers are fed non-GM feed	• Implemented 'hygiene interventions' at each stage of the supply chain. • Have virtually eradicated *Salmonella* from poultry meat. Total eradication will require vaccines. • Claim that *Campylobacter* has been reduced	• M&S codes of practice under the Select Farms initiative. • Taken from FAWC standards. • Farms audited a minimum of twice a year	• Phasing out all growth promoting antibiotics from January 2000. • Gave a very detailed answer to the questions
Sainsburys	• Waiting for changes in legislation on labelling before segregating GM feed from non-GM feed	• "All broiler chickens are managed appropriately in their growth from chick to slaughter" • "We continue to work closely with suppliers to improve controls to reduce the incidence of pathogens"	• Established suppliers through the Partnership in Livestock Scheme. Use supported "good practice".	• Looking to reduce growth promoting antibiotics
Somerfield	• Complicated because insufficient supplies available to guarantee quality. Also imported poultry is difficult to regulate	• Reduced *Salmonella* but little change in *Campylobacter*. Provide advice to consumers about cooking chicken	• Set of minimum standards as with other supermarkets	• Looking to reduce use of antibiotics though are aware that prophylactic use of antibiotics can be used to hide poor production systems. • Gave the most information in the survey
Waitrose	• Yes - still looking to remove all GM feed	• Have been monitoring for a number of years, especially with *Salmonella* - have been decreased incidences of contamination (no evidence provided)	• Minimum standards are those used by FAWC. 31.5% of all chickens sold are organic or free range	• "Consumer choice" is the most important. • Looking to remove growth promoting antibiotics

Not all supermarkets responded to the questionnaire.

Chickens fly further

The graph *Imports of chicken* shows that imports of chicken meat have substantially increased in the past 20 years. The graph *Which countries?* shows that the main countries which export to the UK, in descending order, are the Netherlands, France, Thailand, Denmark, and Brazil. The most dramatic rise has been the imports of broiler meat from third countries (i.e. outside Europe), especially Thailand, Brazil and most recently Chile. Between 1998 and 1999 imports of chicken meat into the UK increased by 29% and imports of chicken meat from Thailand rose from 5,915 tonnes to 13,886 tonnes (135%).[92]

For all imports of chicken meat into any of the European member states, third countries need to gain approval for both the producers and processors to export to the EU. There are a number of European directives that cover which establishments are approved for export to the EU and two examples, Brazil and Thailand, are given below. Countries within the EU are also inspected. In 1999, French broiler producers and processors were visited by the European Commission and several shortcomings were found.[93] Problems included inadequate veterinary supervision of: broiler farms; animal welfare during transport; stunning; and ante mortem inspections. Thus France, the second largest exporter to the UK, has an intensive broiler system that does not meet the minimum standards set by the European Commission.

Brazil

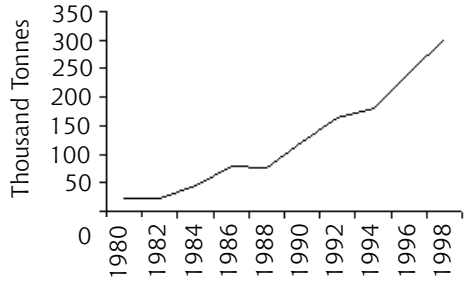
Directive 97/222/EC includes two regions in Brazil. Due to the large increase in imports from Brazil it was decided to re-assess the veterinary structures and legislation, with particular reference to animal health and welfare and public health. The EC mission teams visited several veterinary laboratories, 20 poultry meat establishments and four poultry meat processing plants. Some of the findings of the report [97] included:

- Insufficient number of veterinary staff in some areas; insufficient meat chilling legislation; insufficient data on feed, water consumption, weight gain and health inspection; no animal welfare legislation at slaughter and inadequate stunning legislation.
- Lay-out problems in some establishments, increasing the risk of contamination.

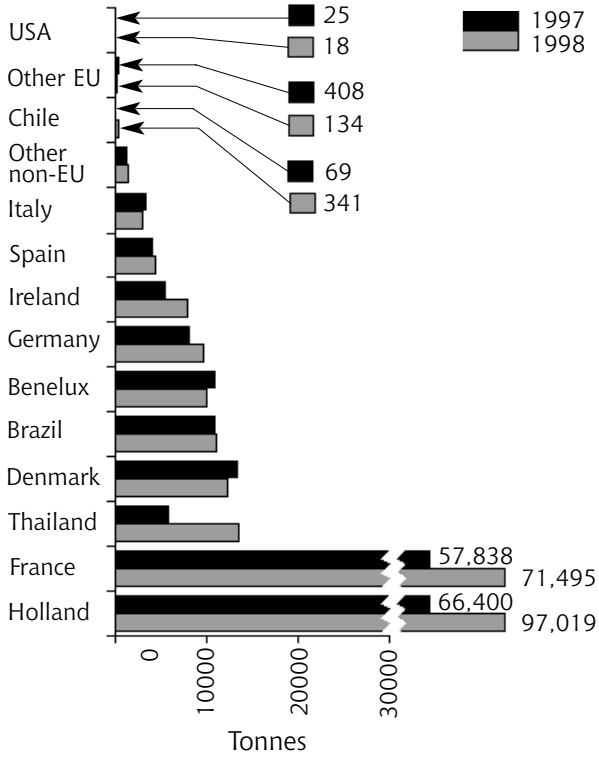
US chicken unsafe

Did you know that all chicken produced in the United States of America (USA) is banned for consumption in the UK and Europe. In 1998 only 18 tonnes of chicken (all in processed foods), was imported into the UK from the USA. In 1997 the European Commission visited and inspected a number of abattoirs and processing plants in the USA and found that they did *"not meet all requirements of the appropriate Community legislation".* The USA contravened Council Directive 71/118/EEC on *"health problems affecting the production and placing on the market of fresh poultry meat".*[94]

Imports of Chicken[95]



Which countries? (1997 & 1998)[96]



- Poor maintenance; poor ventilation; inadequate stunning; inadequate bleeding practices; lack of immediate knife disinfection facilities; low evisceration standards; poor use of carcass showers before meat inspection; automatic cutters only cleaned every two hours.

Other problems included: use of hyperchlorinated water in the immersion chiller (with up to 5ppm of free chlorine); inadequate monitoring of the chilling procedures; incorrect temperature of the meat after chilling and during the cutting process; lack of microbiological control before and after immersion in the chiller; and incorrect temperature of the scalding tank.

The Brazilian authorities have been given 6 months from the date of the report (August 1999) to rectify many of these problems. If they are not, all imports of Brazilian poultry meat will be suspended.

Thailand

The European Commission has been responsible for third country assessments since 1994. However, in the case of Thailand no such assessments have been made, despite the large amount of chicken meat imported from Thailand. As a result the UK (MAFF) exercised its right to inspect the broiler premises in Thailand in February 1999. Although Thailand appeared eager to comply with all European demands for health standards and animal welfare, a number of problems were noted:

- Poor monitoring of broiler houses
- Insufficient post-mortem inspections
- Lack of hygiene at bleeding points and offal harvesting in the abattoir
- Meat destined for the local market was often badly handled, creating possible hygiene problems
- Although rearing conditions were considered "*excellent*", transport and handling at slaughter houses were "*less satisfactory*". "*Our overall impression was that animal welfare was given a lower priority than in the UK*".

Several supermarkets were asked by *Poultry World* [98] (see *Contacts*) in October 1999 to comment on the sourcing of their poultry, following a front page story in *The Express* [99] discussing the MAFF visit in Thailand. Nearly all retailers used chicken imported from abroad, usually for processed foods.

Supermarkets and imported poultry meat

Supermarket	**What they originally said to *The Express***	**What they said to *Poultry World***
Asda	Used in its frozen nuggets and other products	Only small proportion of its own brand products contained third country poultry meat: "The Express claims are rubbish" a spokesperson said.
Iceland	Used Thai chicken	The only major retailer to have an office in Thailand.
Marks & Spencer	Banned all non-EU imports	Majority of meat from UK and EU. No imports from Thailand and Brazil.
Safeway	Own brand chicken burgers and chicken kiev	no information
Sainsbury's	Used Thai chicken	Imports of Thai poultry meat in some frozen meals
Somerfield	Uses imported chicken in frozen ready meals	Sourced pre-cooked chicken breasts from Thailand
Tesco	no information	Did not use Thai poultry meat.

The McLibel Case

Judgement on McDonalds' and Sun Valley broiler chickens

In 1997 the UK's longest libel trial ended after 5 years. McDonalds, the fast food restaurant chain, had sued two members of a small organisation called *London Greenpeace* who had produced a leaflet (see picture). The leaflet had given details about the rearing and slaughtering of animals. McDonalds claimed that the accusations were libellous.

During this trial the whole chicken chain was analysed in detail, with a specific investigation of McDonalds and Sun Valley, the company which supplied all the chicken meat. Sun Valley is one of the biggest broiler producers in the UK producing up to 40 million birds a year of which one-fifth is supplied to McDonalds. McDonalds claims to be the second highest user of chickens in the world. A full copy of the verdict is available from the website www.mcspotlight.org.

McDonald's Corporation is the First Plaintiff and McDonald's Restaurants Limited is the Second Plaintiff. The defendants are Helen Steel and David Morris. The names of those giving evidence included Dr Neville Gregory (Senior Research Fellow, Division of Food Animal Science, School of Veterinary Science of Bristol University and now Professor of Animal Welfare in New Zealand), Mrs Clare Druce, (National Organiser of the Farm Animal Welfare Network), Dr Gomez Gonzales (McDonalds USA Manager of Meat Products), and Dr Mark Pattison (Sun Valley's Group Technical Manager).

The following quotes are from the final verdict by Justice Bell on the 19 June 1997:

Chicks

Sun Valley cull chicks which do not meet its standards in one way or another. Dr Pattison said that Sun Valley culled about 200 to 300 unwanted chicks a day by pouring them into a 50 gallon drum containing carbon dioxide. The drum is then sealed. the gassing takes 40 to 45 seconds. When Dr Gregory was asked if he considered the practice humane he said that he was very concerned about the use of carbon dioxide as a means of killing chicks from a welfare point of view. Prior to the loss of consciousness the chicks would experience a profound and unpleasant sense of breathlessness. He agreed that the chicks at the bottom of the drum got squashed by those on top of them.

Verdict: *In my view chicks gassed by Sun Valley do suffer significantly, albeit for a short period, when gassed by CO_2 and when an alternative method of instantaneous killing is available and on balance, largely guided by Dr Gregory's concern, I find the practice to be cruel.*

Restricted feed for breeders

[Dr Gregory] thought that the broiler industry was in a dilemma so far as broiler breeders were concerned. It either caused suffering through hunger or faced fertility and mortality problems. This dilemma was due to the genetic selection, Dr Gregory said.

Verdict: *My conclusion is that the practice of rearing breeders for appetite, that is to feel especially hungry, and then restricting their feed with the effect of keeping them hungry, is cruel.*

Light

…from Dr Pattison's evidence…Sun Valley normally runs its broiler houses at 10 to 20 lux. There was no daylight in Sun Valley houses, but nor was there any evidence of difficulty finding feed because of gloom. One particular risk of low lighting in broiler houses is that it may make it more difficult for poultrymen to find sick or injured birds, or dead birds lying in the litter with their potential for the spread of disease in various ways. Sun Valley can obviously turn the lighting up for the poultrymen's periodic inspections but Dr Pattison said that they were carried out at 20 lux.

Verdict: *I find it difficult to see why Sun Valley houses should not meet the FAWC recommendation all the time, but I find it impossible to find that the low level of lighting has caused Sun Valley birds any direct suffering.*

Stocking density

In my view the most serious criticism of rearing conditions in Sun Valley broiler houses related to maximum stocking density. FAWC recommends a maximum of 34kg live weight of birds per square metre of space, but Dr Pattison said that Sun Valley's maximum stocking density was generally 36.5kg per square metre and Dr Gregory calculated it at 36.7kg on the day of his visit which was the 41st day of the chicken's lives and therefore the day before the day of maximum density when the females were removed from the unit. That stocking density amounts to less

than the area of an A4 sheet of paper per bird weighing about 2kg. I did not feel that Dr Pattison gave a satisfactory explanation for Sun Valley's maximum stocking density. He was a member of FAWC when it made its recommendation and he said it was judged in the context of ordinary broiler house environment.

Verdict: *The high density is intentional and unnecessary and it probably causes the birds some level of real discomfort. In my judgement it is cruel. The same applies to the U.S.*

Leg problems

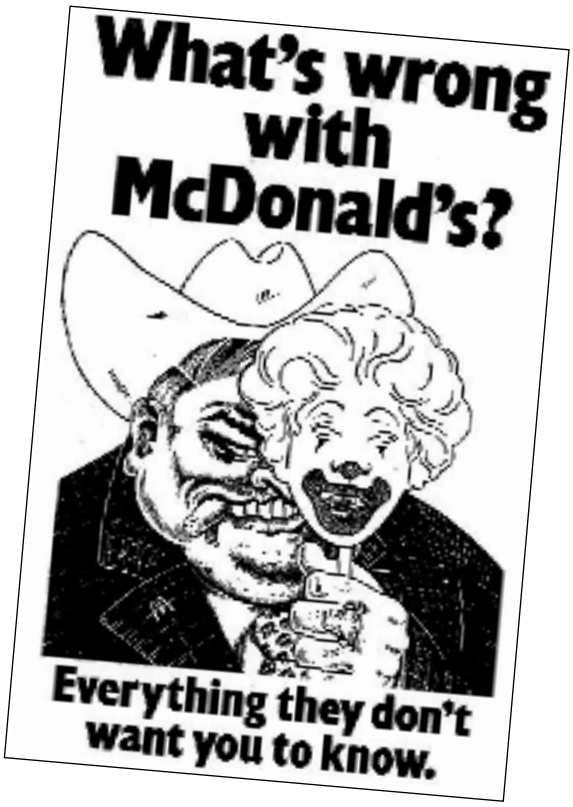
Dr Pattison accepted that at present one consequence of breeding birds for weight was that it might induce leg problems at some later stage in their life and that breeding companies had to work very hard to avoid an increase in genetically induced leg abnormalities. No meat producing breeds had been produced to eliminate leg problems. The view of all three scientists, Dr Gregory, Dr Pattison and Dr Gomez Gonzales, which I accept, was that the most serious leg problems in broilers were caused by infection, mostly in the hatchery, and that lesser abnormalities were caused by breeding for weight gain…The Defendants called Ms Vicki Watkins who made an unobserved visit to one of Sun Valley's contract farmers in Gwent on the 10th September,1995. She said that she found many birds suffering from severe hip and leg deformities. Some were too crippled to stand. She took a video film which I saw. She immediately made a complaint to MAFF and a Ministry veterinary surgeon inspected the farm within an hour. No action was taken by the Ministry, but in my view this fact did not controvert Ms Watkins' evidence, supported by her video, which I accept. The fact that no action was taken by the Ministry lent cogency to Ms Watkins' view that the problem of unculled birds with severe leg problems pervades the industry.

Verdict: *I can see no reason why at least 7% of broilers, and possibly more, should have to suffer from discomforting leg problems with which they live on. In my judgment it involves cruelty.*

Catching

Birds at Sun Valley, as elsewhere, are caught by hand and held upside down by one leg in the hands of the catcher until he has several in each hand, whereupon he puts or drops them into a drawer in a module which has been brought into the broiler house.

Verdict: *…the catching at Sun Valley's own farms and at contract farms has often been done hurriedly and clumsily under pressure of time with the result that it has been cruel, in my view.*



The original London Greenpeace leaflet

Slaughter

Verdict 1: *In my view hanging chickens upside down in shackles where they stay for about a minute and a quarter before being stunned probably causes the chickens some degree of stress and some may suffer a degree of pain.*

Verdict 2: *I judge neck cutting while conscious to be cruel by modern standards.*

Final Verdict:

In summary, so far as broiler chickens reared and slaughtered for the Plaintiffs are concerned, I find that there have been cruel practices relating to the culling of chicks by carbon dioxide (UK), the restriction of feed for breeders (UK and US), the leg problems of broilers bred for weight gain (UK and US), the stocking density in the last few weeks of the females' lives at least (UK and US), the catching and handling of the broilers when caught for slaughter (UK), pre-stun shocks on the slaughter line (UK) and numbers of birds having their throats cut while fully conscious (UK and US).

What are the alternatives?

The intensive broiler system, described above, reveals how over 98% of all chickens are produced in the UK. Poultry is one of the few foods that does offer several alternative agricultural systems but the labelling system is not very simple, clear or helpful to consumers. Moreover, many of these are more expensive than conventional intensive systems. As consumer choice is often based on cost, alternative systems have problems competing with intensive systems. All the alternative systems claim increased welfare standards, and usually better quality meat. At the time of writing, the organic regulations for poultry production are undergoing a review. Organic broiler meat is often imported as there is very little organic chicken production in the UK. The table *Comparison of broiler systems* shows the differences which exist between each type of system.

Free range?

Under EC regulations 1906/90 there are three types of free range chicken: Free Range, Traditional Free Range and Free Range - Total Freedom. However, according to Richard Guy of the Real Meat Company (see *Contacts*) much of the broiler meat claiming to be 'Free Range' is little better than intensive broiler systems. The welfare of a free-range chicken is not necessarily better than indoor chickens. For example, free range are more likely to be de-beaked. Stocking densities can be too high as young chickens are often reluctant to leave the warmth of the shed. The sheds themselves are often poorly built, and difficult to clean. Free range chickens tend to be more independent minded than indoor chickens, and this too can cause welfare problems as they become more stressed when caught and slaughtered.[100]

Even if chickens are free and happy during their lives, this does not necessarily signify that their death is welfare friendly. Joanna Blythman (the award-winning *Guardian* reporter) investigated Tesco's Nature's Choice Free Range chickens from France which were *"raised in total freedom in the forests of France".*[101] Though the rearing conditions may have been excellent compared to the rest of the industry, the slaughter process was considered inhumane. Blythman discovered that many of the birds were still alive and conscious when their throats were cut, as only 20mA was used to stun each bird.

Some alternative systems are not necessarily free range, such as the RSPCA Freedom Foods Ltd certified chickens.

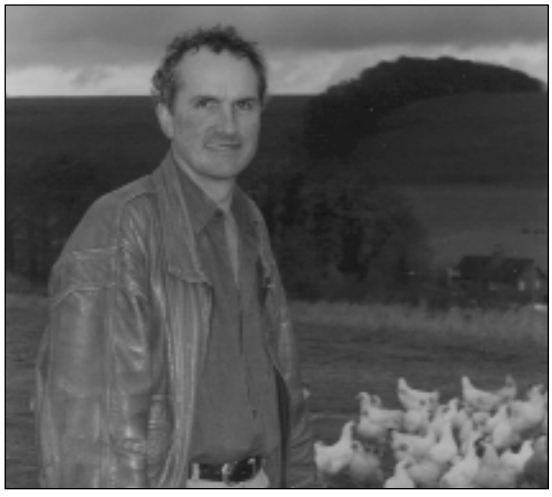
What should the consumer buy?

- Chickens certified by the 'Soil Association' probably have some of the highest welfare standards available.
- Some free range chickens do have higher welfare standards than others labelled 'free range'. The Real Meat Company (see *Contacts*) is one example of such a system.
- The best solution is to visit your local broiler farmer and see for yourself how the chickens are reared, transported and slaughtered. Only those who have something to hide will not allow you to see the chickens.

Broiler legislation

There is little legislation which is specific to broiler systems in the UK. Other livestock such as pigs, calves and laying hens do have specific welfare legislation to protect them. Broiler systems are only covered by general legislation which applies to all livestock systems. Guidelines by MAFF and FAWC have been produced but these are often inadequate and also frequently ignored. Many animal welfare and consumer organisations believe that legislation to protect the welfare of broiler chickens is long overdue.

Richard Guy of the Real Meat Company with some of his free range broilers.



Recommendations

For the consumer

- Avoid purchasing chickens from intensive farming systems, especially if the chickens are still fed growth promoting or prophylactic antibiotics,

- Whenever you can buy chicken meat from organic and some free-range systems. These guarantee improved welfare standards on the farm,

- Visit your local broiler farmer and see for yourself how the chickens are reared, transported and slaughtered,

- Follow the recommendations on page 21 *How to avoid food poisoning from chicken meat.*

- Write to the British Poultry Meat Federation to express your views.

For the broiler industry

This report has found a catalogue of serious failings at all levels of the broiler industry:

- Poor welfare standards which do not even meet the minimum recommendations set by FAWC,
- High levels of bacterial contamination,
- Poor hygiene standards in slaughterhouses,
- Illegal levels of veterinary residues in broiler feed and organs,
- High levels of air pollution which endanger the health of farm workers,
- Continued use of organophosphates despite the known dangers to human and animal health,
- Continued use of growth-promoting antibiotics despite the dangers they pose to human health.

An overhaul of the entire industry is needed starting with independent quality control at all levels of the broiler industry.

For the retailer

- Supermarkets in particular need to implement strategies to support a broiler industry that respects animal welfare and the environment, and protects the consumer.

For the government

- Adopt specific legislation to improve the welfare of broilers, protect the local environment and safeguard the consumer,

- Insist on high levels of hygiene and welfare on all imported chicken meat through the European Commission.

Contacts

Advisory Committee on Animal Feedingstuffs
Address: ACAF Secretariat, Room 224 Ergon House, 17 Smith Square, London SW1P 3JR
Tel: 020 72 38 63 42, **Fax:** 020 72 38 63 38
E-mail: a.acaf@jfssg.maff.gov.uk
Website: www.maff.gov.uk/food/acaf/homepage.htm

British Poultry Meat Federation
Address: 15-19 Kingsway - Imperial House, London, WC2B 6UA
Tel: 020 72 40 98 89. **Fax:** 020 72 40 77 57
E-mail: peter.bradnock@bpmf.co.uk
Details: The BPMF is the trade association for most of the broiler producers in the UK.

Compassion in World Farming
Address: Charles House, 5a Charles Street, Petersfield, GU32 3EH
Tel: 01730 264 208, **Fax:** 01730 460 791
Website: www.ciwf.co.uk/
Details: Compassion in World Farming (CIWF) is one of the leading organisations campaigning for an end to factory farming systems. CIWF was instrumental in the bans on narrow veal calf crates, the close confinement stalls for pregnant sows and the EU phase-out of battery cages.

Farm Animal Welfare Council (FAWC)
Address: Government Buildings, Hook Rise South, Tolworth, Surbiton, Surrey KT6 7NF
Website: www.maff.gov.uk/
Details: The Farm Animal Welfare Council (FAWC) is a consultative body which reports to the Ministry of Agriculture, Fisheries and Food. Its remit is to keep under review the welfare of farm animals on agricultural land, at market, in transit and at the place of slaughter; and to advise the government of any legislative or other changes that may be necessary. In 1992, FAWC published *Report on the Welfare of Broiler Chickens* and in 1998 published *Report on the Welfare of Broiler Breeders.* From both publications some recommendations have been turned into legislation by the government. However, FAWC has been criticised by animal welfare groups for failing to recommend the highest welfare standards.

Fibrowatt Ltd
Address: Astley House, 33 Notting Hill Gate, London W11 3JQ
Tel: 020 72 29 92 52, **Fax:** 020 72 21 86 71

Grampian Country Foods Group
Address: Grampian House, Mugiemoss Road, Bucksburn, Aberdeen, AB21 9XA
Website: www.gcfg.com/
Details: The Grampian Country Food Group (GCFG) is one of the UK's largest food companies with over 11,400 employees in 30 locations in the country and an annual turnover of £1,000 million. One of the largest sections of the company is the production of broiler chickens with nearly 4 million chickens on average produced and killed each week. GCFG has recently renounced the use of growth promoting antibiotics within broiler systems which may have an impact on the whole UK broiler industry - see *Antibiotics.*

McDonalds
Address: 11-59 High Road, East Finchley, London N2 8AW
Website: www.mcdonalds.com OR why not try out the alternative site: www.mcspotlight.org
Details: See The *McLibel Case*

Ministry of Agriculture, Fisheries and Food
Address: Nobel House, 17 Smith Square, London, SW1P 3JR
Tel: 020 72 38 60 00. **Fax:** 020 72 38 62 41
Website: www.maff.gov.uk

National Farmers Union
Address: Agriculture House, 164 Shaftesbury Avenue, London, WC2H 8HL
Tel: 020 73 31 72 00. **Fax:** 020 73 31 73 13
Website: www.nfu.org.uk

National Farmers Union National Poultry Office
Address: Willie Snaith Road, Newmarket, Suffolk, CB8 7SN
Tel: 01638 667 666, **Fax:** 01638 666 442
Details: The National Farmers' Union represents farmers and growers in England and Wales. The NFU

provides information, advice and services to egg and poultry meat producers through 315 local offices, 9 regional offices, Regional Poultry Advisers and National Eggs and Poultry Meat Specialists. The poultry section provides specific information and advice to poultry members, including an average liveweight broiler price report, pullet rearing, broiler chickens and seasonal turkeys and the bi-monthly journal *Poultry Forum*.

Poultry World
Address: Quadrant House, The Quadrant, Sutton, Surrey, SM2 5AS
Tel: 020 86 52 40 21, **Fax:** 020 86 52 40 42
E-mail: poultry.world@rbi.co.uk
Details: An informative monthly read to find out more about the UK poultry industry.

Real Meat Company
Address: Warminster, BA12 0HR
Tel: 01985 841 114, **Fax:** 01985 841 005
Details: Richard Guy's Real Meat Company was set up in 1985 and they "remain dedicated to producing the safest, kindest, tastiest meat available anywhere".[103] This company is independent of the conventional meat industry and supermarkets. All meat is sold to authorised distributors or home delivered. All growth promoters and pre-emptive medication are banned and the company has a policy of "total transparency", in which anyone can visit farms and even abattoirs. All mutilations have also been banned, including wing clipping and de-beaking. For specific details about the Real Meat Company and how they compare with other alternative systems see the table *Comparison of broiler systems*.

Ross Breeders
Address: New Bridge, Midlothian, Scotland
Tel: 0131 333 1056, **Fax:** 0131 333 3296
E-mail: infoworldwide@rossbreeders.com
Website: www.rossbreeders.com
Details: Ross Breeders is one of the three largest poultry breeders in the world, developing pedigree lines for the production of commercial broilers. Ross Breeders provide a quarter of the world market for broiler breeding stock.

Responsible Use of Medicines in Agriculture Alliance (RUMA)
Address: PO Box 29066, London, WC2H 8QR
Details: Established in November 1997 to promote the highest standards of food safety, animal health and animal welfare in British livestock farming.

Soil Association
Bristol House, 40-56 Victoria Street, Bristol BS1 6BY
Telephone: 0117 929 0661, **Fax:** 0117 925 2504
E-mail: soilassoc@soilassociation.org.uk
Website: www.soilassociation.org.uk
Details: The Soil Association is a certifying body for organic agriculture in the UK. They are also involved in the promotion of organic food and local food schemes.

University of Bristol, Division of Animal Health and Husbandry, Department of Clincal Veterinary Science
Address: Langford House, Langford, BS40 5DU
Website: www.bristol.ac.uk

United Kingdom Register Organic Farming Systems
Address: Organic Farming Unit, Rural Marine and Environment Division Branch D, Nobel House, 17 Smith Square, London, SW1P 3JR
Tel: 020 72 38 5915, **Fax:** 020 72 38 6148
Website: www.maff.gov.uk

World Animal Net
Address: 24 Barleyfields, Didcot, Oxon OX11 OBJ
Tel/Fax: 01235 210 775
E-mail: worldanimalnet@yahoo.com
Details: World Animal Net is the world's largest network of animal protection societies with over 1,000 affiliates in 75 countries campaigning to improve the status and welfare of animals.

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