The Dark Side of Dairy

A Viva! Report by
Toni Vernelli, BSc (Hons)
Animal Biology and
Conservation

Viva!

Digital Vision

Executive Summary

The farming of animals for meat has received much public attention and scrutiny over the past few decades, prompting calls for tighter animal welfare regulations and moving millions of people to adopt a vegetarian diet. Meanwhile, the farming of cows for dairy products, which has become increasingly intensive in recent years, has been largely ignored.

This report lifts the lid on modern dairy farming, shattering its benign image and exposing the immeasurable mental and physical suffering inflicted on millions of cows and their calves every year. It serves as a wake-up call for everyone who is opposed to animal cruelty yet continues to buy and consume dairy products.

While many of the welfare problems raised in this report, such as lameness, hunger, mastitis and invasive embryo technologies, are a result of the continued drive to increase the cows' milk yield, the emotional trauma caused by removing a newborn calf from its mother is inherent in dairy production. The enormous physical demand placed on the cow by the dual load of pregnancy and lactation is also an intrinsic part of dairy farming.

For anyone reading this report, the conclusion that dairy farming inflicts unacceptable and unavoidable pain and suffering on cows and their calves is inevitable.

Please note: the health aspects of consuming cow's milk are not covered here. For a fully referenced report on the serious health issues associated with dairy consumption, please see White Lies by the Vegetarian and Vegan Foundation (www.vegetarian.org.uk; tel 0117 970 5190).

The Dark Side of Dairy

A Viva! Report by Toni Vernelli, BSc (Hons)
Animal Biology and Conservation

The Dark Side of Dairy
Published by Viva!

Viva!
8 York Court
Wilder St
Bristol
BS2 8QH

www.viva.org.uk

Tel: 0117 944 1000
Fax: 0117 924 4646
Email: info@viva.org.uk

Design by Sussed Design

The Size and Type of Dairy Industry in Britain

There are currently just over two million dairy cows living on the UK's 21,000 dairy farms, with Somerset and Cheshire the main areas of dairy production (1, 2). As cows must give birth to a calf each year in order to produce milk, there are also around two million dairy calves in the UK at any one time. Over 58 per cent of the UK's dairy cows are now kept in herds larger than 100 – compared to average herds of just 30 in the 1970s (1, 3).

Ninety-five per cent of dairy cows in the UK are black and white Holstein/Friesians, with Ayrshire, Guernsey and Jersey cows making up the remaining five per cent (4). Holsteins and Friesians are two slightly different breeds, with the North American Holstein being larger and having a higher milk output than the British Friesian (4). This high milk yield has lead to Holsteins replacing Friesians on most UK dairy farms and an increase in annual milk yield per cow from 3,750 litres in the 1970s to 8000 litres today, with some high genetic Holsteins reaching 10,000-12,000 litres a year (3, 5). This equates to a daily milk production of 30-50 litres, ten times more than a cow would naturally produce to feed her calf (6).

The unnatural physical demands placed on modern dairy cows results in a quarter of the national dairy herd being killed every year due to lameness, mastitis (udder infection) and infertility (5). In many high-production herds, cows are worn out and sent for slaughter before their third lactation – at only four to five years old – when they can naturally live to be at least 20 (7) (there are cases of dairy cows on sanctuaries living into their 30s).

Milk production in the European Union is limited by milk quotas, with the annual UK production quota set at 14.2 billion litres (8). Although the UK is 90 per cent self sufficient in milk, it imports a significant amount of dairy products. In 2003, for example, the UK imported 314,000 tonnes of cheese (compared to UK production of 366,000 tonnes), mostly from Ireland, France and Germany; and 119,000 tonnes of butter (compared to UK production of 145,000 tonnes), mostly from Denmark, Ireland and New Zealand (8).

Fig. 1. A typical Holstein cow, her high milk yield causing a hugely distended udder and leaving her emaciated

Viva!

With an annual turnover of over £6 billion, the dairy sector constitutes 10 per cent of the UK's food and beverage sales (2). The four largest dairy processors – Dairy Crest, Arla, Wisemans and Milk Link – have a combined annual turnover of £4 billion and profits of almost £200 million (9, 10, 11, 12). Together they spend over £46 million a year on advertising, targeting mainly children, teenagers and new mothers (13).

In 2004 Dairy Crest, the UK's largest dairy processor, received £19.8 million in EU funding under the Common Agricultural Policy – despite having a profit of £85 million that year – while UK dairy processors received a total of over £50 million in CAP payments (14). EU dairy processors also receive export subsidies to 'enable them to compete in international markets' (13). In 2004 this totalled £2.3 billion (13).

Promotion

The UK dairy industry is supported and promoted by the Milk Development Council (MDC), the Dairy Council and Dairy UK.

The MDC is a public body established in 1994 (replacing the Milk Marketing Board) with the aim of 'improving the profitability and competitiveness of Great Britain's dairy farmers' (15). It is situated within the Department of Environment, Food and Rural Affairs (DEFRA) and its council members are appointed by Defra Ministers (15). Their annual income of £7 million comes from a statutory levy paid by dairy farmers on their milk sales (15). They also receive regular funding from the EU, including £3 million in 2004 for their 'Naturally Beautiful' advertising campaign which encourages teenage girls to consume more dairy products for their claim of better looking hair and skin (15). In 2005 they plan to spend £4.7 million marketing dairy products in the UK.

The Dairy Council is a limited company funded jointly by the MDC and dairy processors. Their mission statement is:

'To promote the positive image of milk, its products and the industry as a whole in the eyes of consumers and key influencers, thus helping to increase the consumption of dairy products.' (16)

They work to achieve this goal by distributing 'health education, consumer and teaching literature about dairy products' (16). In 2004 they received £305,527 in EU funding under the Common Agricultural Policy (16).

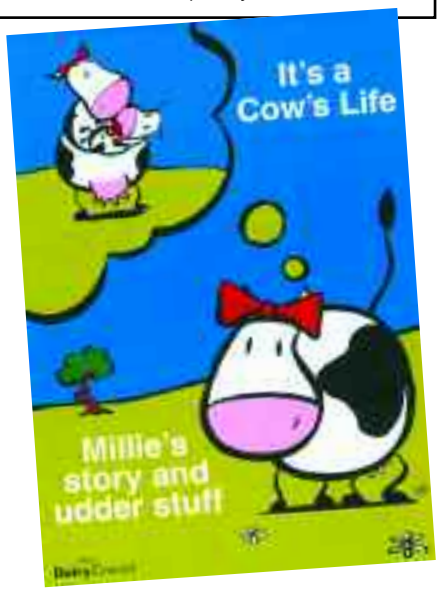
Dairy UK is a limited company which brings together 'dairy processors, farming representatives, co-ops and bottle milk buyers to form an organisation that embraces and gives full priority to the views and opinions of all those involved the industry' (17). Dairy UK staff operate throughout the UK to:

'ensure the interests of the dairy sector are properly considered in the policy formulation process by the UK government, devolved administrations and the EU' (17).

Targeting Children

Realising the importance of getting people hooked on milk while they are young, the dairy industry bombard British schools with propaganda thinly veiled as 'educational' materials. To 'increase the appeal of milk to primary school children', the MDC distribute a free interactive CD Rom, *The Story of Milk*, featuring Charlotte the cartoon cow, to schools across Britain (15). The Dairy Council produce a cartoon booklet along the same vein called *It's a Cow's Life* which 'informs young children about the life of a dairy cow and what happens on a dairy farm' (4). The information in the booklet is so far from reality that it borders on make-believe, featuring a cartoon cow cradling her calf in her arms when in real life dairy calves are torn from their mothers within 72 hours of birth (4, 7).

Fig. 2. The dairy industry bombard schools with propaganda thinly masked as 'educational material', such as this booklet produced by the Dairy Council which is distributed to primary schools



The MDC also target primary school teachers with a *Healthy Choices* pack, aimed to 'put information about the health and nutritional benefits of dairy

products, balanced diets, the composition of milk and dairy products, and the range of dairy products available to UK consumers at the centre of the school curriculum' (15). They also jointly funded Dairy UK's campaign promoting milk consumption in primary schools which involved sending copies of the innocently named *Teacher's Guide to Health and Fitness* to over 10,000 schools (17). According to Dairy UK's Edmund Proffitt, this education pack, which received £50,000 in EU funding, aims to 'develop healthy young milk customers in primary schools' (17).

The EU also recognises the importance of targeting children and operates a school milk subsidy scheme that aims to:

'expand the market for milk and milk products by encouraging children (from the ages of five to 11) to consume milk and milk products, and develop a lasting habit of doing so' (18).

Under this scheme, which is actively promoted by the MDC, the Dairy Council and Dairy UK, milk and yoghurt are supplied to schoolchildren at reduced prices (4, 15, 17, 18). In 2002 this aid totalled over £9 million (18).

More Subsidies

In 2004 EU dairy farmers received a total of €970 million in direct aid from the EU, with UK farmers receiving €119 million (13). According to the Milk Development Council these figures are expected to rise dramatically in the next few years, with a projected total of €4.2 billion paid to EU dairy farmers in 2007 (13).

The EU also operates the Butter for Manufacture scheme which aims to 'dispose of surplus butterfat by encouraging manufacturers to use butter in manufactured products in preference to cheaper vegetable oils' (18). Under this scheme a subsidy is paid to food manufacturers on butter, butteroil and cream processed into certain eligible products (cakes, biscuits, ice cream, soup etc) (18).

The Natural Life of Cattle

Fig. 3. Cows establish strong friendships when only a few days old, making later separation stressful and confusing

Cattle are members of the Bovidae family, which also includes antelope, goats, sheep, bison and buffalo (19). Modern domestic cattle (*Bos taurus*) are descended from the much larger auroch (*Bos taurus primigenius*) which once ranged from Britain to Africa, throughout the Middle East, across India and central Asia (20). Domestication of the auroch began in Mesopotamia around 6500 BC where they were used for meat, milk, hides and labour (20). Selective breeding over the millennia caused dramatic physical changes to domestic cattle, to the extent that they are now considered a separate species (20). Wild aurochs became extinct in Britain in the Bronze Age, with the last members of their species killed by hunters in Poland in 1627 (20).

The closest living relatives of modern domestic cattle are bantengs (*Bos javanicus*) and gaur (*Bos gaurus*) who live in South East Asia and have both suffered drastic population declines (19). These species naturally form small herds, between 10-30 animals, although several herds may get together during the breeding season. Most herds consist of only one bull with several cows and their offspring. Young males that do not manage to take over the herd must head out on their own, sometimes joining together in small 'bachelor' groups (19).

Populations of semi-wild cattle still survive in several countries, including the white cattle which have roamed free in Chillingham Park in Northumberland for at least the past 700 years (21). Studies of this herd, and other semi-wild herds, have provided much insight on natural cattle behaviour.

Like the guar and banteng, semi-wild cattle form small groups, averaging 15-20 animals, with a strict social hierarchy – the highest ranking individuals having priority to food, shelter and water, with offspring inheriting their mother's status (22). The social structure within herds is based on matriarchal families, with mother cows and their daughters remaining grooming and grazing partners for their whole lives (22). These matriarchal families are interconnected by friendships between unrelated cows (22). Once the social structure is established in a herd it remains stable for many years and any disruption to the group, such as a new member or division of the herd, is very stressful and confusing for them (22). According to Rosamund Young, an expert on cattle behaviour, it is extremely common for calves to establish lifelong friendships when only a few days old (23). These social bonds are constantly reinforced through mutual grooming (23).

The birth of a calf is a very private moment for a cow and she will usually take herself off from the rest of the herd to give birth, leaving her calf hidden away in long grass for the first week or so (21, 22). The week-old

calf is then brought to the herd for an introduction ceremony. The 'king' bull comes out to meet them and escorts them into the herd. The other cows then inspect and sniff the calf, as if to decide whether he or she should be admitted to the herd. Once this is 'agreed', the cows pay no further attention to the new calf who remains with the herd (21).

Terminology

Calf: a male or female up to 180 days old

Heifer: a young female over 180 days old before she has her first calf

First-calf heifer: a female who is in her first lactation

Cow: a female in her second lactation

Bullock or steer: a castrated male more than 180 days old

Bull: an entire male more than 180 days old

Cows are very protective of their young and will attack, and even kill, anything they see as a threat – including humans (24). In June 2005, a 66 year-old woman was trampled to death as she walked her dog through a field of cows with their calves in Warwickshire (24). Female calves will naturally suckle until they are around nine months old and stay with their mothers for the rest of their lives (22, 23). Males are weaned at around 12 months old and would then leave the herd and join a bachelor herd (22). Both males and females can easily live to be 20 (21, 22, 23).

Cows are ruminants who digest their food in two steps, first by eating the raw material and then regurgitating a semi-digested form known as cud which they chew again (20). Their stomach is divided into four chambers with each carrying out different functions. In the first chamber, called the rumen, the food is mixed with fluid to form the cud. The regurgitated cud, after having been slowly chewed, is swallowed again, and passes through the rumen into the other stomach chambers for further digestion (20).

Cattle have a wide field of vision but are poor judges of detail and distance (20). Contrary to popular belief, cattle can also see colour although they have a deficiency towards the red end of the spectrum (20). Due to their poor depth perception, they are often reluctant to enter dark or shadowy areas and frequently over-react to quite small things in their path, such as changes in floor surface or shadows (23).

Cattle have excellent hearing and hear sounds at similar and higher frequencies to humans, they dislike loud, sudden noises (19). They also have a very effective sense of smell which they use to explore new objects or environments (19).

Fig. 4. Studies of free-ranging herds have shown that female calves naturally wean at around nine months old while males continue to suckle up to 12 months

The Life of a Modern Dairy Cow

Fig. 5. Most dairy cows in Britain are impregnated by artificial insemination and the semen production industry is now big business

The modern dairy cow's life bears little resemblance to that of her wild relatives. Every aspect of her life is manipulated to maximise milk yield, inevitably at the expense of her health and welfare. According to John Webster, Emeritus Professor of Animal Husbandry at Bristol University's Clinical Veterinary Science Department:

"The dairy cow is exposed to more abnormal physiological demands than any other class of farm animal", making her "a supreme example of an overworked mother." (6, 7)

Cows are mammals who, like us, produce milk in their mammary glands to feed their young. They therefore must give birth to a calf in order to produce milk and must be re-impregnated every year to keep that milk supply going (4, 6, 7). Most dairy heifers are impregnated for the first time when they are between 15 and 18 months old, giving birth to their first calf nine months later (4). Most dairy herds in the UK are now artificially inseminated (AI) as this is much cheaper than keeping a bull and allows farmers to select the sire from a variety of breeds (4). AI is now in fact a very lucrative business, with the dairy farming sector split between farms which produce milk and farms which produce semen (25). The use of more invasive practices such as multiple ovulation therapy and embryo transfer is increasing steadily in the UK and the rest of Europe (26). These techniques are discussed further in *Sex and the Single Cow*.

Fig. 6. A mother dairy cow tenderly grooming her newborn calf who will be taken from her a few short days after birth

Peter Arnold, Inc./Alamy


Fig. 7. Two dairy cows in the milking chamber. Their enormous udders force them to adopt an unnatural stance, leading to pressure on the hind feet and painful sole ulcers

Pixoi Ltd/Alamy

Although a cow would naturally suckle her calf for nine months to a year, calves born on dairy farms are taken away from their mothers within a few days of birth – so that we can drink the milk that was meant to nourish the calves (7, 22). A strong mother/infant bond is formed between cow and calf within the first few hours of birth, making their separation extremely traumatic (27). Both the cow and calf bellow and show obvious signs of distress when they are separated, often continuing for several days, leaving those within earshot in no doubt that it is a harrowing experience for both (6, 7, 23, 27). The cow will be re-impregnated two to three months after the calf is removed and forced to endure this heartbreak again and again, every year until she is worn out (4). Professor John Webster describes the removal of the calf as the 'most potentially distressing incident in the life of the dairy cow' (28). The fate of her calves is outlined in *Calves – Unwanted By-products*.

Because she is re-impregnated while still lactating from the previous pregnancy, a dairy cow spends seven months of every year simultaneously pregnant and producing large quantities of milk. This enormous physical demand requires her to eat over four times more food per day than a beef cow at pasture (7). Her average milk yield will be between 30-50 litres a day, 10 times more than a calf would drink, so her udder is forced to work unnaturally hard (29). In addition, a calf would normally feed five to six times a day so that the maximum amount of milk in her udder at any one time would be around two litres (29). But on modern dairy farms a cow is milked only twice a day, allowing milk to accumulate in the udder and forcing her to carry around 20 litres of milk or more (6). This greatly enlarged udder leads to lameness in her hind legs and predisposes her to mastitis (a painful infection of the udder) (7).

Her only rest from this demanding workload is during the last two months of her pregnancy when she is 'dried off' in preparation for calving – then the whole cycle starts again (4). This gruelling cycle takes its toll on her body, and according to Professor Webster:

"…a depressing number are culled after only two to three lactations because they are worn out, either through complete loss of body tissue (emaciation), or breakdown of the udder tissues, or chronic lameness." (29)

The problems of malnutrition, lameness and mastitis are discussed further in *Suffering in Silence*.

The dairy cow's physical problems are compounded by being kept indoors for six months of the year. The majority of dairy herds in the UK graze from April to October and spend the rest of the year housed indoors in cubicle units (30). There are even some dairy farms in Britain that have adopted the USA's zero-grazing system where cows spend their entire lives indoors (7). According to Defra:

'Today's cows have outgrown the type and dimensions of winter cubicles, the majority of which were built in the 60s and 70s, so that cows are now too large to be comfortable.' (30)

Fig. 8. A cow who is too big for her winter cubicle has difficulty getting comfortable, leading to swelling of the leg joints and contact sores

This is a result of the switch from British Friesians, who average 550kg, to Holsteins, who average 700kg, as the dominant dairy breed. Many cows simply do not fit in the cubicles and their hind legs protrude into the slurry passage behind them, while some find the cubicles so uncomfortable that they choose to lay in the slurry covered aisles instead (3). The social hierarchy within the herd can also contribute to problems in indoor housing units as lower ranking cows often choose not to lie in cubicles next to dominant cows and instead lie in the aisles or slurry passage (3).

While indoors, cows are fed a diet of silage (wet, fermented grass) and high protein concentrate (a mixture of cereals, rape meal, sunflower meal, maize and soya – a large percentage of which are GM) which add to their troubles (7). Wet silage causes wet manure and the resulting poor hygiene conditions contribute to mastitis and lameness (7). High protein concentrates cause a build up of toxins in the cow's system which causes laminitis (inflammation of the tissue which lies below the outer horny wall of the foot) a severely painful condition (see *Suffering in Silence*) (7).

For all of her hard work and suffering, what does the dairy cow get in return? Shipped off to the slaughterhouse as soon as her milk yield drops! Modern dairy farms are about maximising profit and minimising overheads, which, according to Stuart Bacon – Britain's Dairy Farmer of the Future 2005 – is achieved by 'culling out some of the poorer performers' (31). These worn out cows endure a gruelling journey to market where they are sold to fattening farms, before eventually being sent to the slaughterhouse – ending up in 'low quality' beef products like pies, burgers, soups and baby food.

Sex and the Single Cow

Reproduction is at the heart of the dairy industry as cows must give birth to calves in order to produce milk, and no other aspect of the cow's life is artificially manipulated to such a great extent.

Fig. 9. Most dairy cows are impregnated by artificial insemination, a stressful procedure which can cause serious injury if performed improperly

Artificial Insemination

Very few dairy cows in the UK mate naturally. The majority are impregnated by artificial insemination (AI), which involves passing a catheter through the cervix of the cow and depositing the semen in her uterus (33). This is an uncomfortable, stressful experience for the cow which can result in injury if carried out by an untrained or inexperienced person (3). Under the Artificial Insemination of Cattle (Animal Health) (England and Wales) Regulations 1985, the procedure does not have to be performed by a veterinarian and may be carried out by any member of farm staff who has received 'appropriate training' (34). According to Defra it is now 'largely carried out by non-veterinarians' (34). AI training courses take place on working farms, using live animals for practice (34). In January 2005, Defra proposed amendments to the law that would permit farm workers to practice on 'spent' cows in slaughterhouses before they are killed, a practice banned in 2002 because it caused the animals unnecessary suffering and stress (34).

Artificial insemination is so widespread because it is cheaper to purchase frozen sperm than to feed and look after a bull. It also allows the farmer to choose from a variety of breeds to sire the calves. It is common practice for farmers to use semen from dairy breeds such as Holstein/Friesian for 50 per cent of their inseminations and semen from beef breeds such as Charolais or Hereford for the other half (25). This ensures a regular replacement of 'good milkers' for the herd as well as a number of dual purpose calves who can be sold for beef production (25). However, male calves who have been sired by a dairy breed are of little use on a dairy farm as they do not produce milk. They are also of little use to a beef farmer as they do not put on muscle in the same way that beef breeds do. Male pure breed dairy calves are simply unwanted by-products of dairy production and up to 200,000 are killed every year shortly after birth (36, 37, 64). The fate of dairy calves is discussed further in *Calves – Unwanted By-products*.

Fig. 10. Semen production is now big business. Here a Holstein bull ejaculates into a collection tube

Fig. 11. Recognising that male calves are useless to a dairy farmer, the AI company Cogent offer Sexed Semen which claims to provide 90 per cent heifer calves

In 2000, the British AI company Cogent began selling Holstein semen which was sorted to pre-determine the sex of the calf and help farmers avoid 'having large numbers of unwanted Holstein bull calves born every year' (38). This product, they claim, gives an average result of 90 per cent female sperm and 10 per cent male sperm, allowing farmers much greater control over the cow's reproduction (38). However, sexed semen is not currently widely used as it is very expensive (37).

Fig. 12. Cows who have suffered injuries during calving, such as nerve paralysis, may have hobbles attached to their hind legs to hold them in place so they can carry on milking

Embryo Transfer

The use of invasive embryo technologies is increasing steadily in Europe (26). To ensure that high quality cows produce more offspring than is naturally possible, embryos are removed from their reproductive systems and transferred into 'lower quality' cows who serve as surrogate mothers (3). Embryos can either be collected directly from the 'donor' cow or can be produced in vitro (in a test tube) with 'donor' cow eggs retrieved through ovum pick-up (26).

Embryo collection: High quality cows are injected with hormones to increase ovulation and are then artificially inseminated in the usual manner (33). The resulting embryos, which can number from seven to 12, are flushed from her uterus using a catheter type instrument (33). As this procedure takes place a week after oestrus, the uterus is more difficult to penetrate than during artificial insemination and can result in bleeding and sometimes even uterine rupture (33). The procedure is so painful that UK law requires the use of an epidural (35).

Ovum pick-up: Unfertilised eggs are collected from 'donor' cows by a needle inserted through the wall of the vagina and into the ovary (35). According to Defra:

'Repeated epidural injections are necessary for this procedure and they can cause welfare problems for the animals, such as severe pain in the tailhead and lower back'. (35)

Despite these welfare concerns, 26,000 embryos were produced using ovum pick-up in the EU in 2000 (26).

Surrogate cows receiving the embryos, whether direct from the 'donor' cow or from in vitro fertilization, are given hormone injections to bring on heat (33). A 'gun' is then used to insert the embryo high into the uterus, a procedure requiring great skill which can only be acquired with practise (33). The use of an epidural is compulsory (35).

Ultrasound scanning

Over the past decade the use of per rectum ultrasound to detect pregnancy has become common on British dairy farms (3). This involves inserting a long probe (about the thickness of a finger) into the cow's rectum until it lies over her uterus (3). Careless insertion or removal of the probe can damage the rectal tissue and internal organs, causing great pain (3). Both the Royal College of Veterinary Surgeons (RCVS) and the Government's Farm Animal Welfare Council (FAWC) have expressed concerns over non-veterinarians

performing the procedure (3). Despite these concerns Defra still permit non-veterinarians to carry out per rectum ultrasound as long as they have received 'appropriate training' (34).

Calving

Concerns have also been raised by the FAWC and the Food Ethics Council (FEC) over the use of embryos or semen from large cattle breeds in smaller recipient cows who will have difficulty giving birth to them (3, 33). This mismatch can result in severe injuries to the cow during calving, including internal haemorrhage, nerve paralysis and pelvic fracture (33, 39). According to the National Animal Disease Information Service (NADIS) calving difficulties are the cause of 46 per cent of 'downer cows' – when a cow is unable to stand up – on British dairy farms (39).

'Downed' cows require immediate attention to prevent injuries, which may only be temporary, from causing permanent damage (3). A cow may 'go down' because of temporary nerve paralysis caused by calving difficulties or simply fatigue from her gruelling workload, but if left recumbent for several hours permanent damage can be caused to her legs (due to her 700kg body cutting off the blood supply) (37). Several different types of lifting gear are used to get 'downed' cows on their feet again (3, 39). These include:

- a hoist which is clamped to the cow's hip bones
- a lifting bag which inflates underneath the cow
- a net or harness which allows the cow to hang suspended (3).

Hobbles and shackles are also commonly attached to the hind legs of cows who have suffered muscle or nerve damage during calving and would not be able to stand unaided, as illustrated in Fig. 12 (3, 39). If the farmer were to cull a cow who was injured during calving he would lose the large quantity of milk which she was about to produce. Injured cows are therefore often forced to carry on, even when in pain, for seven to eight months until their milk yield drops and they are killed.

Fig. 13. Modern dairy cows have such hugely enlarged udders that their calves often have difficulty finding and reaching the teats

Dairy cows impregnated with large continental beef breeds such as Belgian Blue, Charolais or Limousin are sometimes unable to give birth naturally and must undergo caesarean section (3, 29). In order to prevent the need for this major surgery, farmers using large continental breeds to sire calves may induce calving before the cow reaches full-term (3). The FAWC have raised concerns that induction of pregnancy increases the risk of the placenta being retained, leading to infection of the uterus and premature infertility (3). They therefore recommend that it only be used in extreme circumstances and never as a routine procedure (3). Despite this advice, Defra – in their Code of Recommendations for the Welfare of Livestock: Cattle – state 'induction does have a role to play in preventing oversized calves' (34).

Calves – Unwanted By-products

Although cows would naturally suckle their calves for nine months to a year, dairy calves are taken away from their mothers within one to three days of birth – to ensure that as much milk as possible is available for sale (7, 22). The strong bond that is formed between mother and calf in the first few hours after birth makes this enforced separation a very traumatic experience (7, 27). Both mother and calf bellow loudly after separation and respond to each other's calls by moving toward the sound, with calves able to distinguish their own mother's calls within 24 hours of birth (27). But this mental anguish is only the beginning of the calves' troubles.

Fig. 14. UK law allows calves up to 8 weeks old to be housed in small stalls, such as these found on farms in Dorset and Sussex, denying them the exercise and social interaction that is so important for their development

Female Calves

Half of the female calves born each year will be pure dairy breed calves who will enter the dairy herd, replacing the 25 per cent of cows who are culled every year because they are worn out (3, 37). They are allowed to suckle from their mothers for the first day of life so that they receive the antibody rich milk, known as colostrum, which she produces immediately after calving and which is essential for the calves' immune system (3, 7). They are then separated from their mothers and fed on commercial milk replacer, either from an artificial teat or from a bucket (3, 7). Although the main motivation for removing the calves is financial – farmers want to sell as much of the milk as possible – decades of genetic manipulation have resulted in such hugely distorted udders that it is difficult for calves to find and reach the teat, as illustrated in Fig. 13. Where this is a problem farmers will remove the calves within a few hours of birth and feed them their mother's colostrum from a bucket (34).

In the first few weeks of life calves, like all infants, are very susceptible to disease, with up to six per cent of calves born each year dying before one month old (40). Diarrhoea (known as scours in the farming sector) is the main factor contributing to these deaths and is often caused by low-quality or incorrectly prepared milk replacer (3, 40). For this reason artificially-reared calves are weaned completely on to solid food by four to five weeks of age, much sooner than in the wild where they would continue to suckle for up to 12 months (3, 7).

Under the Welfare of Farmed Animals (England) Regulations 2000, calves may be housed in individual stalls or hutches, either indoor or outdoor, until they are eight weeks old (40). But, even at this young age, healthy calves are very energetic and need to play and socialise with other calves (7). Housing in individual stalls or hutches denies them this vital exercise and social contact, as illustrated in Fig 14. Group housing, which all calves must be moved to after eight weeks of age, allows more natural social behaviour and greater opportunity for exercise and play, but also increases the risk of airborne diseases such as pneumonia – the most common disease of weaned calves (3, 40). Essentially, it is impossible to artificially rear calves in a way which fulfils their natural needs and behaviours without compromising their health.

If the calves are to replace cows on the farm where they are born, they will be turned out to pasture when a few months old, weather permitting, but are kept separate from older animals until at least six months old to reduce the risk of disease (3, 40). Between 15 and 18 months old they will be inseminated, giving birth to their first calf nine months later (3). They will then have 24-72 hours to revel in the joys of motherhood before their calf is taken away and they begin their gruelling life as a milk machine.

Female calves who are surplus to requirements on their birth farm will be sold on to other dairy farms, usually through a livestock market - illustrated in Fig 15 (40). According to The Welfare of Animals at Markets Order 1990, calves as young as seven days old may be brought to market and sold (34). These young calves may travel several hundred kilometres from farm to market and then on to the purchasing farm. This is not only very stressful for the calves but also exposes them to new pathogens which they have no resistance to, leading to an increased risk of disease (40).

The other half of females born each year will be dairy/beef crosses who are sold on, again through a livestock market, and reared for beef in a semi-intensive system (37). These systems involve grazing cattle outside in the summer and housing them during the winter, with slaughter age varying from 15-24 months.

Male Calves

Male calves will never produce milk and therefore are of no use to a dairy farmer.

Around half of the male calves born on British dairy farms are pure dairy calves while the other half are dairy/beef crosses (37). All of the dairy/beef crosses will be removed from their mothers after a couple of days and housed in stalls or hutches and fed milk replacer just like female calves. Most will also be sold on to semi-intensive beef farms through livestock markets, just like female dairy/beef cross calves.

Fig. 15. Calves who are 'surplus to requirements' on their birth farm are sold off at livestock markets, a frightening and stressful experience that also involves long distance journeys

Approximately 50 per cent of the

Fig. 16. Male dairy/beef cross calves will be raised for beef in a semi-intensive system where they will be kept in overcrowded sheds such as this for six months of the year

pure dairy males will also be reared for beef, but as they will only produce 'low quality' beef they are raised in intensive systems (7, 33, 37). After being separated from their mothers they are confined in buildings and yards for most of their lives – which is usually just over one year (7, 33). High mortality rates in these systems are common as it is not financially worthwhile for farmers to strive to keep them alive (7).

The other 50 per cent of male pure dairy calves, or 25 per cent of all male calves born each year, are either raised for veal or shot shortly after birth – the unwanted by-products of milk production (34, 37).

The Veal Industry

All calves raised for veal worldwide are male off-casts from the dairy industry. In many countries, including some such as the USA – from which we import large quantities of butter and ice cream – veal crates are the predominant rearing system (1, 7). These tiny wooden crates are so narrow that the calves cannot turn around for most of their lives, depriving them of exercise and preventing normal muscle development – to keep their flesh supple. They are also fed an iron-deficient diet to produce the anaemic 'white' veal prized by gourmets. Calves kept in these conditions suffer from high incidences of infectious disease and develop stereotypical behaviour patterns such as tongue rolling, crate-licking or mutual tongue sucking (6, 7).

Although the veal crate was banned in the UK in 1990 due to the immense cruelty involved, British dairy farmers continued to export up to 500,000 male calves a year to veal crates in continental Europe (3). This 'live-export' trade came to a halt in 1996 when the rest of Europe banned the import of cattle from Britain because of the bovine spongiform encephalopathy epidemic (BSE) (3, 7).

To compensate dairy farmers for the loss of income from exported dairy calves, the UK government introduced The Calf Processing Scheme in April 1996 which paid farmers for each calf slaughtered before 21 days old (36). Within nine months of the introduction of the scheme almost 500,000 calves were slaughtered (36). When the scheme was withdrawn in 1999, the price of male dairy calves collapsed (36). New measures were quickly introduced to allow calves to be shot and buried on farms, with 200,000 male dairy calves killed and buried on British farms in 2001 (36). In 2003 the EU banned the routine burial or burning of animal carcasses on farms, and dead male calves were then either collected by the local hunt kennels and fed to the dogs, or sent for incineration or rendering (34).

One dairy farmer who was interviewed by Exeter University's Centre for Rural Research in 2003 demonstrates the scale of the killings: "I mean, last year, out of the first 60 cows that I put to Friesian Holstein, I had three heifer cows, so I shot 57 calves in a matter of two months." (36) According to the Meat and Livestock

Commission, 100,000 dairy calves were killed shortly after birth in 2004, rising to 110,000 in just the first six months of 2005 (62, 64).

In March 2006, the EU lifted the ban on British beef and cattle imports, paving the way for live calf exports to resume. On May 5 2006, the first shipment of live calves left the UK for over a decade, destined for veal farms in Belgium, France and the Netherlands (see Continental Veal Production). Since then tens of thousands of calves have been exported, with the industry anticipating a return to pre-ban numbers by the end of 2006.

Fig. 17. From 1995 to 2005, over 200,000 male dairy calves were shot every year in the UK. The lifting of the EU ban on British beef and cattle in 2006 enabled dairy farmers to resume exporting their male calves to veal farms on the Continent, although some still choose to shoot them.

UK Veal Production

A small number of male pure dairy calves, around 20,000 a year, are raised in the UK for rose veal (3). Rose veal production differs from white veal production in that calves may only be kept in individual stalls until eight weeks old, rather than the 16-20 weeks for white veal, after which they must be group housed (7,63). From birth, they must be fed a diet which contains sufficient iron to avoid anaemia (7, 63). From two weeks old they must also be provided with a daily ration of fibrous food to permit normal rumen development (a minimum of 100g at two weeks old to a minimum of 250g at 20 weeks) (7, 63). UK law also requires calves to be provided with bedding, both in solitary pens and group housing, to help reduce stereotypical behaviour (63). Rose veal calves are slaughtered between one and seven months of age. The market for veal in the UK, even that which is promoted as 'welfare-friendly', remains small and seems unlikely to grow in the near future (3, 7).

Continental Veal Production

On 1st January 2007 veal crates will be banned across the EU (65). After this date, EU veal production will come in line with UK regulations in several areas but will still fall below UK standards in others. As in the UK, all calves will be group housed after eight weeks of age, however EU regulations do not provide group housed calves with as much space as UK law requires (see Table 1) (63,65). Under EU law farmers are not obligated to provide bedding for calves, as they are in the UK (63, 65). This is despite the European Commission's expert Scientific Veterinary Committee's (SVC) advice in 1995 that "The welfare of

Table 1. Space required for group housed calves under UK and EU law (63, 65).

Weight of calf	Space required UK	Space required EU
Under 150kg	At least 1.5m2 per calf	At least 1.5m2 per calf
150kg-200kg	At least 2m2 per calf	At least 1.7m2 per calf
200kg and over	At least 3m2 per calf	At least 1.8m2 per calf

calves is very poor when they are kept . . . (with) no bedding or other material to manipulate" (66). And although EU farmers have to ensure calves are fed a nutritionally adequate diet with a minimum daily ration of fibrous food, the quantity of fibrous food is less than in the UK (a minimum of 50g at two weeks to 250g at 20 weeks) (63,65).

Fig. 18. Most dairy calves, both males and females, have their horn buds burned with a hot iron to prevent them growing, causing severe pain which can last for several hours

The European Commission's expert Scientific Veterinary Committee concluded in their 1995 Report on the Welfare of Calves that:
"The best conditions for rearing young calves involve leaving the calf with the mother in a circumstance where the calf can suckle and can subsequently graze and interact with other calves" (66).

No dairy calves are allowed to enjoy these conditions.

Calf Transport

Few dairy calves live out their short life on their birth farm. Most dairy farmers will keep a percentage of female calves born each year to rear as replacements for worn out cows and the rest of the calves will be sold. The majority of these calves will be sent to livestock markets and auctioned off, often involving lengthy journeys to market and on to the purchasing farms. For many unfortunate male calves this means long journeys to veal farms (not veal crates as these are banned from 2007, see Continental Veal Production) in Belgium, France and the Netherlands.

Fig. 19. Burdizzo 'bloodless' castrators are used to crush the spermatic cords of young male bulls without anaesthetic

According to the Welfare of Animals at Markets Order 1990, calves as young as seven days old may be brought to market and sold (34). While all farmed animals suffer during transport, young calves (less than four weeks old) are particularly vulnerable to transport stress due to their naïve immune system and lack of exposure to new environments (67).

'Shipping fever' (a term used to describe a range of diseases caused by respiratory viruses) and diarrhoea are common problems in transported calves and contribute significantly to calf deaths (67). Calves less than two weeks old are particularly susceptible and can suffer mortality rates greater than 20 per cent following transport (68). Young calves are also more vulnerable to tissue damage during transport, with many calves (up to 50 per cent) suffering from bruised stifles (knee joints) (68).

Research conducted by Dr T Knowles of Bristol University in 1995 concluded that:

"Young calves are not well adapted to cope with transport and marketing, often suffering relatively high rates of morbidity and mortality, both during, and in the few weeks immediately following transport ... Comparatively few normal calves actually die during transport but they succumb, usually within four weeks, to secondary disease as a consequence of their inability to respond appropriately to transport" (69).

Mutilations

Disbudding: Most calves raised for dairy and beef are disbudded to prevent the growth of horns and minimise the risk of cattle injuring each other in modern intensive rearing systems (3). This can be done by burning the horn bud with a hot iron (cautery disbudding) or by applying a caustic paste which erodes the horn bud (chemical disbudding) (3, 41). Cautery disbudding causes severe pain which can last for several hours, with low-grade pain and sensitivity continuing for at least 24 hours (41). Under the Protection of Animals (Anaesthetics) Act 1954/1964, it can only be performed on calves under two months old and a local anaesthetic must be used (34). Chemical disbudding is even more painful and may only be performed on calves in the first week of life, however local anaesthetic is not required (34, 41). The caustic paste can also leak on to surrounding skin or into the eyes, causing immense pain (41).

Castration: Male calves sold or raised for beef may be castrated to prevent aggression (3). According to Defra, three methods can be used to castrate calves in the UK (34):

1) A rubber ring or other device can be applied to calves under one week old to restrict the flow of blood to the testicles, which shrivel and drop off within a few weeks. No anaesthetic is required.
2) The spermatic cords of calves under two months old can be crushed using an instrument similar to pliers (called a burdizzo, pictured to the right). No anaesthetic is required.
3) Surgical castration by a vet, under general anaesthetic, can be performed on calves of any age.

According to the FAWC, all three methods cause acute pain - regardless of the age of the calf (3). Complications and infection at the site of castration can also occur (3). In their March 2004 newsletter, the Highgate Veterinary Surgery in Kendal highlighted the problems arising from the use of rusty burdizzo castrators: 'Rusty burdizzos were used to castrate 20 stirks (bullocks) about a month ago. Half of these animals now have scrotal abscesses, some of which have burst leaving gaping holes. The nippers had broken the skin and allowed infection into the dying testicle' (42).

Supernumerary Teats: Female calves are commonly born with one or two small, surplus teats on the udder (3). Although not harmful, these 'supernumerary teats' are routinely removed from dairy calves because they are 'unsightly' and make the animal less saleable, or, if located near the base of a true teat, may interfere with placement of the teat cup during milking (43). Up until three months of age these teats may be cut off using sharp scissors without anaesthetic (3, 34). After this age they must be removed by a veterinary surgeon (3, 34).

According to Defra, castration, disbudding and removal of excess teats are all stressful procedures which can reduce disease resistance in young calves (40).

Suffering in Silence

Most people see dairy cows grazing in the field and think that they have an easy, peaceful life, and die naturally at a ripe old age. In truth, the dairy cow is the hardest worked of all farmed animals, nurturing a growing calf inside her while simultaneously producing 30-50 litres of milk a day. No other farmed animal carries this dual load of pregnancy and lactation. Professor John Webster has likened the workload of the high-yielding dairy cow to that of:

"…a jogger who goes running for six to eight hours every day" and believes that "the only humans who work harder than the dairy cow are cyclists in the Tour de France." (29)

This enormous physical burden takes its toll on the cow's body and after only two to four lactations she is culled, either due to infertility, mastitis, severe lameness or because her milk yield has dropped (7). Compare this to a healthy beef cow, who can produce 10 or more calves before reaching physical exhaustion, and you understand why Professor Webster believes:

"As far as the welfare issue is concerned, the problems with beef cattle are nothing compared to the problems in the dairy industry. So anyone who avoids beef and elects to eat cheese due to welfare concerns is missing the point." (7, 44)

The misconception that dairy cows do not suffer often stems from the fact that they do not display the signs of distress that we expect to see, such as bellowing, immobility or loss of appetite (7). However, in the wild, cattle and other ruminants are prey animals who live in herds to reduce their risk of predation (7). In this situation, the animal that shows outward signs of illness becomes the target of attack (7). Cows have therefore evolved to soldier on regardless of how much they are suffering. According to Professor Webster, pain thresholds in cows are the same as in humans (7).


Ed Shephard

Fig. 20. Modern high-yield dairy cows cannot consume enough food at pasture to satisfy both their enormous milk output and their normal bodily functions, resulting in malnourished animals with protruding bones

Metabolic Disorders

Hunger

The high-yielding Holstein cow is a large animal who simply cannot consume enough food at pasture to sustain her enormous milk output as well as her other bodily functions, leaving her in a constant state of 'metabolic hunger' (6, 7). At pasture, her food intake is limited by the rate at which she can consume and digest grass. As grass is high in fibre, it fills up the rumen (stomach) quickly, causing the cow to feel 'full up' while at the same time still feeling hungry for nutrients (6, 7). Standing and eating for hours on end is also very tiring work and cows, who would naturally spend 12-14 hours a day lying down, face conflicting motivation to eat or rest (7, 37). Rye grass pastures, which are very high in

nitrogen, can lead to increased urea in the cow's blood, making her feel sick and impairing her appetite (7). Professor Webster summarises her feelings as “simultaneously hungry, tired, full up and feeling sick” (7).

Due to their inability to meet the metabolic demands of lactation, it is normal for cows to 'milk off their backs' in early lactation (draw on body reserves), resulting in a 'coat rack' appearance with the bones of the hips and spine protruding, as illustrated in Fig. 20 (7, 29). Dairy farmers consider this to be a normal metabolic situation in high-yielding dairy cows and have come to accept 'bony' dairy cows as typical, when in fact they are malnourished (46).

Ketosis and Fatty Liver Syndrome

The abnormal demands on the cow’s energy reserves often leads to ketosis and fatty liver syndrome (7).

Ketosis occurs when the cow begins to break down body fat in an effort to bridge the 'energy gap' during early lactation (45). Body fat is transported to, and broken down in the liver to metabolites which are then utilized by the body tissues (45). Excess mobilisation of fat can lead to a toxic level of ketones accumulating in the blood, milk and urine, causing a loss of appetite and drop in milk yield (45). Affected cows may also exhibit nervous signs, which include excessive salivation, licking of walls or gates, malco-ordination and aggression (45).

There is a limit to the amount of fat the liver can break down to ketone bodies and, when this is saturated, the surplus fat accumulates in the liver (46). This reduces the normal function of the liver and, because it is a vital organ, many normal body functions are upset. Milk production, mastitis and fertility are all adversely affected by fatty liver (46).

Milk Fever (Hypocalcaemia)

Milk fever is one of the most common metabolic disorders in dairy cattle, usually occurring just before, during or immediately after calving (47). It is caused by low blood calcium resulting from the high calcium demands of pregnancy and lactation. When the cow's blood calcium becomes too low to support normal nerve and muscle function she collapses and is unable to stand until her blood calcium becomes normal again (48). Death can be rapid, with milk fever the most common cause of sudden death in dairy cows (47). According to the National Animal Disease Information Service (NADIS), it is also one of the most important causes of calving problems and subsequent calf deaths (48).

Grass Staggers (Hypomagnesaemia)

Grass staggers (or grass tetany) occurs when the cow's intake of magnesium is lower than her output (49). It occurs most commonly in lactating cows at pasture as grass can be very low in magnesium, especially rye grass, while the output of magnesium in milk is high (49). Clinical signs can appear very rapidly as cows do not store magnesium and must rely on a daily intake (49). Initially, animals become nervous and excitable, and then begin to stagger and fall over (49). This can quickly progress to convulsions, coma and ultimately death. The short duration of clinical signs means that the mortality rate is high, as many animals are found dead before anyone notices they are ill (49).

High Protein Concentrates

While the obvious solution to the problem of hunger and mineral deficiency in high-yielding dairy cows would be to stop breeding animals with such a high milk output, dairy farmers are instead increasingly feeding their

cows on high protein feed concentrates (7). These concentrates, which are usually made from GM soya and maize, are higher in calories than grass and thus provide more energy (7). However, they are also high in amino acids which further accelerate milk production (7). The result of this is increased milk production in the short term but loss of body condition, infertility and greater susceptibility to illness later on (7). The high starch and protein content of feed concentrates also cause digestive problems which lead to a reduction in appetite, bloat and lameness induced by laminitis (discussed further below) (3, 6, 7).

Fig. 21. Sole ulcers such as this are common in the hind feet of dairy cows as the weight of their enormous udder causes the pedal bone of the foot to penetrate through the sole

Lameness

According to Defra:

'The level of lameness in dairy cattle in the UK is unacceptably high. It is a major cause of pain and discomfort to the animals.' (50)

Professor Webster shares these concerns, citing an annual incidence of lameness of 50 per cent and prevalence of 20 per cent - meaning that half of the cows in Britain go lame each year and 20 per cent are lame at any one time (7). As lameness is almost always a painful condition, he believes:

"it is indisputably the most serious welfare problem faced by dairy cows." (7)

And because many lame cows continue to milk satisfactorily, they are forced to struggle on despite their severe pain (7). In their *Report on the Welfare of Dairy Cattle*, FAWC found:

'many farms where lameness is causing unnecessary pain and distress. Yet some stockmen appear not to perceive lameness as a problem and the severity and extent often go unnoticed and untreated.' (3)

Approximately 80 per cent of cases of lameness are due to foot problems and the remainder to leg damage (50). Sole ulcers, white line disease, digital dermatitis and laminitis are the most common foot problems and are caused by a number of complex factors (3, 7, 50). The majority of leg lameness is due to physical damage from badly designed cubicles and to injury at calving (50).

Sole Lesions

Seventy-five per cent of sole ulcers and white line disease (cracks in outer rim of the sole which allow dirt and bacteria to enter, causing abscesses) occur in the outer claw of the hind feet (7). This is directly attributable to the presence of the huge udder which pushes the cow's hind legs apart and forces her to adopt an abnormal gait, putting extra pressure on the outer claws as illustrated in Fig 6 (29). Poor hoof quality, caused by nutritional deficiencies, can also predispose the sole to ulcers (30). Both sole ulcers and white line disease cause chronic pain which gets worse with time (7). They are further aggravated by the long distances many cows must walk between pasture and milking chamber twice a day, and also by winter cubicle housing where many cows are forced to stand on concrete for extended periods of time (discussed further below) (7). According to Professor Webster:

"Most farmers only elect to treat the most severe cases, for example where there has been complete penetration of the sole, inducing deep pain from standing on concrete and scalding pain through exposure of sensitive underlying tissue to acid slurry." (7)

Fig. 22. Modern dairy cows can weigh up to 750kg and are much too big for most of the cubicle houses in Britain which were installed in the 60s and 70s when cows were 150-200kg lighter

Digital Dermatitis

Incidence of digital dermatitis, a painful bacterial infection of the foot, has increased in recent years due to a combination of factors (7). Many indoor cubicles were installed when the predominant dairy breed was the British Friesian, which commonly weighed around 550kg, but the increased popularity of the Holstein means that many cows now weigh in excess of 700kg (50). As a consequence, the length and width of cubicles are too small for modern dairy cows and they are often forced to stand with their hind feet in the slurry passage behind the cubicle (50). Slurry is highly acidic and softens the cow's feet, allowing bacteria to penetrate (50). In addition, most dairy farmers have switched from hay to silage as winter cattle feed (7). Whereas hay is composed of dry grass and other herbaceous plants, silage is wet, fermented grass which causes wet manure, contributing to hygiene problems when cows are housed indoors (7).

Roads, tracks and gateways which have rough, uneven surfaces can cause puncture wounds in the foot which are susceptible to infection (50). When allowed to walk at their own speed, cows are able to place their feet carefully to avoid obstacles or rough objects. When forced to hurry (by the farmer or farm dog) they bunch together and cannot choose where to place their feet, so are more likely to sustain damage from sharp stones (50). In many dairy units the ageing concrete floors have become broken or cracked, causing abrasions and punctures of the sole which are also easily infected (30). Although digital dermatitis can be treated with antibiotics, once it has become endemic in a herd it is very difficult to eradicate (7).

Laminitis

Laminitis is the acute or chronic inflammation of the soft tissue (laminae) between the bone and the outer horny wall of the foot, which, according to Defra:

'results in great pain to the animal.' (51)

To understand the pain of laminitis Professor Webster suggests:

"…imagine crushing all your fingernails in the door then standing on your fingertips." (6)

The soft tissue of the foot is well endowed with nerves and blood vessels which carry oxygen and nutrients to support hoof growth and is therefore very sensitive to toxins in the blood (30). Feed concentrates which are high in protein and starch cause toxins to be produced in the rumen which are absorbed into the blood stream

and irritate the soft foot tissue, causing inflammation (30). According to Defra, research carried out in Scotland in the late 1980s found a significant link between high protein diets and lameness (30). Wet silage, which is high in acid and ammonia, can also lead to toxins in the blood which cause laminitis (30).

When a foot is affected by laminitis the blood flow is restricted, affecting hoof growth and resulting in softer soles which are more prone to disease, such as ulcers and white line disease, as well as puncture, leading to digital dermatitis (30).

Cubicle Housing and Lameness

The inadequately sized cubicles in which most dairy cows spend six months of the year contribute to the high incidence of lameness in several ways. The problem of cows having to stand with their hind legs in the slurry passage has been outlined above. The small size of the cubicles also makes it difficult for modern cows to lie down comfortably, reducing the amount of time that they spend lying down and increasing the pressure on their legs and feet (3, 7). Some cows avoid the cubicles altogether and instead lie in the aisles or slurry passages where they become very dirty and increase their risk of hock abrasions, lameness and mastitis (discussed further below) (3).

Cows may also be forced to spend long periods standing or lying down in the passages because there are not enough cubicles for all of the cows in the herd (3, 7). Due to the social hierarchy of the herd, subordinate cows may also be reluctant to lie in cubicles next to dominant cows, opting to stand or lie in the passages instead (3, 7). To overcome this problem, the FAWC recommends that indoor housing units contain five per cent more cubicles than the number of cows (3).

Many cubicle units have concrete bases because they are easier to clean, but they are also hard and uncomfortable and may lead to swelling of the knees and hocks as well as pressure sores (43, 51). Under The Welfare of Livestock Regulations 1994, dairy farmers must provide indoor cows 'access at all times to a well-drained and bedded lying area' (34). In practice, however, the bedding provided is often little more than a thin layer of sawdust or straw which does not provide adequate cushioning to keep the cow comfortable or prevent contact sores (3). The use of mats or cow mattresses in cubicles helps provide cushioning but must still be covered in bedding such as sand, straw or shavings to prevent contact sores and keep the mat dry (43).

Mastitis

Mastitis is a painful bacterial infection of the udder which affects 30 per cent of British dairy cows at any one time, with one million cases of clinical mastitis occurring in the UK every year (3, 5, 7). While clinical mastitis produces obvious symptoms such as swollen, hard udders and discoloured or clotted milk, mastitis can also occur in a subclinical form with no visible changes to the udder or milk, making the number of these cases impossible to calculate (3, 13, 29).

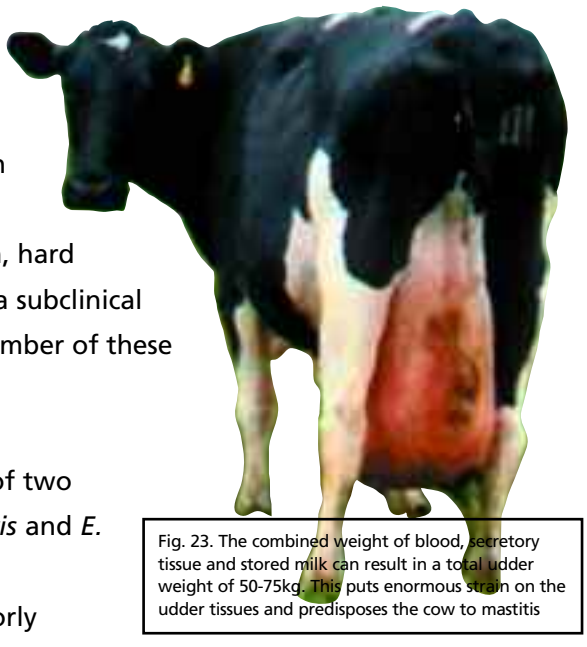


Fig. 23. The combined weight of blood, secretory tissue and stored milk can result in a total udder weight of 50-75kg. This puts enormous strain on the udder tissues and predisposes the cow to mastitis

Mastitis pathogens, of which there are over 200, belong to one of two categories: contagious or environmental (43). *Streptococcus uberis* and *E. coli* are by far the most common causes of mastitis and are both environmental pathogens, thriving in dirty, wet bedding and poorly

ventilated buildings (3, 43). Both contagious and environmental pathogens can be transmitted from cow to cow via the milking machine (43). While the incidence of contagious mastitis has declined over the past 30 years, the incidence of environmental mastitis has remained largely unchanged since 1960, now accounting for over 58 per cent of clinical cases (43). The failure in combating environmental mastitis is largely due to the increase in herd size and the very high milk yield of the modern dairy cow (3, 43).

Fig. 24. Faulty milking machines can damage the cow's teats, causing great pain and increasing her risk of mastitis

Larger herds make it difficult to properly monitor each cow and her milk, allowing infected animals to enter the milking chamber and pass the infection on via the milking machine (43). Larger herds also produce more manure which accumulates in indoor housing units, creating an environment in which bacteria thrive (43). High-yielding dairy cows who are only milked twice a day may leak milk on to the cubicle bed when their udder becomes full, producing a bacterial haven of faeces, bedding and milk (43). The abnormal accumulation of milk in the udder also strains the udder tissues and predisposes high-yielding cows to mastitis (6, 29). The combined weight of blood, secretory tissue and stored milk can result in a total udder weight of 50-75kg (43). In beef cows, who have small udders, the incidence of mastitis is a fraction of that in dairy herds (29).

Poorly designed and maintained milking machines are also recognised as major contributors to udder infection (30, 43, 52). Despite the major role they play on a dairy farm, milk machine maintenance is often neglected (43). This can lead to physical damage of the teats, which are richly endowed with nerves and therefore highly sensitive, and allow infection to penetrate the udder (43). Faulty machines can also actively transport bacteria to, as well as propel them into, the udder (30, 43).

Teat damage can also occur because of high stocking densities in indoor housing units as well as inadequately sized cubicles (43). Large cows in narrow cubicles may push their legs through into the adjacent cubicle and crush their neighbour's teats (43). Disruption to an established herd, either by the addition of new members or splitting it into smaller groups, can result in fighting which may also cause teat injuries (43). Severe teat injuries, such as total teat amputation, are surprisingly common in dairy herds (43).

Summer mastitis, an acute illness of dry (ie not lactating) dairy cows, is also common in temperate countries such as Britain (3, 43). It occurs in 35-60 per cent of UK herds annually, affecting over 20,000 animals (3, 43). The main means of transmission is the sheep head fly (*Hydrotoea irritans*) which feeds on cattle blood (43). Damaged teats predispose cows to infection (3). Summer mastitis causes extensive, painful damage to the udder which becomes swollen, hot and hard and produces a thick, foul smelling secretion (3, 43). Severely affected cows become lame from the pain, with extreme cases leading to abortion and death (3, 43).

Pus

When a cow is suffering from mastitis her body produces large numbers of white blood cells which migrate to the udder to fight the infection (13). Many of these cells then pass out in her milk, and the greater the infection the higher the number of these 'somatic' cells in her milk (13). Dairy processors use this somatic cell count to determine what price they pay farmers for their milk, imposing financial penalties for milk with high somatic cell counts (43, 52). Under EU regulations, milk with a somatic cell count as high as 400 million per litre may still be sold for human consumption (13, 43). Some farmers feed milk which exceeds this threshold to the calves (43).

Antibiotics

Antibiotics are routinely used to treat mastitis and may be injected up the teat canal, as illustrated in Fig. 25, or administered orally (43). Intermammary injections, if performed carelessly, can cause teat canal damage which is extremely painful and increases susceptibility to infection (35). To reduce the amount of drug residue which enters the food chain, all antibiotics have a specified post-treatment milk withholding period stated on the product (43). Due to public health concerns, the EU imposes limits on the maximum permissible level of antibiotics in milk, which is currently set at 0.007 mg/litre (13). Dairy processors use random sampling to test milk for residues, penalising those farmers whose milk fails to meet these restrictions (43).

To help reduce the amount of mastitis in dairy herds, most farmers practice 100 per cent dry cow therapy - as recommended by Defra (43, 52). This involves injecting a long-acting antibiotic into all four teats of all cows, whether infected or not, as soon as they enter their two month dry period (43, 52). Cows that suffer from repeated cases of mastitis or have persistently high somatic cell counts are routinely killed (52).

Infertility

The arduous life that dairy cows endure causes such rapid physical degradation that an alarmingly high number of young animals are killed due to infertility (3, 7). A killing rate of 25 per cent is normal for most dairy herds and poor fertility is the single biggest factor (3). As one dairy farmer put it:

"My cows get pregnant or die." (53)

Although infertility in itself is not a welfare problem, it is an indicator of poor welfare resulting from physical exhaustion (3, 7). Even the Milk Development Council (MDC) acknowledges that 'the drive towards increased milk yield has resulted, in part, to decreased fertility' (54). They also cite postpartum (after calving) uterine infections as a major cause of reduced fertility, with retained placenta and calving difficulties being the most frequent causes of uterine infection (54). The risk of retained placenta and calving difficulties both increase when cows are impregnated with large dairy or beef

Fig. 25. Mastitis, a painful infection of the udder which is widespread in British dairy herds, is usually treated by injecting antibiotics up the teat canal – a procedure which can damage the udder if performed improperly

breeds which they have difficulty giving birth to (3, 29, 33).

To help combat the problem of infertility, the use of fertility drugs is now widespread on dairy farms in Britain (55). Cows are given hormones to help increase conception rates, but also as a herd management tool to ensure that groups of calves are conceived and born around the same time (54, 55).

Markets

When a farmer decides to abandon dairy farming, the herd of milking cows will be sold off, usually at a livestock market. Surplus dairy cows, and all beef/dairy calves, are also routinely sold at markets. But farmers do not necessarily take their animals to the nearest livestock market; they take them where dairy cows are most in demand. Currently the demand for dairy cows is highest in the South West of England and some cows and calves travel from as far away as Essex and Norfolk, enduring journeys of six hours or more (56).

On top of these long journeys, many cows sent to market must also endure the uncomfortable pressure of overfull udders. According to FAWC: 'It is common practice to send dairy cattle to market or to agricultural shows with overstocked udders.' (3) This means that the cow is not milked on the morning of the sale or show so that her udder looks full, making the cow 'more attractive to prospective buyers or judges' (3). In their 1997 report on the Welfare of Dairy Cattle, the FAWC condemned this practice, stating:

'Cows with overstocked udders suffer unnecessary pain and unnecessary distress which is against the law.' (3)

Despite their advice, cows continue to be sent to markets with overstocked udders, as witnessed by a Viva! investigator who attended three dairy cow auctions at Taunton livestock market in 2005. FAWC have also reiterated their concerns over this practice in their 2005 *Report on the Welfare of Farmed Animals at Gatherings* (57).

A Viva! investigator also witnessed two Holstein cows for sale at Taunton Livestock Centre on 19th July, 2005 who had given birth en route to the Centre and were paraded around the auction ring with the afterbirth still hanging from their vaginas. This violates The Welfare of Animals at Markets Order 1990 which prohibits an animal being exposed for sale in a market if she is likely to give birth while she is there, as well as The Welfare of Animals (Transport) Order 1997 which states that animals likely to give birth must not be transported (57). (Viva! reported this violation to Defra and Trading Standards.) Despite these laws, and the well-established fact that the stress of transport and the market itself may induce labour or abortion, the FAWC highlight the continuing problem of pregnant animals being brought to market in their June 2005 report (57).

Animal Aid

Fig. 26. This dairy cow at Colchester market is leaking milk from her overstocked udder, a common sight at UK livestock markets

Farm Assurance Schemes

Food scares such as BSE, *Salmonella* and *E. coli*, as well as concerns over GMOs, antibiotics and pesticides, have led to an increase in the supply of organic milk. However, organic production still accounts for less than two per cent of the UK's annual milk production at 240 million litres (58). Many people who choose to pay the extra for organic milk do so because they believe the animals have a better standard of living, but is this the reality?

Soil Association Organic Standards

In order to receive Soil Association certification for their milk, dairy farmers must comply with specific standards set down by the organisation. Certified farms are inspected annually by the Soil Association to ensure that these standards are being upheld (59). But do these standards result in better animal welfare than conventional dairy farms?

While most of the standards set out by the Soil Association are aimed at improving the quality of the milk, certain standards do pertain specifically to animal welfare. Highly invasive practices such as embryo transfer and ovum pick-up are prohibited but artificial insemination is allowed without any regulations governing the breed (and therefore size) of the sire (59). Fertility hormones may not be used to synchronise calving but may be used to induce parturition or to bring a cow with failing fertility into heat (59). Calves may only be housed individually until seven days old and then must be group housed, however disbudding is still permitted up to three months old and castration with a rubber ring is allowed in the first week of life (59). They may not be taken to market under one month old but beyond that age they may endure journeys of up to eight hours to market or the abattoir (59).

Cows on organic farms are still impregnated every year to provide a continuous supply of milk and endure the trauma of having their calves taken away within 24-72 hours of birth (59). They also carry the dual load of pregnancy and lactation for seven months of every year, just like those on conventional farms. These two welfare insults are inherent in dairy production and cannot be eliminated. The birth of male calves is also a problem for organic dairy farmers using high yield breeds such as Holsteins and the scheme allows these 'unwanted by-products' to be shot shortly after birth. There are also no guidelines on the length of time which dairy cows may be housed indoors, although zero-grazing systems (where cows never go out to pasture) are prohibited (59).

RSPCA Freedom Foods Scheme

The RSPCA's Freedom Foods standards for the welfare of dairy cattle provide little more than the legal minimum for cows and their calves (60). As in organic farming, cows suffer the repeated trauma of having their calves taken away shortly after birth and face the gruelling workload of pregnancy and lactation (60). The only practices of conventional farming which are prohibited are embryo transfer and ovum pick-up (60) Calves may still be housed individually up to eight weeks old and can travel to market as young as seven days old, enduring journeys up to eight hours long (60). The standards on the removal of supernumerary teats and disbudding do offer slightly higher welfare than the legal minimum, with anaesthetic being required for both procedures under the scheme and a younger age limit set (60). However the fate of male calves is ignored under this scheme, leaving farmers free to kill off any unwanted calves immediately after birth (60).

The welfare benefit provided to dairy cows by the RSPCA Freedom Foods scheme was evaluated in a study by Bristol University which investigated the welfare of cows on 40 Freedom Foods farms and 40 non-Freedom Foods farms (7). According to Professor Webster:

"There was no difference in overall welfare score between Freedom Foods and non-Freedom Foods farms. Thus, we were unable to conclude that membership of the Freedom Foods scheme ensured better overall welfare than non-participating farms." (7)

Little Red Tractor - British Farm Standard

The Red Tractor logo on dairy products signifies that the milk was produced in the UK on a farm which meets the standards of the National Dairy Farm Assured Scheme (NDFAS). However, these standards are simply the UK and EU legal minimums and nothing more! All of the farming practices outlined in this report are acceptable under this scheme (61). The only thing this logo guarantees the customer is that the product was produced in Britain and the farm was not breaking any laws, at least not on the day it was inspected.

Acknowledgements

I would like to thank John Webster, Emeritus Professor of Animal Husbandry at Bristol University's Clinical Veterinary Science department for the information he provided on dairy farming in Britain and its impact on dairy cows.

Fig. 27. Two dairy calves removed from their mothers seek what little comfort they can from each other

Damien Bird

References

1. Defra (2005) Agriculture in the United Kingdom 2004. The Stationary Office.

2. Dairy UK (2005) Going Forward: The UK's dairy agenda.

3. Farm Animal Welfare Council (1997) Report on the Welfare of Dairy Cattle.

4. The Dairy Council website. Available at www.milk.co.uk.

5. Roebuck (2005) Herd health and machinery integral to profitability. Farmers Guardian, May 6.

6. Webster, J (1994) Animal Welfare: A cool eye towards eden. Blackwell Science.

7. Webster, J (2005) Animal Welfare: Limping towards eden. Blackwell Publishing.

8. Defra (2005) The UK Dairy Industry. Available from: http://www.defra.gov.uk/foodrin/milk/dairyindustry.htm

9. Dairy Crest Group PLC (2004) Annual Report.

10. Arla Foods UK PLC (2004) Annual Report and Accounts.

11. Robert Wiseman Dairies PLC (2004) Annual Report and Financial Statement.

12. Milk Link (2004) Annual Report and Accounts.

13. Milk Development Council (2004) Dairy Facts and Figures 2003.

14. Rural Payments Agency (2005) Access to Information - CAP Payments.

15. Milk Development Council (2005) About Us. Available from www.mdc.org.uk.

16. Dairy Council (2003) Annual Report and Financial Statement.

17. Dairy UK Press Release, 27th June 2005. Available from: http://www.dairyuk.org/latestnews.html

18. Rural Payments Agency (2005) School Milk Subsidy Scheme. Available from: http://www.rpa.gov.uk/rpa/rpaweb.nsf?open

19. Animal Bytes: Wild Cattle. Available from: http://www.sandiegozoo.org/animalbytes/t-cattle.html

20. Wilson, D. E. and Reeder, D. M. (eds) (1993) Mammal Species of the World. Smithsonian Institution Press.

21. Chillingham Wild Cattle Association. www.chillingham-wildcattle.org.uk

22. Sowell, B. F., Mosley, J. C. and Bowman, J. G. P. (1991) Social behavior of grazing beef cattle: Implications for management. Proceedings of the American Society of Animal Science.

23. Young, R. (2003) The Secret Lives of Cows. Farming Books and Videos Ltd.

24. BBC News (2005) Woman trampled to death by cows. 14th June 2005.

25. Hohenboken, W. D. (1999) Applications of Sexed Semen in Cattle Production. Theriogenology 52: 1421-1433.

26. van Arendock, J. A. M. and Liinamo, A. (2003) Dairy Cattle Production in Europe. Theriogenology 59: 563-569.

27. Marchant-Forde, J. N.; Marchant-Forde, R. M. and Weary, D. M. (2002) Responses of dairy cows and calves to each other's vocalisations after early separation. Applied Animal Behaviour Science 78: 19-28.

28. Webster, J. (1987) Understanding the dairy cow. Oxford: BSP Professional Books

29. Horizon (1992) Fast life in the food chain, transcript. BBC.

30. Defra (2002) Dairy cow welfare throughout the year. Papers presented at Defra / ADAS Meeting on 6 November 2002. Easton College, Norwich.

31. Dairy Farmer, May 2005.

32. Defra (2005) Commission agrees limited voluntary compensation scheme when BSE testing regime introduced. News Release, 26th May.

33. Food Ethics Council (2001) Farming animals for food: towards a moral menu.

34. Defra (2005) Amendments to legislation governing artificial insemination in cattle: Veterinary Surgeons Act 1966. Available from: http://www.defra.gov.uk/corporate/consult/inseminati on-cattle/index.htm

35. Defra (2003) Code of Recommendations for the Welfare of Livestock: Cattle.

36. Reed, M. and Lobley, M. (2003) They shoot calves don't they - living with the excesses of a post productivist countryside. Centre for Rural Research, Exeter University.

37. John Webster, pers comm., 5th July 2005.

38. Cogent (2005) Getting more heifers with sexed semen. Available from: http://www.cogentuk.com/f/sexed_semen.pdf

39. NADIS Cattle Disease Focus - The downer cow. Available from: http://www.qmscotland.co.uk/analysis/downloads/Do wnerCow.pdf

40. Defra (2003) Improving calf survival. Available from: http://www.defra.gov.uk/animalh/welfare/farmed/cattl e/booklets/calfsurv03.pdf

41. Stafford, K. J. and Mellor, D. J. (2005) Dehorning and disbudding distress and its alleviation in calves. The Veterinary Journal, 169: 337-349.

42. Highgate Veterinary Surgery Farmers' Newsletter, March 2004. Available at: http://www.highgate-vets.co.uk/farm/newsletters/pdf/0403.PDF

43. Blowey, R. and Edmondson, P. (2000) Mastitis control in dairy herds. UK: Farming Press Books.

44. Nature (2004) Holy Cow. Available from: http://www.pbs.org/wnet/nature/holycow/

45. University of Reading Cattle Compendium, Ketosis. Available from: http://www.organic-vet.reading.ac.uk/Cattleweb/disease/Keto/keto1.htm

46. Defra (2002) Welfare of cows at grass.

47. University of Reading Cattle Compendium, Milk Fever. Available from: http://www.organic-vet.reading.ac.uk/Cattleweb/disease/MilkF/mf1.htm

48. NADIS Cattle Disease Focus - Milk fever. Available from: http://www.qmscotland.co.uk/analysis/downloads/Milk per cent20Fever.pdf

49. NADIS Cattle Disease Focus - Grass staggers. Available from: http://www.qmscotland.co.uk/analysis/downloads/Hyp omagnesaemia.pdf

50. Defra (2005) Lameness in dairy cattle. Available from: http://www.defra.gov.uk/animalh/welfare/farmed/cattle/pb 4020/pb402toc.htm

51. Defra (2005) Lameness in beef cattle and dairy followers. Available at: http://www.defra.gov.uk/animalh/welfare/farmed/cattl e/pb1151/lamebtoc.htm

52. Defra (2005) Mastitis management action plan. Available from: http://www.defra.gov.uk/animalh/welfare/farmed/advi ce/mastitis/index.htm

53. Blowey, R. (2005) Red deer and cattle fertility. Veterinary Times, 35 (22): 28-29.

54. MDC (1999) Improving reproductive performance of dairy cows.

55. Organic Milk Suppliers Co-operative (2005) Why organic milk? Available at: http://www.organicmilk.co.uk/index.cfm/organicmilk/ WhyOrganic.Health

56. Move west pays off for Hemmings herd event. Farmers Weekly, 143 (2): 35.

57. Farm Animal Welfare Council (2005) Report on the welfare of farmed animals at gatherings.

58. Defra (2003) Organic milk production: profit or welfare?

59. Soil Association (2005) Organic standards, revision 15.

60. RSPCA (2004) Welfare standards for dairy cattle.

61. National Dairy Farm Assured Scheme (2004) Standards and Guidelines for Assessment.

62. Dairy-bred beef calf buyers more selective. Farmers Guardian, 15th July 2005.

63. The Welfare of Farmed Animals (England) Regulations 2000.

64. Dairy beef worth its weight in gold by 2006. Farmers Weekly, 5th August 2005.

65. COUNCIL DIRECTIVE 97/2/EC of 20 January 1997 amending Directive 91/629/EEC laying down minimum standards for the protection of calves

66. Scientific Veterinary Committee, Animal Welfare Section (SVC), 1995. Report on the Welfare of Calves. European Commission, Brussels.

67. Swanson, J. C. and Morrow-Tesch J., 2001. Cattle Transport: Historical, research, and future perspectives. Journal of Animal Science 79: E102-E109.

68. Hemsworth, P. H., Barnett, J. L., Beveridge, L. and Matthews, L. R. 1995. The welfare of extensively managed dairy cattle: A review. Applied Animal Behaviour Science 42 (3): 161-182.

The Dark Side of Dairy
Published by Viva!, 8 York Court, Wilder Street, Bristol BS2 8QH
T: 0117 944 1000
E: info@viva.org.uk W: www.viva.org.uk