



## The Life of: *Broiler chickens*

**Chickens reared for meat are called broilers or broiler chickens.** They originate from the jungle fowl of the Indian Subcontinent. The broiler industry has grown due to consumer demand for affordable poultry meat. Breeding for particular traits and improved nutrition have been used to increase the weight of the breast-muscle. Commercial broiler chickens are bred to be very fast growing in order to gain weight quickly.

In their natural environment, hens spend much of their time foraging for food. This means that they are highly motivated to perform species specific behaviours that are typical for chickens (natural behaviours), such as foraging, pecking, scratching and feather maintenance behaviours like preening and dust-bathing. Trees are used for perching at night to avoid predators.

The life of chickens destined for meat production consists of two distinct phases. They are born in a hatchery and moved to a growing farm at 1 day-old. They remain here until they are heavy enough to be slaughtered. This document gives an overview of a typical broiler's life.

### The hatchery

The **parent birds** (*breeder birds - see also section at end*) used to produce meat chickens have their eggs taken away and placed in an **incubator**. In here, the eggs are kept in an optimum constant atmosphere and regulated temperature. At 21 days, the chicks are ready to hatch, using their egg tooth to break out of their shell (in a natural situation, the mother would help with this). Chicks are **precocial**, meaning that immediately after hatching they are relatively mature and can walk around. A chick classified as a 'day-old chick' is up to 72 hours old (this is when the yolk sac in the egg runs out). At present, chicks destined for organic systems are not treated differently until they get to the growing farm.

Chicks need extra heat and high humidity during the first weeks of life. Newly hatched chicks require ambient temperatures of 32°C to 35°C and relative humidity of 60% to 70% which can be difficult to achieve at these high temperatures<sup>1</sup>.

### Vaccination

The modern broiler reaches slaughter weight within several weeks. This leaves little time to develop a mature immune system. Therefore, broiler chicks (including organic chicks) are vaccinated against several different diseases. Some infectious pathogens (such as *Salmonella*) can also be transmitted via the egg (vertical transmission) from the breeder hen to the chick. The breeder hen should therefore also be vaccinated. The most common vaccines used are against Newcastle disease virus, infectious bronchitis virus, avian pneumovirus, infectious bursal disease and Marek's disease (organic systems do not currently vaccinate against Marek's disease due to the necessity to use an antibiotic on the skin after administration)<sup>2,3</sup>. Vaccines are delivered via spraying or via drinking water. Spray vaccination is the preferred and most effective administration technique for respiratory type vaccines.



Day old chicks in a littered barn, with a controlled atmosphere for humidity and temperature control.



## Transport of chicks

When broiler chicks are a day-old, they are transported in transport modules (or chick boxes) from the hatchery to the rearing farm. Chicks travel along a conveyor belt and are dropped into modules. During this process the chicks are immunised with a spray vaccination<sup>4</sup>. It is currently not clear what the optimal conditions for transport of chicks are, as there is insufficient scientific knowledge. The debate focusses on maximum journey times as chicks are sustained by energy and water reserves from the yolk sac for a period of time after hatching<sup>5</sup>.



Broiler chickens are transported twice in their lives, as day-old chicks (pictured) and as adults to the slaughterhouse.

## Housing systems for broiler chickens

### *Intensive (industrial) farming systems*

Broilers used in intensive systems are of strains that have been bred to be **very fast growing** in order to gain weight quickly (**with typical weight gains of over 50 g per day**). Unlike laying hens (kept for egg production) which live for about a year, broilers only live for several weeks before they are slaughtered. In the EU, the slaughter age ranges from 21 to 170 days (typically around 5 to 7 weeks)<sup>6</sup>.

- **In the US - the average slaughter age is 47 days at a weight of 2.6kg<sup>7</sup>**
- **In the EU – the average slaughter age is 42 days at a weight of 2.5kg<sup>8</sup>**

Over the last 80 years or so, the slaughter age of a standard fast growing broiler has been decreasing, and market weight has increased (see Figure 1). In comparison, traditional meat chickens take around 12 weeks to reach slaughter weight<sup>9</sup>.



**Figure 1.** Market age and weight changes since 1925<sup>10</sup>

Globally, over 70% of broilers chickens are raised in quite similar indoor intensive (industrial) farming systems<sup>11</sup> and only a small proportion are reared in less intensive, higher welfare systems. Keeping broiler production indoors, without any access to outside areas can help with pest control. In temperate countries, broiler sheds are closed, climate-controlled (e.g. fan-ventilated) and have artificial lighting<sup>12</sup>. In hotter countries, the sheds are more open so that the chickens are exposed to daylight and natural ventilation but have no outside access<sup>13</sup>. The standard broiler shed in Europe is window-less, but in some countries (e.g. UK, The Netherlands), retailers or assurance schemes require windows to allow natural daylight<sup>14</sup>. In Sweden, windows to let in daylight are mandatory.

**The sheds are generally barren, except for feeding and drinking points.** Broilers are reared on a littered floor (such as straw, wood shaving, peat, paper) to absorb the chickens' excreta<sup>15</sup>. Feed is available at all times and



consists of a high protein feed, usually delivered via an automated feeding system. Some farms will feed 'whole grains', not processed cereals, as part of the diet<sup>16</sup>.

Broiler chicks are placed in the rearing sheds at one-day old and are kept in large, **mixed-sex flocks**. These flocks can consist of 10,000 to 20,000 birds, or more, in a single house<sup>17</sup>. Broilers stay at the rearing farm until they reach slaughter age. When this point comes nearer, flocks are often **thinned** (not practiced in the US). This involves the catching and removal of a portion of the flock (usually the female birds that are lighter) for slaughter, to allow the remaining birds more room to grow on to a greater weight. The birds remaining in the house are likely to be stressed as a result of the thinning process, making them more susceptible to **bacterial infections** like *Campylobacter*, a cause of food poisoning which poses a public health concern<sup>18</sup>.



A typical chicken shed with tens of thousands birds. The red line provides water; the yellow circular structures are feeders.

The litter in a broiler shed is usually not cleaned out during the birds' lifetime (but completely removed after each batch, and the house cleaned and disinfected). The **quality of the litter** will influence **air quality** (i.e. dust levels, air humidity and ammonia levels). **Litter can become wet** depending on the type of litter material, the type of drinkers, water spillage and diet composition (influencing the composition of the bird's faeces)<sup>19</sup>. Wet litter is a **major risk factor** for **contact dermatitis** (lesions of the breast, hocks and feet)<sup>20</sup>.

There is an EU Directive 2007/43/EC that specifies rules for the protection of chickens kept for meat production<sup>21</sup> providing the minimal standards required to rear broilers. It outlines stocking densities, and atmospheric conditions, aiming to reduce extreme overcrowding and poor conditions. In countries within the EU, such as the UK, permitted stocking density is further restricted. In countries, such as the US (federal law), there are no laws on the stocking density limit. In very hot countries such as Brazil, stocking density may be reduced to allow for the warmer climate<sup>22</sup>.

## Higher welfare (alternative) systems

Chickens in alternative farming systems will have **more space** (lower stocking densities) and are often from **slower growing breeds**, slaughtered at an older age than fast growing breeds. The **environment** can also be **enhanced**, for example with indoor enrichment and/or with an outdoor area.

In the EU, only a small proportion of commercial broilers are reared in alternative systems. In the **USA**, less than 1% of chickens are raised as 'free-range' (the term is used if chickens have access to the outdoors for at least some part of the day)<sup>23</sup>.



Higher welfare indoor includes perches, bails of straw to improve foraging and natural light.

### Higher welfare indoor

In these systems, chickens are kept indoors but they have **enrichment, more space, natural light and are of breeds of intermediate or slower growth rates** as compared to intensive breeds with faster growth rates. This allows birds to express more of their natural behaviours.

For instance, in the **UK** the **RSPCA Freedom** food label outlines welfare standards<sup>24</sup> stipulating a maximum stocking density of 30 kg/m<sup>2</sup> and a growth rate that must not exceed 45g/day.



## Free range

Chickens have access to an outdoor range during the daytime for at least half of their lifetime and the birds used are often **slower growing breeds**. The housing provided is either a fixed shed or a mobile house that can be moved around the pasture. **Popholes allow access to the range**. At night the hens come inside for protection from predators. Chickens use a range more if it is of good quality (e.g. with presence of cover in the form of trees, bushes or hedges or with artificial shelters<sup>25</sup>).



Popholes allow free range birds access to the range. Bales of straw in the shed help provide enrichment.



**Traditional free range:** in these systems, the chickens are usually of slower growing, more traditional breeds and they will live longer than intensively reared chickens. An example of these is Label Rouge broilers in France which are slow growing hardy breeds with golden or black feathers which have been selected for the quality of their meat.

**Capons:** These are male birds that are castrated at an early age to allow them to become fatter than a normal male bird. It is performed without any pain relief and requires cutting into the abdomen to access the testes. This will cause extreme pain to the bird. While it is banned in the EU, traditional farming systems use a Derogation for traditional practices to maintain this practice, such as Label Rouge.

## Organic

Organic hens are **free range**, they should also use **slower growing** chicken breeds and typically have a **reduced stocking density**.

EU organic standards stipulate:

- Chickens should either be reared until they reach the minimum slaughter age of 81 days or else shall come from slow-growing chicken breeds (also reared until 81 days of age)<sup>26</sup>.
- Maximum stocking density is 21 kg per square metre inside the chicken shed and at least 4 per square metre per bird outside. Higher stocking densities are permitted (16 birds per square metre or up to 30 kg per square metre inside, plus 2.5 per square metre per bird outside) if the chickens are kept in small mobile houses which allow easy access to the outdoors.
- Organic chickens should have access to an open air area for at least one third of their life. The outdoor range should be mainly covered with vegetation.

## Catching and Transport

When broilers reach market weight, they are caught, put into transport crates and transported to a slaughterhouse. Before transport broilers are usually **deprived of food** for several hours.

The most common method of **catching** is **manually** by teams of catchers, who pick up the birds and carry them inverted and **by a single or by two legs** to put them in crates for transport. A more gentle method of is where birds are **carried upright in pairs**. Automated **harvesting methods also exist**. **These are machines with long, rotating rubber fingers** which collect the birds onto a transport belt which then conveys the broilers into the drawers of a transport container system<sup>27</sup>.





When broilers reach slaughter age, they are transported in modules or crates to the slaughter-house on loaded vehicles.

The transport compartments are put onto trucks for transport. Modern poultry **transport trucks** are equipped with sails on the side to protect the animals from **adverse weather conditions** during transport<sup>28</sup>. **Journey duration** is an important risk factor for deaths resulting from thermal stress during transport. Journeys of over 4 hours constitute a greater risk to welfare from heat or cold stress than shorter journeys<sup>29</sup>. **Driver behaviour, driving style and road type** have an effect on transported animals. Strong vibration and fast accelerations are aversive to broiler chickens.

On arrival at the slaughter house the chickens normally wait in their transport compartments in a **lairage area** before being removed from their transport units. The processes of catching, crating and transport can cause injuries and stress, leading to the **deaths** of several birds upon **arrival at the slaughterhouse**.

## Slaughter

The most common **methods** for stunning and stun/killing poultry are electrical and gas methods<sup>30</sup>. Stunning is practiced in order to render birds unconscious and insensible, and to immobilize them before slaughter.

### Electrical stunning

Chickens are hung upside-down on metal **shackles** by their legs and then stunned using an **electrified water-bath** system before they are killed. The animals are then killed by automated knife cut to the throat and subsequent bleeding (exsanguination). If their throats miss the cutter they are cut manual by a worker further down the slaughter line.

### Gas stunning

**Controlled Atmosphere Stunning** (otherwise known as gas stunning): birds in transport crates are conveyed through a tunnel filled with increasing concentrations of carbon dioxide, inert gases (argon or nitrogen), or a mixture of these gases. The gas or gases induce unconsciousness, before the birds are hung on shackles, while insensible, and conveyed to the killing machine for slaughter.

**Controlled Atmosphere Killing (CAK)**: birds are exposed to lethal concentrations of gases long enough that they are actually killed, rather than stunned (to avoid the risk that birds regain consciousness after exiting the gaseous atmosphere). **Carbon dioxide** depresses the central nervous systems directly and produces rapid unconsciousness. However, carbon dioxide is aversive to chickens (usually if levels are above 20%). Inhalation of the **inert gases** (argon and nitrogen) is thought to be painless, but when inhaled in high concentrations, they cause oxygen deprivation in the body, leading to death.

**Bi-phasic CO<sub>2</sub>**: A newer gas stunning method uses **carbon dioxide in two phases** (biphasic carbon dioxide) to kill poultry. The first phase containing up to 40 % of carbon dioxide (only moderately aversive to chickens), renders the birds unconscious, the second phase follows with lethal carbon dioxide levels.

### Controlled slow decompression

**LAPS**: Another recent technology that has been developed in the USA is **Low Atmospheric Pressure System (LAPS)**. LAPS killing mimics the physiological effects of ascending to high altitudes by using **controlled slow decompression**, which allows the body of the bird to adjust to changes in pressure and thus lose consciousness (from a lack of oxygen) with minimal discomfort<sup>31</sup>. In the **US**, the method has obtained a 'no-objection' ruling by the United States Department of Agriculture's office of New Technology and it has been in use in a commercial slaughter house since 2011<sup>32</sup>.

### Religious slaughter

According to Halal, Qurbani/Udhia (Muslim) and Shechita (Jewish) slaughter laws, an animal needs to be slaughtered without prior stunning. In the EU, the Slaughter Regulation states that stunning is needed to induce a



lack of consciousness and sensibility, however the EU also respects the freedom of religion<sup>33</sup>. The Regulation therefore allows certain 'religious rites' such as slaughter without stunning, however it requires an accurate cut of the throat with a sharp knife to minimise suffering and the slaughter needs to take place in an officially regulated slaughterhouse.

## Broiler parent birds ('broiler breeders')

The birds that are used to breed the chicks that become broiler meat chickens are called **parent birds or broiler breeders**. There are an estimated 75 million breeder birds in Europe<sup>34</sup>.



The feeding of broiler breeders is controlled and restricted, to manage body weight and sexual activity.

### Housing system<sup>35</sup>

Young broiler breeder birds are kept in relatively small single-sex flocks (about 2,500-3,000 birds) and are transferred to the production farms at the age of 16-21 weeks and stay there (in mixed sex groups). Egg production usually starts between 18-22 weeks of age and lasts until 60-65 weeks of age. Group size during the production period ranges from 3,000-8,000 birds and the percentage of males in the group ranges between 7 and 11 % when egg production starts.

The standard broiler breeder houses in Europe are mechanically ventilated and window-less, but in some countries it is a legal requirement that houses have windows (e.g. Sweden). Houses have a litter area and some proportion of the floor (normally not more than 50% of the total floor area) as a raised slatted area. Nests are positioned on the slats and can either be collective nests with an automated egg collection belt or individual nests. Maintaining a good and dry litter (often wood shavings or straw) is essential for keeping the nests and eggs clean. Enrichment is not commonly used in breeder housing, although sometimes perches and elevated platforms (required by legislation in Sweden and Norway) are present.

**Cage** housing of broiler breeders is rare, approximately 1-2 % of the parent stock in Europe is kept in cages. Some farms (mainly in The Netherlands and Germany), use multi-tier cage systems with groups of 60-100 birds per cage and with natural mating. A small number of farms (mainly in Southern Europe), have breeder hens housed in non-enriched conventional cages, single or group cages, with artificial insemination.

### Mutilations<sup>36</sup>

At the hatchery, besides being vaccinated, **chicks may also undergo one or more mutilations, such as despurring, detoeing, toe clipping and beak trimming**. These procedures have been introduced to reduce injury (such as feather and skin damage) to other birds in the flock due to (forced) matings or fighting between males. Beak trimming (using hot or cold blade or the infrared method) is carried out without any pain relief. De-toeing and de-spurring are also carried out without any pain relief (using a hot blade or hot wire).

### Food Restriction<sup>37</sup>

Weight control is important during the laying period and separate feeding is applied for males and females, so that feeding is carefully controlled. Egg production and body condition determine the amount of feed provided. Food restriction is used to limit body weight gain and achieve desired levels of fertility. **Feed restriction is practised because if broiler breeders were fed standard broiler diets, they would grow too rapidly and become too heavy to maintain good health before reaching the age of sexual maturity**. This would have detrimental effects on their health, their fertility and their welfare. However, feed restriction causes welfare problems associated with hunger and increased aggression around feeding time.

### Mating behaviour<sup>38</sup>

In Europe, natural mating is mostly used. It is important that males and females are equally mature to prevent problems with sexually inactive males or forced copulations/over-mating and aggression towards females. This can



lead to distress and injury in the females. **Mating can be improved by using lower stocking densities, leading to more appropriate mating behaviour, such as a greater display of courtship behaviour, as well as fewer forced matings and less struggling of the hens**<sup>39</sup>. The use of environmental enrichment can also be used to improve mating behaviour, reducing the frequency of forced matings.

### Slaughter<sup>40</sup>

Broiler breeders are usually reasonably well muscled at the end of their production period and weigh between 4 - 5 kg. As there is potential value in the meat from these birds, end-of-lay broiler breeders are sent for commercial slaughter, like standard broilers. There are rarely specific abattoirs for broiler breeders so breeders may have to be transported for long distances to reach suitable slaughter facilities.

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