THE WELFARE OF BROILERS IN THE EU

BETTER CHICKEN COMMITMENT

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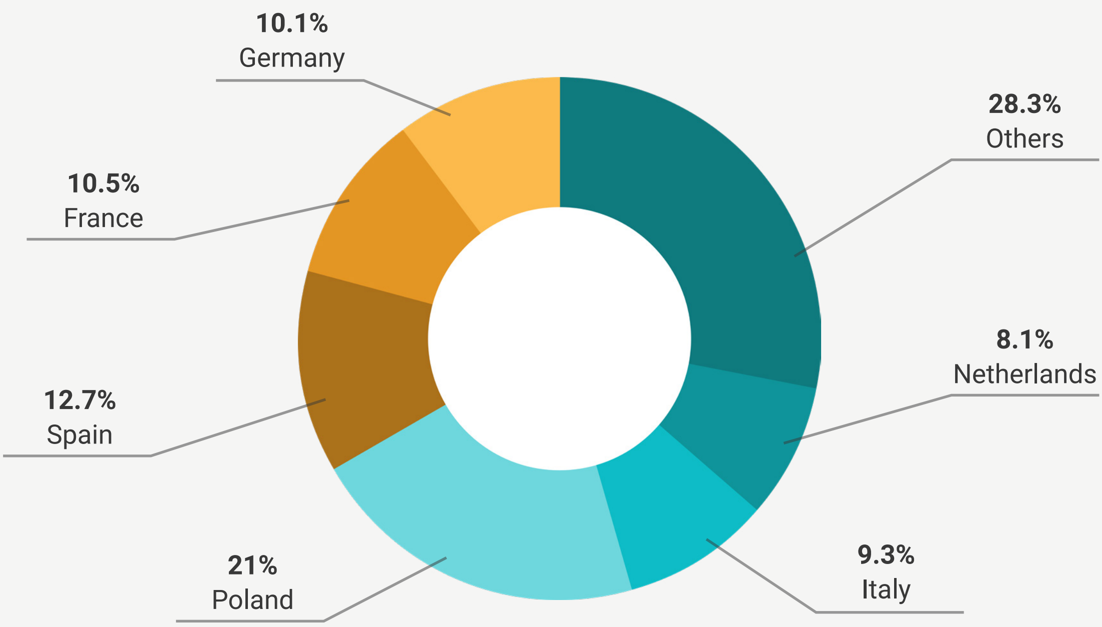
INTRODUCTION

The EU is a major producer of chickens reared for meat (known by the industry as broilers), being responsible for 8.6% of total world production (10.6 million tonnes)[1]. Broiler production in the EU has increased by around 20% from 2012 to 2022, now representing about 6.1 billion birds every year[1]. Production and consumption have been increasing steadily and with an average consumption of 23.4 kg per capita per year in 2022, chicken comes second after pig meat as the highest consumed meat in the EU[2]. Poultry meat production in the EU is expected to increase by 0.2% and consumption by 3% in the period 2022-2032, whereas pig meat and beef are expected to keep declining[2]. The number of broilers slaughtered in the EU is around 25 times higher than pigs[3], the second most slaughtered land animal in the EU.

Intensive broiler systems account for the vast majority (around 90%) of broiler production in the EU[4], while alternative systems (alternative indoors, free-range, and organic) represent a small proportion of total production (less than 10%). The broiler industry is extremely concentrated; while there are over 20,000 professional broiler producers, the top 10 alone account for over 40% of broiler production[5]. Three-quarters of the EU production is concentrated in seven Member States: Poland, Spain, France, the Netherlands, Germany, Italy, and The Netherlands, which are also home to the largest producers (figure 1).

FIGURE 1: CHICKEN MEAT PRODUCTION BY EACH EU 27 MEMBER STATE [1]

Share of EU 27 chicken meat production, 2022



GENETIC SELECTION

The number of broilers slaughtered in the EU is higher than ever, and the broilers themselves grow faster every year. The chickens produced today are genetically selected to grow as big as possible, as quickly as possible, using as little feed as possible. While there may be economic advantages to this, it comes at a significant cost to bird health and welfare. The genetic selection of broilers has led to a 400% increase in broiler growth rate, achieving market weight in 60% less time than broilers 50 years ago. The amount of breast meat on an individual bird increased by two-thirds [6]. These broilers achieve the target live weight of 2-2.5 kg in around 34-39 days, in comparison to 16 weeks back in the 1950s[7,8]. The vast majority of the EU chicken meat sector uses these fast-growing strains. The most widely used breed in all Member States is the Ross 308, which accounts for at least 70% of all broilers slaughtered in the EU, while Hubbard and Cobb breeds are less widely used[9]. Achieving the best food conversion rate with the premium cut of breast meat is the economic driver for the broiler industry we have today. The sentience of the animal is not part of the economic program. However, as a recent paper shows, chickens are cognitively intelligent, they can demonstrate self-control, they communicate with one another in a complex way, and have the capacity for reason and logic[10].

POOR LEG HEALTH

One of the most serious welfare problems in broiler production is the high incidence of skeletal disorders, particularly those that lead to impaired mobility or lameness[11]. The development of many of these conditions is related to selection and management for rapid growth, since they are rarely seen in slower growing strains and laying strains of poultry but are very common in commercial fast-growing chickens such as the Ross 500. Skeletal problems are not just a welfare issue; they are also costly to the industry. They are by far the most costly diseases for poultry producers in terms of output loss, resource wastage, and treatment and prevention costs[12].

The development of large muscle mass on an immature skeleton leads to locomotor problems in fast-growing chickens[13], with the highest levels of lameness seen in the fastest growing birds[14]. Even broilers with moderate lameness (≤ gait score 3 on a score from 0 - 5) have been shown to suffer pain from their impaired walking ability[15]. Chickens given the ability to self-medicate with feed containing painkillers consumed a significantly higher proportion of this feed as the severity of lameness increased[16]. Around 27.6% of commercial intensively-reared broilers presented leg abnormalities and 3.3% were almost unable to walk, according to a study from the UK[17].

Poor leg health can be caused by a number of different factors, including bacterial chondronecrosis and osteomyelitis (BCO), sometimes referred to as femoral head necrosis[14,18,19], tibial dyschondroplasia[20,21], and viral arthritis[22,23]. In severe cases, birds lose the ability to walk so they can't even access the basic resources of food and water, which can lead to starvation and a slow and painful death if they are not culled. Broilers are typically reared in barns with a stocking density of around 39 - 42 kg/m² (19.5 - 21 birds/m² when slaughtered at 2 kg). Such high stocking densities negatively affect their walking ability[17]. Fast-growing broilers with poor leg health spend an increased amount of time sitting, and long periods of time spent on poor litter which can lead to the painful condition footpad dermatitis (inflammation and necrotic lesions on the plantar foot), as well as hock burns and breast blisters[24,25]. The ability to walk is absolutely necessary to avoid pecking from other aggressive birds in the flock[26].

ASCITES

Ascites, commonly known as 'water belly', is an accumulation of fluid in the abdominal cavity[27]. Since ascites develops gradually, the birds suffer for an extended period before they die[28]. It is a multifactorial disorder. However, the main contributor of the condition is believed to be an increased oxygen demand by the fast-growing muscle. The increase in blood pressure required to push the blood through the blood capillaries in the lung and the increase in workload for the right side of the heart results in pulmonary hypertension and ventricular hypertrophy. The increased blood pressure in the veins, liver, and abdominal vessels forces plasma fluid out of the vessels, particularly the ones of the liver, into the abdominal space[26,29,30]. Thus, the increase in metabolic demand, coupled with exposure to environmental conditions such as temperature, lighting and ventilation, and nutritional factors such as feed form or content, all seem to promote the development of ascites[31,32]. It is most commonly seen in male chickens and ascites mortality can range from 0 to 30% in broiler flocks[33]. It is the main cause of carcass condemnations in UK slaughterhouses since 2003 (reaching an annual high of 2.7 million birds in 2013)[34]. In a study conducted in Norway, ascites was found to be the most common condemnation cause of fast-growing broilers sent to slaughter. The frequency of ascites in fast growing broilers was seven times higher than in slow-growing broilers (0.661% and 0.093% respectively)[35].

SUDDEN DEATH SYNDROME

Sudden death syndrome (SDS), or 'flip-over', is a condition in which apparently healthy fast-growing broilers die unexpectedly from no apparent causes[36]. Birds will suddenly start violently flapping their wings, extend their neck, squawk and die within minutes[37]. The condition is estimated to cause mortality of 0.8 to 4% in broiler flocks, with males predominantly affected[38–40].

The cause of flip-over in broilers is still unknown. It is often associated with nutrition (high density diets)[41] and environmental factors (noise, lighting)[36], but a growing body of evidence suggests that it may relate to broilers' high predisposition to cardiac arrhythmia[42]. Ventricular fibrillation appears to be the immediate cause of death[43]. Sudden death syndrome can occur as early as 2 days of age and continues until birds reach market weight. Peak mortality usually occurs between days 21 and 27[44].

BREAST MUSCLE MYOPATHIES

Muscle myopathies, or diseases of the muscle tissue, impact both bird welfare and meat quality. They are more commonly seen today than in previous years and are all associated with the intensive genetic selection of broilers to improve their growth rate, body weight, and breast yield[45–49]. Deep pectoral muscle myopathy has been studied for some time, while other abnormalities such as white striping, wooden breast and spaghetti meat have not been reported until recently[50,51].

Deep pectoral myopathy (DPM) is caused by a lack of blood supply to the pectoralis minor, known as the mini filet to consumers, leading to necrosis of the tissue. This is caused by the overgrown pectoralis major actually compressing the pectoralis minor. This means that when the bird flaps its wings the pectoralis minor is unable to receive the oxygen and nutrients that it needs[52]. It is known as green muscle disease due to the appearance of green flesh within the muscle tissue[53]. The occurrence of DPM in broilers is estimated to vary between 0.02% and 1.9%[54,55] with more cases reported in faster growing strains and in males[56].

Wooden breast (WB) is characterised by necrotic muscle fibres and the replacement of muscle with connective tissue, water, and fat, causing a palpably firm consistency of the breast muscles[57]. WB often occurs with the condition known as 'white striping' (WS)[58]. WS is found on the outside of the pectoral major muscle. It is visible as white striations running parallel to the muscle fibres[59]. These striations are found to be adipose (fat) tissue[60]. Even though the cause of both conditions is unclear, several studies have suggested that their pathogenesis is associated with several biological processes, such as localised hypoxia within the muscle, oxidative stress, increased intracellular calcium build-up, and repair of cellular damages[50,61–63].

Although the incidence rate of WB in commercial chickens is not well known, it is becoming increasingly common[62] and flocks that are affected have up to 50% of birds with the disease[58,64]. Affected chickens are most likely to be those that grow faster, have greatest feed efficiency, heaviest body weight and higher breast muscle yield[47,49]. A recent study found that the incidence of WB in slower growing birds was less than 1%, compared to 3.7 - 23.4% in the three faster growing breeds tested[65]. Another study found that WB is associated with an impairment of gait scores, and may thus be partly linked to the common walking abnormalities in broilers[49].

While WB is apparently asymptomatic, clinical signs such as outbulging of the lateral forebreast and decreased wing movement have been noted in severely affected birds. Also, the degenerative process leading to WB is similar to Duchenne muscular dystrophy in humans[57], a painful and debilitating condition[66,67]. Thus, it may be possible that broilers affected with WB also experience similar pain and discomfort.

Meat that comes from birds suffering from WB or from those with both conditions are found to have a harder texture, impaired ability to hold water, and poorer nutritional value[68]. WS has been found to increase the fat content and decrease the protein content of affected fillets[69] and also impacts the general appearance of the breast meat[59]. These conditions are forcing the downgrading of meat due to the lack of aesthetic appeal[47] and it is estimated that the incidence of these conditions can result in an excess of $200 million (€176 million) per year lost in the US[51]. It's estimated that the disposal of breast muscles by poultry processing plants in Poland due to DPM causes annual losses of €2 million[54].

More recently, a new muscular abnormality termed as 'spaghetti meat' (SM) has emerged[70]. SM, often associated with WS, is characterised by poor muscle cohesiveness due to the immature intramuscular connective tissues. The affected muscle is so loose in structure that the muscle fibre bundles can be pulled away easily with the fingers, like spaghetti[48,50]. Broilers displaying higher breast size seem to be more prone to be affected by SM[70].

STOCKING DENSITY

Stocking density is considered one of the most important factors for the welfare of broilers. Although there is no doubt that keeping broilers at high stocking densities compromises health and welfare, birds continue to be given very little space to move around with varying degrees of density allowed by EU law and in specific countries.

The EU Broiler Council Directive 2007/43/EC outlines the minimum required environmental conditions for maximum stocking densities. According to the Directive 2007/43/EC, the maximum stocking density in a holding or a poultry house on a holding should not at any time exceed 33 kg/m^2. A higher stocking density of a maximum of 39 kg/m^2 is permitted with a set of environmental requirements. The stocking density may rise to a maximum of 42 kg/m^2 if cumulative daily mortality rate is low. Environmental conditions include ventilation, heating and cooling systems to maintain the appropriate temperature, humidity and CO_2 and NH_3 concentrations[71].

However, some Member States have chosen to go beyond these requirements by implementing more stringent legislation or standards. Maximum stocking densities have been set in Austria (30 kg/m^2), Denmark (40 kg/m^2), Sweden (36 kg/m^2), Germany (39 kg/m^2), and the UK (39 kg/m^2)[9].

High stocking density in broiler sheds restricts the chickens' behaviour and causes health problems. Studies have shown that higher stocking densities decrease locomotor activity, stretching behaviour, walking, eating, preening, and shaking[72,73]. Jostling of other birds, disturbance of resting birds, birds climbing on top of one another[74,75], and fights[76] are also observed at higher stocking densities. The restriction of space and locomotor activity in crowded sheds can reduce the consumption of feed, which is followed by a decrease in final body weight[77–79]. Carcass quality may also be compromised due to scratches, bruising, poorer feathering, and condemnations [80,81].

High stocking density leads to greater litter moisture, increased microbial activity, and increased temperature and ammonia concentration which can give rise to hock burn, foot-pad dermatitis, breast blisters [24,28,79,81–84] and respiratory diseases[85]. High levels of ammonia can compromise their immune system, increasing the birds' vulnerability to infections[86].

LIGHT

The majority of broilers produced in the EU are reared in environmentally controlled buildings without windows, where artificial light is provided. Light is an important factor as it allows the bird to establish rhythmicity and synchronise many essential functions like feeding and digestion, body temperature and reproduction[87]. Under natural conditions, birds are active during the daytime light period and rest and sleep at night when it is dark. There is an increase in activity around dawn and dusk, as the birds forage for food. Long day lengths can cause sleep deprivation, which can negatively impact broiler welfare[88]. Despite this knowledge, some global producers routinely utilise almost continuous light regimes, at low light intensities, with the notion that these lighting schedules decrease activity and increase feed intake, consequently maximising growth rate and production.

According to the Council Directive 2007/43/EC, all poultry buildings should have lighting with an intensity of at least 20 lux during the lighting periods, measured at bird eye level and illuminating at least 80% of the usable area. Lighting must follow a 24-hour rhythm and include periods of darkness lasting at least six hours in total, with at least one uninterrupted period of darkness of at least four hours from 7 days of age onwards until three days before slaughter[89].

Low light intensity has a negative effect on broilers' welfare as it impacts activity level, behaviour patterns, performance of comfort behaviours, foot and eye health[90–97]. Broilers perform more active behaviour, such as foraging, under the brightest light available (200 lux)[98]. It has been shown that lighting programs with a minimum intensity of 50 lux stimulate higher diurnal activity levels in broilers without negatively affecting weight gain[99].

Continuous lighting is detrimental to broilers as it has been shown to decrease activity and comfort behaviours such as preening and wing-shaking[100,101]. Fearfulness (shown by a behavioural measure) is greater in broilers reared under continuous light compared to those reared with a proper dark period[100,102–104]. Normal ocular development in the chick requires a minimum of four hours of darkness per day, provided at the same time of the day without interruption[105]. Constant lighting results in the disruption of behavioural rhythms for broiler flocks, and four hours of darkness may not be enough to ensure full rhythm development[88].

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Research has shown that giving broilers an uninterrupted dark period resulted in decreased mortality[106], leg[102] and foot problems[101], rates of sudden death syndrome[36,107] and ascites[108], and improved broilers' antioxidant status and nonspecific immunity[109]. Given these clear impacts on health and welfare, current dark periods should be increased from the standard four hours to a minimum of six hours and must be continuous.

Providing natural light is extremely important as it reduces the percentage of time that broilers spend lying and improves leg health[110]. Chickens spend more time drinking, exploring, moving, and foraging in natural light compared to artificial lighting[111]. The minimum requirement of 50 lux ensures that sufficient windows are installed to provide this. The table below shows common indoor and outdoor light levels, demonstrating the ease at which 50 lux should be able to be met within broiler sheds. In the situation where 50 lux cannot be met through natural light alone, artificial lighting can be used to compensate.

TABLE 1 - COMMON OUTDOOR AND INDOOR LIGHT LEVELS[112]

Condition	Illumination (lux)
Sunlight	100,000+
Full Daylight	10,000+
Overcast Day	1000+
Very dark Day	1000+
Classrooms	300
Libraries	300
Entrance Hall	200
Stairs	150

ENVIRONMENTAL ENRICHMENT

Environmental enrichment is defined as "an improvement of the environment of captive animals which increases the behavioural opportunities of the animal and leads to improvements in biological function"[113]. Broiler houses are usually barren environments, which contribute to the low behavioural activities of broilers. The addition of enrichment items has been shown to increase activity levels[114] and the expression of comfort behaviours[115]. Interestingly, birds in enriched houses show higher levels of several activities even in areas where no enrichments are present[116].

For slow-growing breeds with outdoor access, providing access to perches inside the house increased the percentage of time the birds spent standing[117]. Provision of perches has been associated with the reduction of disturbances (pushing and trampling)[118] and in the number of hock burns and foot pad dermatitis[119,120]. Broilers have been observed to use perches from as early as six days of age, and on average from nine days of age[121]. Platforms have been found to positively affect leg health, as birds with access to platforms have improved gait scores and lower prevalence and severity of tibial dyschondroplasia[121]. Provision of panels has been observed to reduce disturbances during rest[122] and also serve as shelter areas[123].

Provision of straw bales and pecking objects, such as bundles of string, in environments with natural light affect walking ability and decrease time spent lying down[110,124]. Provision of multiple enrichments results in higher overall activity levels and a higher likelihood of birds engaging with the enrichment items[124].

SLAUGHTER

In Europe, the welfare of animals—including poultry—at the time of killing is protected under Regulation (EC) 1099/2009. This regulation requires the use of approved stunning methods for poultry in the EU and extends to slaughterhouses in third countries that export meat to the EU. Today 53% of broilers in the EU are slaughtered in an electrical water-bath system[125]. With this method of slaughter, conscious birds are hung by the legs upside-down on a moving metal shackle line and their heads pass through an electrified water-bath before having their throats cut[126].

Water-bath stunning was created to allow fast processing of birds, however there are many welfare problems associated with this stunning system. The birds' legs are compressed during shackling, causing pain[127], especially in birds with thicker legs or suffering from painful lameness due to leg diseases, bone dislocations or fractures. Bird inversion increases the levels of stress that poultry are subjected to during the shackling process[128]. Rough shackling can significantly contribute to wing flapping leading to dislocations and bone breakages. Pre-stun electric shocks can occur if the birds' wings make contact with the water-bath before their heads do[129–131]. It has been shown that electrical stunning is not completely effective. Occasionally some birds are not properly stunned because they miss the stunner by raising their heads and missing the water[132], or when their heads do enter the water-bath but the currents are too low to induce unconsciousness[126,133].

Controlled atmosphere stunning (CAS), or gas stunning, has become increasingly common during the last 20 years in Northern Europe, mainly as a result of the animal welfare and product quality advantages in comparison with water-bath stunning[131]. The percentage of broilers slaughtered via CAS is rapidly increasing, from 20% in 2014 to 47% in 2021[125]. It works by exposing broilers to either a mixture of inert gases (nitrogen and/or argon) or concentrations of carbon dioxide (CO_2), causing a reduction in available oxygen (O_2) thus inducing loss of consciousness in the birds. In comparison to electrical water-bath stunning, one major advantage of CAS is that uncrating and shackling of live poultry can be completely eliminated, hence avoiding pre-slaughter handling-induced fear, anxiety, distress, suffering and pain in conscious birds[130,134]. However, carbon dioxide is an acidic gas, causing the birds to experience some discomfort and stress before loss of consciousness if inhaled at high concentrations [129,135]. In multi-phase stunning systems, the birds are first exposed to relatively low concentrations of CO_2 (<40%) to be less aversive, and then, once the birds are unconscious, they are exposed to a higher concentration (80%–90%), which is sufficient to induce a deeper state of unconsciousness or death[131,135].

Low atmospheric pressure stunning (LAPS), a newly-approved method of killing poultry under EU law, kills birds with a slow, continuous, controlled decompression causing a gradual reduction of oxygen tension in the chamber, leading to progressive hypoxia[136,137]. Loss of posture, regarded as a behavioural marker for loss of consciousness, occurs on average at 80 seconds[138]. The major welfare benefits of LAPS over electrical water-bath stunning systems include no handling of live birds and no live shackling (since the birds are stunned in the modules used to transport them), no risk of pre-shocks, and no risk of ineffective stunning as LAPS reliably and irreversibly stuns all the birds[137,139]. Some researchers consider LAPS to be superior than CAS since LAPS does not use any gases during the stunning process, being safer for humans in the area[140] and because it is a less aversive method to the animals. There is also potential for small slaughterhouses to convert to this system more easily than to CAS. LAPS is not currently approved under the ECC due to limited research on the welfare implications of the slaughter method.

HIGHER WELFARE BREEDS

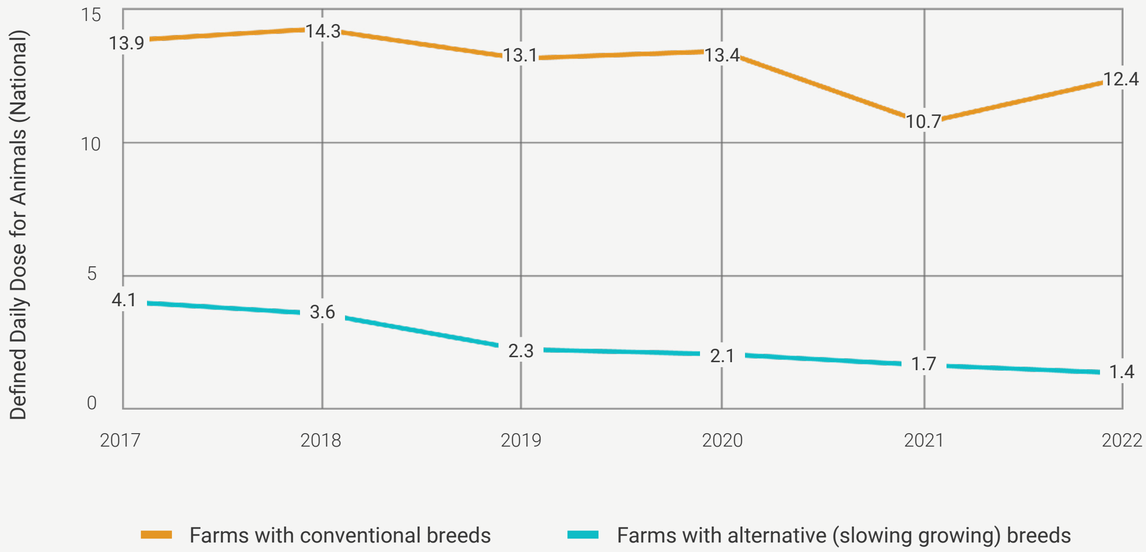
The use of higher welfare breeds accounts for less than 5% of the total number of broilers slaughtered in the EU[9]. However, higher welfare breeds represent 100% of the fresh retail market for chicken in the Netherlands[141]. In the UK, higher welfare breeds represent almost 5-11% of broiler production[141,142,] while in France the Label Rouge higher welfare breeds make up around 15% of the market share[143].

The breeds currently acceptable for use under the RSPCA welfare standards for meat chicken include the JA757, 957, 787, 987, Norfolk Black, JACY57, Redbro, Ranger Classic, Rambler Ranger and the Ranger Gold. The most commonly-used breed is the JA787, while the JA757 remains their standard reference breed for which the RSPCA tests all other breeds against before entering them into the assurance scheme.

Slow-growing broilers have lower mortality rate than typical commercial fast-growing broilers[65,144–146] and are less susceptible to leg disorders and heart problems[65,146–149]. They are more active, perching, running and walking more than conventional breeds[65,149–151]. Fast-growing broilers spend more time sitting on the floor, eating, and drinking than higher welfare birds[65,152–155]. Although fast-growing broilers are motivated to perform their natural behaviours if their environment allows for this, their physical ability to perform some behaviours becomes increasingly restricted as they age, most probably because of their heavy weight[151,156] and the high stocking densities observed in conventional production systems[157].

It is believed that selection for rapid growth reduces immune-competence and increases susceptibility to diseases[158]. This has not only taken its toll on antibiotic usage across the industry, but the increased emergence of antibiotic resistant bacteria. The Food Standards Agency UK found that 60.6% of Campylobacter jejuni taken from retail chickens were resistant to tetracycline, an antibiotic widely used in human medicine[159]. Similarly, E. coli isolated from chickens in the US, Brazil, China, Poland, United Kingdom, Germany, France, and Spain were found to contain resistance to a number of antibiotics, including penicillins and tetracyclines[160]. The breed impact is due to faster growing breeds requiring 3 to 9 times more antibiotics than slower growing breeds[161–163]. This includes the use of fluoroquinolones, antibiotics considered "critically important in human medicine" whose "use in animals should be restricted to mitigate the risk to public health" [164], in which usage was almost 6.7 times lower in slower growing breeds in 2021[165]. This widespread adoption of higher welfare breeds in the Netherlands has allowed the overall industry antibiotic usage to drop by a third between 2017 and 2022. The majority of the farms raising slow-growing breeds (80%) did not record any antibiotic use for 2022[163]. Alternatively, in the UK where this wide scale adoption of slower growing breeds has stalled, antibiotic usage actually increased by a third across the same period[166].

FIGURE 2: AVERAGE ANTIBIOTIC USE ON BROILERS IN THE NETHERLANDS FARMS - CONVENTIONAL VS ALTERNATIVE BREEDS, 2017-2022[163]



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WHY WE MUST ADDRESS ALL OF THESE ISSUES

While all of the factors addressed above have an impact on broiler welfare, all of them must be addressed for the maximum reduction in suffering. For example, switching to a slower growing breed but not addressing the other factors will result in birds that are more able to act out natural behaviours but do not have the space or enrichments to do so. Similarly, giving a faster growing breed more space does not address the breed susceptibility to death and disease or the other welfare concerns. Faster growing broilers at 30 kg/m^2 and with environmental enrichment have consistently higher gait scores, worse feather cover, are less reactive, have lower perch use, higher mortality and cull rates, and more downgraded meat, compared to slower growing birds under the same conditions[149]. Combining breed and stocking density has the greatest benefits for broiler welfare[167].

Further demonstrating the importance of addressing all of the above issues, Schuck-Paim and Alonso[168] measured the impact of different production methods on the time spent in pain for the average animal within that system, directly comparing conventional production to production standards meeting the Better Chicken Commitment (BCC) requirements. They estimated that the adoption of the BCC resulted in a significant reduction in the amount of pain each animal endured, when compared to conventional production (table 2). *See here for full pain definitions.*

TABLE 2: THE REDUCTION IN PAIN WHEN SWITCHING FROM CONVENTIONAL PRODUCTION TO THE BCC[168]

	Pain Reduction With the BCC	
	Before Slaughter	**During Slaughter**
Hurtful *Disrupts the ability of individuals to function optimally*	**24%**	—
Disabling *Pain that takes priority over most behaviours and prevents all forms of enjoyment or positive welfare*	**66%**	**87 - 90%**
Excruciating *Extreme levels of pain that are not normally tolerated even if only for a few seconds*	**78%**	**99 - 100%**

COMMERCIAL VIABILITY

All of these welfare improvements can be made while remaining commercially viable and real world examples confirm this. Norsk Kylling is a poultry supplier in Norway that holds approximately 27% of the country's market share. They manage their whole supply chain, from parent flocks through to, and including, the processing plant. They committed to the European Chicken Commitment (ECC), which addresses all of the above welfare concerns, in 2020 and had fulfilled all of the requirements by spring 2022. Since making this change they now have; a 39% lower daily mortality, 79% lower DOA's (birds that die during transport), and an 80% lower incidence of ascites. Norsk Kylling now produces 3 million fewer birds each year, but still produces the same amount of meat[169].

CONCLUSION

The cost of cheap chicken is paid for with the suffering of fast-growing birds on a mass scale living in large and cramped sheds lacking in environmental stimulation, and experiencing poor slaughter practices. The impact of faster growth and enlarged breast muscle—driven by economic factors—is highlighted by the extensive list of diseases these birds are becoming increasingly predisposed to suffering.

However, there is an alternative; breeds exist that can alleviate many of the negative predispositions we see with the current typical fast-growing breeds. By utilising these higher welfare breeds and giving birds more space, enriching the environment, and improving slaughter conditions using multi-phase CAS, we would see an improvement in the level of welfare for the billions of chickens farmed for meat production every year.

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