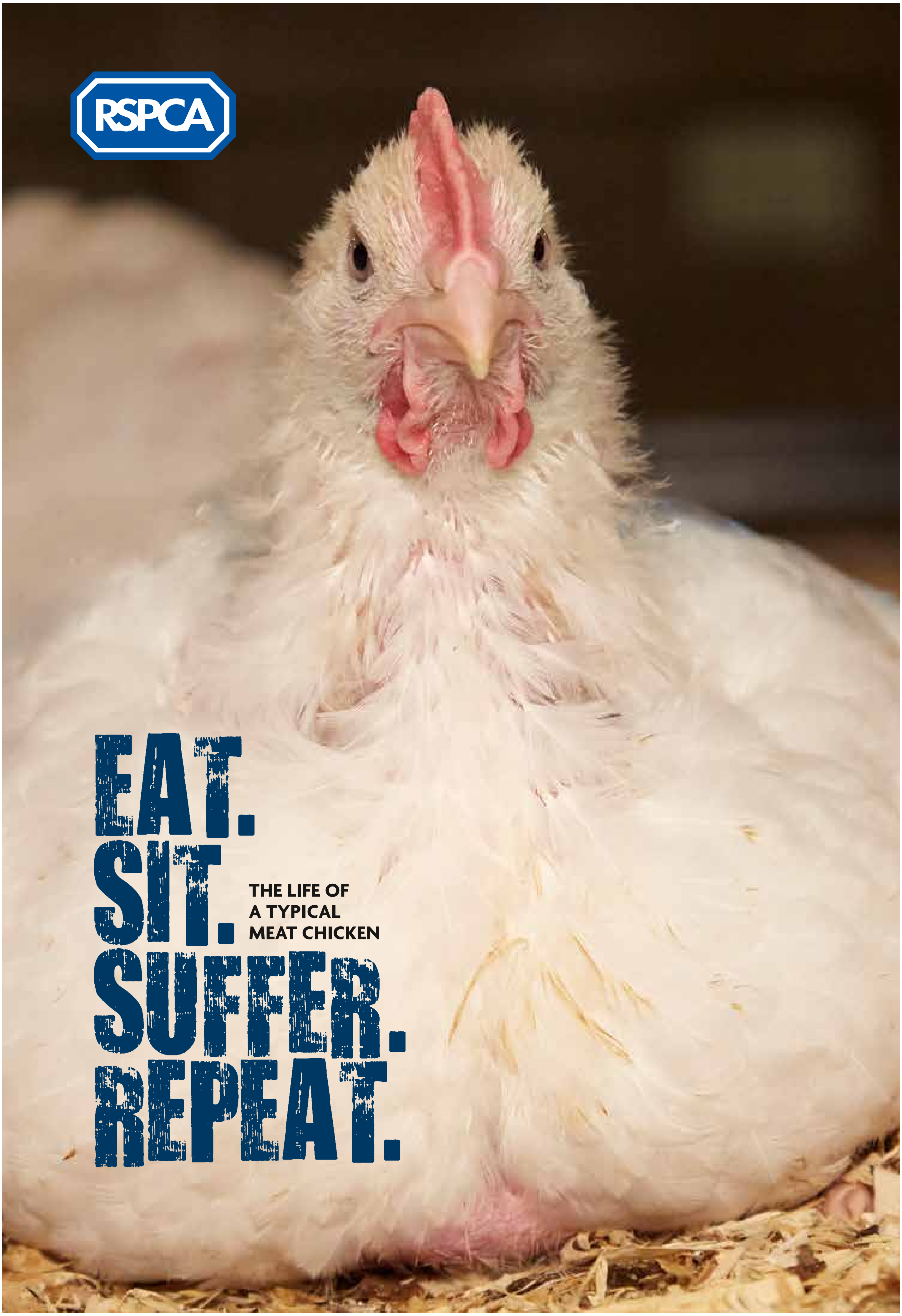
EAT.
SIT.
SUFFER.
REPEAT.
THE LIFE OF
A TYPICAL
MEAT CHICKEN

Hubbard Flex at 34 days of age.

JA757 perching at 34 days of age.

Report conclusions

- There are three meat chicken (broiler) breeds that account for the majority of chicken meat produced globally.
- Each breed is the breed used most extensively worldwide from each of the world's three largest broiler breeding companies.
- An RSPCA commissioned trial revealed that, in general, compared to a commercially viable slower growing breed, these three conventional breeds had significantly higher mortality (including culls), poorer leg, hock and plummage health, and more birds affected by breast muscle disease (wooden breast and white striping)*. Further, they were less active – spending less time walking and standing, and more time feeding and sitting – and spent less time engaged in enrichment type behaviours: foraging, perching and dustbathing.
- The genetics of these three conventional breeds fail to adequately safeguard their welfare* to such an extent that many birds of these breeds could be considered as having a life not worth living.
- It is clear that conventional meat chicken breeding programmes have serious inherent flaws and lead to poor health and welfare*.
- There are significant inefficiencies in producing meat from these conventional meat chicken breeds and, if taken into account, the cost of producing meat from such breeds would likely represent a false economy and result in higher production costs compared to rearing higher welfare breeds.
- The production of chicken meat using conventional meat chicken breeds is a wasteful business*, which brings into question the sustainability of this enterprise.
- As the market has failed to safeguard chicken welfare, legislation must be implemented to address this issue.
- There are commercially-viable breeds available that have improved welfare outcomes and these higher welfare breeds should replace the use of conventional breeds.

* Refer to Appendix 1.

Ross 308 birds at 34 days of age.

Executive summary

Meat chickens, also referred to as 'broilers', are by far the most numerously produced farm animals reared for meat, with more than a billion[1] being slaughtered each year in the UK, 7.4 billion across the EU and more than 66 billion worldwide.

Meat chickens have been genetically selected to grow very quickly. Today's broilers can reach an average UK slaughter weight of 2.2kg in just 35 days. Three broiler breeding companies dominate the worldwide supply of broilers, and achieving the greatest meat yield in the shortest time continues to be their primary focus. This selection for performance has been reported to be responsible for contributing to not only the most, but also the most severe, welfare problems seen in broilers today, such as chronic leg disorders and heart and circulatory problems. The severity of the welfare problems, the huge number of animals involved globally, and the fact that these welfare concerns have not been adequately addressed to date, means this long-standing issue requires urgent attention.

In 2018, the RSPCA commissioned a trial* to assess the production and welfare characteristics of the breed used most extensively worldwide from each of the three globally dominant meat chicken breeding companies. These three breeds are referred to throughout the report as the 'conventional' breeds. To provide some context to the results, another commercially-viable breed, less heavily genetically selected for performance characteristics, was also assessed. This breed is referred to as the 'slower growing breed'. The trial revealed that, compared to the slower growing breed, the conventional breeds had significantly poorer health – higher mortality (including culls); poorer leg, hock and plumage health – and more birds affected by breast muscle disease (wooden breast and white striping). The conventional breeds were also less active – spending less time walking and standing, and more time feeding and sitting – and spent less time engaged in enrichment type behaviours: foraging, perching and dustbathing. The results demonstrate that the genetics of the most extensively used conventional broiler breeds fail to ensure many of these chickens have a life worth living.

The conventional breeds, however, were more efficient at converting feed into body weight and, due to being slaughtered at a younger age, more flocks (and therefore birds) can be reared per year within a commercial chicken house. Both factors have significant economic benefits. However, there are significant inefficiencies associated with producing meat from the conventional breeds that, if taken into account, would have a considerable impact on the cost of production and could result in higher production costs compared to the rearing of higher welfare breeds. Moreover, it is apparent that the production of chicken meat using conventional breeds is a wasteful and ethically questionable business (e.g. higher mortality, higher culls, and poorer meat quality), bringing into question the sustainability of this enterprise.

Conventional meat chicken breeding programmes have serious inherent flaws and lead to poor health and welfare. If the current level and scale of suffering and waste is to be avoided, genetic breeding programmes must place a much greater emphasis on health and welfare traits. While there are legal provisions in place that should be able to address these genetic-related welfare issues, new legislation may be required to enforce a meaningful change in broiler genetics. Such legislation is urgently required to ensure breeding companies are mandated to prioritise bird health and welfare over performance parameters, such as growth rate. In the interim, while the main welfare issues may not have been completely eliminated in breeds that have been less heavily selected for performance, these breeds have a significantly better quality of life and should replace the use of conventional breeds.

* To accompany this report the trial will also be published as a scientific paper by the researcher who undertook the trial at Scotland's Rural College.

Figure 1: Top: Cobb 500 (male); Middle: Ross 308 (female); Bottom: Hubbard Flex (male) all at 40 days of age.

Overview of the broiler genetics industry

In 2017, approximately 1.1 billion meat chickens were slaughtered in the UK[2]. To provide a sense of scale, averaged over one year, this is equivalent to 35 birds being slaughtered every second, every day. Alternatively, if all the chickens were lined up head-to-toe they would circle the world nearly 11 times. In 2017, 7.4 billion[2] chickens were slaughtered in the EU and 66 billion worldwide[2].

Three broiler breeding companies – Cobb, Aviagen and Hubbard (which is now a subsidiary of Aviagen) – dominate the global supply of meat chickens. Wherever you are in the world, whether you are buying, cooking or eating chicken meat, one of these three companies will likely have been responsible for determining the genetic characteristics of that bird.

Within the UK, most meat chickens are reared to a slaughter weight of 2.2kg – roughly the same weight as a two-litre (four pint) bottle of milk – which takes around 35 days[3]. While each genetic company produces a number of different chicken breeds, the fast growing breeds from each company are the most popular and dominate not only UK, but global production.

In the UK, 70–80 percent of the meat chickens reared are produced by Aviagen, whereas Cobb account for between 20–30 percent[4], and Hubbard account for less than five percent. While the market share of a company varies significantly from country to country, it will be the fast growing breed from each company that is used most extensively worldwide – the European Ross 308 (from Aviagen), Cobb 500 and Hubbard Flex. These breeds look almost identical and have very similar performance characteristics (Figure 1 and Table 1). The Ross 308 is the most widely used breed in the UK followed by the Cobb 500. The Hubbard Flex is not typically reared in the UK.

TABLE 1: The most globally dominant broiler breed from each of the world's three largest broiler breeding companies*.

	Number of days to achieve a body weight of 2.2kg	Average daily weight gain** (g/day)	Amount of feed (kg) to achieve 1kg of body weight**
Cobb 500[5]	35	64	1.50
Hubbard Flex[6]	35	62	1.54
Ross 308[3]	35	63	1.47

* The figures represent the average for both male and female birds: males will typically grow faster than females and therefore be of a heavier weight at the same age, but the data averages the performance of both sexes.

** Based on a body weight of c.2.2kg.

Genetic selection programmes focus on those traits that have the greatest economic value: growth rate, feed conversion ratio (FCR) and breast meat yield (breast meat is typically the premium part of the carcass). FCR is the efficiency with which chickens convert feed into body weight – principally muscle (meat). The primary goal for breeding companies is to produce a bird that reaches slaughter weight in as short a time as possible while utilising the least amount of feed. Reducing the amount of time it takes to reach slaughter weight enables producers to rear more flocks of chickens per year in the same house, while reducing feed consumption clearly reduces feed costs, which is one of the most expensive resources involved in chicken production.

Cobb 500 birds feeding at six weeks of age.

Welfare implications of intense genetic selection for performance

Meat chickens have been selected to grow quickly, producing the maximum amount of meat in the minimum amount of time[7]. Since the late 1950s, genetics companies have approximately halved the amount of time it takes for a meat chicken to achieve the same slaughter weight – at the rate of about one day shorter per year[8]. Further, as a result of improving the conversion of feed into muscle, the amount of feed required to achieve this weight has reduced by around a kilo since the early 1970s[9].

The continued, intense genetic selection for performance traits has been reported to be responsible for contributing to not only the most, but also the most severe, welfare problems seen in today's broiler[10]. While changes to the birds' environment can lead to improvements in welfare, a failure to consider the birds' genetics means that any such improvement in welfare will be, at best, modest. Taking into account the severity of the welfare issues and the number of animals involved, broiler welfare is one of the most significant animal welfare concerns in the world today.

Health

Heart and circulatory health

As a result of genetic selection for fast growth, energy is diverted primarily into muscle growth[11]. This process can deprive other parts of the body of energy and oxygen, and put pressure on the bird's organs, especially the heart and lungs[11]. As such, fast growth can increase the risk of two types of heart conditions: ascites and sudden death syndrome[11].

Sudden death syndrome is acute heart failure, i.e. heart attack, which can be triggered by stress; either environmental stress, such as heat stress, or a stressful event, for example catching and transportation. It is difficult to determine the true prevalence of death from heart failure, but it has been estimated that this condition accounts for just over a third of all mortalities on farm[12]. In addition, although birds that arrive dead at the slaughterhouse are not typically examined for cause of death, a study revealed that the majority of these birds are likely to have died from sudden death syndrome[12]. Research has shown that birds that die from this condition have histories of cardiac (heart) rhythm disturbances, with an irregular heartbeat detectable in birds as young as seven days of age[13]. In fast growing breeds, irregular heart rhythms have been found to affect up to 27 percent of the flock[13] indicating that, while not always fatal, this condition can be widespread.

In a world wide survey, the incidence of ascites was estimated to be 4.7 percent, which makes it one of the major causes of death in broilers[14]. Ascites occurs as a result of the increased metabolic demands of fast growth, which causes an increased need for oxygen in the bloodstream. This, in turn, creates stress on the heart and lungs, resulting in enlargement of the heart. As a consequence of this, fluid leaks from the liver and gathers in the abdomen of the bird. As well as this condition causing mortality on farm, carcasses are increasingly being condemned at the abattoir due to this disease, with an average of 2.4 million chickens being rejected from the food chain as a result of this condition each year between 2011 and 2013[15]. In addition to the economic impact, ascites also has a major impact on bird welfare – it develops gradually, causing the birds to suffer for an extended period before they die[16].

Walking ability

Fast growth can cause leg developmental disorders, such as tibial dyschondroplasia (TD) – a condition where the cartilage in the leg and hip develops abnormally and affects the bird's ability to walk. Typically, it causes five to 25 percent of the lameness observed in chickens[17].

Fast growth can also cause the leg bones to become deformed as the body gains weight too quickly for skeletal development to keep pace. The pressure this fast growth puts on the immature skeleton of the bird can also cause microfractures in the cartilage and bone. These fractures can be colonised by bacteria leading to painful infections and lameness, resulting in a condition called bacterial chondronecrosis with osteomyelitis (BCO) which affects around one percent of birds in conventional flocks[18]. Inactivity, with long periods of sitting down, can also stunt bone and cartilage development, increasing the risk of BCO[18].

Gait scoring is a method used to assess the walking ability of a bird. The scores range from 0 (normal walking ability) to 5 (incapable of sustained walking). In the middle of the range is score 3, which describes a bird walking with an identifiable abnormality, i.e. a bird that is observably lame. Research has demonstrated that birds with a score 3 are in pain and discomfort[19], and it has been suggested also that birds with a score 1 or 2 might also be experiencing some pain, as they will choose to self medicate with an analgesic (pain killer) if available[20]. The proportion of birds within a flock with a score 3 has been reported to range from around 26 percent[21] to 57 percent[22]. In the UK, a survey revealed that in more than 50 percent of flocks, 98 percent of birds had an observable gait (leg) defect by the time they reached the end of production, with 28 percent of birds having a score 3 or higher[23].

Although genetics companies have focused on improving leg health, meaningful advances have been limited due to its negative relationship with growth rate[24], i.e. selecting for growth rate impacts negatively on leg health.

Hock burn and foot burn

It has been reported that fast growing breeds may spend 76 percent of their time sitting by the time they reach slaughter weight, with lame birds spending 86 percent of their time sitting[25]. Prolonged periods of inactivity can contribute to the development of ulcers and lesions on those areas of the bird that are in contact with the floor: typically the feet (foot burn) and hocks (hock burn)[26]. Ulcers and lesions can be painful and those affecting the legs and feet can contribute to lameness[27]. In 2007, a study examined the prevalence of these conditions across 206 UK flocks[26]. Foot burn was the most common condition, with an average of 11 percent of all birds, and up to 72 percent of a single flock, affected. An average of 1.3 percent of all birds had hock burn, with up to 33 percent of a single flock being affected by this condition. A more recent study of 53 UK flocks found similarly high levels of foot burn, but higher levels of hock burn: an average prevalence of 51.6 percent and 20.5 percent, respectively, across all flocks[28].

There appears to be a vicious cycle between inactivity and leg health; the less active a bird is then the more likely it will be to have poor leg health and, the worse its leg health is, the more likely it is to be inactive. Further, if the floor covering of the house, e.g. wood shavings, is not maintained in good condition then this can contribute to the development and severity of both hock and foot burn.

Behaviour

Selective breeding for increased performance has resulted in a reduction in the activities the birds can carry out[10]. Healthy chickens are motivated to perform a wide range of behaviours, including foraging, dustbathing and perching. It is widely accepted that for an animal to have 'good welfare', in addition to an absence of negative psychological states, such as fear, they should be able to experience positive psychological states, such as pleasure[29]. If the health of a chicken, for whatever reason, means it cannot express a full repertoire of natural behaviour, it may experience frustration, helplessness or boredom and may not have the opportunity to experience pleasure or other positive states.

Foraging

Birds can be motivated to perform certain behaviours, even when they may appear to be unnecessary. For example, in one study, when red jungle fowl (the ancestor of the chicken) were presented with an easily available food source they still chose to spend around 30 percent of their time foraging for food[30]. By contrast, fast growing meat chickens spent very little time engaged in foraging behaviour – around five percent – with 95 percent of their time eating the easily available food provided.

Dust bathing

Dust bathing is a comfort behaviour (an activity that helps maintain the feathers and increases the physical comfort of the bird) and involves the bird raking up loose, dry ground, e.g. soil, with their feet and then lying down to wing-shake, kick dust into their feathers, and then rub themselves against the ground[31]. So strong is the motivation to carry out this behaviour that laying hens have been shown to attempt dust bathing on wire flooring in the absence of a suitable material[32], and will spend additional time engaged in this behaviour following a period of restriction[31].

A study of dust bathing in meat chickens demonstrated they dust bathed every day and, like laying hens, will increase their time dustbathing after a period of restriction[33]. It is likely, therefore, that meat chickens are highly motivated to dust bathe, but inadequate conditions and poor leg health can limit birds dust bathing in commercial settings. Being unable to satisfy a motivation, and restricting an important behaviour, can cause frustration and stress[34]. Further, in the case of dust bathing, limiting this behaviour could have an impact on feather condition and health.

Perching

A strong motivation to perch has been demonstrated in laying hens[35], whereby hens will perch to rest and preen, for example[36]. Although more research has been conducted to examine perch provision for hens than meat chickens, when provided with the correct type of perch, healthy and capable broilers will use them[37] – especially to roost during the evening period[38] – indicating they too are motivated to perform this behaviour.

JA757 birds perching at four weeks of age.

JA757 perching at 34 days of age.

The trial: meat chicken welfare assessment

The RSPCA commissioned a trial to assess the production and welfare characteristics of the meat chicken breed used most extensively worldwide from each of the three globally dominant meat chicken breeding companies. As these three conventional breeds – the Cobb 500, the Hubbard Flex and the Ross 308 (from Aviagen) – dominate the global production of chicken meat, the results have widespread significance. To provide context to the results, a commercially-viable breed that has undergone less intensive genetic selection for performance traits was also assessed: the Hubbard JA757.

Methodology

The trial was carried out according to the RSPCA Broiler Breed Welfare Assessment Protocol*[39]. This protocol was initially developed in 2013 to assess the welfare of meat chicken breeds and determine their acceptability for use under the RSPCA Welfare Standards for Chickens. The protocol describes how birds are to be reared to help promote full expression of their genetic potential, i.e. by providing a non-limiting diet and environment, and details the assessment methodology for a number of key welfare parameters, including walking ability, hock burn, foot burn and mortality.

In total, 400 day old chicks from each breed, sourced from commercial hatcheries, were reared. The birds were reared indoors in pens with approximately 80 percent more space per bird compared to typical UK commercial conditions (stocking density of 21kg/m^2). Each pen held 50 birds of the same breed. The floor of each pen was covered in litter (wood shavings), which was maintained in a dry and friable condition at all times. Birds had constant access to feed and water, and a 130cm long perch. Starting from six days of age, the birds had a six-hour continuous night period (lights off) per 24 hours.

The birds were assessed for a number of key welfare parameters when they achieved the average UK slaughter weight of 2.2kg. They were also assessed at 2.5kg to gather data relevant to when these birds are reared to this heavier weight. The results presented below represent the average across both assessments, except where stated otherwise. For most parameters, there was no significant difference between the results when the birds were 2.2kg compared to 2.5kg. However, where the degree of difference between the breeds changed considerably between the two assessments, this has been reported. The birds from all four breeds were slaughtered at a similar average weight of approximately 3kg.

All pens were filmed for a 24-hour period each week so the birds' behaviour could be examined. The behaviours recorded during hourly scan sampling were: feeding, walking, standing, sitting, foraging, perching and dustbathing. Birds from all four breeds spent the majority of the night period sitting/resting, so only behaviours performed during the day have been presented. Behaviour was compared across all breeds for birds at the same age. In addition, because the slower growing breed was lighter than the conventional breeds at the same age, i.e. due to it being slower growing, behaviour was also compared across breeds when they were similar weights. However, comparison according to weight did not provide any more meaningful insights, and were very similar to the comparisons done by age, and therefore it was not considered necessary to present the results here. This indicates that the rate of weight gain causes more of a change in behaviour than weight itself.

Results

Results that relate specifically to each conventional breed have not been revealed, as it is not the intention of this report to single out any of these breeds in particular. Therefore, the conventional breeds are referred to as either Breed A, B or C, and are collectively referred to as the 'conventional breeds'. The Hubbard JA757 is referred to as the slower growing breed.

* Except for the assessment methodology for hock burn and foot burn, for which scoring systems developed for use by the industry were used. In the case of foot burn, the agreed Defra/FSA/industryScorecard was used.

The age of the birds at the two assessments is shown in Table 2. Due to the slower growing nature of the slower growing breed it was older than the conventional breeds at each assessment.

TABLE 2: Average age of all four breeds when assessed at 2.2kg and 2.5kg.

Breed	Slower growing breed	Breed A	Breed B	Breed C
Age (days) at the first assessment (birds weighed 2.2kg)	48	35	35	35
Age (days) at the second assessment (birds weighed 2.5kg)	54	37	38	38

Throughout this section, where the terms 'significant' and 'significantly' have been used, this refers to a statistical significance, i.e. where statistical analysis of the data has confirmed that there is at least a 95 percent likelihood of the difference between the breeds being real.

Production parameters

Growth rate

The conventional breeds all grew at a similar rate to each other and had an average daily weight gain of approximately 63g at 2.2kg. The slower growing breed grew approximately 26 percent slower than the conventional breeds – averaging 46g per day at 2.2kg. The growth curves for each breed over the duration of the trial to achieve an average weight of 2.2kg are shown in Figure 2.

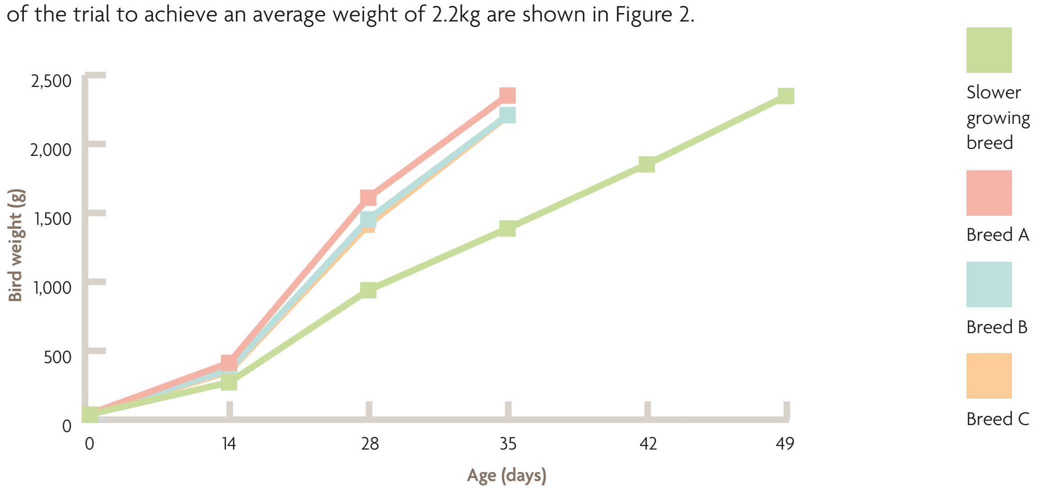

FIGURE 2: Growth curves for each breed to 2.2kg.

Feed conversion ratio

Feed conversion ratio (FCR) is expressed as the amount of feed (kg) it takes to gain one kilogram of body weight. The less feed required to achieve each kilo of body weight then the more efficient the bird is in converting food into meat, and the lower the FCR value.

The conventional breeds had significantly lower FCRs compared to the slower growing breed: 1.46, 1.43 and 1.35 for breeds A, B and C, respectively, compared with 1.76.

Wood shavings usage

Wood shavings were used to cover the floor. Over the course of the trial, the conventional breeds required significantly more wood shavings to maintain the flooring in good condition, i.e. keep the wood shavings dry and friable, compared to the slower growing breed: 23.7–24.8kg v 14.5kg per breed, respectively (NB. this was in addition to the initial allocation of wood shavings) (Figure 3).

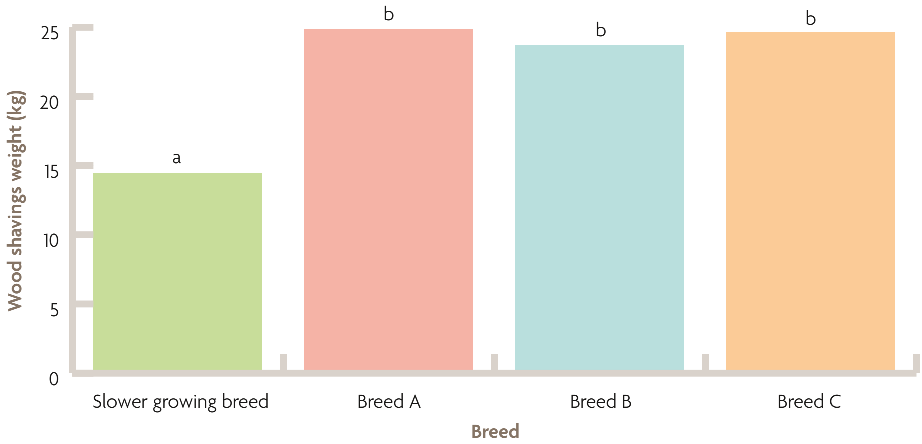

FIGURE 3: Amount (kg) of wood shavings added during the trial per breed.
Different letters indicate a significant difference between those breeds.

Health

Mortality and culls

The specific causes of mortality and reasons for culling that affected all four breeds during the trial are presented in Figure 4.

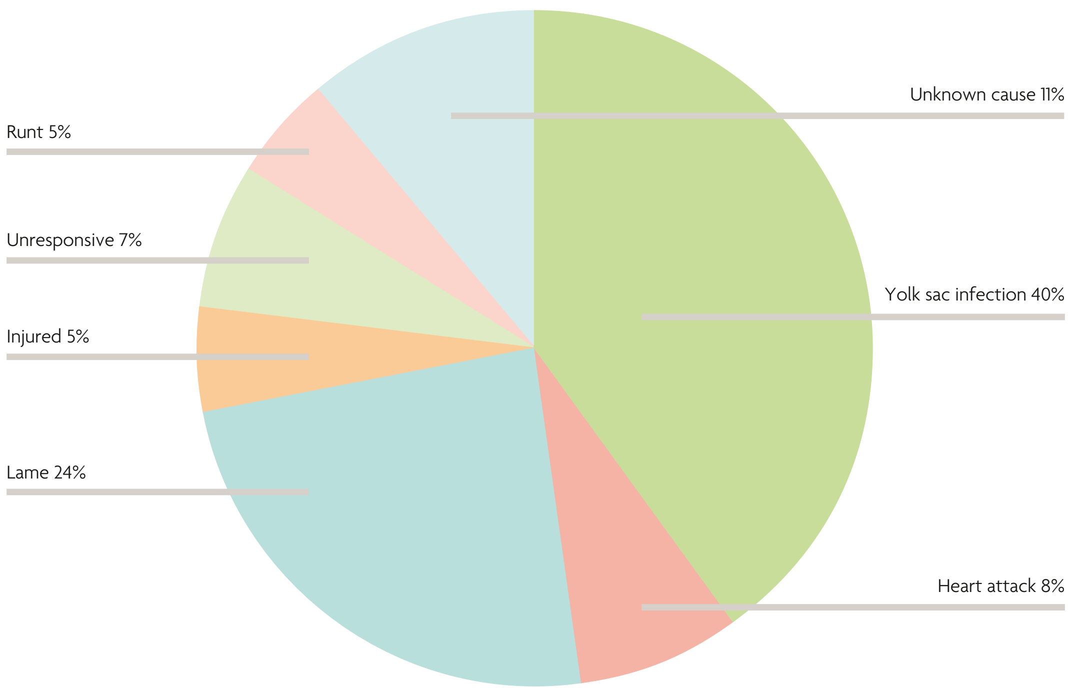

FIGURE 4: Causes of mortality and reasons for culling (data combined for all four breeds).

When the causes of mortality and reasons for culling were examined individually, there was no significant difference between the breeds for death from yolk sac infection (a bacterial infection that primarily affects young chicks within their first week of life) or birds being culled for being unresponsive (birds that appeared unwell, e.g. hunched and listless, and did not respond to food and water or were considered unlikely to make a recovery). There was insufficient data to determine any statistical differences between the breeds for the other causes of mortality and reasons for culling, except lameness. However, the number of birds for each breed affected by each cause is shown in Table 3. See 'Walking ability' section on page 19 for data relating to lameness.

TABLE 3: Number of birds culled or found dead by cause for each breed.

	Reason for mortality and culls (number of birds)							
Breed	Heart attack	Runt	Injured	Lame, i.e. severe inability to walk/ unable to walk*	Yolk sac	Un-responsive	Unknown cause	**Total**
Slower growing	1	1	0	4	10	2	4	**22**
Breed A	4	0	5	17	12	2	5	**45**
Breed B	4	4	1	12	15	4	6	**46**
Breed C	3	2	1	1	18	2	1	**28**

* Birds with a gait score of 4 or 5 (See 'Walking ability' section on page 19 for further details).

When all the causes of mortality and reasons for culling were combined for each breed, there was no significant difference between the slower growing breed and Breed C: 5.2 percent v 6.8 percent, respectively (Figure 5). However, compared to the slower growing breed, the average mortality, including culls, for Breeds A and B were significantly higher: 10.7 percent and 11.2 percent, respectively (Figure 5).

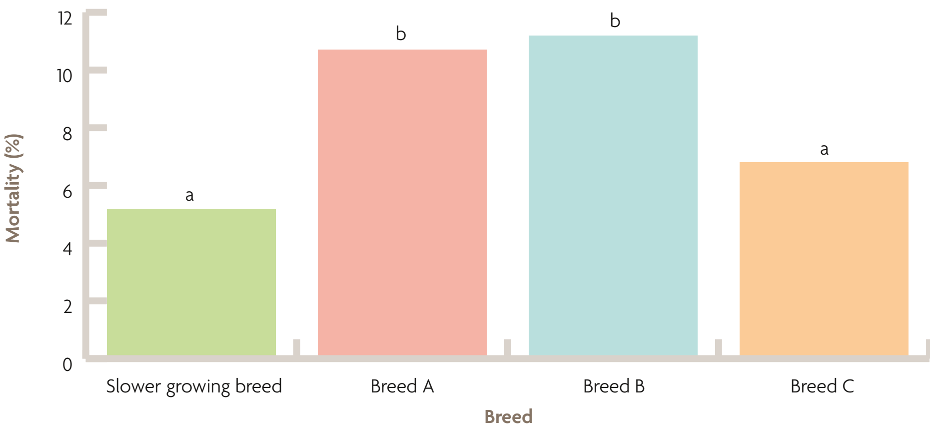

FIGURE 5: The average (%) mortality, including culls, for each breed.
Different letters indicate a significant difference between those breeds.

Walking ability

Gait scoring (GS) is a method used to assess a bird's walking ability. The score ranges from 0 (normal walking ability) to 5 (incapable of sustained walking). In the middle of the range is score 3, which describes walking with an identifiable abnormality, i.e. a bird that is observably lame.

During the trial, birds with a gait score of 4 and 5 were immediately culled and recorded as lame (Table 3). There was no significant difference between the number of birds culled with these scores for the slower growing breed and Breed C (Figure 6). However, the slower growing breed had significantly fewer birds culled with lameness scores of 4 and 5 (one percent) compared to Breeds A and B (4.0 percent and 2.8 percent respectively) (Figure 6).

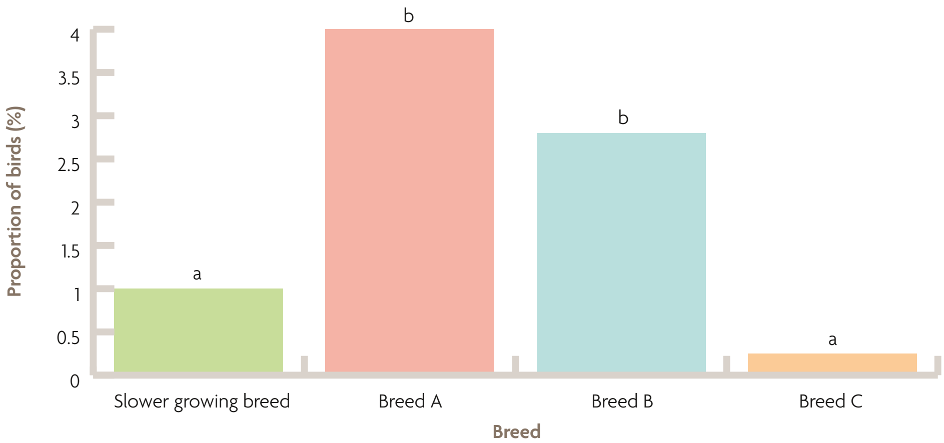

FIGURE 6: The proportion of birds for each breed culled throughout the trial with a gait score of 4 or 5.
Different letters indicate a significant difference between those breeds.

At the time of the welfare assessments, the slower growing breed had significantly better leg health (lower gait scores) than all three conventional breeds (Figure 7). Further, it was the only breed where a proportion of the birds (13 percent) had a score 0. The vast majority of the slower growing breed birds had gait scores of 2 or lower (89.4 percent), with most birds having a score of 1. In contrast, the vast majority of all three conventional breeds had a score of 2 or higher (92.1 percent, 89.6 percent and 88.1 percent, for Breeds A, B and C, respectively), with most birds having a score of 2 (Figure 7). Due to birds with a score of 4 and 5 being culled throughout the trial, very few birds with these scores were observed at the time of these welfare assessments.

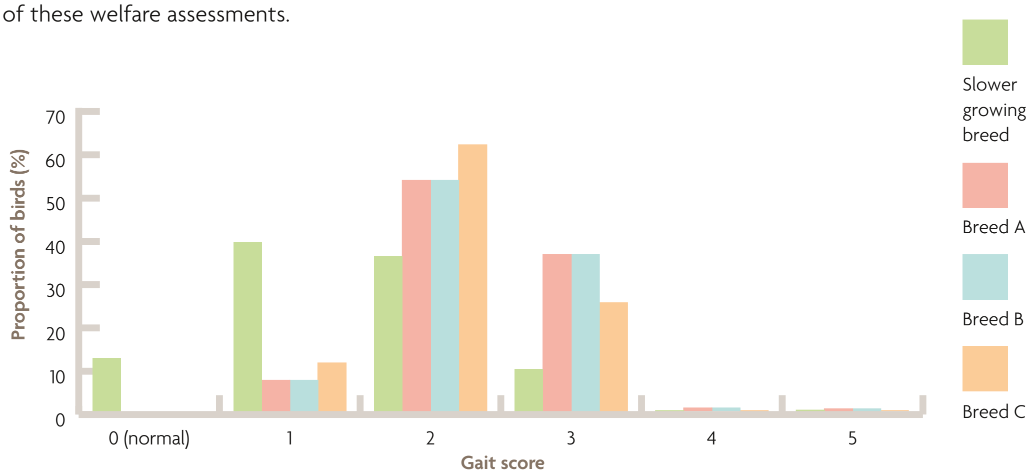

FIGURE 7: Gait scores for all breeds (NB. combined results for 2.2 and 2.5kg assessments).

Overall, across all breeds, gait scores deteriorated significantly between the first and second welfare assessment, i.e. as the birds aged (Table 4) However, while the walking ability of the slower growing breed also deteriorated with time, there were fewer moderately to severely lame birds (gait scores 3–5) compared to the conventional breeds.

TABLE 4: Average percentage of birds within each gait score range (0, 1, 2 combined and 3, 4, 5 combined) for all breeds at the first and second welfare assessment.

Assessment	Gait score range	Slower growing breed	Breed A	Breed B	Breed C
First assessment: birds weighing 2.2kg	0–2	96.0	72.5	81.3	84.0
	3–5	4.0	27.3	18.7	16.0
Second assessment: birds weighing 2.5kg	0–2	82.8	51.4	62.0	64.4
	3–5	17.2	48.6	38.0	35.6

When examining the average results across both assessments, 26–38 percent of the conventional birds had a gait score of 3 and above, while only 11 percent of the slower growing birds had these scores (Figure 7).

Hock burn

Hock burn was scored on a four-point scale, as follows:

- Score 0: healthy, i.e. no discoloration or lesions.
- Score 0P: no discoloration or lesions, but pink and/or swollen.
- Score 1: substantial discolouration of skin, visible lesions but no ulcerations.
- Score 2: large areas of affected skin, deep ulcerations or lesions, or large scabs and severely swollen.

The conventional breeds had significantly poorer hock health than the slower growing breed: 23.5 to 40.7 percent of the conventional breed birds had healthy hocks (score 0) compared with 81.2 percent for the slower growing breed (Figure 8).

The majority of the birds for all three conventional breeds had pink and/or swollen hocks (score 0P) (68 percent, 59.2 percent and 50.4 percent, for Breed A, B and C, respectively), and a small proportion scored 1 (8.5 percent, 10.4 percent and 8.5 percent, for Breeds A, B and C, respectively) (Figure 8). A very small proportion of the Breed B and C birds had a score 2. Only 16.1 percent and 2.5 percent of the slower growing breed birds scored 0P and 1, respectively, with no birds having a score 2.

Ross 308 resting at 34 days of age.

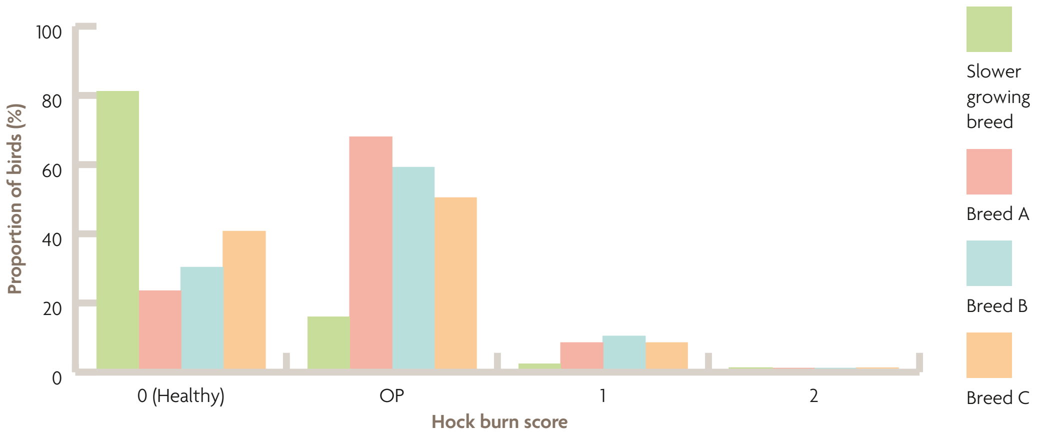

FIGURE 8: Hock burn scores for all breeds.

Foot burn

Foot burn was scored on a four-point scale, as follows:

- Score 0: healthy, i.e. no discoloration or lesions.
- Score 0P: no lesions but pink and/or swollen and/or healed scarring/very small superficial lesions, slight discolouration, mild thickening of the skin.
- Score 1: substantial discolouration of skin, visible lesions, but no ulcerations.
- Score 2: large areas of affected skin, deep ulcerations or lesions and swollen.

There were no significant differences in foot burn scores between all four breeds, with the vast majority (more than 95 percent) of birds for all breeds scoring 0 (Figure 9).

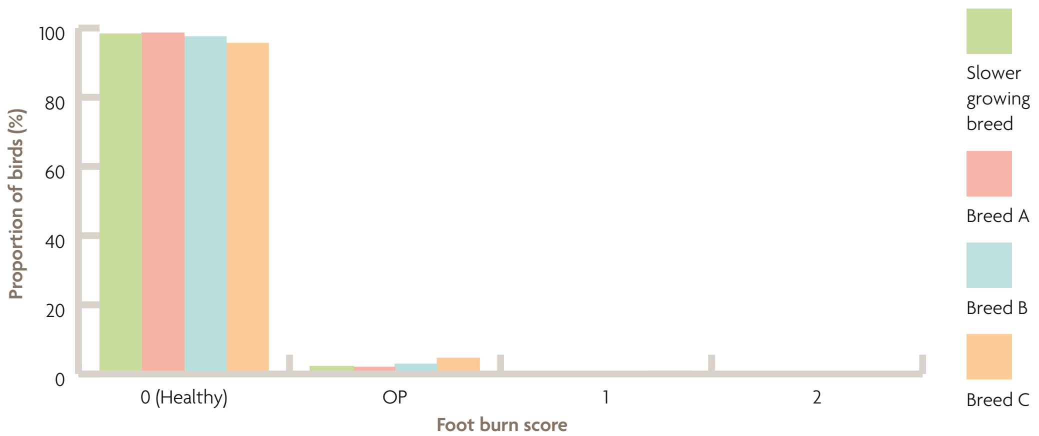

FIGURE 9: Foot burn scores for all breeds.

Breast feather cleanliness

Birds use their feathers to keep warm and protect themselves from moisture, dirt and skin infections. Healthy birds will spend time keeping their feathers in good condition. If feathers become wet or dirty then they can lose their protective properties. Therefore, feathers that are in poor condition can have significant effects on bird welfare.

Breast cleanliness was scored on a three-point scale, as follows:

- Score 0: clean.
- Score 1: slightly dirty.
- Score 2: large patches of dirty feathers on breast, or breast is completely covered in dirty feathers.

The conventional breeds had significantly poorer breast cleanliness scores than the slower growing breed. The slower growing breed was the only breed to have birds with completely clean breast feathers (score 0) (Figure 10).

Most of the slower growing breed birds had a score of 1 (40.5 percent), whereas the vast majority of the three conventional breeds scored 2: 80.1, 82.1 and 81.5 percent for Breeds A, B and C, respectively (Figure 10). None of the conventional breeds had completely clean breast feathers (score 0).

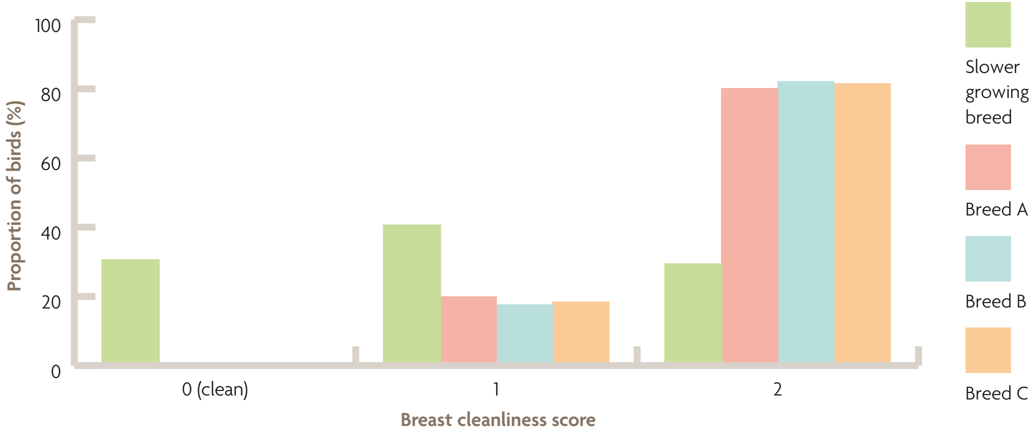

FIGURE 10: Breast feather cleanliness scores for all breeds.

SECTION SUMMARY

- In general, compared to the slower growing breed, the conventional breeds – taken as a group – had significantly poorer leg health, hock health and breast feather cleanliness scores and significantly higher mortality (including culls).
- Foot health for all four breeds was good with no significant difference in scores between the breeds.

Behaviour

Feeding

Throughout the trial, the conventional breeds spent significantly more time feeding than the slower growing breed (Figure 11).

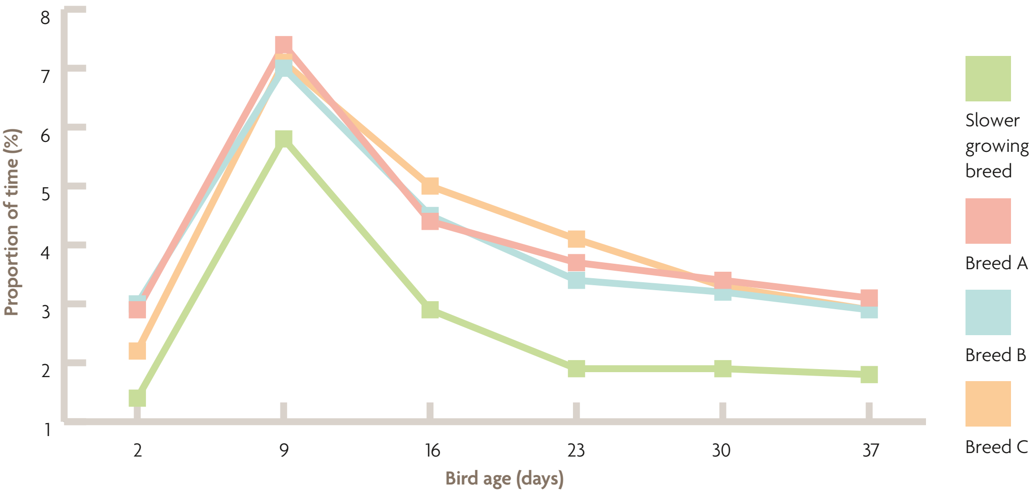

FIGURE 11: The average proportion of time each breed spent feeding throughout the trial.

Walking

Over the course of the trial, all three conventional breeds spent significantly less time walking compared to the slower growing breed (Figure 12).

For all four breeds, the amount of time spent walking gradually declined from nine days of age. However, this decreased at a significantly greater rate for the conventional breeds compared to the slower growing breed (Figure 12).

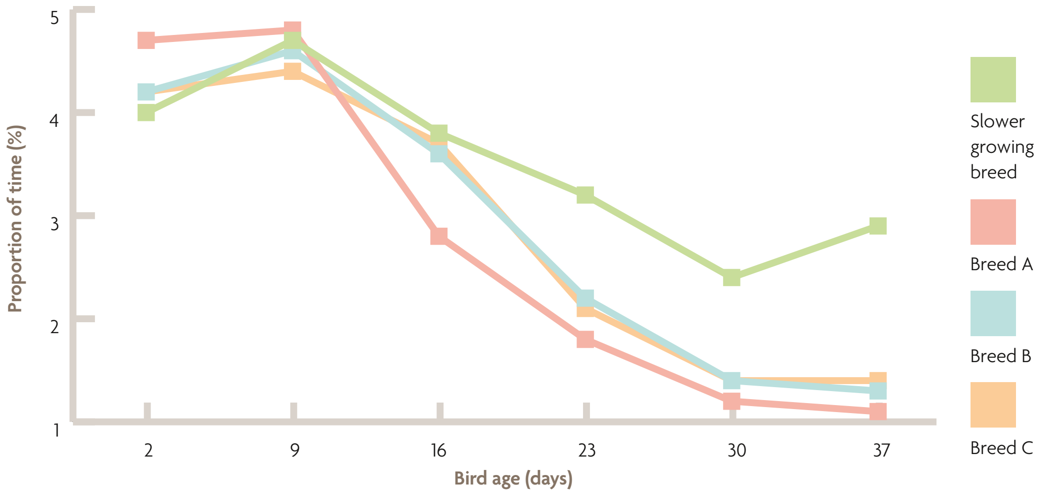

FIGURE 12: The average proportion of time each breed spent walking throughout the trial.

Standing

Over the course of the trial, the conventional breeds spent significantly less time standing compared to the slower growing breed (Figure 13). This difference primarily occurred after 16 days of age.

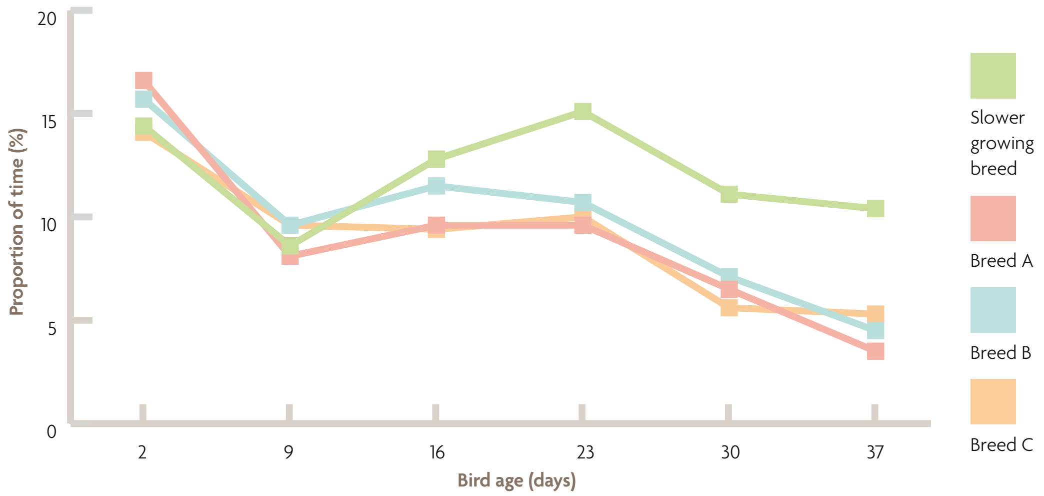

FIGURE 13: The average proportion of time each breed spent standing throughout the trial.

Sitting

Over the course of the trial, the conventional breeds spent significantly more time sitting than the slower growing breed (Figure 14). From 16 days of age, the time spent sitting increased for all breeds as the birds gained weight, but this increase was significantly less for the slower growing breed (Figure 14). Towards the end of the trial, when the birds were 37 days of age, the slower growing breed spent 51 percent of the time sitting compared to 71–74 percent for the conventional breeds.

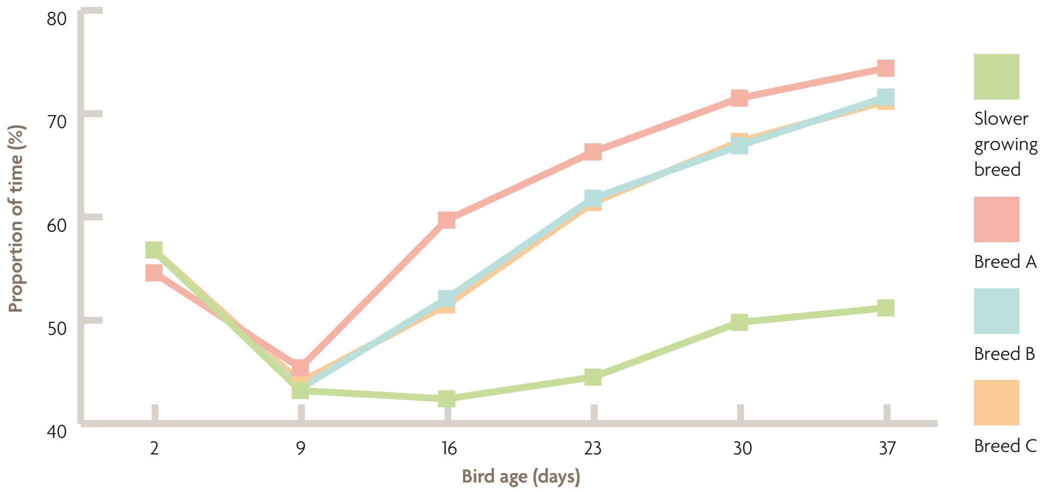

FIGURE 14: The average proportion of time each breed spent sitting throughout the trial.

Foraging

Over the course of the trial, the conventional breeds spent significantly less time performing foraging behaviour (scratching or digging in a substrate with the beak or feet) compared to the slower growing breed (7.9–10.3 percent v 12.9 percent) (Figure 15).

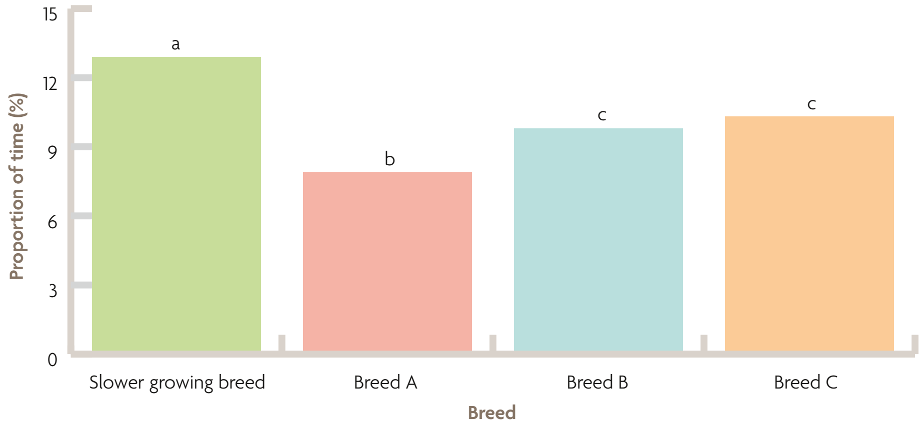

FIGURE 15: The average proportion of time spent foraging for all four breeds.
Different letters indicate a significant difference between those breeds.

Dust bathing

Over the course of the trial, the conventional breeds spent significantly less time dust bathing than the slower growing breed (Figure 16). For all four breeds, the time spent dust bathing increased up to day 16 and then remained approximately constant until around day 30 when this increased again for the slower growing breed but decreased for the conventional breeds (Figure 16).

JA757 birds displaying dust bathing behaviour at 34 days of age.

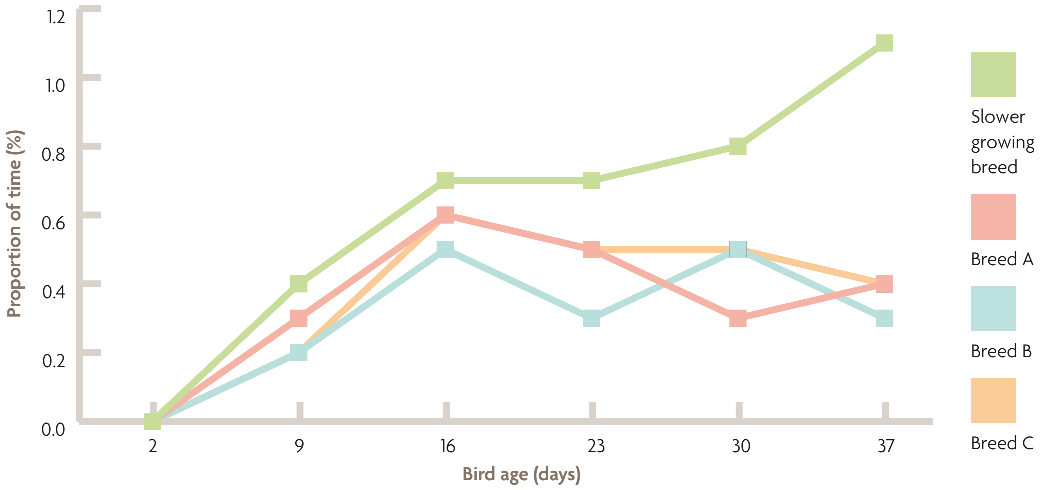

FIGURE 16: The average proportion of time spent dust bathing for all four breeds.

Perching

Over the course of the trial, the conventional breeds spent significantly less time perching than the slower growing breed – spending very little time performing this behaviour (daily average: 0.5–1.2 percent v 8.0 percent, respectively) (Figure 17). From approximately nine to 30 days of age, the time spent perching for the slower growing breed increased sharply (Figure 17). In contrast, for the conventional breeds, the time spent perching increased marginally up until day 16, before decreasing to the end of the trial when the birds were rarely observed performing this behaviour (Figure 17).

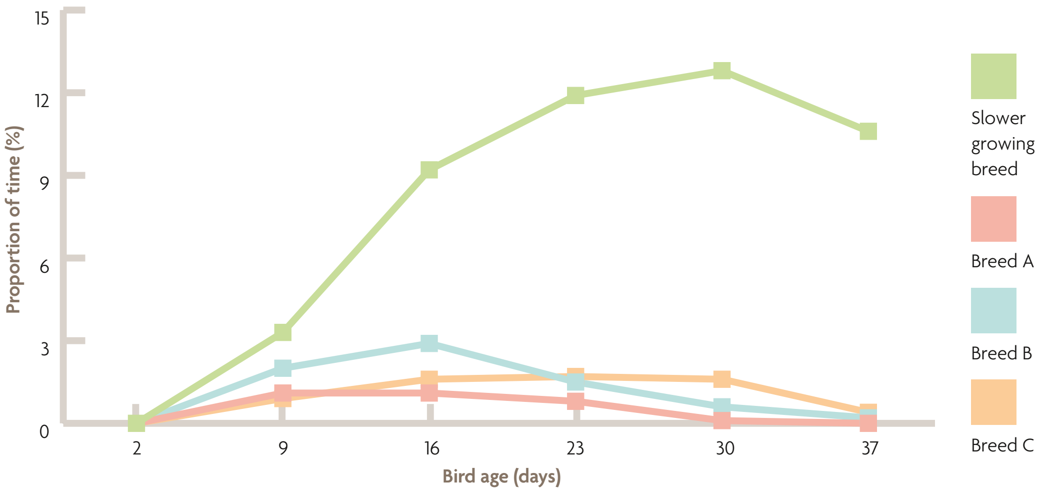

FIGURE 17: The average proportion of time spent perching for all four breeds.

Note: all pens had a 130cm perch space per 50 birds. From approximately 14 days of age, the slower growing breed birds were observed to almost always occupy the full length of the perch. Therefore, if more perch space had been provided, it is likely more birds would have performed this behaviour. The conventional breeds were frequently observed trying to perch, but only very few individuals were successful. Anecdotally, many of those that attempted to perch appeared to have trouble balancing and would have to step down to avoid falling off. It therefore appears the conventional breeds were motivated to perch, but were physically incapable of doing so.

SECTION SUMMARY

- Over the course of the trial, the conventional breeds spent significantly less time walking, standing, foraging, dust bathing and perching, and more time feeding and sitting, compared to the slower growing breed.

Meat yield

Carcass weight

The birds from all four breeds were slaughtered at a similar average live weight of approximately 3kg.

Carcass weight is the weight of a dead bird once its innards, head and lower legs (feet up to the hock) have been removed. There was no significant difference between the slower growing breed and the conventional breeds for average carcass weight, except Breed B which had a significantly lighter average carcass weight compared to all the other breeds (Figure 18).

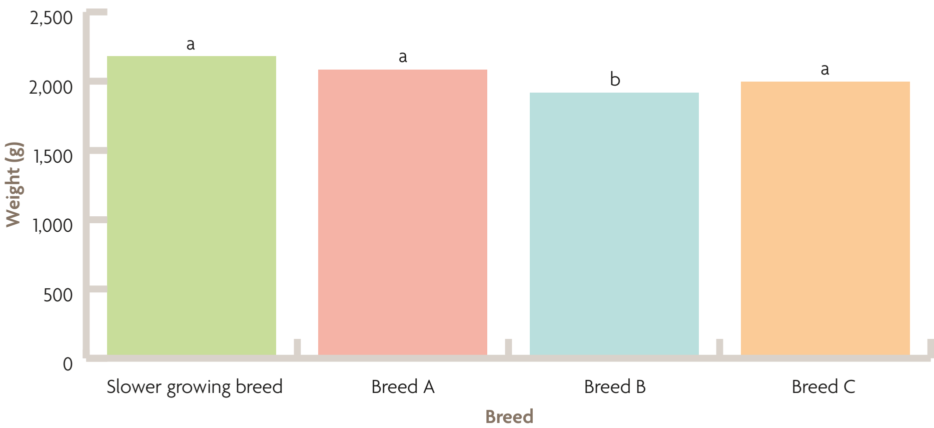

FIGURE 18: Average carcass weight at slaughter for the four breeds.
Different letters indicate a significant difference between those breeds.

Breast weight

There was no significant difference in average breast weight between the slower growing breed and Breed B, both of which had significantly lighter breast weights compared to Breeds A and C (Figure 19).

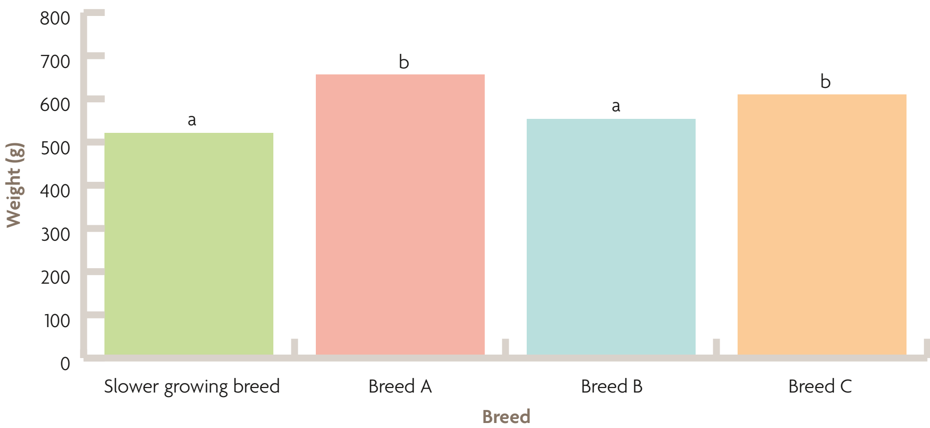

FIGURE 19: Average breast weight per bird for the four breeds.
Different letters indicate a significant difference between those breeds.

Leg weight

The average bird leg weight for the slower growing breed was significantly heavier than those of the conventional breeds (Figure 20).

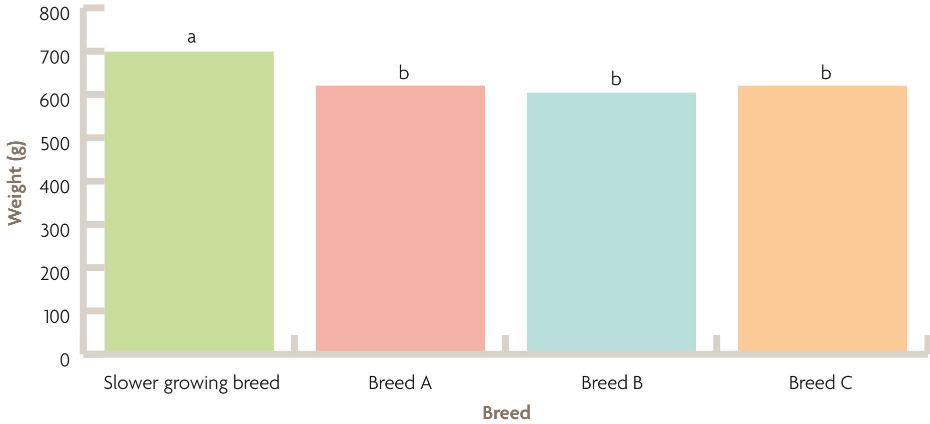

FIGURE 20: Average leg weight per bird for the four breeds.
Different letters indicate a significant difference between those breeds.

SECTION SUMMARY

- The carcass weights of the conventional breeds were equivalent to, or significantly lighter than, the slower growing breed.
- The breast weight of one of the conventional breeds was equivalent to the slower growing breed.
- All conventional breeds had lighter leg weights than the slower growing breed.
- Therefore, although the slower growing breed took approximately 14 days longer to reach the same weight as the conventional breeds for slaughter, it had an at least equivalent meat yield compared to one or more of these breeds across all the parameters assessed.

Meat quality

White striping

White striping is a disease of the breast muscle and is caused by fat depositing in the breast muscle during the bird's growth and development. The disease affects the functioning of the muscle fibres and results in muscular weakness. This parameter was scored as follows:

- Score 0: no striping.
- Score 1: moderate striping.
- Score 2: severe striping.

Most of the conventional breed birds had a moderate degree of striping (57.1–63.9 percent), and 6.3–14.8 percent had severe striping (Figure 21). Conversely, the slower growing breed had significantly fewer birds affected by white striping compared to the conventional breeds, with the vast majority of the birds (90.4 percent) not affected by this condition, and only 8.7 percent with a moderate degree of striping (Figure 21).

Breast meat with white striping.

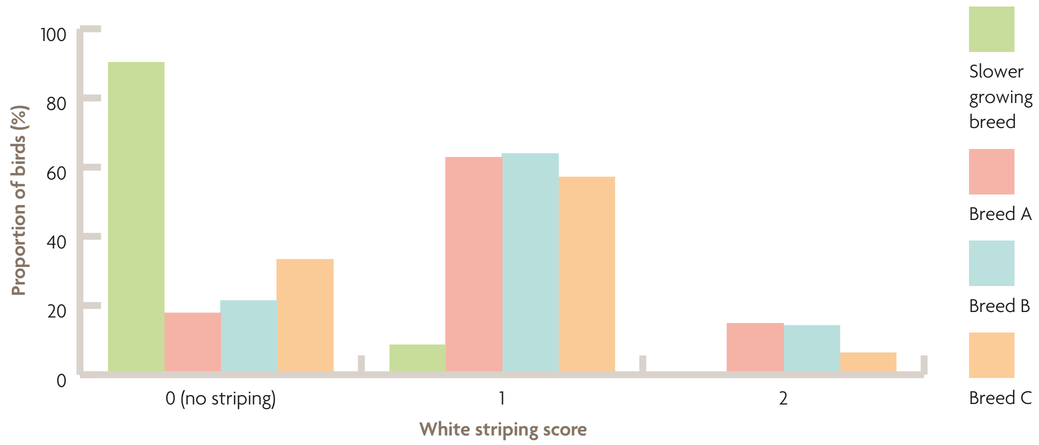

FIGURE 21: Average proportion of birds from each of the four breeds affected by white striping.

Wooden breast

Wooden breast is a disease of the breast muscle and is caused by fast muscle growth where the muscle cells become enlarged and the space between the fibres reduces. This condition restricts blood, and therefore oxygen, supply to the muscles, which results in cell death and muscular weakness. The affected muscle tissue consequently hardens, i.e. becomes 'woody'. This parameter was scored as follows:

- Score 0: absence of wooden breast.
- Score 1: presence of wooden breast.

Wooden breast was not observed in the vast majority of the slower growing breed and Breed B birds (99.1 and 96.3 percent, respectively) (Figure 22). Breeds A and C had a significantly greater proportion of birds with wooden breast (23.4 and 14.3 percent, respectively), compared to the slower growing breed and Breed B.

FIGURE 22: Average proportion of birds from each of the four breeds with wooden breasts.

SECTION SUMMARY

- With the exception of wooden breast for one of the conventional breeds, meat quality was significantly worse for the conventional breeds compared to the slower growing breed.

Note: white striping and wooden breast are diseases of the muscle and result in downgraded carcasses[40 41]. While research concerning these conditions has primarily focussed on meat quality and consumer acceptance, the discomfort and pain associated with these diseases cannot be excluded[42]. Both diseases result in progressive deterioration and loss of function in the tissues, which causes some degree of necrosis (death) of the muscle fibres and muscle weakness[43]. Research has shown that inflammation can accompany this degenerative process[44], particularly in relation to wooden breast, which may also be painful. Further, necrosis itself can be painful.

Conclusion

The trial revealed that, in general, compared to the slower growing breed, the conventional breeds had significantly poorer health: higher mortality (including culls), poorer leg, hock and plumage health, and more birds affected by breast muscle disease (white striping and wooden breast) (Appendix 1, page 35). The conventional breeds were also less active, spending less time walking and standing, and more time feeding and sitting, and spent less time engaged in enrichment type behaviours: foraging, perching and dust bathing.

The welfare impact of poor health on an animal is clear and, depending on the issue and its severity, poor health can result in persistent and significant pain and suffering. However, the welfare impact of reduced behavioural expression is less clear, but should not be underestimated, as it can have a significant psychological impact. Chickens should be able to behave like chickens, with the ability to exhibit behaviours natural to the species. When they are hindered from performing certain behaviours, such as perching, this is not necessarily because they are not motivated to perform them, but because they are physically incapable of doing so, e.g. due to their larger size and poorer health (e.g. lameness). The thwarting of such behaviours can be a significant source of frustration[10].

Overall, there was no significant difference in meat yield between the slower growing breed and the conventional breeds but, as a consequence of living longer, the slower growing breed consumed more feed to achieve the same slaughter weight, which resulted in it being less efficient at converting feed into body weight. As such, it consumed approximately 21 percent more feed than Breed A to achieve a weight of 2.2kg, i.e. an extra c.660g of feed per bird. Further, as a consequence of living longer, this would mean fewer flocks (and therefore birds) could be reared per year in a commercial house, which would have additional cost implications. However, these inefficiencies are likely to be significantly, if not entirely, offset if other factors affecting the conventional breeds are taken into account. For example, **the mortality (including culls) of two of the conventional breeds was more than double that of the slower growing breed: 10.7 percent and 11.2 percent for Breeds A and B, respectively, versus 5.2 percent for the slower growing breed. Further, these figures do not include the lame birds (gait scores 3–5) identified at assessment that should be culled if the birds were being reared commercially under higher welfare standards. Such birds represented between 26–38 percent of the flock for the conventional breeds compared to 11 percent for the slower growing breed, an increase of 136–245 percent**. In addition to a loss of income from being unable to sell such birds (because they had been culled) there are additional costs involved in the disposal of these birds that need to be factored in, as well as the cost of rearing these birds to the point of culling.

In addition, over the course of the trial, **the conventional breeds required approximately 67 percent more wood shavings** to maintain the floor covering in good condition (15kg v c.25kg per breed). The cause of the greater deterioration in litter quality for the conventional breeds is unknown, but could possibly be a result of greater faecal output (as the birds were consuming more feed per unit of time and therefore defecating more) and/or poorer faecal quality. It could also be a result of the birds being less active and therefore not 'working' the litter as much. Whatever the cause, this increased litter requirement (if provided in commercial practice) would amount to a considerable additional expense.

Further, meat quality was significantly poorer for the conventional breeds. **Wooden breast affected 3.1–23.4 percent of the conventional breeds versus 0.9 percent for the slower growing breed**, an increase of 244–2,500 percent. Whereas **white striping (moderate and severe) affected 63.4–78.1 percent of the conventional breeds versus 9.6 percent for the slower growing breed**, an increase of 560–713 percent. While we understand that **such meat is often downgraded and removed at the processing plant**, some is likely to be sold to the consumer, especially in the case of whole bird carcasses where it may go undetected at the processing plant. Wooden breast has a hard, chewy texture when cooked and therefore is regarded as a

Cobb 500 bird sitting at 34 days of age.

product quality issue that consumers should not be unwittingly paying for. White striping is caused by fat deposits, meaning that the meat is less lean and tender[45] and, arguably, less desirable for consumers who chose chicken breast meat for its healthier, lower fat credentials.

In summary, the conventional breeds had significantly poorer welfare outcomes, but were more efficient at converting feed into body weight and, due to being slaughtered at a younger age, more flocks can be reared in a building per year. However, **there are significant inefficiencies in producing meat from these conventional breeds: mortality (including culls) (11.2%); lame birds requiring culling (26–38% of the flock); birds affected by meat quality issues resulting in downgrading/removal and disposal of affected meat (white striping (63–78% of flock) and wooden breast (3–23% of the flock)), and increased use of wood shavings. If all of these parameters were accounted for then this would considerably impact the cost of production. Currently, it appears that the cost of 'standard' chicken meat is being kept artificially low due to some of these issues not being addressed. If they were addressed, the rearing of conventional breeds would likely represent a false economy. Further, it's highly probable that if we were to truly consider the welfare of chickens and do what is morally right – not simply what is legal – then the cost of chicken meat from conventional breeds would be greater than that from higher welfare breeds. But, even despite these economic and welfare elements, it is clear that the production of chicken meat using conventional breeds is a wasteful and ethically questionable business, bringing into question the sustainability of this enterprise.**

Although the welfare of the slower growing breed was significantly better than the conventional breeds, there is room for improvement. **It is clear that genetic breeding programmes, even those with a less prominent focus on performance, need to place a much greater emphasis on health traits**. Current breeding programmes have failure in-built – knowingly accepting a compromise on bird health. As the market has failed to safeguard chicken welfare, **legislation needs to be developed to address this issue**.

Is conventional chicken production falling fowl of the law?

Currently, legislation states: "Animals may only be kept for farming purposes if it can reasonably be expected, on the basis of their genotype or phenotype, that they can be kept without any detrimental effect on their health or welfare."[46] Further, the Defra code of practice for the welfare of meat chickens[47] states: "Welfare and health considerations, in addition to productivity, should be taken into account when choosing a strain for a particular purpose or production system. In line with this, meat chickens should stem from broad breeding programmes, which promote and protect health, welfare and productivity."

However, despite these legal provisions and codes, legal proceedings in 2004[48] resulted in obiter dicta (a judge's expression of opinion, but not legally binding as a precedent) from the Court of Appeal that new legislation would be required to bring about a change in the genetics of meat chickens to address the welfare issues we have highlighted in this report. The court said that requiring producers to select certain genotypes (breeds) to meet the legislation went beyond the scope of current legislation. The court expressed the opinion that without new regulation then the use of existing conventional genotypes was unavoidable and unlikely to be successfully legally challenged.

The trial demonstrates that, at present, the most commonly used genetics do not adequately safeguard chicken welfare and are not consistent with ensuring the vast majority of chickens live a good life or even have a life worth living. While breeds that have been less heavily selected for performance may not completely eliminate all welfare issues, they offer a significant improvement. These 'higher welfare' breeds, which have been shown to be commercially-viable in practice, should be adopted instead, and breeding companies mandated to prioritise health and welfare traits over performance.

Although current genetic selection programmes may be justified by some on the basis they result in an animal that provides a cheap and efficient source of meat and protein, there is no acceptable justification when such programmes have serious inherent flaws and are associated with poor health and welfare. If genetics companies were manufacturers of, say, mechanical products, then these products would be very cheap to buy but also very unreliable – products that could only be used with great care, under very controlled conditions and for a short period before mechanical failure would occur. Such products would be considered unacceptable. However, chickens aren't inanimate objects, they are sentient animals, so it is far more important to ensure the 'product' – and the way in which it is produced – is as high in quality as possible.

Acknowledgements

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Endnotes

[1] For the purposes of this report, one billion = one thousand million.
[2] FAO, 2017.
[3] Aviagen, 2019.
[4] Competition and Markets Authority, 2018.
[5] Cobb, 2018.
[6] Hubbard, 2015.
[7] Hooijet, 2005.
[8] Cooper and Wrathall, 2010.
[9] Davies, 2013.
[10] de Jong et al., 2012.
[11] SCAHAW, 2000.
[12] Kittelsen et al., 2015.
[13] Olkowski and Classen, 1998.
[14] Maxwell and Robertson, 1997.
[15] Part et al., 2016.
[16] Afolayan et al., 2016.
[17] Julian, 2004.
[18] Wideman, 2015.
[19] McGeown et al., 1999.
[20] Danbury et al. 2000.
[21] Kestin et al. 1992.
[22] de Jong, et al., 2011.
[23] Knowles et al., 2008.
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APPENDIX 1: Key production, health and meat quality results from the RSPCA commissioned trial to assess the production and welfare characteristics of the leading meat chicken breed from each of the three globally dominant meat chicken breeding companies (Conventional breeds) and a commercially viable slower growing breed*.

	Slower growing breed	Conventional breeds			Compared to the slower growing breed, the conventional breeds…	Compared to the slower growing breed, the Conventional breeds were…
		Breed A	Breed B	Breed C		
Growth rate (g/day)**	46	63	63	63	…grew **1.4** times faster (an increase of **37%**)	—
Feed conversion ratio (Kg)**	1.76	1.46	1.43	1.35	…consumed **17–23%** less feed. (NB the slower growing breed consumed **21–30%** more feed).	—
Mortality (including culls) (%)	5	11	11	7	…had **1.4–2.2** times higher mortality (an increase of **40–120%**)	…up to around twice as likely to die/be culled.
Lame birds (moderate to severe) (%)***	11	38	28	26	…had **2.4–3.5** times more lame birds (an increase of **136–245%**).	…up to 3.5 times more likely to be moderately to severely lame and require culling.
Hock burn (%)****	19	77	70	59	…had **3.1–4.1** times more birds with hock burn (an increase of **211–305%**)	…up to 4.1 times more likely to suffer from hock burn.
Dirty feathers (%)	70	100	100	100	…had **1.4** times more birds with dirty feathers (an increase of **43%**)	—
White striping of breast muscle (%)	10	78	78	63	…had **6.3–7.8** times more birds with white striping of the breast muscle (an increase of **560–713%**).	…up to 7.8 times more likely to suffer from white striping of the breast muscle.
Wooden breast muscle (%)	1	23	3	14	…had **3–23** times more birds with wooden breast (an increase of **244–2,500%**).	…up to 23 times more likely to suffer from wooden breast.

* Figures have been rounded for ease of presentation (except Feed conversion ratio). Calculations are based on actual (not rounded) figures.
** At a body weight of 2.2kg.
*** Gait score 3, 4 and 5 (see page 19).
**** Score 0P–2 (see page 20).

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Photos: RSPCA, World Animal Protection, CIWF.