COMPASSION in world farming
ciwf.com

WELFARE OUTCOMES FOR BROILERS

SETTING THRESHOLDS AND TARGETS FOR HIGHER WELFARE BREEDS

THE NEED FOR HIGHER WELFARE BREEDS

There is significant research on the welfare issues in today's industry standard, faster-growing (FG) broiler breeds. These strains of broiler chickens have been genetically selected for fast growth and increased breast muscle mass, with daily weight gains around 95g/day at 5 weeks of age.[1–3] Welfare concerns related to fast growth and high breast meat yields include low activity levels, reduced behavioral expression, a higher prevalence of contact dermatitis and cardiovascular disease, and poor leg health. These conditions can lead to chronic pain, impaired locomotion, leg weakness, and mortality.[4,5]

New research continues to support that slower-growing (SG) commercial strains - with more balanced body confirmations - have a greater potential for better welfare outcomes in well-managed flocks than today's faster-growing breeds. For example, commercial studies comparing SG broilers (birds with an average weight gain of 45-53 g/day) to a FG strain (birds with an average weight gain of 63 g/day) found lower mortalities and carcass rejections, better gait scores, and lower incidences of footpad and hock burn lesions in the SG birds.[6,7] Other welfare outcomes shown to be favorable in SG birds, include: better mobility (*e.g.,* better gait, group obstacle test scores), straighter leg conformations (*e.g.,* less valgus-varus angulation), and higher frequencies of welfare-positive behaviors, such as perching, ground scratching, and play.[6,8–13]

Whereas a decrease in daily growth rate is often correlated with positive welfare outcomes, the potential for higher welfare is not only related to the growth rate of the birds, but to an increased robustness and ability to thrive in enriched environments. This is often due to differences in the conformation and muscle mass distribution of birds classified as "slower-growing". As such, there has now been a shift to refer to these breeds more accurately as 'higher welfare' breeds.

In addition to scientific research on welfare issues in conventional broiler breeds, public concern about the way in which chickens are raised continues to grow. According to a 2018 survey sponsored by the National Chicken Council (NCC)[14], 78% of respondents expressed concern about how chickens are raised. More specifically, 78% of consumers are concerned about how chickens are being bred to optimize meat production, with 61% expressing concern with the time it takes to raise a chicken. Consumer awareness and unease increased for all of these purchasing considerations from the previous year.

In the US, food businesses have responded to both scientific information and public concerns regarding the welfare of broiler chickens by adopting commitments to:

a) **Transition to breeds that demonstrate higher welfare outcomes approved by the Royal Society for the Prevention of Cruelty to Animals (RSPCA) or Global Animal Partnership (G.A.P.);**

b) **Reduce stocking density to a maximum of 6 lb/sq ft and prohibit broiler cages;**

c) **Provide birds with an improved environment - inspired by G.A.P.'s baseline standards, including deep & friable litter, a minimum level of daytime lighting & a continuous period of darkness for birds to rest each day, and at least 1 type of functional enrichment available for the flock to use;**

d) **At slaughter, chickens must be processed in a manner that avoids pre-stun handling and instead utilizes a multi-step controlled-atmosphere processing system that induces an irreversible stun;**

e) Demonstrate compliance with the above standards via third party auditing and annual public reporting on progress towards these commitments.

This document offers guidance in support of these commitments, especially with regard to the transition to approved breeds with higher welfare outcomes. The main objective of the document is to provide an understanding of the definition and role of welfare outcomes in the overall assessment of animal welfare. To this end, it offers definitions of animal welfare indicators, inputs, and outcomes, and presents a comprehensive list of welfare outcomes commonly used in the assessment of broiler welfare, with thresholds for each outcome specifically for higher welfare breeds.

WELFARE INDICATORS, INPUTS, AND OUTCOMES

DEFINITION AND SCOPE

Animal welfare pertains to the individual and how it perceives its life in terms of avoiding negative physical and mental experiences, as well as having access to what they want and need. Animal welfare is not limited to good health and physical condition, but also includes good mental well-being and the ability to perform behaviors that are characteristic of the animal in question. For chickens, this includes pecking, scratching, wing-flapping, perching, and running. Because it involves all of these aspects, there is no straightforward or simple way to measure welfare. However, we can objectively sense the welfare state of an animal

based on two kinds of measures: the first relates to whether the animal has what it needs and wants to experience good welfare **(inputs)**, and the second to if and how the animal is able to use these inputs to observably demonstrate that it has good welfare **(outcomes)**.

INDICATORS

When it is not possible to directly measure these inputs and outcomes, **indicators** are used as an indirect measure or proxy. For example, there is no single way to measure the input "good air quality", but ammonia levels are often used as a reliable indicator. Indicators act as reference values for performance or outcomes, but are not a measure of welfare, per se. Depending on when these indicators are being measured, they can be considered lag indicators or lead indicators. **Lag indicators** are those recorded at the end of a production cycle (often post-mortem), which can provide feedback on the overall performance of a flock.[15] Examples of lag indicators are: mortality, total leg culls, dead-on-arrivals, reject levels, level of contact dermatitis at slaughter (*e.g.,* breast blisters, hock burn, and pododermatitis), and abnormal leg rotation (*e.g.,* valgus-varus angulation).[16]

Lead indicators, on the other hand, are measured throughout the production cycle, and can be used to proactively change management and practices.[15] For instance, indicators that look at skin condition, such as hock burn or footpad dermatitis (FPD) assessments can be used as either lag or lead indicators. When assessed during the production cycle, hock burn and FPD indicators can help correct environmental and management factors linked to the development of skin lesions, such as poor litter quality. Indicators should be selected in a way that effectively measures the adequacy of inputs and their effects on welfare outcomes. Additionally, lag and lead indicators should be balanced such that measurements and results can be used to proactively improve welfare during the growth cycle, as well as to fine-tune practices in the long term.

INPUTS

Animal welfare is influenced by intrinsic factors (genetics), and extrinsic factors (environmental provisions). Thus, good welfare requires good care, including good feeding, housing, breeding, health care, and a good overall environment. In the case of domestic animals, both genetic and environmental factors that are known to influence welfare outcomes are considered **inputs** and should be well managed to ultimately deliver good outcomes (physical, mental, and behavioral). Relevant inputs include:

- **Good Housing**: No cages, but instead environments with good design features, sufficient space to live (stocking density not to exceed 6 lb/sq ft), and functional areas (*e.g.,* separate resting and activity areas).

- **Good Environment**: In addition to the structural elements described above, the environment of the house must provide good ventilation, climate control to maintain comfortable temperature and relative humidity for the animal's type and age, **good litter quality** (with friable litter covering the entire floor), and an **enriched, stimulating environment** to meaningfully occupy the animal. Examples of acceptable enrichments are straw bales, scattered grains, perches and platforms, edible hanging enrichments, pecking blocks, ramps, and shelter structures.

- **Good Breeding:** Healthy genetics is perhaps the most important input, as it not only directly impacts important welfare outcomes, but also determines the animal's potential to use the available inputs (*e.g.,* environmental enrichments) to further achieve good outcomes.

- **Good Healthcare and Husbandry**: Adequate housing, environment, and breeding are likely to result in better health outcomes for broilers, decreasing the need for non-therapeutic use of antibiotics and other medications often needed to sustain the growth of unhealthy birds in crowded, barren environments. Good husbandry and handling, from chick placement to slaughter, is key to ensuring that these good outcomes translate to higher-quality products. Adequate handling of broilers during transport and slaughter is essential; chickens must be handled in a manner that **avoids pre-stun handling** and instead utilizes a **multi-step controlled-atmosphere processing system** that induces an irreversible stun.

OUTCOMES

The focus on outcomes to assess and monitor animal welfare is a widely accepted approach, as it stays true to the definition of welfare as an animal-centered measure. However, because outcomes are directly influenced by inputs, their adequacy as a measure of welfare depends on whether these inputs are provided, and on the availability of suitable indicators.

Additionally, outcomes must not only serve as an assessment tool, but also inform plans to improve welfare and mitigate potential poor welfare situations. Measuring outcomes without considering the various inputs that influence them is unlikely to result in improved welfare for birds. For instance, a welfare policy may include a threshold value for the outcome "walking ability" (*e.g.,* 95 percent of birds with gait scores 0, 1, or 2) - but without offering detail on what inputs are being provided to affect the outcome "walking ability". This could result in management practices that ignore or exclude entire categories of inputs known to affect that particular outcome, such as genetics, environmental enrichment, or

sufficiently bright daytime lighting. A comprehensive and meaningful welfare plan should give equal importance to inputs, outcomes, and the indicators used to measure them, and make clear connections between what is provided to the animals, and what is expected in terms of outcomes.

SELECTING THE RIGHT OUTCOMES

Welfare outcomes must be selected according to their potential to accurately portray the welfare state of an individual or flock. An important feature of welfare outcomes is that they provide robust evidence, which for the purposes of animal welfare assessment must be repeatable, valid, and feasible to obtain.[17] Other features of good welfare outcomes are:

PRACTICAL:

Outcomes should be reasonably simple to assess on-farm, on a commercial scale, by a trained observer. Gait scoring, although reliable, requires a significant time investment, and can be challenging for commercial scale operations. In such cases, methods may be modified such that reliability is not compromised; for instance, manual gait scoring using a transect method has shown good results in terms of interobserver reliability, as well as time and personnel requirements.[18]

NON-INTRUSIVE:

Preference should be given to outcomes and indicators that can be measured with minimal disturbance to the animal. Additionally, assessments should be conducted such that more intrusive measurements are conducted last.[19] For example, optical flow measures use webcam technology to record bird movement patterns, which are then analyzed using image vector analysis. This fully-automated and non-intrusive method has shown potential to substitute manual gait scoring on commercial farms.[20]

ROBUST:

Outcomes should deliver consistent, reliable results despite changes in environmental variables (*e.g.,* seasonal variations in temperature or humidity). Robust outcome measures should also have good inter-observer reliability.[19] For an outcome to be robust, it must be tested against other methods and proven to be the most reliable, both in terms of replicability and alignment with the most recent science. For example, whereas systems that automatically monitor broiler activity can be used to assess walking ability, these methods must be tested and validated against the standard method used to assess lameness, which is gait scoring.[21]

INTEGRATIVE:

As no one outcome or indicator is able to provide a full picture of animal welfare, they must be selected for their potential to complement other measures to offer a comprehensive assessment of an animal's welfare. An integrative outcome is also one that is able to convey information about the historical welfare status of the animal. For example, the presence of severe footpad lesions (FPD) not only tells us about the welfare of the animal in that moment (pain or discomfort are present), but also about welfare issues leading up to that point (*e.g.,* wet litter, low bird mobility, poor ventilation, or susceptible skin).[19]

PROGRESSIVE:

In the context of a comprehensive welfare plan, the role of an outcome measure is twofold: to monitor welfare so it can be maintained at an acceptable level, and to use results to improve welfare based on the welfare potential of the animals in question. Outcome measures must offer the possibility of setting and modifying thresholds based on observed results to ensure continuous improvement to animal welfare. For instance, many third-party auditing schemes require certain welfare indicators or outcomes to be measured for every flock at key time points (*e.g.,* during the final week prior to slaughter or at the slaughter facility).

The G.A.P. 5-Step® Animal Welfare Rating Standards for Chickens Raised for Meat[22] are a good example of the use of progressive outcomes. Footpad dermatitis (FPD) scores must be calculated for every flock reared under G.A.P. certification. When the total FPD score for a flock fails to meet the specific step threshold, an intervention plan is created to identify why the problem has occurred and for actions to be put in place to prevent the issue occurring for future flocks. G.A.P. certification also had different FPD thresholds for the step levels of the program. Systems certified as Step 1 must have a total FPD score less than 20. Flocks under steps 2 and 3 need to have a FPD score of 15 or less, while Step 4 flocks are required to have a FPD score of 5 or less. Higher step levels of the G.A.P. program provide greater amounts of outdoor access with birds at Step 4 and above living primarily on pasture. Given birds living outside experience a wider range of environmental conditions than birds housed indoors, it is important to maintain higher targets for footpad health.

USING OUTCOMES TO MONITOR AND IMPROVE WELFARE

Regularly scoring relevant outcome measures can identify welfare problems and be used to set **thresholds**, define **targets** for good welfare, and benchmark for **improvements** through an active program—and all of these must be informed by scientific findings. When commercial trials are used, they must be carefully designed such that the treatments, treatment levels, and the data measures provide meaningful information about what is deemed acceptable in terms of welfare. Trials should avoid replicating research on issues for which there is already a substantial body of evidence and should instead aim to provide evidence for outstanding research questions.

When interpreting scientific research to determine outcomes and set thresholds, it is important to keep in mind that what might be statistically significant is not necessarily significant for welfare from the perspective of the animal (which is what ultimately matters). This is especially important when deciding on thresholds and targets for issues that have not been thoroughly researched, or for which research results remain ambiguous. In these cases, it is useful to consider the correlations between different relevant outcomes, to set targets that will result in improvements for all of the correlated outcomes.

For example, it may be difficult to determine what the target activity level is for higher welfare broiler breeds. From the existing research on activity levels in broiler chickens, we can clearly see that the today's industry-standard breeds have been heavily selected for performance traits, such as rapid growth and greater breast meat yields, but at the cost of their health and behavioral expression. These faster-growing (FG), conventional breeds have weaker legs that results in impaired walking so these birds spend more time inactive sitting idle and ingesting feed.[6,10–12] These breeds have been observed to spend as little as 7% of their time actively moving (*i.e*., walking, running, or foraging).[23] Even when provided with enrichments (e.g., straw bales, roughage, or dust-bathes), today's FG breeds are still less active than slower-growing (SG) strains without these additional environmental provisions.[6,24] In contrast, SG broilers selected for improved physical and behavioral welfare outcomes are more active (35-55% of total observation time)[9,25,7] and spend more time walking[26] than the current FG breeds throughout their lives.[12] Under commercial settings, these higher welfare broilers show a wider range of natural behaviors indicative of positive welfare than FG breeds. When compared to conventional breeds growing ~65 g/day, SG breeds (≤53 g/day) appear more physically able to engage with enrichments – especially perches and straw bales at older ages, and will move more often into open spaces of the barns to play.[6,7,9,26,27]

Whereas as this research points to a higher potential for activity in SG birds, it does not suggest what the target levels for activity should be. Here, it is important to keep in mind that welfare, from the animal's perspective, involves avoiding negative experiences (pain and frustration) as much as enjoying positive ones (*e.g.,* foraging, perching). As such, looking for correlations between outcomes that focus on avoiding poor welfare (*e.g.,* gait scoring or walking ability), with those that focus on welfare-positive states (*e.g.,* activity, play, foraging, dust-bathing) can offer valuable insights when setting targets for welfare outcomes.

Correlating different outcomes, as well as outcomes and inputs, can help fine-tune thresholds and is important in designing a welfare program focused on the maximization of positive welfare states, rather than just avoiding the worst-case scenarios.

Welfare programs designed around the assessment of outcomes should clearly:

1) **Establish acceptable thresholds (or ranges) for each outcome or indicator;**
2) **Acknowledge correlations between outcomes when setting thresholds** *(e.g., FPD is known to affect walking ability, so these measures should be assessed with this in mind)*;
3) **List the inputs and provisions which are necessary to achieve the desired outcomes;**
4) **Contain a list of actions to mitigate poor welfare situations** *(e.g., "birds with a gait score of 3 or higher shall be humanely euthanized")*;
5) **And include a timeline for assessments of outcomes (including both lead and lag indicators), mitigation of poor welfare situations, and periodic revision of the program as a whole.**

TRANSPARENCY AND ACCOUNTABILITY

Transparency is an additional factor in the use of outcomes to assess and improve welfare. Transparency involves providing clear, sufficient, and timely information to both internal and external stakeholders. From a food business perspective, this includes sharing animal welfare commitments, detailed plans, and policies (including inputs and resulting welfare outcomes), as well as progress reports with consumers and investors. Sharing detailed information about animal welfare practices and policy is an important way to foster consumer trust, as labeling often fails to give consumers the information they are seeking with regard to the treatment of animals or other product attributes.

Accountability involves a willingness to have animal welfare commitments publicly scrutinized, and to be responsive to public concerns arising from the disclosure of policies and progress reports. Transparency and accountability are the final link in ensuring continuous progress for farm animal welfare.

OTHER CONSIDERATIONS

- **Seasonal/regional variation:** This should be acknowledged as a factor, but it does not necessarily invalidate outcome measures or assessment tools. Seasonal variation has been shown to affect litter moisture and other environmental factors that may cause variation in

welfare outcomes. For example, a study on prevalence of footpad dermatitis (FPD) in Dutch broiler flocks found that FPD scores were lower in the warmer months.[28]

- **Scalability:** For use at farm level, outcomes must be scalable in addition to being meaningful measures of welfare. This can be achieved in a number of ways, including using individual assessment in small samples in combination with transect assessments of whole flocks, and the use of automated monitoring technologies and techniques such as optical flow, vocalization analysis, etc.

- **Inter-observer reliability:** Outcome measures and indicators selected, as well as methods used to collect data must enable inter-observer reliability. Periodic training and assessment against "gold standard" observers are good ways to increase reliability.

SELECTING AND MEASURING WELFARE OUTCOMES FOR HIGHER WELFARE BREEDS

Monitoring welfare outcomes at the farm level, and especially at commercial scale, is a resource-intensive activity. As such, outcome measures should be carefully selected to reflect welfare priorities based on the experiences of the animals themselves (rather than how feasible they are to assess, for example). With regard to breed/genetics, the central question guiding outcome selection should be: which outcome measures are better suited to track the welfare potential of higher welfare breeds in good baseline environments? Selection of welfare outcomes must also consider the following sources of information:

- **Research on outcomes for today's conventional, faster-growing (FG) breeds under improved environmental conditions:** The vast majority of research on broiler welfare outcomes involves the use of today's industry-standard FG breeds in experimental or commercial trials. Whereas results from this research may not be directly applicable to higher welfare breeds, it provides relevant information on what the thresholds may be for these outcomes when only environmental and management conditions are improved. For example, the results of a large-scale study of welfare outcomes in commercial broiler production in varying environmental circumstances helped establish baseline levels for leg straightness, hock burn, footpad dermatitis, and other outcomes for FG broilers. These values have been referenced to set thresholds in breed assessment protocols.[29–31]

- **Research comparing commercial slower-growing (SG) to the current FG breeds:** This research provides insight into if and how much baseline outcome levels may differ in

SG breeds when compared to FG breeds. This information may be used to establish outcome thresholds specific to higher welfare breeds, which are likely to present a more reliable picture of the welfare state of birds with a higher welfare potential. For example, a 2020 study found healthy hocks in only 23.5-40.7% of birds of three most commonly used FG breeds (Cobb 500, Ross 308, & Hubbard Flex) compared to 81.2% of birds from a commercially-available SG breed (Hubbard JA757). Only 16.1% of SG birds had pink and/or swollen hocks versus 50.4-68% of the birds from the FG strains.[10] If both of these populations were assessed using a protocol where a "passing score" for hock burn was "85% of birds with HB scores 0 (healthy) or 0.5 (pink and/or swollen hocks)", all the FG and SG birds would pass, regardless of the SG birds' demonstrated potential for better results for this particular outcome.

- **Research on potential of SG breeds in higher welfare environments:** When setting outcome thresholds, it may also be useful to know what outcomes are likely to be for higher welfare birds in optimal welfare situations (*e.g.,* well-managed, pasture-based systems). Research conducted in these conditions may be used to make projections for welfare improvements based on these best-case scenarios. For example, a study comparing eight broiler chicken lines (seven SG higher welfare & one FG conventional breed) reared under EU traditional free range standards with access to an outdoor range with forage reported the SG breeds spent 25.4-71.5% of time moving (*i.e.,* walking, running, and foraging) versus 7.0% of FG birds at ~ 81 days of age.[25,32]

DEVELOPING THRESHOLDS FOR HIGHER WELFARE BREEDS

In addition to the sources listed above, two important sources of information for selecting outcomes and setting thresholds are the available broiler breed welfare assessment protocols from the Royal Society for the Prevention of Cruelty to Animals (RSPCA)[29] and Global Animal Partnership (G.A.P.).[33] It is important to keep in mind that the thresholds listed are for breeds tested in enriched indoor systems, and therefore thresholds may need to be adjusted for testing breed suitability to systems with outdoor access or rearing breeds primarily on pasture.

The table below provides a comparison of the welfare outcomes and thresholds for the RSPCA's Broiler Breed Welfare Assessment Protocol[29] and G.A.P.'s Broiler Chicken Assessment Protocol.[33] While the RSPCA assessment measures these outcomes in a test breed at final body weight of 4.85 lb (2.2 kg), the G.A.P. protocol evaluates these outcomes in a test breed at two target body weights: 5.5 lb (2.5 kg) and 7 lb (3.2 kg) or to maximum of 84 days for breeds that never reach a weight of 7 lb.

The two assessments also differ in the application of thresholds. For the RSPCA assessment, any breed scoring above (or below) on the set threshold for a measure may be deemed to ineligible for approval. This regardless of how close or far the tested breed's value is from a set threshold. The performance of a breed for each outcome measured is weighed equally to determine whether a breed passes the RSPCA assessment. RSPCA-approved breeds can be used by companies signed up to the North American Better Chicken Commitment.

In contrast, the G.A.P. protocol scores test breeds on how much they vary from the thresholds set for each of the 12 welfare outcomes measured at the two target weights. A breed is then evaluated based on a total summed score (out of 100%) across all of the assessed measures. A breed with total score of 80% or above is eligible for use in the G.A.P. program, as well as the Better Chicken Commitment for the US & Canada. This feature of the G.A.P. breed assessment process to meant to ensure breed approval decisions are based on biological importance versus one-off numerical differences in the data. However, assessing breeds based on a combined final score could also cover up a breed having poor performance on a single outcome if the breed scored in line with the higher welfare thresholds for the other welfare traits measured.

HEALTH AND PRODUCTIVITY OUTCOMES

OUTCOME OR MEASURE	RSPCA BROILER BREED WELFARE ASSESSMENT PROTOCOL	G.A.P.'S BROILER CHICKEN ASSESSMENT PROTOCOL
Daily weight gain	ADG calculated at 4.85 lb final body weight • **Indoor ≤ 60 g/day** • **Free-range ≤ 52 g/day**	**No set thresholds.** Individual bird weights recorded weekly as well as daily as birds approach the two target body weights (5.5 and 7 lb), as well as the day of processing.
Feed consumption/FCR	**Feed conversion ratio (FCR) calculated at 4.85 lb body weight** **No threshold or reference value provided**	**Feed intake measured weekly** **FCR calculated weekly and at both target weights (5.5 lb and 7 lb)** **No thresholds or reference values provided for these feed consumption measures**
Mortality	**Total mortalities:** • ≤ 3% *(Excluding runts, other culls, and 1st week mortalities)*	**Total mortalities:** • ≤ 2.50% (± 0.37) from day 8 to 5.5 lb • ≤ 2.50% (± 0.37) from 5.5 to 7 lb *(Excluding 1st week mortalities)*
Culling & rationale *(Legs, runts, sickness, other)*	**Leg culls, heart attack, ascites:** • ≤ 1% each **Other dead:** • ≤ 1.5% **Runts & other culls:** • For information only *Birds culled if their gait score ≥4 or if in poor health and unlikely to benefit from treatment.*	**Culls from day 1 to 5.5 lb:** • ≤ 5% (± 0.21) **Culls from 5.5 to 7 lb:** • ≤ 2.5% (± 0.21) *Reasons for culling include runts or birds with gait scores of 2, FPD scores of 2, or HB scores ≥ 4, sick or injured birds without chance of recovery, or injured accidentally.*
Skin lesion scores *[Incidence and severity of foot pad dermatitis (FPD), hock burn (HB), breast blisters]*	HB measured using 0-2 scale • **HB scores 0 & 0.5 combined:** ≥ 80% • **HB score 0 but pink/swollen:** ≤ 25% • **HB score 0.5:** ≤ 10% FPD measured on 0-2 scale • **FPD scores 0 & 0.5 combined:** ≥ 90% • **FPD score 0 but pink/healed/swollen:** ≤ 8% • **FPD score 0.5:** ≤ 1%	HB measured using 0-4 scale **% Mild HB scores of 1 & 2:** • ≤ 15% (± 3.99) at 5.5 lb • ≤ 20% (± 5.09) at 7 lb **% Severe HB scores of 3 & 4:** • ≤ 0% (± 1.15) at 5.5 lb • ≤ 0% (± 1.24) at 7 lb FPD measured on 0-2 scale **% Mild FPD Scores of 1:** • ≤ 35% (± 4.66) at 5.5 lb • ≤ 45% (± 4.82) at 7 lb **% Severe FPD Scores of 2:** • ≤ 0% (± 1.92) at 5.5 lb • ≤ 0% (± 2.69) at 7 lb

Leg health & mobility *(Lameness/gait scoring /walking ability, leg deviations/valgus-varus angulation)*	Gait measured using 0-5 scale • **Gait scores 0, 1, 2 combined:** ≥ 95% • **Gait score 2:** ≤ 60% • **Gait score 3:** ≤ 5% **Leg deviations** (scored as angle-in, angle-out, twist, or rotation): • For information only	Gait measured using 0-3 scale **Gait score 1:** • ≤ 20% (± 0.50) at 5.5 lb • ≤ 25% (± 0.50) at 7 lb **Gait score 2:** • ≤ 0% (± 0.50) at 5.5 lb • ≤ 0% (± 0.50) at 5.5 lb **Valgus-Varus leg angulations** scored on 0-3 scale: **% Intermediate & severe (scores 2 & 3 combined):** • ≤ 0% (± 0.50) at 5.5 lb • ≤ 0% (± 0.50) at 5.5 lb
Feather cover & cleanliness	Feather cover scored from 0-2 • **Scores 0 & 0.5:** ≤ 70% • **Score 0.5:** ≤ 50% • **Score 1:** ≤30% Breast plumage dirtiness measured on 0-2 scale • **Score 0:** 100% • **Score 1:** ≤ 70% • **Score 2:** ≤ 50%	**Not assessed**
Morbidity	**The impact of illness during the trial must be recorded.** If illness results in death, reason for death must be recorded.	**The incidence of sickness/illness must be recorded.** If birds become sick/ill, the number of birds affected, diagnosis, treatment, and outcome of treatment must be recorded.

BEHAVIORAL OUTCOMES

OUTCOME OR MEASURE	RSPCA BROILER BREED WELFARE ASSESSMENT PROTOCOL	G.A.P.'S BROILER CHICKEN ASSESSMENT PROTOCOL
Ethogram/Activity levels *(e.g., % foraging, % time active vs. resting, dust-bathing activity, enrichment use, group obstacle testing)*	**Only walking ability assessed with specific thresholds.** Video recordings taken throughout the trials to show the general behavior and activity of both the test and control breeds. However, not used for the assessment and there are no set thresholds.	**Number of birds on top of the straw bale enrichment:** • ≥ 8% (± 0.75) of birds on straw bale at 5.5 lb • ≥ 8% (± 0.50) of birds on straw bale at 7.0 lb **Group obstacle testing** following 1 hour of feed deprivation: • ≥ 7 (± 0.98) obstacle crossings at 5.5 lb • ≥ 7 (± 0.93) obstacle crossings at 7 lb
Ability to perch	**Protocol requires that perches be placed in pens, but perching ability not assessed.**	**Number of birds on top of the perch during daylight hours:** For information only

PROCESSING/QUALITY OUTCOMES

OUTCOME OR MEASURE	RSPCA BROILER BREED WELFARE ASSESSMENT PROTOCOL	G.A.P.'S BROILER CHICKEN ASSESSMENT PROTOCOL
Slaughter outcomes	**Any slaughter data that is available must be recorded, including percentages of dead-on-arrivals, factory rejections, carcass downgrades, breast blisters, scratches, and grade A's.** However, data not analyzed for assessment and there are no set thresholds.	**No slaughter outcomes measured besides muscle integrity.** Assessment focuses on thresholds for mortalities, culls, and morbidity during grow out to a final body weight of 7 lb.
Flock uniformity	**Not assessed**	**Not assessed**
Processing yields *(Breast, thigh meat)*	**Not assessed**	**Not assessed**
Muscle integrity *(Incidence of white striping, wooden breast, or other abnormalities)*	Data on white striping and wooden breast collected upon request, but not required for protocol. Measurement scale not provided in protocol.	Wooden breast measured using 0-3 scale **% Severe wooden breast (score 3):** • ≤ 10% (± 2.72) at 5.5 lb • ≤ 15% (± 2.76) at 7 lb White striping measured using 0-3 scale **% Severe white striping (scores 2 & 3):** • ≤ 5% (± 2.30) at 5.5 lb • ≤ 10% (± 2.33) at 7 lb
Meat texture	**Not assessed**	**Not assessed**
Skin condition *(Scratches, tears, color)*	**Scratches and breast blisters recorded at slaughter**, if data is available. However, the data is not used for breed assessment and there are no set thresholds.	**Not assessed**
Fat *(Color and %)*	**Not assessed**	**Not assessed**

LITERATURE CITED

1. Cobb-Vantress. *Cobb 500 Broiler Performance & Nutrition Supplement (2022)*. https://www.cobb-vantress.com/assets/Cobb-Files/product-guides/5502e86566/2022-Cobb500-Broiler-Performance-Nutrition-Supplement.pdf (2022).
2. Aviagen. *Ross 308: Broiler performance objectives*. https://en.aviagen.com/assets/Tech_Center/Ross_Broiler/Ross308-308FF-BroilerPO2019-EN.pdf (2019).
3. Aviagen. *Ross 708: Performance Objectives*. https://en.aviagen.com/assets/Tech_Center/Ross_Broiler/Ross-708-BroilerPO2019-EN.pdf (2019).
4. Bessei, W. Welfare of broilers: A review. *Worlds. Poult. Sci. J.* **62**, (2006).
5. Hartcher, K. M. & Lum, H. K. Genetic selection of broilers and welfare consequences: a review. *https://doi.org/10.1080/00439339.2019.1680025* **76**, 154–167 (2019).
6. Rayner, A. C., Newberry, R. C., Vas, J. & Mullan, S. Slow-growing broilers are healthier and express more behavioural indicators of positive welfare. *Sci. Rep.* **10**, (2020).
7. Baxter, M., Richmond, A., Lavery, U. & O'Connell, N. E. A comparison of fast growing broiler chickens with a slower-growing breed type reared on Higher Welfare commercial farms. *PLoS One* **16**, (2021).
8. Shim, M. Y. *et al.* The effects of growth rate on leg morphology and tibia breaking strength, mineral density, mineral content, and bone ash in broilers. *Poult. Sci.* **91**, 1790–1795 (2012).
9. Wallenbeck, A., Wilhelmsson, S., Jönsson, L., Gunnarsson, S. & Yngvesson, J. Behaviour in one fast-growing and one slower-growing broiler (Gallus gallus domesticus) hybrid fed a high- or low-protein diet during a 10-week rearing period. *Acta Agric. Scand. A Anim. Sci.* **66**, 168–176 (2016).
10. Dixon, L. M. Slow and steady wins the race: The behaviour and welfare of commercial faster growing broiler breeds compared to a commercial slower growing breed. *PLoS One* **15**, 1–20 (2020).
11. Santos, M. N. *et al.* In pursuit of a better broiler: walking ability and incidence of contact dermatitis in conventional and slower growing strains of broiler chickens. *Poult. Sci.* **100**, 101309 (2021).
12. de Jong, I. C. *et al.* Providing environmental enrichments affects activity and performance, but not leg health in fast- and slower-growing broiler chickens. *Appl. Anim. Behav. Sci.* **241**, 105375 (2021).
13. Dawson, L. C., Widowski, T. M., Liu, Z., Edwards, A. M. & Torrey, S. In pursuit of a better broiler: a comparison of the inactivity, behavior, and enrichment use of fast- and slower growing broiler chickens. *Poult. Sci.* **100**, (2021).
14. National Chicken Council (NCC). *National Chicken Council (NCC) US Chicken Consumption FINAL Report 240718*. (2018).
15. Manning, L., Chadd, S. A. & Baines, R. N. Key health and welfare indicators for broiler production. *Worlds. Poult. Sci. J.* **63**, 46–62 (2007).
16. Grandin, T. Poultry Slaughter Plant and Farm Audit: Critical Control Points for Bird Welfare (Updated July 2009). http://www.grandin.com/poultry.audit.html (2009).
17. Main, D. C. J., Whay, H. R., Leeb, C. & Webster, A. F. J. Formal animal-based welfare assessment in UK certification scheme...: Ingenta Connect. *Anim. Welf.* **16**, 233–236 (2007).
18. Marchewka, J., Watanabe, T. T. N., Ferrante, V. & Estevez, I. Welfare assessment in broiler farms: Transect walks versus individual scoring. *Poult. Sci.* **92**, 2588–2599 (2013).
19. Webster, J. The assessment and implementation of animal welfare: theory into practice. *Rev. sci. tech. Off. int. Epiz* **24**, 723–734 (2005).
20. Dawkins, M. S., Lee, H. joo, Waitt, C. D. & Roberts, S. J. Optical flow patterns in broiler chicken flocks as automated measures of behaviour and gait. *Appl. Anim. Behav. Sci.* **119**, 203–209 (2009).

21. Silvera, A. M. *et al.* Lameness assessment with automatic monitoring of activity in commercial broiler flocks. *Poult. Sci.* **96**, 2013–2017 (2017).
22. Global Animal Partnership. *Global Animal Partnership's 5-Step® Animal Welfare Standards for Chickens Raised for Meat v3.2*. https://globalanimalpartnership.org/wp-content/uploads/2020/05/G.A.P.s-Animal-Welfare-Standards-for-Chickens-Raised-for-Meat-v3.2.pdf (2020).
23. Wilhelmsson, S., Yngvesson, J., Jönsson, L., Gunnarsson, S. & Wallenbeck, A. Welfare Quality® assessment of a fast-growing and a slower-growing broiler hybrid, reared until 10 weeks and fed a low-protein, high-protein or mussel-meal diet. *Livest. Sci.* **219**, 71–79 (2019).
24. de Jong, I. C. *et al.* Providing environmental enrichments affects activity and performance, but not leg health in fast- and slower-growing broiler chickens. *Appl. Anim. Behav. Sci.* **241**, 105375 (2021).
25. Castellini, C. *et al.* Adaptation to organic rearing system of eight different chicken genotypes: Behaviour, welfare and performance. *Ital. J. Anim. Sci.* **15**, 37–46 (2016).
26. Bokkers, E. A. M. & Koene, P. Behaviour of fast-and slow growing broilers to 12 weeks of age and the physical consequences. *Appl. Anim. Behav. Sci.* **81**, 59–72 (2003).
27. Malchow, J., Berk, J., Puppe, B. & Schrader, L. Perches or grids? What do rearing chickens differing in growth performance prefer for roosting? *Poult. Sci.* **98**, 29–38 (2019).
28. de Jong, I. C., van Harn, J., Gunnink, H., Hindle, V. A. & Lourens, A. Footpad dermatitis in Dutch broiler flocks: Prevalence and factors of influence. *Poult. Sci.* **91**, 1569–1574 (2012).
29. The Royal Society for the Prevention of Cruelty to Animals (RSPCA). RSPCA Broiler Breed Welfare Assessment Protocol. https://www.rspca.org.uk/documents/1494935/9042554/RSPCA+Broiler+Welfare+Assessment+Protocol+May17.pdf/a8dfa8ff-69ed-e1ab-c908-b1523e4ec642?t=1553171031284&download=true (2017)
30. Torrey, S. *et al.* *Final Research Results Report Prepared for Global Animal Partnership*. https://globalanimalpartnership.org/wp-content/uploads/2020/09/Better_Chicken_Project_Summary_Report_Global_Animal_Partnership.pdf (2020).
31. Dawkins, M. S., Donnelly, C. A. & Jones, T. A. Chicken welfare is influenced more by housing conditions than by stocking density. *Nature* **427**, 342–344 (2004).
32. Official Journal of the European Union. *COMMISSION REGULATION (EC) No 543/2008 of laying down detailed rules for the application of Council Regulation (EC) No 1234/2007 as regards the marketing standards for poultrymeat*. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:157:0046:0087:EN:PDF (2008).
33. Global Animal Partnership. *Global Animal Partnership's Better Chicken Project: Broiler Chicken Assessment Protocol v1.0*. www.globalanimalpartnership.org/standards/chickens. (2021).

Compassion is recognized as the leading international farm animal welfare charity. This organization was founded in 1967 by Peter Roberts, a British dairy farmer, who became concerned about the development of intensive factory farming.

For more information, visit www.ciwf.com

Food Business Program

Compassion in World Farming's Food Business team works in partnership with leading manufacturers, food service businesses, restaurant chains, and supermarket retailers that have the ability to positively impact large numbers of animals in their supply chains.

We believe in collaboration and a solutions-led approach, developing relationships that are based on trust, mutual benefit, and recognizing progress.

For more information, visit compassioninfoodbusiness.com

Contact Us

Compassion in World Farming, Inc.
211 East 43rd Street, 7th Floor
New York City, NY
USA 10017
(678) 902-CIWF
info@ciwf.com