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Assessment of University of Guelph Breed Study Initial Findings

Prepared by Compassion in World Farming, September 2020

The recent release of initial summary findings from the University of Guelph's study adds significant knowledge to the existing scientific literature on potential welfare outcomes of different broiler breeds. As with the RSPCA study released earlier this year, this research from Guelph provides further evidence that today's industry-standard – commonly referred to as "conventional" – broiler strains had poor welfare outcomes. This research reaffirms that breeding chickens primarily for production traits, such as fast growth, high breast meat yields, and feed efficiency, is detrimental to their welfare. A brief overview of the methodology, results, and future implications of the Guelph study is provided below:

OVERVIEW OF SUMMARY REPORT

Methodology

This two-year study compared the welfare of 16 strains of commercially-available broiler breeds based on a variety of animal-based measures of their health, behavior, anatomy, physiology, performance, and meat quality. Physical discomfort and potential pain was evaluated through assessments of bird activity, leg health (presence of footpad or hock lesions), and behavioral expression, including testing the birds' capacity to stay upright or move to either avoid aversive stimuli (latency-to-lie test) or access food and water after a period of withdrawal (obstacle test). Over eight trials, the outcomes were measured at similar weights – Target Weight 1 (TW1) 4.6 lbs/2.1 kg and Target Weight 2 (TW2) ~7 lbs/3.2 kg – and at similar ages. This allowed for measurement of the individual and combined impacts of growth rate, age, body weight, and body confirmation (breast meat yield) on broiler chicken welfare.

Broiler strains were divided into four breed categories based on their rate of average daily gain to achieve TW2. Conventional strains ("CONV") included the fast-growing breeds currently used in most intensive systems in North America. The slower growing chickens were further divided into fast (FAST), moderate ("MOD"), or slow ("SLOW") growing breed categories. Birds were housed in indoor pens at a stocking density of 6.15 lb/ft2 with well-managed litter and enrichments, including a ramp and platform, pecking stone, and uspended rope.

Results

Bird Health

1. Faster growing breeds suffered from a higher incidence of footpad dermatitis (FPD) and hock burn lesions than slower growing broilers, which may be painful for the affected birds.

    a. CONV breeds showed the highest prevalence of FPD (overall and mild cases) with roughly ~78% of bird affected overall when compared to the slower growing breed categories at both target weights. Even when younger and lighter* at TW1 (34 days of age), CONV breeds had more cases of mild FPD and FPD overall than the older, heavier FAST or MOD birds (48 days of age) at this time point. Birds from CONV strains also had more severe FPD lesions (approx. 18% of birds affected) than the other breed categories at TW2 (~3-6%). However, the SLOW breeds had a high prevalence of FPD lesions (50-57% of birds affected overall) at both target weights in comparison to the FAST and MOD breeds (~30-48% of birds with FPD overall).

- Lower activity levels likely contributed to poorer litter conditions along with a greater excreta output (due to a higher feed intake) in the CONV strains leading to poorer footpad condition. For the SLOW breeds, greater bird activity and enrichment use could have caused more water leakage from pen drinker lines, which deteriorated litter quality and lead to more FPD cases in these strains.
- CONV and FAST birds had worse hock burn lesions than MOD or SLOW birds likely due to these lower activity breeds spending more time in contact with poor quality litter.

2. Breeds with faster growth rates and higher breast meat yield had greater cellular damage to the muscle tissues and disproportionate cardiovascular development, suggesting a poorer level of health.

    a. CONV breeds showed >50% higher circulating levels of creatine kinase (CK), aspartate transaminase (AST), and lactate dehydrogenase (LDH) than the slower-growing categories, meaning a much higher incidence of muscle tissue damage in these breeds negatively impacting bird health and may result in reduced mobility and pain. Those breeds with the highest breast yield also had the highest concentrations of these biochemical markers.
    b. When controlled for body weight variation, the CONV birds had 5-18% heavier heart and 3-14% lighter lung weights than the other breed categories, which can lead to CONV breeds experiencing poorer tissue oxygenation, tissue degeneration, and breathlessness especially when active.

- This suggests CONV breeds have a greater capacity to move blood around the body, but without a proportional increase in lung capacity.
  Therefore, these faster growing CONV strains are likely unable to provide the necessary oxygenated blood to support normal function and rapid growth of their tissues and dissipate the resulting metabolic heat.

3. At approximately 4 weeks of age, the fastest growing strains had the strongest leg bones, but their leg bone strength around 7 weeks of age was the same as the birds from the slowest growing breeds that were lighter and 2 weeks older.

    a. CONV breeds had 16-29% stronger leg (tibia) bones (measured as tibia breaking strength, TBS) than the other strains at TW1. At TW2, this difference in TBS was reduced to 12-18% when comparing the ~7-week-old CONV to ~9-week-old FAST and MOD strains. Whereas birds from the CONV and SLOW breeds had similar TBS at TW2.

    This suggests that modern selection criteria have addressed components of leg health in industry standard strains, but we are awaiting the complete assessment of all the recorded leg bone measures to determine acceptable growth rate thresholds to ensure overall good leg health.

Behavioral

1. Faster growing breeds spend more time inactive than slower growing breeds, even at the same age.

    a. At 26 days of age, CONV breeds spent on average 10.6% more time sitting, 3.6% less time standing, and 2% less time walking per day than the slower growing strains.
    b. At 4 weeks of age, CONV birds had more periods of inactivity per day (as measured by the wearable accelerometers) than any of the slower growing breed categories. At 5 weeks of age, CONV birds spent significantly more time inactive than the SLOW birds.
    c. CONV breeds engaged with enrichments less than any of the slower growing breeds at both 26 and 42 days of age.

    The provision of enrichments is a key component of the BCC and these findings suggest the current fast-growing commercial breeds would be unable to engage and fully benefit from the welfare benefits of an enriched environment. For instance, the raised platform allows birds to get off the floor and experience a less disturbed location to rest, escape from more dominant birds, and reduced contact with soiled litter, which results in better leg and foot pad condition.

2. As birds age, faster growing breeds cannot stand as long and have a reduced capability to move and access vital resources (feed & water) than slower growing breeds.

    a. In the “latency to lie” test, chickens from the faster growing strains sat in the water, which they consider aversive, faster than slower growing breeds at TW2. At TW1, a bird’s body weight influenced their latency to lie down, with heavier birds sitting more quickly than lighter birds of this age regardless of breed.
    b. In the group obstacle test, after an hour of deprivation, CONV and FAST birds crossed the obstacle less often to access food and water than SLOW broilers at TW2.

Production Efficiency and Meat Quality

1. The strains selected for faster growth rates had greater breast meat yields, but a lower percentage of wing, thigh, and drumstick yields than the breeds selected for slower growth rates, suggesting a more proportional distribution of weight in slower growing breeds.

   ► Greater leg muscle yield may be linked to higher activity levels and bird mobility in the slower-growing strains.

2. Breeds selected for the fastest growth and greatest breast meat yield had a higher incidence of both wooden breast (WB) and white striping (WS), two breast meat myopathies that not only represent meat quality defects, but also negatively impact bird welfare.

   a. At TW1, the CONV breeds showed the highest incidence of WB overall and more severe WB cases than the other slower growing breeds even though they were both lighter* and two weeks younger. At TW2, the CONV strains had a significantly higher number of overall (~77% of birds affected) and severe WB cases (~64%) than any of the other breed categories (prevalence of WB:12-40% of birds affected; ~3-24% with severe WB).

   ► New research suggests broilers with WB show early, chronic muscle tissue inflammation and degeneration—which may cause discomfort or pain—as well as impaired movement, reduced respiratory function, and higher mortality rates.

MOVING FORWARD

These findings demonstrate that the current industry-standard broiler strains selected for fast growth and high production efficiency experience poor welfare, even under carefully managed experimental conditions. When compared to slower-growing strains, conventional birds had worse physical health, poorer breast meat quality, and a reduced behavioral capacity – even though the CONV birds were two weeks younger than FAST, MOD, and SLOW birds when measured. This study confirms that the current conventional breeds must be replaced with slower-growing strains, which are more active, healthy, and demonstrate higher welfare outcomes prioritized in the BCC. The analysis of further data from this study will enable Global Animal Partnership to create a comprehensive criteria of welfare outcome thresholds for higher welfare breed approval under their scheme, ensuring food businesses can achieve a higher welfare standard for broilers in their supply chain while balancing important production traits.