

IPWA KEY WELFARE INDICATORS (KWIs)

# REFERENCE GUIDE



## BROILER CHICKENS

Your guide to assessing and improving poultry welfare around the world.

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Visit our website to learn more:  
[poultrywelfare.org](http://poultrywelfare.org)



# POULTRY WELFARE HAS COME A LONG WAY.

Many improvements in welfare have been brought on by advancements in our understanding of poultry genetics, nutrition, housing, and management. As the poultry industry and farmers care for more poultry and produce more food for the growing world population, the focus on welfare outcomes and the desire to increase knowledge about poultry welfare are critically important.

Continuous improvement in welfare is a journey, and there is still an opportunity to do better. **For the purposes of this guide, we will be focusing on how to incorporate welfare assessments into poultry management to drive further improvements. This guide was built to help you assess your poultry welfare at the foundational level based in proven science that can be consistently used around the world.**

## ABOUT THE INTERNATIONAL POULTRY WELFARE ALLIANCE

Experts tasked with improving poultry welfare programs around the world recognized a need for an unbiased, science-based resource focused on tackling the complexities of poultry welfare. They needed an independent authority to bring together the perspectives of all the stakeholders in the supply chain and to bring forward resources that support improved welfare. That's where IPWA and the concept of the IPWA Key Welfare Indicators Reference Guide was built.

Our membership is made up of production managers, veterinarians, research experts, welfare program leaders, and other experts in poultry care and management as well as their business and consumer-facing counterparts in retail, restaurants, and nongovernment organizations. Beyond these experts, much of IPWA's work is done transparently, welcoming input from specialty experts and the general public.

## WHAT DOES “POULTRY WELFARE” MEAN IN PRACTICE?

According to the World Organisation for Animal Health Terrestrial Code (formerly OIE), welfare is defined as “the physical and mental state of an animal in relation to the conditions in which it lives.” This is a broad definition that encompasses the top-level care we aspire to provide for poultry. As IPWA started on this journey to develop a practical key welfare indicator guide for poultry, our experts evaluated globally recognized welfare frameworks that have been commonly used to enhance our understanding of animal welfare. These welfare concepts included the Five Freedoms and the Five Domains. These models help inform and increase the understanding of the welfare state of animals, the role that humans have in providing for the physical and mental needs of animals, and how the animals' experiences can be maintained or improved.

Providing animal care is complex and requires customization for each species, age or type of animal and the environment. While IPWA recognizes that there are many different definitions and standards for poultry welfare, our experts believe that this this holistic approach to welfare and the development of this KWI guide will help improve the overall welfare state and welfare outcomes of poultry around the world.

**IPWA has developed this guide to provide a reference to help those managing and caring for poultry understand key welfare indicators and how they can be used to improve welfare outcomes.**

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IPWA MEMBERS

500+

INDIVIDUALS

85+

ORGANIZATIONS

RESEARCH & EDUCATION COMMITTEE

18

RESEARCH EXPERTS  
ACADEMICS

HEALTH & WELFARE COMMITTEE

57

PRODUCTION MANAGERS, WELFARE  
PROGRAM SUPERVISORS, BUSINESS OWNERS,  
VETERINARIANS, AND OTHER PROFESSIONALS

IPWA BOARD OF DIRECTORS

14

MEMBERS

THANK YOU ALL FOR BEING A PART  
OF THIS DEVELOPMENT PROCESS.



# DEVELOPMENT

## POULTRY WELFARE IS A PRIORITY FOR THE SUPPLY CHAIN AND THE GLOBAL POULTRY INDUSTRY.

While there are different welfare programs and standards used around the world, there was a need for a comprehensive list of KWIs with standardized instructions for the measurements that can be used in different poultry species and at different production stages. IPWA's subject matter experts formed multistakeholder groups to discuss and develop a list of KWIs that can be applied to poultry, broken out by the specific needs of broilers, layers, and turkeys.

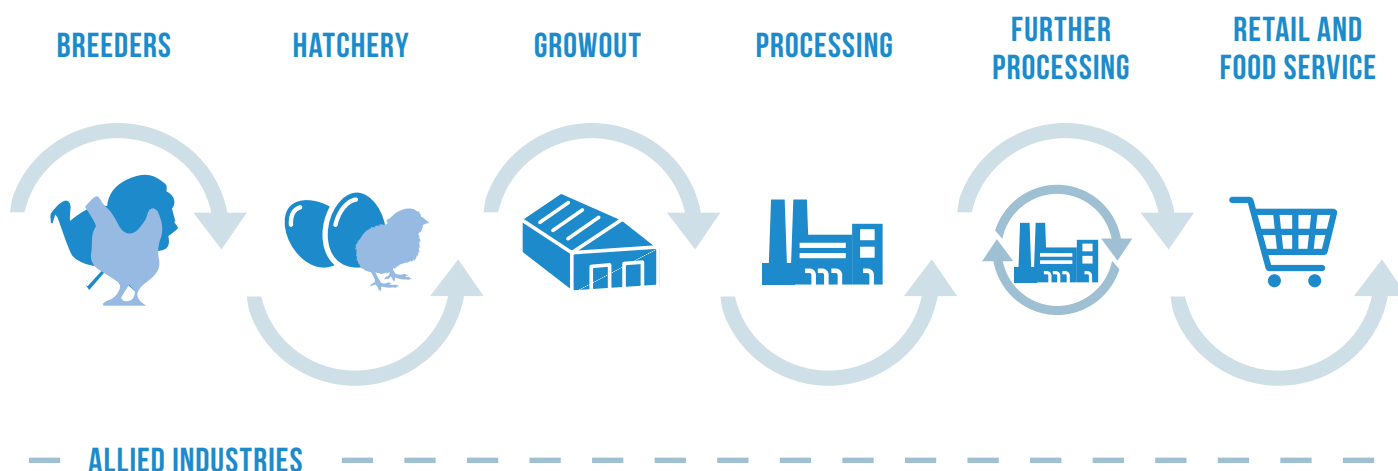
The IPWA Poultry Health & Welfare Committee, who served as the primary authors, was made up of 57 production managers, welfare program supervisors, business owners, veterinarians, and other professionals actively involved in the creation, implementation, or verification of welfare protocols for poultry. Their expertise and current work covered every poultry market in the world. The IPWA Research & Education Committee completed a rigorous academic review and revision process of the guide, bringing together 18 research experts from the world's leading institutions and growing poultry research programs. IPWA is also led by a diverse board of 14 directors that oversee the execution of the strategic vision of the organization. They also reviewed the IPWA KWI Guide and drove revisions that ensure this resource holds true to the mission of IPWA to uphold credible science and a transparent approach to welfare.

In the spirit of transparency and understanding that resources only bring their full value when put into practice in production, IPWA has brought its draft KWI Guide to you. This guide was opened for full membership and public comment to gather even wider input into what is most needed in the industry to drive improved welfare outcomes in poultry through better assessment. Thank you for being a part of this development process.

The membership of IPWA is constantly growing. At the time of publishing this guide, IPWA has 90+ member organizations and more than 30+ individual scientists that make up the alliance. This document was authored by these members and the IPWA director of communications, Candace Bergesch, with oversight and support from executive director, Ryan Bennett, and several contracted experts.

**IPWA will update the KWI Guide in future versions as new science, technology, or learnings become available which contribute to the ability to measure, manage, and implement outcomes-based welfare indicators.**  
Direct questions to [info@poultrywelfare.org](mailto:info@poultrywelfare.org).

## COMPLETE SUPPLY CHAIN AND MULTI-STAKEHOLDER ENGAGEMENT





# DEFINITIONS & GOALS

Experts created the IPWA KWI Reference Guide to help those who manage poultry understand specific factors that can be measured, monitored, and managed to inform improved welfare. Each KWI included here is based on the latest available scientific consensus and designed to be able to be applied at farms, hatcheries, and processors around the world.



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**This guide includes key welfare indicators (KWIs) — factors that can be measured, monitored, and managed to assess and/or improve poultry welfare.** Welfare is a complex subject with scientific, ethical, economic, cultural, social, religious, and political considerations. But simply put, poultry welfare describes the culmination of every step taken to provide high-quality care for our birds.

**The KWIs are a subset of measures selected by the multistakeholder group of welfare experts, that have a scientifically proven, clear, and significant correlation with poultry welfare.** The majority of KWIs are outcomes-based measures — the best available way to accurately assess the welfare status and impacts on the birds. Bird- and environment-based measures are only used where outcomes-based measures have not yet been developed and proven. Other areas that lack proven, objective measures at this time (e.g. bird natural behaviors) are not included, but that does not mean they could not be in future versions. IPWA aims to make this a living document that is updated as our scientific understanding advances.

**These indicators were determined to have the highest potential for improvement and/or hold substantial risk if not monitored effectively.** It is not intended to be all-encompassing of every measurement needed to provide optimal care for poultry. However, this guide does provide clear definitions, reasoning, observations, measurements, and resources for the most important welfare indicators — focusing on providing users with a place to start.

**Management practices are crucial to poultry welfare, but IPWA did not include husbandry direction in this guide.** The IPWA KWI Reference Guide is meant to be used as a reference for assessments and improvements and is best paired with an overall management plan and adherence to applicable welfare guidelines.

Our goals in developing this guide are to:

1. Encourage the global poultry industry to measure their progress with meaningful KWIs in their respective hatcheries, farms, transport vehicles, and processing facilities;
  2. Provide a reference guide to enhance awareness and understanding of KWIs and how to assess them for all stakeholders involved in the supply chain; and
  3. Include guidance on welfare indicators on the leading edge of research that could be incorporated into future welfare standards. **Every effort to continuously improve welfare is important, and IPWA is proud to provide the resources you need.**
- .....

## THE KEY WELFARE INDICATORS ARE:

- ✓ Outcomes-based where possible (measured on the bird, flock, or in the housing environment)
- ✓ Considerate of all poultry housing systems and sizes, with clear notes that not all KWIs apply to each
- ✓ Implementable for different levels of welfare programs (e.g., dedicated resources, staff, technology available)
- ✓ Inclusive of all regions/types of production (ensured through active efforts to secure input from representatives from different types in the development process)
- ✓ Defined in a way that is largely accessible to those actively caring and managing poultry or informing their stakeholders
- ✓ Able to be used to guide improvements of a specific welfare outcome (e.g., each KWI can be used individually or as a set)
- ✓ Packaged with implementation instructions and resources to ensure the data can be used to guide improvements

## THE KEY WELFARE INDICATORS ARE NOT:

- ✗ Setting a prescriptive performance or compliance standard
- ✗ Based on theorized recommendations — must be backed by substantial science (vetted by thorough reviews and diverse input)
- ✗ Only applicable to regions with committee members or IPWA members providing input
- ✗ Only applicable to advanced programs in developed poultry markets
- ✗ All-encompassing — some best practices are not KWIs due to variance, proven repeatability, or other factors
- ✗ Self-serving of company/organization interests *(All contributors and leaders set aside their vested interests for what is best for the poultry and future of production in line with IPWA's values.)*

# HOW TO USE THIS GUIDE

The IPWA KWI Reference Guide was created to be a useful tool for those involved in directly in poultry production and informative for their stakeholders and customers. The IPWA KWI Guide is a reference for poultry professionals to measure, monitor, and manage key indicators to drive continuous improvement in welfare outcomes.

## KEY CONSIDERATIONS

IPWA designed the KWIs to be measurable and coupled with observations that support the assessment process. The list of KWIs developed by IPWA are designed to be outcomes-based where possible and flexible so they can be implemented in many different geographic areas and in various types of poultry management programs and housing systems. This set of KWIs can be used to drive consistency throughout your supply chain and beyond, as it is open for all industry use and made to apply globally.

Everyone involved in the care and management of poultry has something to learn from the IPWA KWI Guide. Whether you are looking for ways to improve your welfare assessment or better your understanding of the important indicators of welfare, the IPWA KWI Reference Guide is a great place to start.



### **THERE ARE NO MANDATORY MINIMUMS, MAXIMUMS, OR RANGES PROVIDED IN THIS GUIDE.**

The KWIs included in this guide are not a set of requirements to be met. It is a reference for each farm, hatchery, processor, or full supply chain to use to build and decide on their own what goals and requirements that align with their business goals and applicable standards and guidelines. All measurements included here are designed to be flexible and customizable.

## HOW TO BEGIN

If you are the manager of the welfare program or working in any other capacity at a farm, hatchery, or processor, you can review the IPWA KWI Reference Guide in its entirety to determine what measures you already have in place, which you could add to improve your program now, and where to set your sights for improvement for the future.

These measures can be implemented as a spot assessment or real-time monitoring protocols. (Each KWI provides some direction on this recommended implementation.)

This guide was built to help you assess your poultry welfare at the foundational level based in credible science that can be consistently used around the world. It is not a standard to audit against nor a specialty standard that can be used to seek certification. It cannot be used as a replacement for standards, guidelines, or applicable regional- or industry-based regulatory guidance. **The IPWA KWI Guide is a reference for assessing key indicators of welfare that you can use to inform improvements to your management for greater positive outcomes beyond regulation compliance.**

If you are engaging with the IPWA KWI Guide to better your understanding of poultry welfare, start with the reasoning sections and consult with those who manage poultry directly to discuss how the concepts can be applied to your business. There are many cases where the poultry sector has specialized terms comparatively to other species and livestock categories as well as regional differences that an expert can best explain. If you have questions about application or want to explore ways to learn more, feel free to contact IPWA at [poultrywelfare.org](https://poultrywelfare.org).

**SCAN QR CODE  
TO CONTACT IPWA STAFF OR VISIT  
POULTRYWELFARE.ORG**





**OUR END GOAL IS TO CREATE A PRACTICAL  
REFERENCE GUIDE TO HELP UNDERSTAND  
AND IMPROVE POULTRY WELFARE.**



## IMPROVE TRAINING

The IPWA KWI Reference Guide includes assessments, implementation guidance, and reasoning that are best applied with intentional training. If you are in charge of the welfare training protocol or implementing the adherence to one, this guide can be a valuable reference to educate yourself and your colleagues on the “why” behind important welfare indicators.

Knowing the reasoning behind why assessments or practices are recommended can help with both the retention of skills and consistency of using them, even when unsupervised.

If you are involved in the management of poultry, you can use information in the observations sections of each KWI to monitor and measure KWIs for the birds in your care. Each assessment includes areas that can be objectively measured or subjectively observed to allow for better welfare understanding. You may also be asked to execute the assessments by a manager, and the KWI Guide includes helpful instructions and references to help you get the most accurate results.

## IMPROVE SUPPLY CHAIN COLLABORATION AND UNDERSTANDING

The complexities of poultry welfare are an everyday challenge for poultry managers, and yet this effort is often overlooked. If you are indirectly working with poultry producers in your supply chain, you can use this guide to become an informed stakeholder of the depth and breadth of the welfare programs.

Whether the information included here is new to you or an enhancement to your existing understanding,

IPWA recommends making your next step having conversations with your colleagues about the measures in place within your supply chain and areas where they are feeling challenged. By reading through this guide, you will be equipped to have more productive and informed conversations with those in your supply chain.

If you are in production, pass this guide along to your supply chain partners and/or customers to help them have easy access to resources that help bridge the gap between your disciplines. When all parties align around the objectives and better understand the essential functions, that supply chain can more clearly see their path to improvement and mutual benefit.

## WHEN SHOULD YOU ASSESS?

Some KWIs may be measured at the end of the flock or production cycle and provide a final overview or comprehensive result of the factor. Other KWIs may be measured in real time during the production cycle and provide an insightful perspective at that point in time. These factors allow for corrective actions to prevent undesirable outcomes. Both of these can be compared with expected benchmarks for flocks and are thus both included in the IPWA KWI Guide to promote continuous improvement in welfare outcomes.

**WHEN ALL PARTIES ALIGN AROUND THE  
OBJECTIVES AND BETTER UNDERSTAND THE  
ESSENTIAL FUNCTIONS, THAT SUPPLY CHAIN  
CAN MORE CLEARLY SEE THEIR PATH TO  
IMPROVEMENT AND MUTUAL BENEFIT.**

# AIR QUALITY

## REASONING

**Measuring and monitoring air quality is important for bird comfort and health.** There are different measurements and needs as applicable to the environment being monitored, but, in all types, good air quality can contribute to good welfare outcomes. The presence of irritants or other air quality issues can cause negative outcomes and be an indicator of the presence of a welfare concern.

Because air quality issues affect the entire environment, negative outcomes can be severe and affect a large number of birds in a short period of time. Frequent measurement or monitoring is recommended to allow for the quickest detection and response to an issue (as outlined by the included measurements). Regular training of workers on how to use equipment and detect problems is essential to preventing negative welfare outcomes as a result of poor air quality.

Air quality issues are also related to other KWIs (e.g., [litter quality](#), [footpad condition](#), [leg condition](#), [mortality](#)).

Air quality is important in all environments for poultry, as air quality issues can contribute to health challenges in outdoor (e.g., pollution) and indoor (e.g., natural emission of waste gases) settings. Poultry reared indoors in climate-controlled barns can be protected from exposure to outdoor challenges such as detrimental climate changes, but they depend on functional ventilation systems and appropriate settings to ensure air quality is maintained within thresholds best suited for poultry.

**Specifically, high levels of ammonia, dust, humidity, carbon monoxide, and carbon dioxide can negatively impact poultry welfare and flock health.** For example, high levels of ammonia can negatively impact birds' immune systems, weight gain, feed conversions, and overall mortality.

- > **Dust** can be the result of dry litter in the environment or a sign that ventilation equipment is working improperly. However, there is some dust expected with birds moving normally. Assessing the dust particulate present is key to understanding if there is an excess and mitigation practices may be needed.
- > **Temperature and humidity** can be assessed objectively with air monitoring devices and their outcome can also be subjectively assessed as they relate to bird comfort and activity level. If ventilation systems are not managed correctly, relative humidity in the air can contribute to excessive moisture for indoor-housed poultry which can cause air and litter quality concerns. Humidity can also contribute to excessive moisture, which can cause air and [litter quality](#) concerns. Even the temperature and/or humidity outside a controlled environment can also present air quality challenges. There is a limit on how much the humidity in a protected environment can vary relative to the external environment.
- > **Air speed** can also be assessed to determine the ventilation management. Air movement plays a role with evaporated cooling, proper exchange of air, and temperature/humidity management. Air speed deviations can be an indication of improper ventilation that warrants equipment inspection or other corrective action. As birds grow and if stocking density changes, the temperature, humidity, and ammonia should be assessed to ensure the facility is equipped to manage flock needs.



**THE MEASUREMENTS AND CORRECTIVE ACTIONS RELATED TO AIR QUALITY IN INDOOR ENVIRONMENTS ARE OFTEN MECHANICAL.** For example, carbon monoxide levels can be indicative of lack of airflow or equipment (brooders) in need of service. New and varied heating systems can also play a role. However, they can also be environmental, such as the proximity to outdoor irritants or excessive moisture in the [litter](#).



**AMMONIA TEST PAPER METHODS AND VISUAL DUST ASSESSMENTS HAVE HAD THEIR ACCURACY QUESTIONED DUE TO THE INNATE SUBJECTIVITY OF USING A VISUAL MEASURE THAT CAN VARY PERSON TO PERSON.** Using ammonia test papers is a great place to start with the goal of adding more advanced measurement systems as you can.



**High levels of ammonia, dust, humidity, carbon monoxide, and carbon dioxide can negatively impact poultry welfare and flock health.**

**DEFINITION:** Air quality is the assessment of the characteristics of the atmosphere within the environment where birds are housed.

## OBSERVATIONS & MEASUREMENTS

### OBSERVATIONS:

#### Bird-based:

Birds or the flock can show physical evidence of air quality issues including signs of respiratory distress, redness around the eyes, blindness, airsacculitis, mortality. Workers assessing mortality or doing regular inspections of the flock should be trained to identify potential indicators of an air quality issue and take action to investigate further. If negative bird outcomes are observed, contact a veterinarian or experienced poultry specialist to diagnose, as there could be several possible causes beyond air quality.

- > **Reference:** [AAAP Avian Disease Manual, Integument Disorders, Keratoconjunctivitis](#)
- > **Reference:** [Poultry DVM, Ammonia Toxicity](#)

#### Environment-based:

1. **Ammonia** can be detected by human observation as it presents a strong odor, but detecting the levels (ppm) by humans is unreliable, as people have different sensitivities to ammonia (e.g., ability to detect an odor) and ammonia concentrations may vary in different areas of the poultry environment. Ammonia can exceed the healthy threshold for birds well before it can be detected by human observation. Mechanical measurement is recommended.

2. **Air speed** can be observed and felt by workers based on visual indications of working ventilation equipment and feel of the environment, but it shouldn't be relied upon. Mechanical measurement of air speed in various parts of a poultry house is recommended. There can be issues present far before a worker can detect the issue, and ventilation issues can cause mortality.
  3. **Dust** particles can be observed by workers using a visual test. To test, a worker can stand in the center of the environment and look to each end to determine if they can see a predetermined set distance clearly (no more than a slight haze), based on the facility design and production type. If not, there may be excessive dust in the air, and measurements should be taken.
    - Blackout shades or other window or ventilation coverings can also be inspected to look for dust buildup in the environment or on equipment.
    - Workers should be trained to observe variances from a healthy environment for poultry and know the proper protocol to investigate further using measurements.
- > **Reference:** ["Poultry Dust — What You Need to Know About Impact on Bird Health," Penn State Extension 2020](#)



View of a climate-controlled broiler breeder chicken house.

PHOTO CREDIT: BIGDUTCHMAN

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AND RESOURCES



# AIR QUALITY

## OBSERVATIONS & MEASUREMENTS (CONTINUED)

### MEASUREMENTS:

Follow instructions to assess each of the core areas of air quality for the most comprehensive measurement. For the best results, sample several different types of areas within the environment to ensure the readings are representative of the air quality in the full atmosphere (e.g., near walls, corners, center of area, near equipment). Each measurement can also be sampled at varying times of day and heights to ensure that the density of present gases or irritants don't skew readings (e.g., at ground level, bird's head level, or at vents). Mechanical tools should be calibrated regularly. Tools can become unreliable without calibration and adherence to care and maintenance guidelines.

1. **Ammonia:** Use an ammonia test strip or ammonia measuring device to evaluate ammonia at the level of the bird's head. Test strips and other tools come equipped with specified instructions for each test type. Reference the welfare standards that your organization and/or region adheres to for more detailed guidance on the threshold.
  - > **Reference:** ["Measuring Ammonia Levels in Poultry Houses," University of Georgia Extension 2017](#)
  - > **Reference:** ["Detecting Ammonia in Poultry Housing Using Inexpensive Instruments," Penn State Extension 2019](#)
  - > **Reference:** [Poultry Houses and Ammonia: Test Strips, Penn State Extension 2021](#)
  - > **Reference:** [Accurately Measuring Ammonia Levels in Poultry Houses, Jones-Hamilton Ag](#)
2. **Humidity:** High humidity can indicate insufficient ventilation or less than adequate conditions with **litter** that can negatively impact bird health. Evaluate relative humidity with installed sensors or sample with a meter.
  - > **Reference:** [University of Georgia 2011, "Relative Humidity...The Best Measure of Overall Poultry House Air Quality"](#)
3. **Carbon monoxide and/or carbon dioxide:** Evaluate carbon monoxide and/or carbon dioxide at the level of the bird's head with installed sensors or sample with a meter.
  - > **Reference:** [University of Georgia Extension 2007, Carbon Monoxide Measuring and Monitoring](#)
  - > **Reference:** [Best Management Practices, Winter Ventilation](#)
4. **Dust:** Use a measuring device to evaluate dust in air (particulate matter) in the environment or use the visual observation test.
  - > **Reference:** [Testing Poultry Dust Mitigation Practices, Iowa State University 2020](#)
  - > **Reference:** ["Poultry Dust — What You Need to Know About Impact on Bird Health," Penn State Extension 2020](#)
5. **Air speed:** Where tunnel ventilation is used or other cases where applicable, air speed can be measured. Fans and ventilation are used to manage humidity and temperature as well. Evaluate air speed with an anemometer in multiple areas based on the facility design for best results (e.g. inlets, center). Ensure each anemometer is calibrated and workers are trained on that specific tool's use.
  - > **Reference:** [University of Georgia, Average Tunnel Air Velocity](#)



**CARBON MONOXIDE LEVELS ARE VERY DIFFICULT TO BE DETECTED BY HUMAN OBSERVATION, AS IT IS ODORLESS.** Carbon monoxide should be monitored in any partially or fully closed environment (e.g. barn, shelter with machinery). Unsafe levels can yield nausea, dizziness, mental confusion, drowsiness, headache, or worsening symptoms in people working in the environment. Because of the density of the gas, the birds may have an unsafe level without human effects.

- Brooder equipment can also contribute to a carbon monoxide issue. There may be soot on the brooders and yellow flames, which can be an indication of incomplete combustion of gas.
- Regular inspection of brooders is recommended to ensure the environment has optimal air quality.



**SPECIFIC RANGES FOR AIR QUALITY ARE NOT PROVIDED AS THESE VARY BASED ON THE SPECIES, TYPE OF PRODUCTION, AND RELEVANT REGULATIONS.** Seek expert advice to confirm the minimum levels for your production and determine if a higher standard should be set to optimize positive outcomes.

**DEFINITION:** Air quality is the assessment of the characteristics of the atmosphere within the environment where birds are housed.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Set or evaluate protocols:** Determine and assign which role/worker(s) within the poultry environment will be responsible for actively observing and taking air quality measurements, how they will be done, and how often they will be collected based on your environment, available labor, and technology.

Assess your resources/labor to determine which air quality observations and measurements you can enact on a recurring basis.

Set or review the protocol for troubleshooting possible solutions when a potential air quality issue is observed or measured with the objective to ensure air quality levels are within the ideal range for bird health for positive outcomes. Outline what observations trigger the need for a sample measurement to be conducted.

- ✓ **Observe and measure:** It is recommended to begin with training workers to observe potential bird-based indicators of air quality issues and how to observe and measure ammonia, air speed, and humidity levels on a recurring basis.



Ammonia meters can be an effective tool to monitor air quality.

PHOTO CREDIT: BIG DUTCHMAN.

### IMPROVE:



**Increase measurement capabilities:** Over time, work up to adding all the measurements and improving training. Invest in improving measurement capabilities by improving methods, frequency, or analysis capacity. Evaluate ammonia and other air quality metrics including humidity, carbon dioxide, carbon monoxide, air speed, and dust that are relevant to the housing type and production system.

**Increase data collection/tracking:** Take samples of each metric by season, time of day, and bird age to determine if trends are present that warrant further investigation. Identify if changes are needed to achieve improved outcomes.

**Conduct further analysis:** Analyzing the data over time with guidance can reveal common factors that may be causing a challenge (e.g., in summer months in a tropical climate, current equipment may not be able to keep up and should be replaced).

**Cross-reference with other KWIs:** Compare data with other KWIs that may be linked to air quality ([litter quality](#), [footpad condition](#), [hock condition](#), etc.) and overall flock health outcomes to understand and detect trends.

**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

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REFERENCES  
AND RESOURCES





# FLOCK MORTALITY

## REASONING

**Those responsible for the health and care of poultry flocks work hard to keep mortality as low as possible.** When mortality occurs, the best option available is to track and understand the cause and if there are any trends that might indicate a specific health or welfare issue is involved that could be addressed to prevent future negative outcomes.

Mortality can be measured and analyzed as a sample or cumulatively to provide insight into the overall health and welfare of the flock.

High or increasing rates of mortality (independently or as a trend) are cause for an investigation into a possible welfare concern. Regular tracking and assessment of flock mortality enables the workers to make adjustments quickly, preventing further impacts.

Digging deeper into the causes and commonalities of mortality can unearth problems with equipment, the environment, or other areas that can be observed and addressed (disease,

prolapse [breeder hens], injury, cannibalism, etc.). Workers can use mortality data to notice trends and gain understanding if further investigation is needed to correct a welfare issue. A slight increase in mortality may not be noticeable until you look at the trended data.

Weekly and cumulatively trended results can be tracked and compared with previous data on that flock, similarly aged flocks, previous farm results, and general health status outcomes for the company. Industry data and breed/species data can also be a point of comparison.

Tracking culls and mortality by cause can provide further insight into the health and welfare status of the flock. Data may indicate husbandry investigations or management modifications may be needed (e.g., changes to feed, water, ventilation, housing). And it can allow for more comprehensive corrective actions. The additional specificity in the data collection gives more direction on where to start an investigation to make improvements.



**WHEN UNEXPECTED CATASTROPHIC MORTALITY SCENARIOS OCCUR, THEY SHOULD BE RECORDED, TRACKED AND REPORTED (AS REQUIRED BY OFFICIAL STATE OR NATIONAL ANIMAL HEALTH AUTHORITIES) TO PROTECT OTHER POULTRY AND TO PROVIDE INSIGHT INTO THE EFFICACY AND ADHERENCE OF BIOSECURITY PROTOCOLS.**



**TRACKING INSTANCES OF CULLING SEPARATELY FROM MORTALITY PROVIDES MORE COMPLETE DATA THAT IS MORE USEFUL TO ASSESS WELFARE.**

The cause data can be collected at the time of discovery by any worker and/or confirmed or adjusted by a veterinarian during a diagnosis. [See cull tracking KWI](#). Setting the protocol by the production management is a key part of the assessment implementation.



**Use an existing chart of common causes of mortality or establish one for the best insight into the welfare of the flock.**

**DEFINITION:** Flock mortality is the assessment of birds that have died in the poultry house which can be tracked on an individual and flock basis as a rate and by cause.

## OBSERVATIONS & MEASUREMENTS

### MEASUREMENTS:

Record and evaluate mortality rates on the daily and weekly level for each flock, environment/barn, and the overall operation for the most complete data and greatest opportunity for prompt corrective actions. Compare on-farm mortality with previous mortality rates from past flocks or expected mortality rates for the production system for the most complete assessment.

1. **Daily and weekly mortality rate:** Collect and record total mortality on a daily and weekly basis. Set a consistent standard for the start and end time of the "daily" and "weekly" metric and be consistent.
  - The seven-day mortality rate should be calculated and sent back to the hatchery for the greatest insight.
  - **Reference:** [Scotland Agriculture and Rural Economy Directorate, 2014](#)
2. **Cumulative mortality rate:** Track the total mortality of a flock over time to analyze trends and assess possible reasons for any increase(s). For the best results, review on a weekly, monthly, and flock basis.
3. **Mortality by cause:** Segment total mortality on a daily and weekly basis by primary "likely cause" categories based on observations (e.g., disease, piling incident, fatal injury, unknown). This assessment does not need to be a formal diagnosis or at that level of detail if the categories have been established. Use an existing chart of common causes or establish one for your production environment based on common issues and/or the type of production or species raised. Track the rates over time by category to analyze mortality trends related to specific reasons.
  - After a known issue has been corrected, continuing to track and analyze mortality rates helps to determine if interventions and/or a veterinary health plan are needed for further action or if the applied corrections were effective in controlling an issue.
  - **Reference:** [University of Arkansas, 2004, "Mortality Patterns Associated with Commercial Broiler Production"](#)
  - **Reference:** [Poultry World, 2020, "How to identify cause of Mortality?"](#)



**TO INVESTIGATE FURTHER,** a veterinarian or specialist can be contacted to diagnose, conduct testing, and provide additional detail and direction.



**SPECIFIC RANGES FOR MORTALITY ARE NOT PROVIDED AS THESE VARY BASED ON THE SPECIES, TYPE OF PRODUCTION, AND RELEVANT REGULATIONS.** Seek expert advice to confirm the minimum levels for your production and determine if a higher standard should be set to optimize positive outcomes.

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Healthy, young broiler chickens on a farm.

# FLOCK MORTALITY



Free-range broiler chickens on a farm in France.

**DEFINITION:** Flock mortality is the assessment of birds that have died in the poultry house which can be tracked on an individual and flock basis as a rate and by cause.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Collect and track data:** Train workers on how to track and record daily and weekly mortality rates as part of their management practices.
- ✓ **Set or evaluate protocols:** Implement a scheduled, regular analysis of the mortality data to look for trends over time, particularly monitoring for increases. Action levels can be created based on increases or mortality levels that trigger corrective action or further investigation. Assign workers who will be responsible for the analyses and train them on the protocol to raise an issue and investigate if changes are detected.
- ✓ **Conduct analysis:** Analyze data against industry norms, species guidelines, or similar production-type data to determine if improvements can be made.



Flock mortality is a lagging indicator of a welfare challenge that can be used to inform improvements.

### IMPROVE:



**Increase data collection:** Train workers to determine a cause of each mortality occurrence and keep records categorized by common cause categories (as possible with your resources and as applicable to your production type). Start by using an existing list of common causes or creating one based to best fit your production. Work up to increasing the number of categories to provide the most valuable and specific data to inform cause investigations and other opportunities to improve positive outcomes.

**Conduct further analysis:** Analyzing the data over time with guidance can reveal common factors that may be causing a challenge. If analyzing on a weekly basis to start, increase to monthly, quarterly, and annual data review. Implement comparisons with additional industry data, your previous flock data, and other baselines that could offer further insight into if you have room for improvement. Additional comparisons against other flock data can be used to further deduce details.

**Cross-reference with other KWIs:** Compare mortality data across other KWIs such as cull tracking and [air quality](#) for greater insight into causes of mortality and the appropriate corrective actions.

**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

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# LITTER QUALITY

## REASONING

**Litter quality is a leading welfare indicator that can be used to prevent foot health issues and the possibility of resulting discomfort, lameness, or mortality in poultry. (See footpad condition KWI.)** Litter should be dry, crumbly, and easily moved by poultry within the environment for healthy footpads and good welfare outcomes.

Litter quality can also be a lagging indicator of other health challenges present in the flock (e.g., incidence of enteric viral, bacterial, or parasitic challenges) or nutritional issues (poor feed ingredient quality or improper feed formulation). Vitamin, mineral, or nutritional deficiencies or surpluses can result in metabolic conditions or issues with fecal consistency that show up in litter. Litter quality may also impact respiratory and integumentary (skin) health beyond the feet (hocks, breast).

Litter quality can also include assessment of litter depth, evaluation of the uniformity of the litter substrate (e.g., size of litter, texture of litter), and quality assurance evaluation of the litter (e.g., biosecurity evaluation).

Litter condition of the right depth and moisture level will be suitable for comfortable bedding and expressing natural behaviors (e.g., scratching, dust bathing, pecking, etc.), as applicable to the type of production/housing environment. In indoor housing systems, the better material on top of the floor is referred to as the litter. In outdoor systems, there may be no additional litter substrate, so the quality of the ground surface may need to be assessed. In outdoor systems, the ground itself can be assessed as the "litter." Each type of production environment has unique challenges when it comes to litter where corrective interventions can be explored (e.g., flock management changes, litter type changes, or facility layout/equipment changes).



**LITTER QUALITY, AIR QUALITY, LEG CONDITION, BREAST SKIN CONDITION, AND FOOTPAD CONDITION ARE ALL CLOSELY CONNECTED AND ARE BEST USED AND ANALYZED TOGETHER.** Different production types and substrates will determine if excess moisture is more or less of a challenge.



Litter substrate visible with broiler chicks at an indoor poultry farm.



**Assessing and managing litter quality regularly can help prevent foot health issues and detect flock health challenges sooner.**



**DEFINITION:** Litter quality is the assessment of the condition of the substrate/material covering the ground or floor of the poultry environment.

## OBSERVATIONS & MEASUREMENTS

### OBSERVATIONS:

1. **Litter moisture:** A clump test observation can be used for a quick assessment of litter quality.
  - **“Clump test” for litter moisture:** Evaluate a handful of litter substrate, picked from a central location or varying locations (avoiding areas directly near any feeder or drinkers). For a simple moisture assessment, collect a handful of litter and verify how it compacts when squeezed in the hand. If the litter remains in a clump when it is squeezed in the hand, it is too wet. If it is loose and flakes, the moisture content is acceptable.
2. **Litter dryness:** The outcome of too-dry litter is excessive dust observed in the environment. (Refer to [air quality](#) for observation and measurement direction.)
  - > **Reference:** [Chicken Farmers of Canada Animal Care Program Manual, p. 21](#)



Poultry worker checking litter quality.

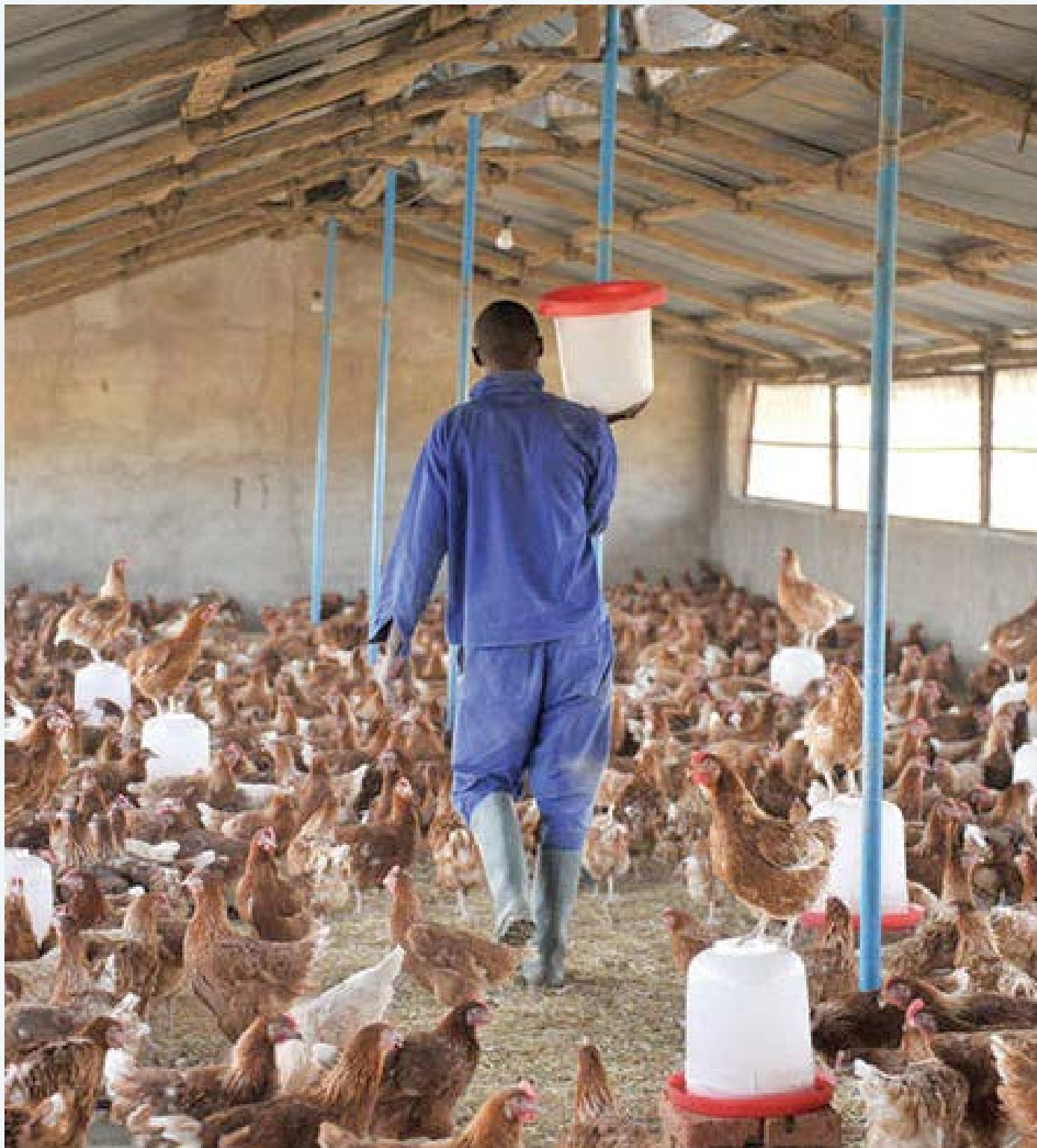
### MEASUREMENTS:

1. **Litter moisture:** Use a table or chart to track samples for each barn at the age(s) included within the welfare standard most applicable to your production type and environment. For the best results, sample areas that are representative of the litter throughout the environment.
  - **Moisture testing device:** For more accurate moisture assessment, use a testing device to verify the moisture percentage present in litter sampled.
  - > **Reference:** [University of Georgia, Monitoring Litter Moisture](#)
  - > **Reference:** [University of Georgia, Brian Fairchild](#)
  - > **Reference:** [University of Georgia, 2012, “Litter Quality and Broiler Performance”](#)
  - > **Reference:** [Avian Pathology, 2016, “Effect of litter quality on footpad dermatitis”](#)
  - > **Reference:** [Poultry Science, Mississippi State University, 2020, “Good Litter Management Improves Broiler Performance, Health and Welfare”](#)
  - > **Reference:** [Managing Litter Moisture in Broiler Houses with Built-Up Litter](#)

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# LITTER QUALITY



Poultry farmer checking waterer functionality at a broiler farm in Africa.

**DEFINITION:** Litter quality is the assessment of the condition of the substrate/material covering the ground or floor of the poultry environment.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Collect and track data:** Conduct recurring litter quality observations and/or measurements using the testing method available and applicable to the production environment.
- ✓ **Set or evaluate protocols:** Determine and assign which role/worker(s) within the poultry environment will be responsible for actively observing and assessing litter quality, how it will be done, and how often it will be done based on your environment and available labor and technology.

Set or review the protocol for troubleshooting possible solutions when a litter quality issue is suspected, including what corrective actions will be taken to ensure quality levels are within the ideal range for bird health to improve positive outcomes.



Young broiler walking on bedding material.

### IMPROVE:



**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

**Increase data collection/tracking:** Record litter quality test results over time and compare with assessments of other KWIs (e.g., [footpad condition](#), [air quality](#), [breast skin condition](#), and [leg condition](#)) to track and analyze trends, and to make corrective actions as needed to improve outcomes. If a consistent issue occurs during a certain time of year, while using a certain litter type, or at another common point, additional corrective actions may be used to prevent litter quality issues in future flocks.

Work up to more frequent assessments in more areas until ideal litter quality data is being collected with the best tools available/applicable to the production type.

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# CULL TRACKING

## REASONING

**Those who care for poultry aim for the most positive welfare outcomes possible, and sometimes it is necessary to cull individual birds to prevent suffering in individual birds or to prevent disease issues that may spread throughout the flock.** The process of humanely euthanizing birds that are sick and/or unfit for production is referred to as “culling,” and the bird identified for euthanasia is referred to as a “cull bird.” Birds identified for culling may be experiencing pain, injury, illness, or some other indication of a failure to thrive. Euthanasia is defined as “ending the life of an individual animal in a way that minimizes or eliminates pain and distress” (American Veterinary Medical Association). Birds with qualifying attributes for culling should be identified and euthanized in a timely manner to minimize discomfort or pain. All deceased birds (mortality and culled birds) are removed from the environment as quickly as possible for the best outcomes for the health and welfare of the flock (e.g., limiting the spread of disease).

Defects and deformities are an inherent biological occurrence, and as such, some culls are expected and unavoidable. Bird injury may also occur and may result in a need to cull affected birds.

Importantly, low levels of culling activity when cull birds are present indicates a welfare issue as much as excessive culling. An absence or lower rate of culling can indicate a failure to identify birds that may be experiencing discomfort due to challenges. Higher rates of culling can indicate that a management, environmental, disease, or other stressor has occurred or is occurring.

Mortality rates can also be informative of an issue with cull decisions on a farm. Comparison of these rates can offer a more complete picture of challenges present and how they are being managed.

Although some interventions will not result in positive outcomes until the following flock (e.g., equipment repairs where a malfunction caused injuries that result in a cull), regular tracking and assessment enables the production manager to make adjustments sooner, thereby preventing further negative impacts.

For the above reasons, cull data can be used to analyze deviations from trend patterns (based on previous experience, best practices, or a welfare program for the environment). Data analysis is a starting point for the investigation, identification, and adjustment of contributing factors to prevent future issues.



**THERE ARE DIFFERENT APPROVED METHODS FOR EUTHANASIA FOR DIFFERENT TYPES OF POULTRY AND IN DIFFERENT PRODUCTION SYSTEMS WHICH MAY ALSO BE INFLUENCED BY REGIONAL, NATIONAL, OR OTHER STANDARDS.** The details of these methods are not included in this reference guide due to the variances in regulation, though some best practices are consistent globally.



**AS WITH THE MORTALITY KWI, SETTING A DEFINED START AND END TIME FOR THE “DAY” AND “WEEK” THE FARM WILL BE USING IS IMPORTANT.** Stay consistent with that measure to have accurate data. For the best results, consult with your supply chain stakeholders to determine if a defined range is already in use by another farm or company in your organization. Then, you can adopt those definitions to allow for better high-level data analysis. Mortality and culls should be tracked separately and clearly with consistent definitions.



**High cull rates can be an indication of a flock health challenge, and low cull rates can indicate a need for better cull decision and management training.**

**DEFINITION:** Cull tracking is the assessment of the number and type of occurrences of bird euthanasia for insight into the welfare of the bird, flock, and future flocks.

## OBSERVATIONS & MEASUREMENTS

### MEASUREMENTS:

Use a table or chart to quantify the KWI for each flock for best results. The table or chart may be structured to fit the frequency of assessment (daily/weekly totals and may include categories to specify reasons).

When applying a protocol for keel bone assessment, it is crucial that care is given following a strict definition of keel bone conditions. Discriminating between fractures and deviations is vital, as they cannot always be assessed with the same methodology/procedure.

Therefore it is also essential to carefully design the assessment protocol and the methods to be applied. The number of birds investigated and the age of the birds at the time of assessment must be justified to obtain valid information so that the assessment and consequences are effective.

Compare the number of culls with the total flock (e.g., proportion or percentage) to determine if further troubleshooting is needed to correct an issue. Although the number of culls alone may not provide insight, important information can be learned: 1) What changes over time? 2) Is the proportion of reported culls appropriate to the operation type, flock age, and species? 3) Were proper decisions made based on the available information?



Broiler chickens resting in outdoor access area of a poultry farm.

House this data in one location and regularly review with production management and other relevant stakeholders to uncover issues.

Each of these measures can be collected on a supply chain, group of farms, farm, or flock-specific level of detail.

- **Daily cull tracking:** Set a “day” cull tracking criteria (e.g., 24 hours, end of the second shift, 8 p.m. daily) and collect the number of birds euthanized at the farm up until transport to another facility.
- **Weekly cull tracking:** Set a “week” cull tracking criteria (e.g., end of day Friday or Saturday, end of last day shift on Saturday) and collect the number of birds euthanized at the farm up until transport to another facility.
- **Cull tracking by category:** Identify and record the reason for culling each bird (e.g., injury, anatomical, health, quality reasons).
  - > **Reference:** [Canada Code of Practice “Euthanasia”](#)
  - > **Reference:** [Culling Hens, Mississippi State University Extension](#)
  - > **Reference:** [Poultry Handling and Transportation Manual, Alberta Farm Animal Care](#)
  - > **Reference:** [Poultry Extension Collaboration \(Vol. 23, 2022\) Maintaining Poultry Welfare: Identifying Pain and Deciding About Treatment and Euthanasia](#)

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AND RESOURCES





# CULL TRACKING



Training workers on cull decisions and how to observe a bird that may have a welfare challenge is crucial to optimize positive outcomes.

**DEFINITION:** Cull tracking is the assessment of the number and type of occurrences of bird euthanasia for insight into the welfare of the bird, flock, and future flocks.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Collect data:** Record the total number of culls at the flock-specific level daily and weekly. Then, track cumulative culls over time and conduct regular analyses to detect trends and assess possible reasons for any significant deviations from your operation's trends.
- ✓ **Conduct analyses:** Use the data collected to establish a cull rate range for your operation to analyze trends. This will likely be informed by rates observed in the geographic regions and specific times of year, and consulting with best practices.
- ✓ **Set protocols:** Have a plan to discuss and investigate causes if deviations are observed. Action levels can be created based on increases, decreases, or cull levels that trigger corrective action or further investigation.



**EVEN THOUGH A FARM MAY HAVE AN OVERALL CULL RATE WITHIN THEIR EXPECTED RANGE,** tracking the reasons for the cull decisions might uncover details for additional welfare improvements. For example, if a high percentage of the culls identified can be attributed to a preventable cause (e.g., equipment, handling, nutrition), that cause can be investigated and corrected.

### IMPROVE:



**Improve protocols and data collection:** Expand the volume and detail of data collected on culls to move from daily tracking of one flock to analyses of the entire operation.

Record and analyze total cull data by categories regularly to gain further insight into husbandry or other adjustments that could reduce the need for culling and increase positive outcomes.

**Test your protocols:** Conduct an intentional review after an intervention has been made or a new protocol put in place to evaluate whether the adjustment was effective in producing more positive outcomes or if further work is needed.

**Improve cull decision training:** Assess the cull categories with decision-makers to determine if a training or other worker-related improvement can be made.

**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

**Compare data:** Share cull data with members of the internal supply chain or other collaborating partners to compare against other flocks and farms to better understand if the number and cause of culling is within the expected range or if improvements can be made by implementing better practices.

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FOR ON-FARM  
CULL TRACKING  
REFERENCES CITED**



# FOOTPAD CONDITION

## REASONING

**Footpad condition can be an indicator of significant welfare issues in poultry.** In this guide, we focus on the assessment of footpad condition and other ailments and injuries to the foot. These conditions can cause discomfort, stress, lameness, or mortality if not monitored closely. (Reference [leg condition and mobility](#) and [defects reported](#) KWI.)

Foot health is particularly key as negative outcomes in individual birds can cause chronic pain and limit the bird's ability to express their natural behavior and have mobility.

The skin condition of the footpad (paw) is important for the health, welfare, biological function, and performance of the bird. Footpad condition is correlated with [litter quality](#) since moist litter can be a risk factor for footpad lesions. This KWI focuses on skin lesions on the plantar surface (bottom of the foot, including the footpad and toes), since this is the portion of the foot that has direct contact with litter, ground cover, or flooring of the barn. It also includes evaluation of the foot for possible palpable heat and swelling, which may or may not be accompanied by gait impairment.

### Other ailments and injuries

Foot health in poultry may be impacted by or threaten:

- The flock's health status (e.g., the incidence of viral or bacterial challenges that impact the foot and leg).
- Developmental attributes of the bird (e.g., toe straightness or fractures or presence of anatomical deformities, bumblefoot).
- Environmental conditions (e.g., [litter condition](#)).
- Nutrition (e.g., vitamin, mineral, or nutritional excesses or imbalances resulting in metabolic conditions and/or changes in fecal moisture content).
- System failures or problem areas that hold potential for injury (e.g., equipment-related injury to the foot).
- Other injuries damaging the bird (e.g., bird pecking).



**FOR BREEDING CHICKENS, GOOD FOOT CONDITION IS ALSO ESSENTIAL FOR FLOCK ACTIVITIES SUCH AS MATING, WALKING ON SLATTED FLOORING (IF UTILIZED IN A LAYING BARN), AND ACCESSING NESTS FOR EGG PRODUCTION.**



Poultry welfare specialist inspecting a bird at broiler chicken farm in South America.



**Foot health is important to detect early as challenges can cause chronic pain and limit the bird's mobility and ability to express their natural behaviors.**



**DEFINITION:** Footpad condition is the assessment of the condition and characteristics of the foot and footpad as a measure of comfort and mobility.

## OBSERVATIONS & MEASUREMENTS

### OBSERVATIONS:

Workers can observe foot health issues during normal walk-through inspections and should be trained to identify when further investigation is needed.

- **Observed ailments and injuries:** Provide direction to production staff to note occurrences of bumblefoot, lameness, foot injuries (those that lead to cull and/or those that warrant a transfer to a recovery pen/area if applicable), palpable heat or swelling, or any other abnormality of the foot. (This includes observing culls and [mortality](#) and noting if a foot health condition is observed as a cause.)

> **Reference:** [LayWel 2016: page 63](#)



Chicken footpad condition is important for the overall health, mobility and welfare outcome of the flock..

PHOTO CREDIT: COBB-VANTRESS, LLC

### MEASUREMENTS:

Follow instructions to assess different foot health considerations related to the species and environment on a recurring basis. Use a table or chart to quantify the KWI by category for the number of birds sampled.

- **Footpad condition scoring:** Several different tools and references are available to score footpad condition on the farm and/or at the processing facility. Select a reference that best suits your species and production type and be consistent in using it to assess foot health. The most important aspect of scoring is detecting the presence of footpad dermatitis, which can yield significant negative welfare outcomes.

- **At the processing facility:** Reference the defects reported KWI.
- **On-farm:** Samples should be selected with care for the age and health status of the bird. Be advised that handling mature birds and/or birds at higher weights for the species can be at risk of stress from turning over for a foot inspection. Proper training on how to handle birds and inspect feet safely is strongly recommended. Consult with experts in your species to determine the best age or weight to limit turning birds over for inspection.

> **Reference:** [AAAP Scoring Guide](#)

> **Reference:** [Welfare Quality 2.0](#)

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FOR ON-FARM  
FOOTPAD CONDITION  
REFERENCES CITED**



# FOOTPAD CONDITION



Poultry worker conducting a walk-through assessment of the flock.



**DEFINITION:** Footpad condition is the assessment of the condition and characteristics of the foot and footpad as a measure of comfort and mobility.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:

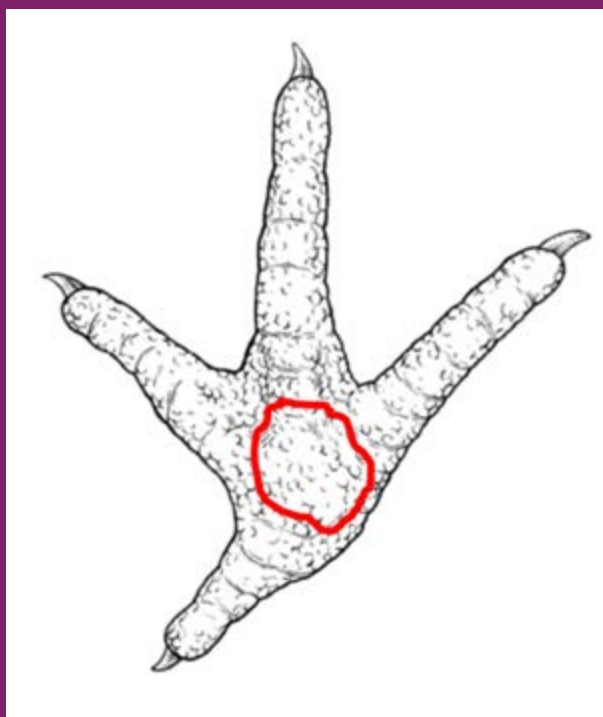


#### Collect data and set protocols:

Observe feet for foot ailments and injuries and set protocols for corrective action. Implement footpad condition sample assessment on randomly selected individual birds during regular walk-through inspections or during bird handling or an observed suspected foot issue (e.g., visual gait impairment). Evaluate data routinely to track and trend the KWI.



**Assess with a veterinarian:** Contact a veterinarian to diagnose and ascertain the cause of adverse outcomes observed. Then, make husbandry or environmental changes as needed to reduce the occurrences.



Broiler chicken footpads can be assessed on-farm and at processing.

PHOTO CREDIT: AAAP BROILER PAW GUIDE

### IMPROVE:



**Improve protocols:** Establish a protocol for detailed data collection of footpad condition scores and other observed foot ailments and injuries. This assessment can occur during walk-through inspections and after every incidence of handling for maximized data, or at processing. As with the footpad condition assessment, a random and representative sample of individual birds should be used for the assessments where possible while minimizing unnecessary handling of birds.

**Review protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

**Compare data for deeper analyses:** If the data indicates a welfare risk, analyze the data against that of [litter](#) and [air quality](#) (and processor defects reported data, if applicable) to uncover the issue present. If these additional measures are not already being tracked, implement them.

Collect and keep records on foot health data by the type and frequency of observation. Then, cross-reference this data with [mortality](#) and cull rates data to determine the scale and impact of foot health. Analyze trends regularly in order to inform any necessary management change(s) and prevent further incidences of foot health challenges.

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# MOBILITY & LEG CONDITION

## REASONING

**Mobility and leg condition includes assessments of the hock skin, joint, and overall bird mobility as an indicator of the health and welfare of the bird and health status of the flock.**

Healthy leg condition is key to the biological function, welfare, and performance of poultry. Good leg condition enables birds to complete essential life functions and express motivated behaviors. Poor leg condition can result in abnormal gait, injuries, or lameness, which can be a cause of discomfort or stress and, if severe, may necessitate culling.

If a mobility issue is identified, a more detailed data analysis can be conducted. There are corrective actions available to poultry management by identifying the prevalent issues and their possible causes.

**Leg conditions observed in a flock may be impacted by:**

- The health status of the flock (e.g., incidence of viral or bacterial challenges that impact the hock and leg).
- Activity level (e.g., movement of the bird at different ages, types of activity available [perch heights]).
- Genetics or developmental attributes of the bird (e.g., leg straightness, presence of anatomical deformities, normal gait variances between strains and species).
- Environmental conditions (e.g., [litter condition](#)).
- Nutrition (e.g., vitamin, mineral, or other nutritional deficiencies or excesses resulting in metabolic conditions or changes with fecal consistency).
- Injury (e.g., equipment-related or bird-to-bird pecking injury to the leg).



Breeder chickens in a climate-controlled house.

PHOTO CREDIT: COBB-VANTRESS, LLC



**As you monitor and measure leg condition and mobility in poultry flocks, look for opportunities to invest in environment or technology improvements to further enhance positive welfare outcomes and the activity level of poultry flocks.**

**DEFINITION:** Mobility and leg condition is defined as the assessment of the legs as it relates to the health, comfort, and mobility of the bird.

## OBSERVATIONS & MEASUREMENTS

### OBSERVATIONS:

1. **Bird mobility:** Assess the gait and amount of movement of birds in their environment (as applicable to the production type) and compare to the standard for that flock's age and type (e.g., broilers vs. breeder pullets).
  - Lameness, gait scoring, and other mobility issues should be tracked closely to determine when culling of individual birds is necessary. Compare mobility issues recorded with cull tracking details to gain further insight into the reason(s) for culling and/or any recurring leg condition issues.
  - Observation of any developmental and anatomical attributes that hinder bird movement should be recorded and shared with the appropriate poultry professionals (nutritionist, veterinarian, production manager, etc.) to determine what corrective actions may be needed to address the concern.
  - For additional detail about leg injuries, refer to the leg tracking section of the KWI guide.



**FOR BREEDING CHICKENS, GOOD LEG CONDITION IS ALSO ESSENTIAL FOR PRODUCTION ACTIVITIES LIKE MATING AND ACCESSING NESTS FOR EGG PRODUCTION.**



**BECAUSE POOR LEG CONDITION CAN INDICATE A NEED FOR A CULL DECISION OR CAUSE MORTALITY,** compare leg condition metrics with [cull tracking](#), [footpad condition](#), and [mortality rates](#) as measured at the processor for a holistic view of the welfare environment and leg outcomes.

### MEASUREMENTS:

Use a table or chart to quantify the KWI by measurement category and note the number of birds sampled.

1. **Gait scoring:**\* Assess gait of a select sample of birds (can be done at the frequency that fits the operation).
  - > **Reference:** [Five-Point Gait Scoring Guide - Welfare Quality on pg. 26/111](#)
  - > **Reference:** [Validation of a Three-Point Gait-Scoring System for Field Assessment of Walking Ability of Commercial Broilers](#)
2. **Hock skin condition:** Assess the general condition of skin covering the hock of the bird, looking for visible skin lesions or other abnormalities (e.g., hock burn).
  - Refer to [litter quality](#) and foot condition KWIs for further direction if hock abnormalities appear to be those as a result of a litter issue.
  - > **Reference tool:** [Hock Skin Lesion Scoring Guide - Welfare Quality \(pg. 35/111\)](#)
  - > **Reference tool:** [Hock Skin Scoring Guide, AAAP 2022](#)
3. **Hock joint condition:** Assess the health of the hock joint of the bird by looking for any palpable heat or swelling of the hock joint, which may or may not be accompanied by gait impairment.
3. **Leg anatomy issues:** Assess for leg anatomy issues (i.e. straightness, abnormalities, or irregular development).

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# MOBILITY & LEG CONDITION



Poultry mobility is important for accessing feed and water at a broiler chicken farm.

PHOTO CREDIT: BIG DUTCHMAN

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**DEFINITION:** Mobility and leg condition is defined as the assessment of the legs as it relates to the health, comfort, and mobility of the bird.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Set protocols:** Set protocols for how to observe bird mobility (easily paired with footpad condition observations) and what the appropriate next steps and/or corrective actions will be once a mobility or leg condition issue is observed.
- ✓ **Observe leg condition:** Routinely evaluate bird mobility through walk-through observations to identify leg condition issues and address accordingly.

Take corrective action or conduct an investigation into if other birds are affected and the cause of the leg issue if an impaired gait or other leg condition issue is observed.



Observe broiler chicken leg condition on walk-through inspections.

### IMPROVE:



**Conduct sample scoring:** Evaluate and record the gait scores of a set sample size over a set frequency to analyze trends. Track the scores by categories to assess bird mobility overall and determine if further action is needed to correct an issue.

**Record observations:** If a leg condition concern or impaired mobility is observed, record the instance and the corrective action taken (e.g., culled, monitored, followed up with nutritionist).

**Assess potential leg issues:** Evaluate hock skin and joint condition routinely to be able to track and trend the KWI.

- For breeders, evaluate hock skin and joint condition at the farm during individual bird handling.

If concerns are noted with the incidence and/or severity of hock condition from the sample of birds evaluated, a poultry specialist and/or poultry veterinarian should be consulted to determine if husbandry interventions and/or a veterinary health plan for the flock is needed or needs to be updated.

**Compare with other KWIs:** Refer to cull tracking for direction on management of incidences where leg condition results in a cull. Compare with data collected via injury tracking and leg condition at the processor if possible.

**Review and improve protocols:** Conduct thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

**Consult with internal supply chain:** Share KWI data with supply chain partners (breeders, hatcheries, processors, farmers) or other collaborators to take a more holistic look at leg condition and assess where improvements could be made in the environment, care, nutrition, or genetics of the birds.

# FLOCK CONDITION

## REASONING

**Flock condition is an assessment of the overall health and welfare of the birds in their environment and includes parameters like bodyweight, uniformity, and feather condition.**

**Average flock bodyweight** that is within the acceptable range for the breed and production type can indicate that feed and other resources are adequately available. If the average bodyweight is below the normal range, it may indicate improper nutrition, a lack of availability of feed, reduced feed consumption, and other stressors such as a disease or feed/water contamination that may be contributing to a slowed growth or loss of weight. If average bodyweight is above the normal range, this may be an indication that birds are overfed or the diet may not be formulated properly, or it may be a precursor to the flock developing metabolic issues like fatty liver disease.

Bodyweight is particularly useful for individual and flock insight versus other indicators. Weight is closely managed from a production standpoint, but often low weights can be an indicator of a welfare challenge — particularly one that may be hard to notice in other assessments.

**Uniformity** is the consistency of the bodyweights within a flock. A uniform flock can indicate that birds have consistent access to resources. Poor uniformity can indicate that not all birds can access resources equally within their environment and/or there is a disease or other stress challenge present among a portion of the flock that may warrant intervention.



**THE EXPECTATION FOR UNIFORMITY IN A FLOCK OF MIXED MALE AND FEMALE BIRDS (STRAIGHT-RUN) WILL DIFFER FROM THAT OF A SEXED FLOCK.** This is not an indicator of a welfare issue.



**FEATHER COVERAGE AND CONDITION CAN VARY NORMALLY OVER TIME BASED ON BREED, AGE, AND NATURAL FEATHER CHANGES AS BIRDS GROW AND DEVELOP.** However, feather condition can also be an indicator of a welfare issue in the environment (e.g. adverse pecking behavior [feather pulling], poor nest box management, or wearing due to equipment or improper handling), nutrition, or a health challenge.



A recently constructed broiler chicken farm in Europe.



**Set protocols for observing uniformity, bodyweight, and feather condition during normal flock management, including when observations dictate further action.**

**DEFINITION:** Flock condition is defined as a holistic assessment of a flock's average bodyweight, uniformity, and feather condition as an indicator of the flock's health status.

## OBSERVATIONS & MEASUREMENTS

### OBSERVATIONS:

1. **Uniformity and bodyweight:** On walk-through assessments, include instructions to notice the visible size and condition of the birds in the flock as compared to one another or breed standard. If significant size differences are noted, further investigate the cause.
  - Bodyweight and uniformity can also be observed during routine handling and servicing to trigger further sampling.
2. **Feather coverage:** Observe adequate feather coverage and condition. Deviations from expected feather coverage for that bird type, age, and time of year (climate) can be an indicator of a welfare challenge. This should be compared with other KWI data for true understanding.
  - For additional detail, notice the key areas targeted such as neck, back, vent, wing, and saddle.
  - Observe and record instances of malformations, skin conditions, or ectoparasites present.
  - Dirty feathers can be an indication of a welfare challenge in some cases. However, there is a wide deviation between species, climates, type of litter substrate used, and other factors. The production manager should establish what the expectation is for each flock and bird type and train workers on what a deviation looks like.



Flock and feather condition can be observed on walk-through inspections and through conducting a sample measurement.

### MEASUREMENTS:

Assess the various aspects of flock condition among a sample of the flock and compare for a holistic indication of the flock's health.

1. **Bodyweight:** Select a representative sample of birds from the flock and weigh them. Record the bodyweights of the birds and compare against the breed- and production-type standard. Collecting bodyweight data can be useful in informing husbandry adjustments including nutrition and management.
  - Use an automatic or hand scale to record individual weights. Video or other technology may also be used for estimations.
  - Collecting bodyweight samples can be coupled with servicing in production protocols to minimize handling.
2. **Uniformity:** Measure uniformity by analyzing the bodyweight samples collected across a flock.
  - Use a coefficient of variation (CV%), which measures the spread of bodyweights across the flock. Lower CV% numbers indicate a more uniform flock.
  - Another assessment is recording the percentage of the sampled bird weights that are more than 10% above or below the average of all samples taken for that flock.
  - For broilers, uniformity is typically assessed as it relates to the body weight of the flock. For breeders (in rearing and laying farms), uniformity and CV% may be used to assess body weight of females and males and may also be used to assess body condition (also known as fleshing) of the breast musculature of the poultry population at specific age intervals.

SCAN QR CODE  
FOR MORE  
REFERENCES  
AND RESOURCES



# FLOCK CONDITION

## OBSERVATIONS & MEASUREMENTS (CONTINUED)

- > **Reference:** [Grading to Manage Uniformity, Aviagen 2018](#)
  - > **Reference:** [How to Calculate Uniformity, Winspire](#)
  - > **Reference:** [Managing Flock Uniformity, Aviagen](#)
3. **Feather condition:** Assess a sample of the flock's feather condition on a scale of 1 (complete feather loss) to 4 (no feather loss). Compare to the norm for that species,

flock, etc., to determine if there has been a deviation from expectation to investigate.

- For additional detail, notice the key areas targeted such as neck, back, vent, wing, feather coverage/condition on the breast and tail.
- Observe and record instances of malformations, skin conditions, or ectoparasites present.



Flock condition includes bodyweight and uniformity of broiler chickens within a flock.



**DEFINITION:** Flock condition is defined as a holistic assessment of a flock's average bodyweight, uniformity, and feather condition as an indicator of the flock's health status.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



✓ **Set protocols:** Set protocols for observing uniformity, bodyweight, and feather condition during normal flock management, including when observations dictate further action.

✓ **Observe and collect data:** Collect bodyweights by either a sample during normal handling or by automatic scale, or in adherence with a set protocol. Review data and analyze to calculate the average bodyweight and uniformity of a flock.

Conduct a feather scoring sample if a deviation from expected condition for that bird type, age, environment, etc., is observed as directed by the adopted protocol.

✓ **Take corrective action:** Follow up with production management and/or a veterinarian or nutritionist if a low average bodyweight, high coefficient of variation, or low feather condition score average is recorded (as compared with breed standard for that production type and age). Service technicians may also take a sample on a visit.



Poultry workers consult with a veterinarian in Asia.

### IMPROVE:



**Compare with other KWIs:** Flock condition can be an indicator of several welfare challenges, so data is best used when compared with other KWIs. Compare with [mortality](#), cull tracking, and injury tracking for greater insight.

**Improve data collection and analyses:** Collect and record scores for long-term analysis for greater insight into if a recurring environmental, management, nutrition or genetic issue is present.

Collect data on a higher volume sample at a higher frequency for additional insight.

**Compare data:** Compare flock-level data against historical data and other data groupings (e.g., previous flocks, averages of all flocks at that facility, data around similar flocks) to reveal trends and insights.

**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

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# INJURY TRACKING

## REASONING

**Processing facilities are carefully managed, planned, and monitored under several welfare protocols for the birds and safety procedures for the workers.** However, welfare challenges can be presented at the processor through injuries. Assessment of the number and type of injuries present can give insight into where and how injuries are occurring, so that they can be corrected and prevented in the future. Injuries can also be identified on the farm and actively addressed, but processing captures any that did not result in a cull decision or were not observed on-farm as well as those occurring during transport and processing. Studying trends of injury types can provide even greater insight and reveal adjustments needed.

If a welfare concern is identified and corrected at the processor, adjustments made in one part of the flow can reduce injury occurrences or other welfare challenges and can improve the welfare outcomes of millions of birds.

In addition, the processing environment provides a point of assessment for the welfare of the bird on-farm, serving as a lagging indicator which can inform husbandry improvements. This KWI breaks down these assessment opportunities into three categories: wings, legs, and other injuries. These can be evaluated and corrected based on their determined cause.

**Wing injuries** are assessed at the time of processing and include dislocated or broken wings. **Leg injuries** are assessed at the time of processing and includes bruised or broken legs.

Assessing wing and leg injuries is an important part of poultry welfare assessment at the processing plant. Wing or leg injuries can be a measurable outcome of one or more of the following: improper handling (during catching at the farm or unloading or shackling at the processing plant), improper use of or poorly maintained equipment, rough transport conditions, suboptimal stunning conditions, nutrition or health challenges on the farm, or other incidents in the flow of the birds through processing.

Data collected at the processor can be used for invaluable adjustments made in the birds' husbandry as well. For example, bone breaks due to weak bones can be shared back with the farm and inform an investigation into factors such as bird nutrition or management practices which may lead to injury.

**Other skin or tissue injuries:** Skin damage, physical traumas, bleeding, evidence of skin/tissue injuries (e.g. bird scratching, equipment injuries) can also be observed on the processing line and indicate a welfare issue has occurred.

Consider evidence of healing as an indication of when/where the injury occurred. This allows you to track backwards to the cause and make adjustments (on-farm, transport, in processing).



**TRENDED RESULTS FOR THIS KWI CAN BE TRACKED AND COMPARED WITH PREVIOUS TRANSPORT OR PROCESSING EFFECTIVENESS PLANT RESULTS.** If concerns are noted with the incidence and/or severity of wing or leg injuries from the sample of chickens evaluated, a poultry specialist should be consulted to determine if bird handling, unloading of poultry at the plant, and equipment interventions are needed.



**IN THE CASE OF THIS KWI, ANY AUTHORIZED LOCATION OR TEAM SLAUGHTERING POULTRY QUALIFIES AS A "PROCESSOR."**



**THIS KWI IS USUALLY APPLIED TO BIRDS TRANSPORTED LIVE TO PROCESSING.** These measurements are not applied to flocks that are euthanized on-farm for rendering or further processing.



**Processing facilities are carefully managed, planned, and monitored under several welfare protocols for the birds and safety procedures for the workers.**

**DEFINITION:** Injury tracking is the assessment of wing, leg, and other injuries that are observed from the point of arrival at the processor to the point of insensibility (including on-farm and at-processing injuries).

## OBSERVATIONS & MEASUREMENTS

### OBSERVATIONS:

1. **Observed injuries:** Workers can be instructed to observe wing and leg injuries during their routine job functions. When deviations occur, this can signal a need for an assessment or follow-up investigation or communication back to the farm or at the processing facility.
  - It is recommended to train the workers on the most common or most likely to be observed injuries and the protocol for corrective action.

### MEASUREMENTS:

Use a table or chart to quantify the KWI to conduct a sample assessment. The sample should be representative of the chickens from each flock.

1. **Wing injury assessment:** Evaluate a sample of poultry at the processing plant to score and document wing injury. This should be collected as a number and/or a percentage based on the total number of birds processed (determined by the processor and kept consistent). Frequency of assessment and number of poultry to sample for wing injury can be



At processing, injuries can be observed more easily and provide further insight into the welfare of the bird on-farm, during transport, and unloading at the processor.

PHOTO CREDIT: COBB-VANTRESS, LLC

informed by the welfare standard used. How and when to evaluate for wing injuries depends on the method used:

- Electrical stunning systems: Score after stunning to allow for full visualization of wing condition (evaluate wing injury before feather removal).
- Controlled atmosphere stunning (CAS) systems: Where possible, score before stunning since wing damage can occur during CAS.

> **Reference:** [Wing Scoring Guide, AAAP 2022](#)

2. **Leg injury assessment:** Evaluate a sample of poultry at the processing plant to score and document leg injury. Score after feather removal to allow for full visualization of the legs. Frequency of assessment and number of poultry to sample for leg injury can be informed by the welfare standard being used.

> **Reference:** [AAAP broiler leg condition scoring guide \(2022\)](#)

> **Reference:** [Animals 2019, The Influence of Welfare Training on Bird Welfare and Carcass Quality](#)

> **Reference:** [Poultry Meat Quality Guide UK \(2011\)](#)

> **Reference:** [Humane Slaughter Association, Poultry Catching and Handling](#)

3. **Other skin or tissue injuries:** Skin damage, physical traumas, bleeding, evidence of skin/tissue injuries (e.g., bird scratching, equipment injuries), etc., should be populated into a chart to be checked as observed or not observed. The processor and/or farm can determine appropriate categories and frequency for assessment.

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# INJURY TRACKING





**DEFINITION:** Injury tracking is the assessment of wing, leg, and other injuries that are observed from the point of arrival at the processor to the point of insensibility (including on-farm and at-processing injuries).

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Set protocols:** Designate a member of the quality assurance team or other worker to conduct a sample assessment and observe wing injuries, leg injuries, and/or other skin/tissue injuries. If higher than your expected baseline levels are observed, take action to investigate further.
- ✓ **Collect data:** Record the number or rate of birds observed with wing and/or leg injuries from the sample evaluated. The sample should be representative of chickens from each stunning line.
- ✓ **Analyze data:** Regularly collect data and analyze trends to assess possible reasons for any increases, spikes, or decreases.



Chicken being processed at a facility in China.

### IMPROVE:



**Improve data collection and analyses:** Add assessments of other injuries and skin damage for greater insight into those injury types.

The sample data (volume and/or rate) can be correlated with and communicated back to each catching crew and be compared against other processing facilities within the internal supply chain or other partner data.

**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a spike or increase is discovered. Revisit the responsible parties and opportunities to invest in improved infrastructure to address issues and increase positive welfare outcomes.

Evaluate if adequate or exceptional training protocols are in place to reduce injuries in the processing flow at all worker categories that interact with the birds.

**Determine location of impact:** The processor can determine if injuries occurred at the processing facility. If the injuries were caused after unloading, they can be addressed by the processor. If caused before unloading and showing evidence of healing or another indicator of on-farm or transport origination, the processor should work with the transport manager and/or the farm to take corrective action.

Look at the data and figure out where the damage is occurring. Communicate the findings across the internal supply chain to assess and determine corrective action. Compare with the [leg condition](#), [mortality](#), and [cull tracking](#) on-farm KWIs for deeper insight.

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# PROCESSING EFFECTIVENESS

## REASONING

**The processor plays an important role in handling poultry from arrival to final processing.** Shackling, stunning, and processing effectiveness are essential to optimizing the handling and care of live poultry and providing quality meat products for the outgoing product from the processor. This KWI includes assessments of three core components of processing which can have an impact on the welfare of the bird.

**Shackling effectiveness:** Assessing shackling effectiveness is an important part of poultry welfare assessment at the processing plant. Containment or the use of shackles are important for processing plants that utilize electrical stunning, since the birds are conscious when handled and placed in the equipment.

To optimize slaughter effectiveness, birds should be in an environment that promotes calm behavior, and workers should be trained to handle poultry securely by both legs when placing the birds' legs in the equipment.

Improper shackling is a welfare concern for the individual bird and other birds being processed. A bird that is not placed in shackles correctly can create unnecessary stress for other birds, is more prone to leg injury, and may not be stunned or slaughtered effectively as a result.

**Stunning effectiveness:** Stunning is used to induce insensibility and aid in handling and positioning of the bird prior to slaughter. The method and use of stunning varies by geography and poultry type and should always be done in accordance with the applicable standards, authorities, and legal framework. Improper or ineffective stunning poses a significant welfare concern by causing distress to poultry during processing.

In most cases, electrical or controlled atmosphere stunning is used to effectively induce unconsciousness in poultry in conventional commercial poultry operations. Positive outcomes occur when stunning methods do not induce pain, injury, and/or distress prior to loss of consciousness and the period of unconsciousness induced is of a sufficient duration to maintain insensibility until slaughter method is applied.

**Slaughter effectiveness (as applicable):** It is vital to ensure that the application of all the processing practices (shackling and containment) work together to minimize discomfort for poultry at the point of slaughter. The slaughter method(s) may be automated or manual, and the processor strives for 100% effectiveness.

Processors maintain a backup process to identify and address any poultry that are not properly slaughtered initially. These methods can also be evaluated for effectiveness.

Communicate across the supply chain in advance of arrival at the processing plant with regards to the age, size, or other characteristics of incoming birds (e.g., preslaughter testing or report), so processing staff can be alerted to evaluate equipment performance and make the necessary adjustments to improve processing outcomes. Negative outcomes for processing effectiveness can be an indication of a need for greater communications and planning ahead.



### CERTAIN KWIS MAY NOT BE APPLICABLE IN ALL TYPES OF PROCESSING — INCLUDING RELIGIOUS PROCESSING PRACTICES.

Recoverable electrical stunning is intended to be coupled with a slaughter method. Slaughter effectiveness and stunning effectiveness are paired together to measure the correct application of both steps. In controlled atmospheric stunning where it is used for slaughter, only stunning effectiveness is recommended for welfare assessment. These should be used as applicable to the process being used and informed by the applicable welfare standards for your region and processing type.



**To optimize slaughter effectiveness, birds should be in an environment that promotes calm behavior, and workers should be trained to handle poultry securely.**

**DEFINITION:** The assessment of the welfare considerations of poultry at the point of processing.

## OBSERVATIONS & MEASUREMENTS

### OBSERVATIONS:

- **Backup method application:** Observe that the backup method operator is present at the point of slaughter, monitoring each bird on the line. When a failure occurs, the backup method should be applied immediately.
- **Equipment inspection:** Workers should inspect equipment regularly for production efficiency and worker safety, poultry welfare, and production efficiency concerns. It is important that equipment inspections are treated as an important part of avoiding processing ineffectiveness and welfare challenges.
- **Uniformity issues:** If stunning effectiveness measures are indicating an increase in failures, observe the uniformity of the birds on the line. Communicate these findings back to the farm (can be cross-referenced with [flock condition KWI](#)). Ideally, communication from the farm to the plant identifying flocks with poor uniformity is made proactively so the plant can be properly prepared.



Different processing methods have different measures of efficacy. Measure to method used, and look for improvements.

PHOTO CREDIT: COBB-VANTRESS, LLC

### MEASUREMENTS:

Processing effectiveness can be evaluated using a series of samples during a set period of time on the line at each step of the process. Use a table or chart to quantify the KWI for the number of birds sampled. The sample should be done in accordance with applicable standards and at a number and frequency that allows for quick, corrective action if an issue is discovered.

1. **Shackling effectiveness (as applicable):** Evaluate a sample of poultry at the processing plant to score and document the shackling effectiveness. Observe and record instances of improper shackling (i.e., bird shackled by only one leg, bird shackled over two shackles, rough handling during process, etc.) or other obvious indications of poor maintenance of shackle equipment or handling failure. Leg bruising associated with improper shackling is best observed once the feathers have been removed. Frequency of assessment and number of poultry to sample for shackling effectiveness can be informed by the welfare standard being used. (Welfare standards may ask that this measurement be converted to a numerical score or percentage.)
  - For best data, cross-reference data with injury tracking KWI.
  - > **Reference:** [Humane Slaughter Association, The Shackle Line](#)
  - > **Reference:** [Humane Slaughter Association, Summary](#)

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# PROCESSING EFFECTIVENESS

## OBSERVATIONS & MEASUREMENTS (CONTINUED)

2. **Stunning effectiveness:** Evaluate a sample of poultry at the processing plant to observe and document stunning effectiveness. For best results, sample each stunning line. Frequency of assessment and number of poultry to sample for stunning effectiveness is dependent on the welfare standard used and should be used consistently.

- **Visual observation:** Observe signs of activity, body posture, tension in the muscles, or relaxation to indicate a successful or failed application of stunning. Note the total number of birds within the sample that were not stunned effectively. (Welfare standards may ask that this measurement be converted to a score.)
  - **Time to insensibility:** Measure the time it takes from the application of the stunning method to the visual observation of insensibility on a sample number of birds.
    - Data can be compared to the industry norms for that stunning method and be used to confirm if equipment is functioning properly.
- > **Reference:** [Humane Slaughter Association, Stunning Efficacy](#)
- > **Reference:** [AAAP, “Stunning of Commercial Poultry in North America”](#)
- > **Reference:** [NCC, 2013, “National Chicken Council Brief on Stunning of Chickens”](#)

3. **Slaughter effectiveness:** Observe a sample of each processing line to evaluate the efficacy of the slaughter method used. For the best data, consistently measure each line or area of application used at an established and repeatable frequency.

- **Visual observation:** Record the number of birds from the sample where the primary slaughter method failed and the backup method was applied. (Welfare standards may ask that this measurement be converted to a score.)
- > **Reference:** [AVMA Slaughter Guidelines](#)
- > **Reference:** [Poultry Handling and Transportation Manual, Alberta Farm Animal Care](#)
- **Backup method observation:** Observe the backup method operator is present during processing. Record the number of birds per line where the operator is not present and if the backup method was not effectively applied when needed.



Effective stunning processes render the bird insensible to discomfort before the point of slaughter. An operator often oversees the process to ensure the equipment used is working properly.



**DEFINITION:** The assessment of the welfare considerations of poultry at the point of processing.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Observe and measure:** Collect the data from the applicable observations and measurements according to the processing methods used from selected samples. Track and trend these over time to create a baseline and trigger for variances that warrant further investigation.
- ✓ **Conduct analysis:** Document the sample results from each stunning line and processing plant shift. Analyze trends and assess possible reasons for any concerns and/or deviations from the created baseline that could need follow-up action.

If concerns are noted with ineffective stunning or slaughter methods, a poultry processing specialist should be consulted to determine if the function of the stunning system (operation and maintenance), shackling, and other equipment interventions are working correctly or need improvement.

- ✓ **Set and evaluate protocols:** Determine and assign which role/worker(s) within the poultry environment will be responsible for actively observing and taking processing effectiveness measurements, how they will be done, and how often they will be collected based on the environment and available labor and technology.

Determine if the restraint, slaughter, and stunning methods used are the best system for the bird type being processed and aligned with the applicable welfare standards, guidelines, and best practices available to increase the number of positive outcomes.

### IMPROVE:



**Increase data collection/tracking:** Document scores from each processing line and correlate these with the shift and/or shackling/slaughter/stunning team. Analyze trends over a longer term and/or compare data to other industry data and assess possible reasons for any concerns. Add spot samples of the time to insensibility into the processing effectiveness protocol.

Over time, increase the frequency and sample size of birds assessed. Refer to standards and welfare guidelines for direction on the minimum sample sizes recommended and work to increase.

**Conduct further analysis:** Trended results for this KWI can be tracked and compared with previous processing plant results on a regular basis. Findings can be analyzed throughout the supply chain to identify issues or areas for potential improvement (e.g., sizing variability, best-suited equipment, etc.).

**Cross-reference with other KWIs:** Compare data with other KWIs ([injury tracking](#), [transport mortality](#), [leg condition](#), [footpad condition](#)) and overall flock health outcomes to understand and detect negative impacts that may be occurring before processing that might negatively impact this KWI.

**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

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# DEFECTS REPORTED

## REASONING

**The processor provides an opportunity to assess some KWIs that occur on the farm but are best measured on the processing line at the plant.** This category is not inclusive of injuries that may occur on the farm or at the processing facility and are primarily associated with bird handling. (For more information on that KWI, refer to the [injury tracking](#) section.)

### Leg condition

Leg condition can be evaluated on-farm or at the processing plant. At the processor, workers are looking for evidence of hock burn, which is dermatitis found at the joint. Lesions on the hock are an indicator of a welfare concern. Refer to the [leg condition](#) and [litter quality](#) KWI for more information.

### Footpad condition

The skin condition of the footpad (paw) is important for the health, welfare, biological function, and performance of the bird. Footpad condition can be evaluated at the processor and on-farm. At the processor, workers are looking for footpad dermatitis and bumblefoot. This data can be communicated

back to the farm for adjustments to [litter](#) or other husbandry changes to reduce further instances. (Refer to the [footpad condition](#) and [litter quality](#) KWIs.)

### Breast skin condition

Skin condition is an important indicator of the health, welfare, and biological function, of chickens. Skin defects may be related to [litter quality](#), bird health, and [mobility](#) issues on-farm. This is a lagging indicator but also an opportunity for processors to have insight into various attributes of husbandry that can be communicated back to the farmer.

The evaluation and documentation of breast skin condition (presence of irritated skin, skin lesions, buttons or blisters on the breast of the bird) at the end of the production cycle allows for a comprehensive welfare assessment of the flock.

The assessment includes the skin covering the breast and the keel of the chicken.



Various KWIs (leg, footpad and skin condition) can be easily and accurately assessed at the processing plant.

PHOTO CREDIT: TYSON FOODS



**Some KWIs reflect what occurs on the farm but are best measured on the processing line.**

**DEFINITION:** Defects reported is the assessment of hock, foot, or breast damage that could indicate a welfare concern before or upon arrival at processing.

## OBSERVATIONS & MEASUREMENTS

### MEASUREMENTS:

Use a table or chart to quantify the KWI for the number of birds sampled. The sample should be representative of the chickens from each flock.

#### 1. Leg condition:

- **Hock skin assessment:** Assess a sample of birds on the line for hock burn based on an established scoring protocol.
- **Other skin lesions:** Assess a sample of birds on the line for other leg lesions and score or record occurrences.
- > **Reference:** [Skin Lesion Scoring Guide, Welfare Quality, \(pg. 26/111\)](#)

#### 2. Footpad condition:

Assess a sample of paws on the line for footpad issues including footpad dermatitis and bumblefoot. Use a checklist or established scoring system for accurate data.

- > **Reference:** [Footpad Scoring Guide - Welfare Quality on pg. 27/111](#)
- > **Reference:** [AAAP Scoring Guide](#)
- > **Reference:** [Welfare Quality 2.0](#)

#### 3. Breast skin assessment:

Evaluate a sample of poultry at the processing plant to score and document breast skin condition. The number of poultry to sample for breast skin condition can be informed by the welfare standard used.

- > **Reference:** [AAAP Breast Skin Condition Scoring Guide \(2022\)](#)
- > **Reference:** [WUR breast skin scoring mention in item 2.4.2.2.1](#)
- > **Reference:** [Cause of Enlarged Sternal Bursas \(1974\)](#)
- > **Reference:** [Merck Vet Manual, Breast Blisters](#)
- > **Reference:** [Breast Blister Scoring Guide - Welfare Quality on pg. 26/111](#)



Inspection of the birds for breast skin damage can be collected and reported back to the farm to inform management improvements.

PHOTO CREDIT: NATIONAL CHICKEN COUNCIL



**TRENDED RESULTS FOR THIS KWI CAN BE TRACKED AND COMPARED WITH PREVIOUS FLOCK AND FARM RESULTS.** If concerns are noted with the incidence and/or severity of breast skin lesions from the sample of chickens evaluated, a poultry specialist and/or poultry veterinarian should be consulted to determine if husbandry interventions and/or a veterinary health plan is needed.

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# DEFECTS REPORTED



Processing data can be observed and collected as a sample or as an ongoing monitoring project.



**DEFINITION:** Defects reported is the assessment of hock, foot, or breast damage that could indicate a welfare concern before or upon arrival at processing.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Observe and collect data:** Collect data from set samples of chickens from each processing line using the applicable measures of leg condition, footpad condition, and/or breast skin condition.
- ✓ **Compare with other KWIs:** Cross-reference the defects reported with [litter quality](#), [footpad condition](#), and [leg condition](#) for greater insight into cause investigation and areas for improvement.
- ✓ **Conduct analyses and take corrective action:** Track over time to analyze trends and assess possible reasons for any increases or changes. If concerns are noted with the incidence and/or severity of defects reported from the sample of birds evaluated, a poultry specialist and/or poultry veterinarian should be consulted at the farm of origin to determine if husbandry interventions and/or a veterinary health plan is needed.
- ✓ **Consult with the internal supply chain:** Communicate findings within the internal supply chain to inform the farm of necessary husbandry changes to reduce the number of defects reported at processing.



If possible, take note of evidence of healing. This can indicate the time and place the welfare challenge occurred.

### IMPROVE:



#### Increase data collection and analyses:

Keep long-term records of defects reported for regular analysis to uncover trends and insights into causes.

Increase the sample size and frequency for improved data over time.

**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

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# TRANSPORT & HANDLING MORTALITY FROM FARM TO PROCESSING

## REASONING

**All handling and transport can be a stressful event for birds, but with proper training and handling techniques as well as management of the environment, birds can be transported in ways to minimize discomfort and increase positive outcomes.**

Transport-related mortality also known as DOAs (dead on arrivals), is a lagging indicator for welfare since it represents the outcome of poultry that are caught, handled, loaded and transported.

DOAs can be an indicator that the birds should have never been loaded because they were unfit for transport due to an existing health challenge, the journey included a lethal stressor (e.g., heat stress), or an incident (e.g., equipment injuries, handling errors).

All parties involved in the handling and transport of live birds, whether part of the same company or separate companies

working together in the supply chain, must work together to minimize stress and optimize the environment for the birds during these critical steps. It is important that these parties also work together to identify opportunities and find viable solutions that improve the welfare of the birds.

There are multiple observations that can be collected as part of an evaluation of transport protocols. The most important element is assessing these occurrences with all handling teams and equipment used, as that can vary widely between independent/contracted groups (if used). However, this observation can be subjective and vary depending on equipment used, so an objective reference point is always DOAs. The assessment of DOAs can be an indicator of a need for a deeper assessment and investigation to reduce occurrences.



Equipment maintenance and checks before departure are crucial to a productive trip from the farm to processing.

PHOTO CREDIT: BRITISH POULTRY ASSOCIATION



**With proper handling techniques and management of the environment, birds can be transported in ways that minimize discomfort and support comfortable travel.**

**DEFINITION:** The assessment of discovered fatalities during or after loading, transport, and unloading at the processor (DOAs).

## OBSERVATIONS & MEASUREMENTS

### MEASUREMENTS:

1. **Transport mortality tracking (DOAs):** Record the number of deceased birds (DOAs) found within the transport compartment at the time of unloading the flock at the processor. Track and record the total DOAs over time to analyze trends and assess possible reasons for any increase(s). For the best results, review on a regular basis (e.g., shift, daily, weekly, monthly, quarterly)..
  - > **Reference:** [EU Commission Guide to Good Practices for the Transport of Poultry \(2016\)](#)
  - > **Reference:** [Poultry Handling and Transportation Manual, Alberta Farm Animal Care](#)
2. **Mortality by cause:** Include both the volume of mortality and the suspected reason why (e.g., disease, injury, environment). Use an existing chart of common causes or establish one based on common issues and/or the type of production or species raised. Track the rates over time by category to analyze DOA trends related to specific reasons.
  - After a known issue has been corrected, continuing to track and analyze mortality rates helps to determine if interventions and/or a change in transport equipment or protocol are needed for further action or if the applied corrections were effective in controlling an issue.

Compare with on-farm [cull tracking](#) and [injury tracking](#) at the processor KWIs for best data and understanding.



Training on secure handling of birds and proper use of catching and transport equipment can support more positive transport outcomes.

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# TRANSPORT & HANDLING MORTALITY FROM FARM TO PROCESSING

## OBSERVATIONS & MEASUREMENTS (CONTINUED)



Example of vehicle used for transportation of broilers from farm to processor. Evaluation of DOAs by load, by driver, and by catching team can help production staff identify areas for welfare assessment and continuous improvement.

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**DEFINITION:** The assessment of discovered fatalities during or after loading, transport, and unloading at the processor (DOAs).

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Set protocols:** Set the protocol for the collection of DOA total data and communicate it back to those responsible for growing, handling, transporting, receiving, and unloading the birds at the processing facility. This should include the frequency of data reporting and the number or percentage that would be considered a deviation, to inform corrective action.
- ✓ **Collect and track data:** Train workers on how to track and record DOAs as part of their management practices when unloading.
- ✓ **Conduct analyses:** Analyze data against industry norms, species guidelines, or similar transport-type data to determine if improvements can be made.

Establish the protocol for analyzing the mortality data on a frequency that allows for prompt interventions if increases are observed. Include direction for how to connect and communicate data back to the those responsible for growing, handling, transporting, receiving, and unloading the birds at the processing plant to inform management improvements. (See [cull tracking](#), [mortality](#), [injury tracking](#).)



In warmer seasons, open-sided trucks are used to allow for maximized air flow and temperature control for the birds during transport.

PHOTO CREDIT: BRITISH POULTRY ASSOCIATION

### IMPROVE:



**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

**Increase data collection:** Train workers to determine a cause of each DOA informed by observations. Record DOAs and include data related to the transport team (crew, drivers, vehicle, equipment, location of origin, etc.) and categories to identify the likely reasons for DOAs (e.g., climate related, bird quality related, density related, equipment related).

Start by using an existing list of common causes or creating one based to best fit your production. Work up to increasing the number of categories to provide the most valuable and specific data to inform cause investigations and other opportunities to improve positive outcomes.

**Conduct further analysis:** Track cumulative data over time per poultry production operation to analyze trends and assess possible reasons for any increases. Evaluate mortalities by categories to determine if transport/handling, training, and vehicle interventions were effective.

Analyzing the data over time with guidance can reveal common factors that may be causing a challenge. If analyzing on a weekly basis to start, increase to a monthly, quarterly, and annual data review. Implement comparisons with additional industry data, your previous flock data, and other baselines that could offer further insight into if you have room for improvement.

**Consult with internal supply chain:** Communicate this data within the internal supply chain to inform husbandry improvements or necessary training, catching, or transport improvements to increase positive welfare outcomes.

**Cross-reference with other KWIs:** Compare DOA data across other KWIs such as [cull tracking](#), [injury tracking](#), and [flock condition](#) for greater insight into causes of mortality and the appropriate corrective actions.

# TRANSPORT & HANDLING MORTALITY BETWEEN FACILITIES

## REASONING

**All transport can be a stressful event for birds, and with proper training and handling techniques as well as management of the environment, birds can be transported in ways to minimize discomfort and enhance positive outcomes.**

In some production systems, transportation is necessary to move birds from one facility to another as they grow. Chicks are transported from the hatchery to placement (e.g., grow out or a pullet environment). Pullets may be moved to another location as they age for production or management reasons (e.g., breeding). These facilities may be owned by the same organization or birds may pass between management companies at transport. The transportation company itself may be a third party or managed within the flock's owner operation. These variables make it harder to collect welfare data during this crucial time, but with collaboration, it can be easily added to your existing protocols.

When transporting birds between production sites, workers must handle poultry in a way that will yield the most positive

welfare and health outcomes for the flock. If not ideal, loading, unloading, and transportation can contribute to mortalities (called dead on arrivals or DOAs). Transport and handling mortality is a lagging indicator of welfare present as birds are caught, handled, and transported.

DOAs can be an indicator that the birds should have never been loaded because they were unfit for transport due to an existing health challenge, the journey included a lethal stressor (e.g., heat stress), or an incident (e.g., equipment injuries, handling errors).

There are multiple observations that can be collected as part of an evaluation of transport protocols. The most important element is assessing these occurrences with all handling teams and equipment used, as that can vary widely between independent/contracted groups (if used). However, this observation can be subjective and vary depending on equipment used, so an objective reference point is always DOAs. The assessment of DOAs can be an indicator of a need for a deeper assessment and investigation to reduce occurrences.



Open Air Transport

PHOTO CREDIT: U.S. POULTRY & EGG ASSOCIATION



**All parties involved in the handling and transport of live birds must work together to minimize stress and optimize the environment for the birds.**

**DEFINITION:** The assessment of discovered fatalities during or after loading, transport, and unloading of poultry from one facility to another (dead on arrivals or DOAs), excluding processing.

## OBSERVATIONS & MEASUREMENTS

### MEASUREMENTS:

1. **Transport mortality tracking (DOAs):** Record the number of deceased birds (DOAs) found within the transport compartment at the time of unloading the flock at the destination. Track and record the total DOAs over time to analyze trends and assess possible reasons for any increases. For the best results, review on a regular basis (e.g., weekly, monthly, quarterly).
  - > **Reference:** [EU Commission Guide to Good Practices for the Transport of Poultry \(2016\)](#)
  - > **Reference:** [Poultry Handling and Transportation Manual, Alberta Farm Animal Care](#)
2. **Mortality by cause:** Include both the mortality rate and the suspected reason why (e.g., injury, heat stress, etc.). Use an existing chart of common causes or establish one based on common issues and/or the type of production or species raised. Track the rates over time by category to analyze DOA trends related to specific reasons.
  - After a known issue has been corrected, continue to track and analyze mortality rates to determine if interventions and/or a change in transport equipment or protocol are needed for further action or if the applied corrections were effective in controlling an issue.

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Compare with on-farm [cull tracking](#) and [injury tracking](#) at the processor KWIs for best data and understanding.



Chicks are processed ahead of loading for transport.

PHOTO CREDIT: COBB-VANTRESS, LLC



# TRANSPORT & HANDLING MORTALITY BETWEEN FACILITIES



Chicks are not able to regulate their own temperature, so they rely on the comfort of the external environment.

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**DEFINITION:** The assessment of discovered fatalities during or after loading, transport, and unloading of poultry from one facility to another (dead on arrivals or DOAs), excluding processing.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Set protocols:** Set the protocol for the collection of DOA total data and communicate it back to the farm of origin or hatchery. This should include the frequency of data reporting and the volume that would be considered a deviation, to inform corrective action.
- ✓ **Collect and track data:** Train workers on how to track and record DOAs as part of their management practices when unloading.
- ✓ **Conduct analyses:** Analyze data against industry norms, species guidelines, or similar transport-type data to determine if improvements can be made.

Establish the protocol for analyzing the mortality data on a frequency that allows for prompt interventions if increases are observed. Include direction for how to connect and communicate data back to the origin site of the birds to inform management improvements. (See [cull tracking](#), [mortality](#), [injury tracking](#).)



Guidelines on monitoring chick comfort during loading can be coupled with transport data for a full picture of the welfare status of the birds from hatchery to the final farm destination.

PHOTO CREDIT: COBB-VANTRESS, LLC

### IMPROVE:



**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

**Increase data collection:** Train workers to determine a cause of each DOA informed by observations. Record DOAs and include data related to the transport team (crew, drivers, vehicle, equipment, location of origin, etc.) and categories to identify the likely reasons for DOAs (e.g., climate related, bird quality related, density related, equipment related).

Start by using an existing list of common causes or creating one based to best fit your production. Work up to increasing the number of categories to provide the most valuable and specific data to inform cause investigations and other opportunities to improve positive outcomes.

**Conduct further analysis:** Track cumulative data over time per poultry production complex to analyze trends and assess possible reasons for any increases; also evaluate mortalities by categories to determine if transport/handling, training, and vehicle interventions were effective.

Analyzing the data over time with guidance can reveal common factors that may be causing a challenge. If analyzing on a weekly basis to start, increase to monthly, quarterly, and annual data review. Implement comparisons with additional industry data, your previous flock data, and other baselines that could offer further insight into if you have room for improvement.

**Consult with internal supply chain:** Communicate this data within the internal supply chain to inform husbandry improvements or necessary training, catching, or transport improvements to increase positive welfare outcomes.

**Cross-reference with other KWIs:** Compare DOA data across other KWIs such as [cull tracking](#), [injury tracking](#), [flock condition](#), etc., for greater insight into causes of mortality and the appropriate corrective actions.

# CULL TRACKING

## REASONING

**Those who care for poultry aim for the most positive welfare outcomes possible. Chicks may be identified for culling and euthanized due to anatomical defects, nonrecoverable injuries or conditions, or because they do not meet quality requirements and/or the needs to thrive as adult birds.**

As with adult bird cull tracking, cull data is analyzed as deviations from the standard. Some chick culls are expected due to anatomical or developmental deformities that naturally occur during the embryo development and hatching phases. Hatcheries should have guidelines to inform staff which defects, injuries and conditions result in chick culling. Based on these guidelines, hatcheries can then assess if cull chicks are being identified and euthanized on a timely basis.

Higher rates of cull birds may indicate opportunities to improve with breeder farm or hatchery management due to bacterial contamination, or environmental, disease, or other stress factors that have occurred during egg handling or incubation. Regular tracking and assessment enable the hatchery manager to make adjustments sooner, preventing further impacts.

Chicks identified as culls should be euthanized in a timely manner to minimize any possible discomfort. The analysis of cull tracking data at the hatchery provides insight into the welfare of young birds in the hatchery and the efficacy of the cull protocol in place.



**THERE ARE DIFFERENT APPROVED METHODS FOR EUTHANASIA FOR DIFFERENT TYPES OF POULTRY AND IN DIFFERENT PRODUCTION SYSTEMS WHICH MAY ALSO BE INFLUENCED BY REGIONAL, NATIONAL, OR OTHER STANDARDS.** The details of these methods are not included in this reference guide due to the variances in regulation, though some best practices are consistent globally.



**Those who care for poultry aim for the most positive welfare outcomes possible.**

## OBSERVATIONS & MEASUREMENTS

### MEASUREMENTS:

Identify and document the number of cull chicks removed and euthanized from all areas in the hatchery (from point of separation of chicks/eggshells to the point of final chick order dispatch from the hatchery). Use a table or chart to quantify the KWI relative to the number of chicks hatched. Maintain this data in one location and review regularly with hatchery management and any other relevant stakeholders to uncover issues.

Note that mortality and culls should be tracked separately and clearly with consistent definitions.

1. **Cull percentage:** Record the number of chicks euthanized in the hatchery and compare to the total number of birds hatched by hatch day for a cull percentage.
2. **Cull tracking by category:** Identify the culling reason of each cull and record that data (e.g., injury, anatomical, health, quality reasons). Determine the relevant reasons or areas to segment the cull data into and be consistent with data collection. For the best results, consult with your supply chain stakeholders to determine if a defined measure is already in use by another hatchery that you could adopt to allow for better high-level data analysis.

> **Reference:** [Cobb Broiler Management Guide \(page 36\)](#)

> **Reference:** [Canada Code of Practice "Euthanasia"](#)



Training workers on how to identify cull chicks throughout the hatchery is essential to improving positive outcomes and quickly addressing concerns.

**DEFINITION:** Cull tracking is the assessment and quantification of chicks that are euthanized for any reason.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:

- ✓ **Collect data and calculate rate:** Calculate the cull percentage and record all culls in the hatchery by source flock and hatch day. Then, conduct regular data reviews among hatchery management to uncover deviations from the standard.
- ✓ **Set protocols:** Have a plan to discuss and investigate causes if deviations are observed.



Cull tracking not only by volume but also by cause provides the greatest insight into improvement opportunities in management.

### IMPROVE:



**Improve data collection:** Expand the volume and detail of data collected on culls to move to cull tracking by category, by flock source, by hatch day, and by larger trend analyses of cull percentages over time and across hatcheries (if applicable).

Record and analyze total cull data by categories regularly to gain further insight into husbandry, handling, equipment or other adjustments that could produce more positive outcomes.

**Review and deepen analyses:** If deviations are observed, share cull data up and down the supply chain to compare against other hatcheries to better understand if the cull rate is in line with the standard or if improvements can be made by implementing better practices.

**Improve training:** Assess the cull categories with the decision-makers to determine if a training or other worker-related improvement can be made. Conduct an intentional review after an intervention or a new protocol has been made to evaluate whether the adjustment was effective in outcomes or if further work is needed.

**Compare with other KWIs:** Compare data with [chick injuries](#), [mortality](#), and especially early mortality in rearing environment for an even greater understanding.

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# INJURY TRACKING

## REASONING

**The identification and analysis of injured chicks in the hatchery is important to understand welfare challenges. This KWI focuses on injuries that occur in the hatchery.**

Chicks can become injured as a result of service issues or other factors within the hatchery environment, such as environment related to the equipment function, equipment set-up, operator errors, etc. Examples of potential general hatchery injuries include toe pinches, scrapes, stack tip-overs, and overwet chicks (due to equipment failure).

Injured birds should be evaluated (and culled if deemed unfit), and corrective actions should be made to identify and eliminate the probable cause of injury.

The hatchery environment is designed to safely and comfortably move chicks from hatch to the point of transport. However, improper facility design or malfunctions of the equipment used to hold and move birds through the processing of chicks may cause injury. There are detailed guidelines in welfare standards that should be followed as applicable to the national, regional, and production type. The injury tracking KWI is one of the most effective indicators of a facility design issue or poor equipment operation. An intervention or correction can improve welfare for all the chicks that follow and produce more positive welfare outcomes.



**THIS KWI SHOULD BE USED IN CONJUNCTION WITH CULL TRACKING, FLOCK MORTALITY, AND TRANSPORT & HANDLING MORTALITY BETWEEN FACILITIES FOR HOLISTIC DATA AND THE BEST RESULTS.**



**The injury tracking KWI is an indicator of effective hatchery design, equipment uses, and handling protocols.**

## OBSERVATIONS & MEASUREMENTS

### MEASUREMENTS:

Use a table or chart to quantify the KWI and also reflect the person(s) and equipment involved in that area of the hatchery. Track by source flock and hatch day to analyze trends and to know what changes may need to be made to achieve the desired outcome.

1. **Injury tracking:** When an injury is observed, record the type of injury, source flock, and hatch day. Define the types of injuries by the applicable welfare standard or by most observed in that species, type, or hatchery and be consistent.

- This can be done as a random sample from the hatchery on a routine basis or regularly monitored for a more real-time analysis.

> **Reference:** [Chick and Poult Injury and Deformity Assessment, Canada](#)

2. **Injury rate:** Measure the injury rate by dividing the number of birds injured by the total birds hatched in a given period of time.

> **Reference:** [Chick and Poult Injury and Deformity Assessment, Canada](#)



Tracking the worker schedule with injuries and culls can help determine if additional training is needed in one specific area of the hatchery.



**DEFINITION:** Injury tracking is the assessment and segmented analysis of injuries that occur in newly hatched birds.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:



- ✓ **Observe and set protocols:** Set or review hatchery protocols to instruct workers to record injuries that are observed within the hatchery. Action levels can be created based on increases or mortality levels that trigger corrective action or further investigation.
- ✓ **Conduct analysis:** This evaluation can be done on a routine basis that is manageable to the hatchery labor force (weekly, monthly, quarterly, annually). The higher the frequency of evaluation, the greater potential for minimizing an ongoing issue or detecting patterns otherwise overlooked. Keep records of the data from each sample to conduct trend analysis over time to uncover greater insights into improvements or a growing issue.
- ✓ **Compare with other KWIs:** Compare injury data with [cull tracking](#) and [flock mortality](#) for more complete understanding if there is a welfare challenge present.



Equipment should be inspected regularly and after observing increased injuries, mortality, or culls to ensure it is not posing a welfare challenge.

PHOTO CREDIT: COBB-VANTRESS, LLC

### IMPROVE:



**Increase data collection and analysis:** Track the injury rate of randomly sampled hatch days and trend over time against the hatchery average and other hatchery data to determine if improvements are below the baseline for that species, production type, and region. If a spike or large deviation from a similar hatchery occurs, this can indicate a need to investigate further.

Take a sample from each area or mechanical process of the hatchery. Record this data by area and analyze to uncover if you have an area of the hatchery that is producing more negative welfare outcomes that could be improved with intervention (e.g., box type, vaccine application equipment).

Track each sample by each person or team working in that area to analyze trends and learn which specific personnel may need training or interventions to achieve the desired outcome.

Trend all scores to understand if continuous improvements are achieved by interventions after injury tracking discoveries.

**Review and improve protocols:** Conduct a thorough analysis of the protocols in place to take action when a deviation is discovered. Assess if adequate training is available and has been administered. Revisit the responsible parties and opportunities to invest in environment or technology improvements or training to address issues and increase positive welfare outcomes.

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# CHICK COMFORT

## REASONING

The metrics for assessing chick comfort are available through an environmental- and chick-based comfort assessment.

Chicks are poikilothermic, which means that they cannot thermoregulate their body temperature and depend on external environmental conditions to be thermally comfortable. For this reason, evaluation of the environment in the hatchery and evaluation of actual chick body temperature and behavior are important to prevent unnecessary stress (e.g., overheating or chilling) and to optimize chick welfare outcomes.

The environmental assessment of chick comfort is defined as measurement of the environmental temperature parameters provided within the hatchery.

By monitoring and tracking ambient temperature and chick outcomes, hatchery ventilation and incubation settings can be corrected to improve the welfare status of all chicks in the hatchery.

The chick-based comfort assessment includes the measurement of the body temperature of the chicks and includes behavioral expression as it relates to thermal comfort. Are chicks demonstrating panting behavior or increased vocalization [overheated]? 2) Are chicks demonstrating huddling behavior [chilled]?)



Broiler chicks at a hatchery.



**Conduct an intentional review after an intervention or a new protocol introduction to evaluate whether the adjustment was effective.**

**DEFINITION:** Chick comfort is defined as the bird- and environment-based assessments that characterize welfare in the hatchery environment.

## OBSERVATIONS & MEASUREMENTS

### OBSERVATIONS:

1. **Bird behavior:** Observe chick behavior (e.g., huddling, panting, abnormal vocalizations) as it relates to chick thermal comfort and discomfort. Set a protocol for taking corrective action if discomfort is observed.
2. **Environment observations:** If a bird behavior that can indicate a possible discomfort is observed, the environment should be assessed. Consider and observe if there has been a deviation in the organization of stocking density, crates or boxes used, stacks, ventilation, equipment, etc. There can be thermal discomfort, ventilation issues, or spacing issues present. Set a protocol for taking corrective action if abnormal environmental factors are observed.

> **Reference:** [Cobb Hatchery Management Guide](#)



Chick comfort can be assessed through observation and sample measurements.

PHOTO CREDIT: COBB-VANTRESS, LLC

### MEASUREMENTS:

Use a table or chart to quantify the KWI (environmental assessment and bird assessment) on each day that chicks are hatched. These measurements can be used to investigate if there are deviations in the hatchery process or environment that may present a welfare challenge. There isn't a singular metric to track or trend over time, but rather these indicate a need for corrective action or further analysis of other KWIs.

1. **Environmental assessment:** Assess the hatchery environment for adequate space and thermal comfort. Document room temperature throughout the day and in rooms where chicks are hatched, processed, and held prior to transport. Hatcheries can take an environmental assessment as a sample. (Vary where and when the assessment is done throughout processing for best data.)

> **Reference:** [Hatchery Tips, Aviagen](#)

> **Reference:** [How to Check Your Chicks are Comfortable, Aviagen](#)

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# CHICK COMFORT

## OBSERVATIONS & MEASUREMENTS (CONTINUED)

2. **Bird-based assessment:** Measure the body temperature of the chicks in the hatchery. Observe any demonstration of discomfort. Document chick vent temperature and behavior throughout the day and in rooms where chicks are hatched, processed, and held prior to transport.

- Documentation of vent temperature of random selection of individual birds from various boxes are recommended for this assessment. Staff can use a digital thermometer (e.g., rectal or ear thermometer) to objectively measure the chick's body temperature.

> **Reference:** [Cobb Hatchery Management Guide: Page 39](#)



### TRENDED RESULTS FOR THIS KWI CAN BE TRACKED AND COMPARED WITH PREVIOUS HATCHERY RESULTS.

This data can provide further insight into hatchery equipment function and maintenance, chick comfort, and early farm results, and can allow for more comprehensive corrective actions.



Chick comfort includes assessments of the environment and the bird in order to get a more holistic picture of welfare status.

PHOTO CREDIT: AVIAGENGROUP



**DEFINITION:** Chick comfort is defined as the bird- and environment-based assessments that characterize welfare in the hatchery environment.

## ASSESSMENT IMPLEMENTATION GUIDANCE

### START HERE:

- ✓ **Observe and set protocols:** Implement environment- and bird-based observations. Set or review the protocol in place for taking corrective action based on observations and when and who will conduct observations.
- ✓ **Record and collect data:** Record environmental results, vent temperatures, and behavioral observations in each room in the process flow (e.g., holding room) to establish a baseline for the hatchery. Measure for deviations from this agreed-upon baseline when investigating welfare challenges.



The seven-day-mortality report on-farm can be compared with hatchery data for insight into the welfare of the hatchery.

### IMPROVE:



**Review protocols:** Conduct an intentional review after an intervention has been made or implementing a new protocol to evaluate whether the adjustment was effective in yielding positive outcomes or if further work is needed.

**Compare with other KWIs:** Compare with cull tracking, [transport-related mortality](#), [mortality](#), and early mortality in the rearing environment for greater understanding and metrics to track for improvement.

**Increase data collection and analysis:** Track deviations identified over time by area to identify where birds are thermally stressed.

Analyze trends related to specific areas to determine if interventions related to ventilation system, incubation program, equipment (maintenance, setup, function), and hatchery staff response to process flow (e.g., movement of during the hatch day) were effective.



**IF A DEVICE FOR ASSESSING CHICK BODY TEMPERATURE IS NOT AVAILABLE, YOU MAY CHECK THE FOOT OF THE CHICK FOR A TEMPERATURE DEVIATION.** However, this is a subjective measure and can be affected by the overall environment, so objective measures are recommended.

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## ADDITIONAL CONSIDERATIONS:

The IPWA KWI Reference Guide focuses on building and refining a foundation for assessing key welfare indicators across varying production types around the world.

It was developed to be a living document that can be updated as the industry advances or additional input becomes available. This guide only includes incontrovertible assessment options to avoid adding any confusion to ongoing debates or emerging technologies.

There are several other important indicators of welfare or best practices that relate to producing more positive welfare outcomes that were not included at this time due to one of the following reasons:

- Lack of current scientific consensus.
- Attributes that make an assessment better suited to be guided by regulatory authorities, individual farms (i.e., management practices), or another existing body.

We invite you to contact us if you find an error, have a resource to add, or if you would like to have an addition or change considered for a revision. We welcome all input.

IPWA also has several other avenues to provide you with best practice information and assistance. IPWA is a firm believer in transparency and open conversation. Contact us if you have interest in helping develop resources or want to stay informed through IPWA membership when resources become available around other topics.

### Contact IPWA

[poultrywelfare.org](https://poultrywelfare.org)  
[info@poultrywelfare.org](mailto:info@poultrywelfare.org)

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Your guide to assessing and improving  
poultry welfare around the world.

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**Contact IPWA**

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