Virginia Cooperative Extension
Virginia Tech • Virginia State University

EXPERT REVIEWED

APSC-209P

Preslaughter Welfare of Broiler Chickens

Authored by Samantha Vitek, Graduate Student, and Leonie Jacobs, Associate Professor, School of Animal Sciences, Virginia Tech

What is the preslaughter phase?

The preslaughter phase is the last phase of the broiler chicken's life before slaughter. This phase includes multiple steps: withdrawal from feed and water, catching, loading into transportation crates, and transportation by road. In some cases, chickens may be placed in lairage (a waiting area) after arrival at the processing plant. The chickens are then removed from the crates, shackled on the processing lines, and stunned prior to actual slaughter. The shackling and stunning may vary in order depending on the stunning method. Different aspects of broiler welfare are at risk of being compromised during the preslaughter phase.

This publication focuses on the animal welfare risk factors in this preslaughter phase (fig. 1). Management of these risk factors can minimize animal welfare concerns.

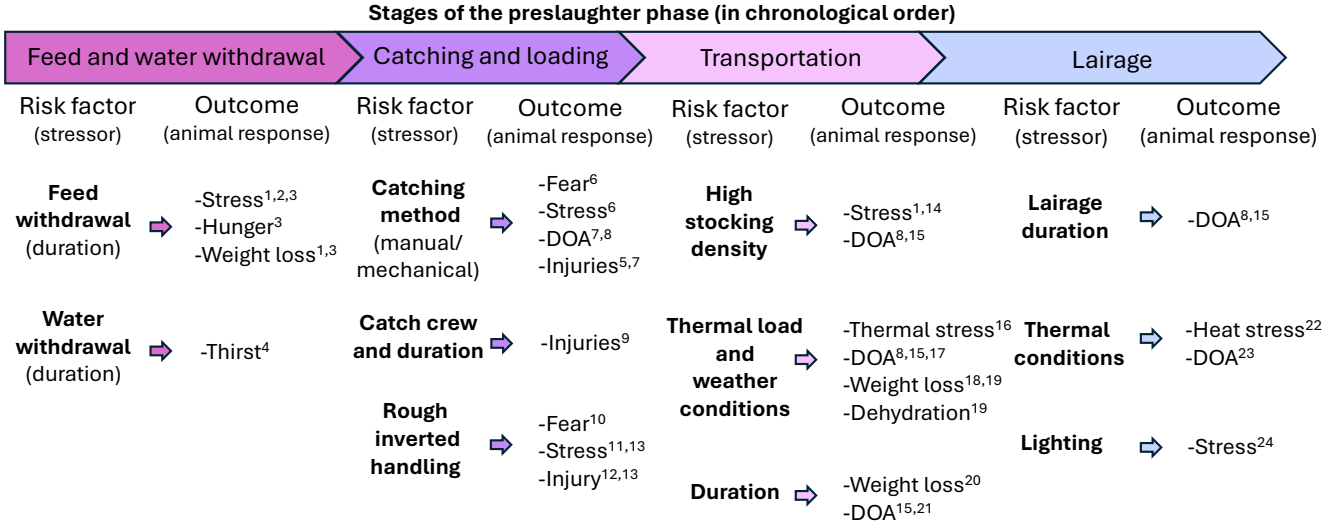

Figure 1. Summary of risk factors found in scientific literature associated with separate stages within the preslaughter phase for broilers. Animals experience distress when they have difficulties adapting to the conditions they are exposed to. Animals that are unable to adapt to stressors can experience poor animal welfare.

Numbers in the figure indicate references: 1. Delezie et al. 2007; 2. Najafi et al. 2016; 3. Nijdam et al. 2005; 4. Vanderhasselt et al. 2013; 5. Smith and Pierdon 2023; 6. Delezie et al. 2006; 7. Ekstrand 1998; 8. Chauvin et al. 2011; 9. Jacobs et al. 2017; 10. Jones 1992; 11. Kannan and Mench 1996; 12. Kittelsen et al. 2018; 13. de Lima et al. 2019; 14. Bedánová et al. 2006; 15. Nijdam et al. 2004; 16. Knezacek et al. 2010; 17. Vecerek et al. 2006; 18. Petracci, Fletcher, and Northcutt 2001; 19. Mitchell and Kettlewell 2009; 20. Arif et al. 2022; 21. Warriss et al. 1992; 22. Warriss et al. 1999; 23. Vieira et al. 2011; 24. Barbosa et al. 2013. Figure adapted from Jacobs and Tuyttens 2020.

Feed and water withdrawal

The first step in the preslaughter phase is feed and water withdrawal. Feed is normally withdrawn hours before catching to reduce the risk fecal matter contaminating the carcass and spreading foodborne illness to consumers.

A feed withdrawal time of eight to 12 hours (including the time needed for catching, loading, transport, and lairage) before slaughter is recommended, and in some countries legally required (European Union 2007), although longer periods of withdrawal may occur. Water access is typically removed just prior to catching.

If prolonged, this period without feed and water may lead to hunger, weight loss, thirst, dehydration, and distress (Delezie et al. 2007; Najafi et al. 2016; Nijdam et al. 2005; Vanderhasselt et al. 2013). To minimize the risk of these issues occurring, a feed withdrawal time of 8 to 12 hours prior to slaughter is recommended, along with water removal just prior to catching.

Catching and loading

Broilers need to be caught and loaded into transportation crates. The catching process should occur in dim light to minimize bird activity and distress.

Birds can be manually or mechanically caught, usually by contracted professional catching crews. In some countries, this is done by acquaintances of the producer.

When they are manually caught, birds are typically picked up by both their legs, carried upside down, and then loaded into containers with plastic crates or drawer systems. Catchers can carry five birds in each hand (National Chicken Council 2022). The full containers are then loaded onto the truck by forklift.

In some cases, birds are mechanically caught, where a vehicle with a conveyor belt or rotating "rubber fingers" is driven through the barn to catch and load birds into crates. Birds are never inverted and not manually caught or carried.

Both manual and mechanical catching systems are used in the United States. Benefits of mechanical catching include cost (it's cheaper) and improved working conditions (it requires less physical labor) (Lacy and Czarick 1998). However, the initial purchase and the maintenance of these systems are factors that must be considered.

Catching and loading may cause the broilers to experience fear, distress, injuries, or even death (Chauvin et al. 2011; Jacobs et al. 2017; Jones 1992; Kannan and Mench 1996; Kittelsen et al. 2018; Nijdam et al. 2006).

The risk factors for broiler welfare during the catching and loading process include catching crew, catching duration, rough inverted handling, catching method (animal handling), and catching environment (lighting).

Catching crew, catching duration

The choice of catching crew matters. Although manual catching can be physically demanding for the catching crew, mechanical catching also requires skilled operation. The prevalence of bruising on breasts and wings tends to differ depending on which catching crew is involved (Jacobs et al. 2017). In addition, a prolonged catching process results in more welfare issues, including bruising, scratching, and fractures (Jacobs et al. 2017).

Manual versus mechanical catching

Manual catching tends to have a more negative impact on broiler welfare than mechanical catching:

- Greater risk of bruised legs and bruised wings (Smith and Pierdon 2023), more bruised wings (7.7% vs. 4.2%; Delezie et al. 2006), and more bruising overall (3% vs. 2%; Knierim and Gocke 2003).
- More fractures (0.9% vs. 0.7%; Knierim and Gocke 2003) and dislocations (0.6% vs. 0.5%; Knierim and Gocke 2003).
- Higher stress and fear levels (Delezie et al. 2006).

However, in some cases manual catching scores better than mechanical catching:

- Fewer wing fractures (0.021% vs 0.041%; Ekstrand 1998) and bruises (0.022% vs 0.036%; Ekstrand 1998).
- Fewer dead-on-arrivals at the slaughterhouse (Chauvin et al. 2011; 0.095% vs 0.360%; Ekstrand 1998).

Upright versus inverted handling

An alternative to the conventional inverted catching method or mechanical catching is an upright manual catching method.

Although rarely applied, birds can be carried upright by their abdomen. Doing so results in many improvements for animal welfare, especially reduced injuries (Kittelsen et al. 2018). Upright handling is required for G.A.P. certification (Global Animal Partnership 2025).

Birds that are caught upright are also less fearful (Jones 1992), show a reduced acute stress response (Kannan and Mench 1996), show less agitation (de Lima et al. 2019), and have fewer wing fractures (Kittelsen et al. 2018) compared with birds exposed to inverted handling. However, catching this way takes more time because workers can only carry two birds at a time using this method.

Catching environment (lighting)

Light intensity should be reduced to a minimum during catching. High light intensity (lux) can increase acute stress responses (Wolff et al. 2019).

Transportation

Once birds are loaded onto a truck, they are driven to the slaughter plant.

Transportation trucks may have tarps, curtains or ventilation doors to protect birds from extreme weather, but in some cases no such protections are in place.

Transportation to the slaughterhouse may elicit acute stress (Delezie et al. 2007; Mitchell, Kettlewell, and Maxwell 1992), and death in extreme circumstances (Chauvin et al. 2011; Nijdam et al. 2004; Vecerek et al. 2006).

Stocking density in crates, thermal and weather conditions, and duration of transportation are all risk factors for broiler chicken welfare.

High crate stocking density

Bird welfare can be at risk when the animals are transported under high densities (little space allowance):

- Strong acute stress response (corticosterone) (Delezie et al. 2007).
- Strong chronic stress response (H:L ratio; heterophil to lymphocyte ratio is an indicator of the physiological long-term stress response in chickens) (Bedánová et al. 2006).
- Higher dead-on-arrival rates (Chauvin et al. 2011; Nijdam et al. 2004).

Birds should be upright and crated in a single layer, allowing space to sit comfortably. The appropriate crate stocking density depends on bird size and weather conditions.

Weather conditions

In cold weather, birds may huddle together, indicating thermal discomfort (too cold). In hot weather, birds may spread out and pant, also indicating thermal discomfort (too warm).

Either one of these conditions may risk bird welfare:

- Birds experienced cold stress when they were near air inlets (Knezacek et al. 2010).
- Birds experienced heat stress in poorly ventilated areas of the truck (Knezacek et al. 2010).
- Low (less than 45 F/5 C) and high (greater than 59 F/15 C) ambient temperatures, wind, and rain were associated with increased dead-on-arrival rates (Nijdam et al. 2004; Chauvin et al. 2011).
- Birds that were transported at 93 F/34 C lost more weight compared with birds transported at 85 F/30 C or 77 F/25 C (Petracci, Fletcher, and Northcutt 2001).
- The summer months (June, July, August) and winter months (December, January, February) have the highest dead-on-arrival rates (Vecerek et al. 2006).
- The negative effects of heat stress are exacerbated by lack of access to water.

Journey duration

Prolonged transportation may result in reduced welfare outcomes:

- Broilers that were transported for three hours lost more body weight compared with broilers transported for one and two hours (Arif et al. 2022).

- Dead-on-arrival rates in broilers were higher for journeys lasting more than four hours compared with journeys lasting less than that (Warriss et al. 1992).

Lairage

Once the birds arrive at the slaughterhouse, they may have to wait on a truck before processing, which is called lairage.

Lairage is the location at the plant where the trucks wait prior to processing. Lairage allows birds to recover from transportation stressors and allows the plant to have a buffer of birds present so that the slaughter line is never unintentionally empty.

Lairage times at the slaughterhouses usually range from two to four hours but may vary depending on logistics of the slaughterhouse (Rodrigues et al. 2017).

The lairage area can be a warehouse, an open building with a roof, or just an area where the trucks are parked. It may contain fans, misting fans, or heaters. Most U.S. slaughter plants have fans to cool the birds when it is hot.

These conditions during lairage may risk bird welfare:

- Using white lights in the lairage area is more stressful for broilers compared with using blue lights (Barbosa et al. 2013).
- A prolonged lairage time can increase the risk of birds dying prior to processing (Chauvin et al. 2011; Nijdam et al. 2004).
- Thermal conditions during lairage may cause heat stress (Warris et al. 1999).
- Temperatures above 82 F/28 C were associated with higher dead-on-arrival rates compared with temperatures below 75 F/24 C (Vieira et al. 2011).

Conclusion

The preslaughter phase for broiler chickens is a period that contains many stressors and risks for animal welfare:

- Feed and water withdrawal: This can lead to hunger, weight loss, thirst, dehydration, and distress.
- Catching: This can lead to fractures, bruising, distress, fear, and mortality. Mechanical catching, upright catching, or effective training of catching staff could minimize some of these issues. However, crews may need incentives to change their catching procedures.
- Transportation and lairage: These can lead to thermal stress, distress, dehydration, weight loss, and mortality. Thermal stress poses a significant risk to animal welfare. Although weather and season cannot be controlled, climatic conditions could be managed by active ventilation, heating, or even climate-controlled trucks.

Understanding the factors that can lead to negative welfare outcomes is important to make improvements in broiler chicken welfare during the preslaughter phase.

References

Arif, A., S. F. M. Ibrahim, K. F. M. Abouelezz, and A. H. M. Omar. 2022. "Influences of Different Transport Durations on Blood Biochemical, Meat Quality, and Meat Yield of Broiler Chickens." *Archives of Agriculture Sciences Journal* 5 (2): 165–79. https://doi.org/10.21608/aasj.2022.147917.1125.

Barbosa, C. F., R. H. de Carvalho, A. Rossa, A. Lourenço Soares, F. A. Garcia Coró, M. Shimokomaki, and E. Iouko Ida. 2013. "Commercial Preslaughter Blue Light Ambience for Controlling Broiler Stress and Meat Qualities." *Brazilian Archives of Biology and Technology* 56. https://www.scielo.br/j/babt/a/wjQZDNPr3gpzxCpBTwzQ4JF/?lang=en.

Bedánová, I., E. Voslárová, V. Vecerek, V. Pistěková, and P. Chloupek. 2006. "Effects of Reduction in Floor Space during Crating on Haematological Indices in Broilers." *Berliner Und Munchener Tierarztliche Wochenschrift* 119 (1–2): 17–21. https://pubmed.ncbi.nlm.nih.gov/16450703/.

Chauvin, C., S. Hillion, L. Balaine, V. Michel, J. Peraste, I. Petetin, C. Lupo, and S. Le Bouquin. 2011. "Factors Associated with Mortality of Broilers during Transport to Slaughterhouse." *Animal* 5 (2): 287–93. https://doi.org/10.1017/S1751731110001916.

Delezie, E., D. Lips, R. Lips, and E. Decuypere. 2006. "Is the Mechanisation of Catching Broilers a Welfare Improvement?" *Animal Welfare* 15, no. 2 (2006): 141–47. https://doi.org/10.1017/S0962728600030220.

Delezie, E., Q. Swennen, J. Buyse, and E. Decuypere. 2007. "The Effect of Feed Withdrawal and Crating Density in Transit on Metabolism and Meat Quality

of Broilers at Slaughter Weight." *Poultry Science* 86 (7): 1414–23. https://doi.org/10.1093/ps/86.7.1414.

de Lima, V. A., M. C. Ceballos, N. G. Gregory, and M. J. R. Paranhos Da Costa. 2019. "Effect of Different Catching Practices during Manual Upright Handling on Broiler Welfare and Behavior." *Poultry Science* 98 (10): 4282–89. https://doi.org/10.3382/ps/pez284.

Ekstrand, C. 1998. "An Observational Cohort Study of the Effects of Catching Method on Carcase Rejection Rates in Broilers." *Animal Welfare* 7, no. 1 (1998): 87–96. https://doi.org/10.1017/S0962728600020285.

European Union. 2007. "Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of chickens kept for meat production." *Official Journal of the European Union* L 182, 14 December 2019, 19-28. http://data.europa.eu/eli/dir/2007/43/2019-12-14 https://eur-lex.europa.eu/eli/dir/2007/43/oj.

Global Animal Partnership. 2025. "G.A.P.'s 5-Step Animal Welfare Standards for Chickens Raised for Meat." https://globalanimalpartnership.org/wp-content/uploads/2020/05/GAP-Standards-for-Chickens-Raised-for-Meat-v4.0.pdf.

Jacobs, L., E. Delezie, L. Duchateau, K. Goethals, and F. A. M. Tuyttens. 2017. "Impact of the Separate Pre-Slaughter Stages on Broiler Chicken Welfare." *Poultry Science* 96 (2): 266–73. https://doi.org/10.3382/ps/pew361.

Jacobs, Leonie, and Frank Tuyttens. 2020. "Improving Welfare in Catching and Transport of Chickens." In *Understanding the Behaviour and Improving the Welfare of Chickens*, edited by Christine Nicol, 91:417–58. Cambridge: Burleigh Dodds. https://doi.org/10.19103/AS.2020.0078.

Jones, R. Bryan. 1992. "The Nature of Handling Immediately Prior to Test Affects Tonic Immobility Fear Reactions in Laying Hens and Broilers." *Applied Animal Behaviour Science* 34 (3): 247–54. https://doi.org/10.1016/S0168-1591(05)80119-4.

Kannan, G., and J. A. Mench. 1996. "Influence of Different Handling Methods and Crating Periods on Plasma Corticosterone Concentrations in Broilers." *British Poultry Science* 37 (1): 21–31. https://doi.org/10.1080/00071669608417833.

Kittelsen, K. E., E. G. Granquist, A. L. Aunsmo, R. O. Moe, and E. Tolo. 2018. "An Evaluation of Two Different Broiler Catching Methods." *Animals: An Open Access Journal from MDPI* 8 (8). https://doi.org/10.3390/ani8080141.

Knezacek, T. D., A. A. Olkowski, P. J. Kettlewell, M. A. Mitchell, and H. L. Classen. 2010. "Temperature Gradients in Trailers and Changes in Broiler Rectal and Core Body Temperature during Winter Transportation in Saskatchewan." *Canadian Journal of Animal Science* 90 (3): 321–30. https://doi.org/10.4141/CJAS09083.

Knierim, U., and A. Gocke. 2003. "Effect of Catching Broilers by Hand or Machine on Rates of Injuries and Dead-On-Arrivals." *Animal Welfare* 12, no. 1 (2003): 63–73. https://doi.org/10.1017/S0962728600025380.

Lacy, M. P., and M. Czarick. 1998. "Mechanical Harvesting of Broilers." *Poultry Science* 77 (12): 1794–97. https://doi.org/10.1093/ps/77.12.1794.

Mitchell, M.A., and P.J. Kettlewell. 2009. "Welfare of Poultry during Transport - A Review." *Proceedings of the 8th European Symposium on Poultry Welfare*, January.

Mitchell, M. A., P. J. Kettlewell, and M. H. Maxwell. 1992. "Indicators of Physiological Stress in Broiler Chickens During Road Transportation." *Animal Welfare* 1, no. 2 (1992): 91–103. https://doi.org/10.1017/S0962728600014846.

Najafi, P., I. Zulkifli, A. F. Soleimani, and Y. M. Goh. 2016. "Acute Phase Proteins Response to Feed Deprivation in Broiler Chickens." *Poultry Science* 95 (4): 760–63. https://doi.org/10.3382/ps/pew001.

National Chicken Council. 2022. "National Chicken Council Broiler Welfare Guidelines and Audit Checklist." https://www.nationalchickencouncil.org/wp-content/uploads/2023/01/NCC-Broiler-Welfare-Guidelines_Final_Dec2022-1.pdf

Nijdam, E., P. Arens, E. Lambooij, E. Decuypere, and J. A. Stegeman. 2004. "Factors Influencing Bruises and Mortality of Broilers during Catching, Transport, and Lairage." *Poultry Science* 83 (9): 1610–15. https://doi.org/10.1093/ps/83.9.1610.

Nijdam, E., E. Delezie, E. Lambooij, M. J. Nabuurs, E. Decuypere, and J. A. Stegeman. 2005. "Comparison of Bruises and Mortality, Stress Parameters, and Meat Quality in Manually and Mechanically Caught Broilers." *Poultry Science* 84 (3): 467–74. https://doi.org/10.1093/ps/84.3.467.

Nijdam, E., A. R. Zailan, J. H. van Eck, E. Decuypere, and J. A. Stegeman. 2006. "Pathological Features in Dead on Arrival Broilers with Special Reference to Heart Disorders." *Poultry Science* 85 (7): 1303–8. https://doi.org/10.1093/ps/85.7.1303.

Petracci, M., D. L . Fletcher, and J. K. Northcutt. 2001. "The Effect of Holding Temperature on Live Shrink, Processing Yield, and Breast Meat Quality of Broiler Chickens." *Poultry Science* 80 (5): 670–75. https://doi.org/10.1093/ps/80.5.670.

Rodrigues, D. R., M. B. Café, R. M. Jardim Filho, E. Oliveira, T. C. Trentin, D. B. Martins, and C.S. Minafra. 2017. "Metabolism of Broilers Subjected to Different Lairage Times at the Abattoir and Its Relationship with Broiler Meat Quality." *Arquivo Brasileiro de Medicina Veterinária e Zootecnia* 69 (June):733–41. https://doi.org/10.1590/1678-4162-9268.

Smith, K.C., and M. K. Pierdon. 2023. "Impact of Mechanical vs. Manual Catching on Stress, Fear, and Carcass Quality in Slower Growing Broilers." *Journal of Applied Animal Welfare Science* 28 (2): 222–29. https://www.tandfonline.com/doi/full/10.1080/10888705.2023.2254226.

Vanderhasselt, R. F., S. Buijs, M. Sprenger, K. Goethals, H. Willemsen, L. Duchateau, and F. A. M. Tuyttens. 2013. "Dehydration Indicators for Broiler Chickens at Slaughter." *Poultry Science* 92 (3): 612–19. https://doi.org/10.3382/ps.2012-02715.

Vecerek, V., S. Grbalova, E. Voslarova, B. Janackova, and M. Malena. 2006. "Effects of Travel Distance and the Season of the Year on Death Rates of Broilers Transported to Poultry Processing Plants." *Poultry Science* 85 (11): 1881–84. https://doi.org/10.1093/ps/85.11.1881.

Vieira, F. M. C., I. J. Oliveira da Silva, J. A. D. Barbosa Filho, A. M. C. Vieira, V. C. Rodrigues-Sarnighausen, and D. de B. Garcia. 2011. "Thermal Stress Related with Mortality Rates on Broilers' Preslaughter Operations: A Lairage Time Effect Study." *Ciência Rural* 41. https://www.scielo.br/j/cr/a/trkfzpj6RcTp4rQD3FMbwFz/?lang=en.

Warriss, P. D., E. A. Bevis, S. N. Brown, and J. E. Edwards. 1992. "Longer Journeys to Processing Plants Are Associated with Higher Mortality in Broiler Chickens." *British Poultry Science* 33 (1): 201–6. https://doi.org/10.1080/00071669208417458.

Warriss, P. D., T. G. Knowles, S. N. Brown, J. E. Edwards, P. J. Kettlewell, M. A. Mitchell, and C. A. Baxter. 1999. "Effects of Lairage Time on Body Temperature and Glycogen Reserves of Broiler Chickens Held in Transport Modules." *Veterinary Record* 145 (8): 218–22. https://doi.org/10.1136/vr.145.8.218.

Wolff, I., S. Klein, E. Rauch, M. Erhard, J. Mönch, S. Härtle, P. Schmidt, and H. Louton. 2019. "Harvesting-Induced Stress in Broilers: Comparison of a Manual and a Mechanical Harvesting Method under Field Conditions." *Applied Animal Behaviour Science* 221 (December):104877. https://doi.org/10.1016/j.applanim.2019.104877.

VT/0425/APSC-209