UF IFAS Extension UNIVERSITY of FLORIDA

UF/IFAS PEER REVIEWED FCS3364

https://doi.org/10.32473/edis-FY1503-2022

Wild Game: Safety and Quality in the Field[1]

Chad Carr, Jason M. Scheffler, Michael Fioretto, Jennifer G. Bearden, and Halie Corbitt[2]

Introduction

This publication is the first of a four-part *Wild Game* series intended to help hunters and processors produce safe and delicious game meat products.

Two statements demonstrate the importance of the "in the field" component to ensure safe, high-quality game meats.

1. We can never make quality or safety better; we can only make it worse.

2. Low-quality or unsafe raw material yields a low-quality or unsafe finished product.

Before the Shot

When hunting for game meat, safety starts even before the shot. It is important to pay close attention to the animal's appearance and behavior. It is very unlikely, especially in Florida, but if a deer appears to be staggering, uncoordinated (due to a gross neurological defect), or especially unfit or unhealthy (unthrifty), do not process meat from the animal, and notify the Florida Wildlife Commission (866-293-9282). The animal could have chronic wasting disease (CWD) (FWC, 2020). CWD is a contagious fatal disease similar to bovine spongiform encephalopathy (Hedman et al., 2020). While this disease has not been identified in Florida, it has been identified in both captive and free-ranging animals of the deer family in 26 states. CWD is a rare progressive neurodegenerative disorder most often found in tissues with lots of nerves such as the brain and spinal cord. While this disease may not be present in the muscle or fat, it is important that you **do not process or eat meat from an animal you suspect could have CWD**.

To further reduce the risk of CWD in Florida, the FWC has revised rules that were enforced starting July 1, 2021, prohibiting importation or possession of whole carcasses or high-risk parts of deer, elk, moose, caribou, and all other species of the deer family from any place outside of Florida (FWC, 2021).

Making a Humane Kill Shot without Contacting the Digestive Tract

After ensuring that the animal is healthy (thrifty) and appears normal prior to harvest, use an accurate and humane kill shot to maximize human safety, meat quality, and value. A head or neck shot will contaminate or waste the least amount of meat. However, these areas provide a smaller target than the "vitals" or the area behind the shoulder containing the heart and lungs. Bacteria within the gut can contaminate the carcass and increase the risk of foodborne illness, so the hunter should steer clear of the digestive tract and avoid "gut shooting" the animal.

We can never truly undo contamination. After a gut shot, the chance of product contamination with pathogenic

1. This document is FCS3364, one of a series of the Department of Family, Youth and Community Sciences, UF/IFAS Extension. Original publication date January 2022. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

2. Chad Carr, assistant professor, Department of Animal Sciences; Jason M. Scheffler, research assistant professor, Department of Animal Sciences; Michael Fioretto, student, Department of Animal Sciences; Jennifer G. Bearden, agriculture Extension agent II, UF/IFAS Extension Okaloosa County; and Halie Corbitt, Extension agent I, family and consumer sciences, UF/IFAS Extension Columbia County; UF/IFAS Extension, Gainesville, FL 32611.

(disease-causing) bacteria increases, regardless of how carefully someone trims the carcass (Carr et al., 2002).

Bacteria that can cause serious foodborne illness such as *Salmonella* and *E. coli* O157:H7 can live in the digestive tract or on the hide of animals and can be transferred to the carcass surface during dressing (Gill, 1979; Odeyemi et al., 2020). Additionally, regardless of how effectively trimmed, the meat generated from a poor shot is more likely to result in extensive spread of spoilage microorganisms, which can lead to shorter shelf life as well as off flavors. *Clostridium gasigenes* has been documented to induce spoilage of venison (Broda et al., 2002), while members of the family Enterobacteriaceae were responsible for spoilage of meat from feral pigs (Boers et al., 1994). You can trim off contamination, but you cannot see microorganisms that contribute to foodborne illness and/or spoilage.

Direct Risk to the Hunter

After you have made a successful kill, be aware of the following before you put a knife to the animal. North American hunters have acquired illnesses such as brucellosis, bovine tuberculosis, and leptospirosis from dressing of wild game (Brown et al., 2018; Hedman et al., 2020). The chances of acquiring one of these pathogens during dressing, while unlikely, could result in chronic illness or death.

Wear glasses as well as latex, nitrile, or rubber gloves while gutting, or while handling the animal's brain, spinal cord, eyes, spleen, tonsils, and lymph nodes.

Do not eat, drink, or touch your face or eyes until you have thoroughly washed your hands.

Note: These diseases have **not** been associated with eating game meat, only with the hunter's direct contact with the animal's fluids.

Skinning a Deer

There are multiple ways to dress wild game. However, your next step likely depends on your access and ability to effectively chill the carcass.

1. If you do not have the chance to place a carcass into a walk-in cooler, the ambient temperature is above 40°F, and/or you plan to grind all of the meat from the carcass—you do not have to gut and take the organs out of the animal. Instead, remove the hide and prepare to debone the muscles from the skeleton.
2. If you have the chance to place a carcass into a walk-in hanging cooler or the ambient temperature is below 40°F and you would like to generate some whole-muscle pieces—prepare to gut the animal.

The Most Important Rules of Thumb

1. Keep it clean!

2. Eliminate anything that is questionable!

3. Get it cold and keep it cold!

Promptly moving the recently shot animal to a location with running water will allow you to wash your hand, minimize cross-contamination, and keep the meat clean. When cutting the carcass, maintain a "dirty" hand to handle the hide, and a "clean" hand to hold the knife.

Use water to clean off dirt and fecal material from the hide prior to making a cut. When cutting the hide or gutting the animal, cut "inside-out" to minimize contamination. Both hands should be "clean" when gutting the animal. To reduce the risk of piercing the guts when gutting the animal, point the knife blade outward. Be especially careful when removing the anus and intestine to prevent puncture and minimize contamination.

Trim off any pieces of meat that have come in contact with feces, milk, or digestive tract contents before using an antimicrobial spray such as a vinegar water (50/50) mixture. The vinegar water mixture can be sprayed on areas where hair or hide touch the meat. Rinse hands and tools periodically in a bucket of sanitizing solution containing 1 tbsp of chlorine per gallon of water.

Clean knives after trimming contamination and/or cutting the more nerve-dense tissues such as the brain, eyes, and spinal cord. Discard the area of the initial wound/or shot including any blood clots to improve shelf life and quality.

The quicker you get the meat chilled, the better. The amount of time the carcass and/or meat remains above 40°F will allow harmful bacteria such as *Salmonella* and *E. coli* O157:H7 to grow exponentially (Hedman et al., 2020). Even if the meat does not become contaminated with bacteria that can make you sick, the meat will still be exposed to food-spoiling bacteria, such as *Clostridium gasigenes*.

Getting meat below 40°F as quickly as possible will improve the shelf life and/or eating quality of the meat (USDA-FSIS, 2013).

What if something looks nasty?

Animals can harbor several different internal parasites including *Trichina spiralis* from feral pigs, worms (lungworm, tapeworm, stomach worm, arterial worm), liver flukes, and nasal bots, the virus which causes blue tongue, or external parasites including mange, mites, and ticks.

This is a difference between wholesomeness and safety. There is little to no evidence that meat generated from animals with any of these parasites or viruses can make a human sick when meat is cooked to the correct internal temperature of 160°F (USDA-FSIS, 2013; USDA-FSIS, 2020). However, you might determine that this product is not wholesome. Discard or use at your discretion.

What about cooked meat tenderness?

If you plan to grind all the meat from the carcass, whole muscle tenderness is not a concern. Keep the meat as clean as possible and place in the cooler or freezer until the product can be ground and further processed. To minimize pathogen growth and maximize shelf life, it is important to get boneless products below 40°F or frozen as quickly as possible.

If you would like to make some whole-muscle cuts such as steaks or cutlets, **do not freeze the meat hot!** Even though the animal is dead, the muscle is still alive. Freezing hot meat will result in excessive shortening upon thawing (i.e., thaw rigor) and steaks will be exceptionally tough (Ertbjerg & Puolanne, 2017).

To make the best deer steaks or cutlets possible, after promptly gutting the animal and minimizing contamination, keep the hide on the carcass and hang in a walk-in cooler, head down with the hide on for approximately one week. This allows the natural enzymes within the muscles to improve the tenderness of the meat (Kim et al., 2018). This is a process known as aging. The walk-in cooler or refrigerator should be clean, with good air circulation and proper temperature control (34°F–38°F).

A large ice chest can also be safely used to age meat. First, fill the clean ice chest with ice and water. Place clean, hide-off bone-in loin, legs, and shoulders into the cooler. This rapidly chills the meat. As the ice melts, drain the water out of the cooler and add more ice. Product should be frozen or further processed within seven days of harvest.

What about flavor?

The flavor of meat is primarily driven by the amount and/or kind of fat present. What the animal has eaten drives both the amount and kind of fat (or fatty acid profile). Deer harvested during the late fall in Florida will likely have little fat. What fat it has will have a very different fatty acid profile compared to the fat on a deer carcass harvested from a Midwestern cornfield (Calkins & Hodgen, 2007). This is generally even more true in feral pigs due to their monogastric digestive system. The fat on a wild game carcass will likely result in an undesirable taste for the meat. What is the best solution? Trim all the fat off of the wild game.

Additionally, the meat from an intact feral boar pig and some mature feral gilts or sows will taste bad (like a urinal cake smells) due to the deposition of the pheromones/steroid hormones androstenone and/or skatole within the fat (Squires et al., 2020). This will not cook out or lessen over time. Female consumers tend to be more sensitive to the off flavor than male consumers. This can be reduced by safely trapping and castrating the boar at least 8 weeks before it is harvested (Dunshea et al., 2001).

In conclusion, if you follow these rules of thumb:

1. **Keep it clean!**

2. **Eliminate anything that is questionable!**

3. **Get it cold and keep it cold!**

You will generate raw materials to make safe and delicious wild game products.

References

Boers, R. H., Dijkmann, K. E., & Wijngaards, G. (1994). Shelf-Life of Vacuum-Packaged Wild Boar Meat in Relation to That of Vacuum-Packaged Pork: Relevance of Intrinsic Factors. *Meat Science, 37*(1), 91–102. https://doi.org/10.1016/0309-1740(94)90147-3

Broda, D. M., Bell, R. G., Boerema, J. A., & Musgrave, D. R. (2002). The Abattoir Source of Culturable Psychrophilic *Clostridium* spp. Causing "Blown Pack" Spoilage of Vacuum-Packed Chilled Venison. *Journal of Applied Microbiology, 93*(5), 817–824. https://doi.org/10.1046/j.1365-2672.2002.01757.x

Brown, V. R., Bowen, R. A., & Bosco-Lauth, A. M. (2018). Zoonotic Pathogens from Feral Swine That Pose a Significant Threat to Public Health. *Transbound. Emerg. Dis., 2018*(65), 649–659.

Calkins, C. R., & Hodgen, J. M. (2007). A Fresh Look at Meat Flavor. *Meat Science, 77*(1), 63–80.

Carr, M., Knutson, H., & Scott, C. (2002). Assessment of Microbial Contamination on Deer Carcasses. *Angelo State University Management, Instruction, and Research Center Progress Report*, 19–22.

Dunshea, F. R., Colantoni, C., Howard, K., McCauley, I., Jackson, P., Long, K. A., ... & Hennessy, D. P. (2001). Vaccination of Boars with a GnRH Vaccine (Improvac) Eliminates Boar Taint and Increases Growth Performance. *Journal of Animal Science, 79*(10), 2524–2535.

Ertbjerg, P., & Puolanne, E. (2017). Muscle Structure, Sarcomere Length and Influences on Meat Quality: A Review. *Meat Science, 132*, 139–152.

FWC. (2020). Precautions When Pursuing or Handling Deer That May Have Been Exposed to CWD. Retrieved from https://myfwc.com/media/18817/cwd-hunter-precaution.pdf

FWC. (2021). Florida Rules Regarding Carcass Importation. Retrieved from https://myfwc.com/media/26882/cwd-importation-rule.pdf

Gill, C. O. (1979). Intrinsic Bacteria in Meat. *J. Applied Bacteriology, 47*, 367–378.

Hedman, H., Varga, C., Duquette, J., Novakofski, J., & Mateus-Pinilla, N. (2020). Food Safety Considerations Related to the Consumption and Handling of Game Meat in North America. *Veterinary Sciences, 7*, 188. doi:10.3390/vetsci7040188.

Kim, Y. H. B., Ma, D., Setyabrata, D., Farouk, M. M., Lonergan, S. M., Huff-Lonergan, E., & Hunt, M. C. (2018). Understanding Postmortem Biochemical Processes and Post-Harvest Aging Factors to Develop Novel Smart-Aging Strategies. *Meat Science*, *144*, 74–90.

Odeyemi, O. A., Alegbeleye, O. O., Strateva, M., & Stratev, D. (2020). Understanding Spoilage Microbial Community and Spoilage Mechanisms in Foods of Animal Origin. *Comprehensive Reviews in Food Science and Food Safety, 19*(2), 311–331.

Squires, E. J., Bone, C., & Cameron, J. (2020). Pork Production with Entire Males: Directions for Control of Boar Taint. *Animals, 10*(9), 1665.

USDA-FSIS. (2013). Food Safety Counts. Retrieved from https://www.fsis.usda.gov/sites/default/files/media_file/2020-12/Food_Safety_Counts.pdf

USDA-FSIS. (2020). Post-Mortem Inspection. Retrieved from https://www.fsis.usda.gov/sites/default/files/media_file/2020-08/PHVt-Post_Mortem_Inspection.pdf

US FDA. (2009). FDA Food Code. Retrieved from http://www.fda.gov/downloads/Food/FoodSafety/RetailFoodProtection/FoodCode/FoodCode2009/UCM189448.pdf