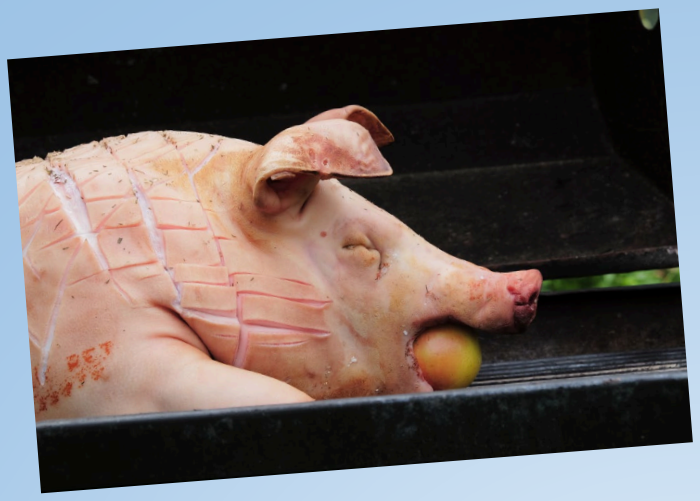


This document is to help you safely prepare a whole roaster pig. Information is provided on how to safely purchase, store, and prepare this food that is served at events and celebrations to avoid spreading foodborne illness.

Whole Roaster Pigs

Guidance for the Safe Handling and Cooking

Conference for Food Protection Safe Handling & Cooking of Roaster Pigs Committee

Table of Contents

Introduction

This document includes data from past outbreaks from the United States and other countries, existing guidance, and currently accepted best practices to provide guidance for the retail food industry (chefs, caterers, and restaurant owners/employees), fundraiser organizers, community event sponsors, and the general public when handling, preparing, cooking, and serving whole roaster pigs. This document does not supersede any regulatory requirements. The recommendations in this guideline are not regulatory. The information is intended to assist individuals in meeting the FDA Model Food Code regulatory requirements and to produce a safe food.

In the United States, a whole pig is occasionally roasted to celebrate a holiday or special event. Unfortunately, there have been several foodborne illness outbreaks connected to these special events due to improper handling of the roaster pig. Between 2015 and 2017 there were three confirmed *Salmonella* outbreaks associated with roaster pigs in the United States. Public health investigations identified that inadequate handling and inappropriate cooking of the pig contributed to these illness outbreaks. Consumer and food handler preparation techniques are essential to prevent foodborne illness.

Pigs, like other livestock, are a known source of bacteria that can cause human illnesses. These bacteria may be transferred to the carcass during slaughter, processing, and handling. In addition to the presence of bacteria, roaster pigs are large. Ranging in size between 50 to 200 pounds, pigs require careful handling to reduce cross-contamination and proper monitoring of internal temperature to ensure thorough cooking. To address the size of the animal and the desired finished product, there is also a wide range of cooking methods from roasting on an open spit to using an imu pit in the ground, which presents multiple food safety challenges. Therefore, there are numerous opportunities for bacteria to multiply to dangerous levels and cause foodborne illness if mishandled.

History of Associated Illnesses and Lessons Learned

There is an established history of foodborne outbreaks that have been attributed to events where roaster pigs were cooked and served. Suspected bacteria identified during the outbreak investigations as the likely sources of illness include *Clostridium perfringens, Bacillus cereus, Escherichia coli,* and *Salmonella*, with *Salmonella* being the most commonly reported cause. This document summarizes published outbreak investigations from several roaster pig outbreaks (Novotny, et al., 1987; Trotz-Williams, et al., 2012; Connecticut Department of Public Health (DPH), 2016; Todd, 2013). The investigations reported on interviews with food handlers regarding their roaster pig preparation and handling processes. The investigations identified concerns regarding handling of roaster pigs that may be contributing factors to these outbreaks, including storage, cooking, cooling, and cross-contamination. This section discusses each contributing factor in more detail, from the perspective of the outbreak. Guidance on how to control for these contributing factors is addressed in the Preparing the Pig section.

Improper Storage

Food service workers and food handlers play a critical role in the receipt and storage of whole roaster pigs. Pigs were received a day or more before the event. The roaster pigs were generally between 45 and 65 pounds. The size of the pig presented a challenge for storage, particularly with events held in private homes. Proper storage can have a significant impact on control of these bacteria. Refrigeration units were often too small or not designed for holding a carcass of the size and shape of the roaster pig. In one outbreak, the pig was stored in a home refrigerator with the door partially open, which prevented adequate cold holding of

the pig and, thus, providing ideal temperatures to promote bacterial growth (Novotny, et al., 1987). In an outbreak in England, the pig was stored at room temperature for 38 hours (Todd, 2013). In other outbreaks, the pig was covered with bags of ice, but no indication as to completeness of coverage or monitoring of temperature to ensure the pig was kept at an appropriate temperature (Washington State Department of Health, unpublished, 2016).

Commercial facilities associated with outbreaks often had large mechanical coolers; however, these facilities were often used for storing other cooked or ready-to-eat foods, providing potential for cross-contamination. When roaster pigs were stored in someone's home, ice was commonly used and was found to be inconsistent as a method of temperature control, posing an increased risk of bacteria growth (Washington State Department of Health, unpublished, 2016).

Inadequate Cooking

The lack of uniformity in pig size and shape presents another risk factor. This requires that temperatures are taken in multiple locations on the carcass to confirm that final cook temperatures are achieved. Most outbreak investigations demonstrated attempts to monitor temperatures with a thermometer. However, there were no records verifying the temperatures or the locations of where the temperature was collected. Due to the lack of records, it was unknown if all parts of the pig reached the minimum cooking temperature of how long it took to achieve the final temperature.

Improper Cooling

Many of the outbreak investigations identified improper cooling of leftover meat as a likely contributor to the outbreak. In one outbreak, it was noted that food was left to cool on the counters and not placed into refrigeration quickly. Improper cooling exacerbated the growth of bacteria, causing rapid proliferation of the suspected agents *Clostridium perfringens* and *Bacillus cereus* (Trotz-Williams, et al., 2012). Another outbreak with *Clostridium perfringens* occurred in New Zealand. This outbreak was attributed to the 90-minute rest period between cooking and serving (Todd, 2013). Both of these bacteria may survive the cooking process and can produce toxins if the meat is not cooled properly. Reheating the meat will not destroy these toxins.

Cross-Contamination

The most predominate bacteria noted in the outbreak investigations was *Salmonella* spp. Contributing factors included cross-contamination due to brining, mishandling of large carcasses, and lack of handwashing.

In situations where brining was a concern, large volumes of meat, both large and small cuts, were brined at the same time in the same brine solution, a common practice for large events. Mishandling of these large volumes of brine led to cross-contamination which was enhanced through the improper disposal of the brine solution into sinks that were then improperly cleaned and sanitized afterwards (Connecticut Epidemiologist, 2016). The contamination in the sinks then led to cross-contamination throughout the facility when the sinks were later used for other ready to eat product preparation as well. Ready-to-eat food products were implicated in the outbreak; however, their source of contamination was likely due to the mishandling of the brine and its disposal.

Preparing the Pig

Roasting a whole pig is no small feat. From purchasing and storage to cooking and serving, the large size complicates every step of the process and provides ample opportunity for things to go wrong. Both USDA and FDA recommend to keep the pig 41°F or colder prior to cooking, to cook the pig to 145°F with a 4-minute rest time (USDA Cooking Guide [also known as Appendix A; under the *Salmonella* heading, https://www.fsis.usda.gov/wps/portal/fsis/topics/regulatory-compliance/compliance-guides-index/bacteria-guidance], FDA Model Food Code [https://www.fda.gov/food/retail-food-protection/fda-food-code] subparagraph 3-401.11(B)(1)), and to avoid cross-contamination. In reality, this is easier said than done. This section reviews some of the common practices in roasting whole pigs and how those practices relate to food safety.

Purchasing and Receiving

There are several considerations when purchasing a whole pig, like where does one buy a whole pig? What age or size should be selected? Will the pig come already dressed (clean and eviscerated where the innards are removed)? How is the pig going to be transported?

Whole pigs may be purchased directly from a slaughter establishment, grocery store, butcher, or in some states, a local farmer. Most places will require one to three weeks' notice to ensure availability and often require special order. Grocery stores receive their pigs from a state or federally-regulated slaughter establishment. These processing facilities have the proper equipment to slaughter and eviscerate the pig to minimize fecal contamination. In a state or federally-regulated establishment, each carcass will also undergo inspection to ensure it is fit for human consumption. All food establishments must use a state or federally-approved source for customers.

Some pigs may have specific raising claims, such as antibiotic-free or naturally raised. These claims are consumer preferences and do not impact the food safety since all slaughtered animals are required to be free of antibiotics, achieved by either never giving the animal antibiotics or by observing an FDA-regulated withdrawal time (time for the body to eliminate the antibiotic).

Regardless of where the pig will be purchased, the seller will need to know the desired age and/or size. Some consumers prefer the suckling pig to the adult. Suckling pigs are still nursing off the mother. They are 2 to 6 weeks old and generally under 25 pounds, but some may be up to 50 pounds. When deciding on the size of the pig, the general rule is to estimate 1 to 2 pounds of dressed weight per person. Larger animals will have a higher meat to bone ratio, and therefore, may be on the low end of that estimate. Respectively, smaller animals will have a lower meat to bone ratio and may be on the higher end of that estimate. This estimate assumes a 25-50% meat yield after cooking and that each person will eat roughly half of a pound. The number of expected guests will greatly influence size determination, however, keep in mind that as the size of the pig increases, so do the risk factors of temperature abuse, improper cooking, and cross-contamination. Depending on the situation, it may be safer to select a smaller pig and offer more side dishes or alternate meat choices.

Some may ask what the term dressed weight means. Dressed weight is the weight of the pig after it has been slaughtered, cleaned, and eviscerated. Some places sell uneviscerated pigs, which would require the pig to be eviscerated by the buyer. For food safety reasons, pigs should not be eviscerated at home. Evisceration is a messy process and is critical for food safety. If not done properly, and with appropriate equipment, the intestinal contents can transfer to the work surface and onto the meat. This will increase the risk of cross-contamination and increase the number of bacteria that would need to be killed during cooking, thus increasing the possibility of bacteria surviving the cooking process and causing illness.

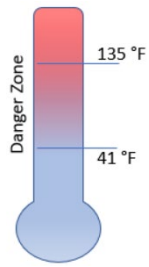
Dressed weight is the weight of the pig after it has been slaughtered, cleaned, and eviscerated.

Evisceration is the process of removing the internal organs from an animal.

As part of the dressing process, there may be the option to have the pig split so it will lay flat. This process is referred to as spatchcocking. The decision to split is based on the desired appearance of the end-product and whether the pig will be stuffed. With either option, there needs to be a method to ensure the hams and shoulders are cooked to the proper time and temperature to ensure food safety. Split pigs open up the hams and shoulders to allow for heat exposure, thus decreasing cooking time. If it is desired that the pig retains its roundness, then increasing the amount of coals in the area heating the hams and shoulders or applying a direct heat source, such as a hot rock, can provide better heat distribution.

Once the pig has been purchased, then the question is how to transport the pig. During the purchasing process, ask the seller if they will provide a food-grade plastic bag for transport. If not, then one should be purchased to prevent cross-contamination from the juices. The bag will need to be large enough to cover all parts of the pig, including the feet. Ask the seller about approximate length and girth so an appropriately-sized bag can be purchased. For larger pigs, consider searching for a food-grade 55-gallon barrel liner or box liner.

Thawing and Storage



Depending on the seller, the pig may come fresh or frozen. Either option has significant food safety implications. Bacteria are capable of growing at temperatures between 41°F and 135°F (referred to as the danger zone; FDA Model Food Code paragraph 3-501.16(A) and corresponding Annex) and it only takes a couple hours for some bacteria to double in number. High bacterial numbers could overwhelm the cooking step and result in their survival. For this reason, it is necessary to keep all parts of the pig cold -- 41°F or below. Ideally, a fresh pig would be available for pickup right before the big event and the thawing and/or storage would not be necessary.

If the pig is frozen, it will need to be thawed completely before cooking. When done properly, this process can take a couple days to even a week, depending on the size of the pig. There are two safe options for thawing a whole pig – refrigeration and keeping the pig under ice cold water. These are also safe options for storing a fresh pig.

Of the two options, the best option is to place the pig in a refrigerator. As most home refrigerators are not large enough to accommodate anything larger than a small suckling pig, it may be necessary to keep the pig at a local grocery store, butcher, or restaurant that has a walk-in refrigerator. If a large refrigerator is not available, another option is to place the pig in a large, clean and sanitized cooler, bathtub, or other container filled with ice and water. The water will ensure even distribution of the ice. The maintenance of ice in the water ensures the water stays close to 32°F and the pig stays below 41°F as long as the pig is submerged.

Use a thermometer to determine if enough ice is present. If the temperature approaches 41°F, add more ice. The ice water should cover all parts of the pig. If part of the pig is sticking out, then that part could rise above 41°F and allow for bacterial growth. Likewise, just ice alone will not ensure that all parts of the pig are kept cold enough unless the pig stays completely buried by the ice at all times.

If the pig will be brined, then the brining solution can be added to the ice water. If the brining solution contains high amounts of salt, it could cause the ice to melt quicker. The salt lowers the freezing temperature of water. If this happens, then add more ice if the temperature of the brining solution starts approaching 41°F.

If the pig is not going to be brined, then it is recommended to keep the pig in its food-grade bag while it is in the ice water bath. Another option is to put the brine in the bag with the pig, then submerge the bag in the ice water. The bag will help reduce cross-contamination between the ice water bath and the pig.

If a container is used to thaw or store the pig, make sure the container is thoroughly cleaned and sanitized prior to use and again after the pig is removed. Since pigs can carry bacteria such as *Escherichia coli* (*E. coli*) and *Salmonella*, it is important to select an appropriate sanitizer, concentration, and contact time. Refer to the section on Clean Up and Preventing Cross-Contamination for more information.

Cooking Methods Overview

There are numerous variations in cooking a whole pig, but most can be categorized into one of three methods: underground, open pit, or closed pit/oven. All three methods involve preparing a fire a couple of hours *prior* to transferring the pig to the heat source for cooking.

1. The **underground method** is most often used in Hawaii and the Polynesian Islands. Cooking a whole roaster pig underground begins with digging a hole into the ground, called an imu. The imu should be three times the width of the pig and twice as long. Rounding the corners aids in air circulation. Prepare the imu by starting a fire using untreated hard wood that burns hot. You may place river rocks on the firewood prior to lighting or wait and place the rocks on the bed of hot coals created from burning the firewood. Once the rocks are heated, they are spread out over the base of the imu. A few rocks will be removed from the imu and added to the pig's cavity near the hams and shoulders to provide extra heat to the thick muscles. (Cooking tip: Keep the pig on a grate throughout the cooking process to help with moving the pig around without disrupting the location of the hot rocks.) Green vegetative material with a high-water content (banana trunk, cabbage, corn husks) is layered on top of the coals. Aim to have the pit around 225°F to 250°F. The pig is lowered into the imu and covered with more vegetative material. Moistened burlap bags or gunny sacks are added on top. The imu is filled in with dirt. The moisture from the vegetative materials and moistened sacks will create steam to transfer heat to cook the pig. If any steam is leaking through, then more dirt is added to prevent the heat from escaping.

2. **Open pits** most commonly involve a spit or rotisserie-style of cooking. As with an imu, start a fire first. Either wood or coals can be used. The goal is to get a hot bed of coals that will provide the heat source for cooking the pig. Additional wood or coal will be needed periodically to maintain heat. The spit is placed between the thighs, along the inside of the body cavity, and out through the mouth. The pig is then secured to the spit to prevent it from falling off or rotating independently of the spit. There are several how-to videos and instructions on the internet for securing a pig to a spit, often referred to as trussing. Once done, the pig should not be able to move around the spit. The distance between the pig and the fire may vary depending on weather or individual circumstances. Most people aim to place the pig where it will be exposed to an air temperature of 225°F to 250°F. Rotate the pig frequently throughout the process to provide even heating and to keep the opposite side from cooling down. If rotation is performed manually, thermometers placed in each ham and shoulder can help gauge when the pig should be rotated. Rotation should occur at a frequency to keep the parts facing away from the fire from cooling down. Time intervals will vary based on ambient temperature, distance from the fire, and other contributing factors.

    - **Purchasing Equipment**. Specialized hog rotisserie equipment is available for purchase. If you are a food establishment, ensure the rotisserie equipment meets your local jurisdictional requirements before purchasing. Electric rotisseries are also available and can rotate the pig automatically and continuously.
    - **Making Equipment**. If you create your own rotisserie out of Y-shaped sticks, spare lumber, or cinder blocks pay attention to the materials you use. This style typically uses a food-grade stainless steel rod for the spit. **Do not use galvanized material, because toxic zinc may leach into the meat and into the air around the fire**. Carbon steel may impart off flavors into the meat.
3. **Closed pits** can include an oven, caja china box, grill, smoker, or even a homemade pit using cinderblocks. Ovens are typically used for the small suckling pigs. Caja china boxes are specifically designed for roasting large amounts of meat, including whole pigs. Some of the larger roasting boxes can hold a 110-pound pig live weight (approximately 80 pounds dressed weight). Large grills may be available to rent from party suppliers, home improvement stores, or barbeque rental companies. If you prefer to create your own outdoor oven using cinderblocks and covered with metal, **do not use galvanized metal, as this may release toxic zinc into the air and into the meat**. Lining the inside of the pit with aluminum foil may help to hold in more radiant heat and decrease cooking time, but it is not required. Aim to have the pit around 225°F to 250°F prior to placing the roaster pig in the oven.

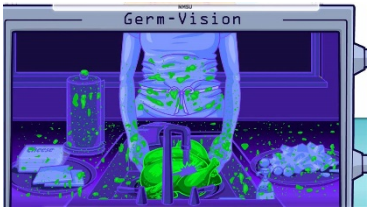
Pig Preparation

Regardless of the cooking method chosen, the fire will need time to build up and get a bed of hot coals. Use that time to prepare the pig. Depending on cooking preferences and style, some pig preparation will take place before the fire is started, such as brining. But much of the pig preparation will take place after the fire is started. Whenever handling the pig, it is recommended to wear gloves and a plastic or disposable apron. This will make clean up easier and minimize cross-contamination.

Brining is done to increase the flavor and tenderness of the pig. As mentioned in the Thawing and Storage section, brining can be performed while thawing or storing the pig prior to cooking. If brining is done, the solution needs to be kept at 41°F or below to prevent bacteria from multiplying.

Other methods to increase flavor and tenderness include scoring, salt rubs, and injections. Scoring involves making partial thickness cuts through the skin. Salt rubs are applied directly to the skin, and if made, into the scored areas. Injections means injecting a marinade solution directly into the meat. If the marinade solution will be used for basting during the cooking, then it is important to thoroughly cook and properly cool the solution prior to using it as a baste. This will kill bacteria that are present in the solution, which is especially important if the solution is applied near the end of cooking. Properly refrigerate the solution between injection and basting applications to prevent bacteria from multiplying and potentially producing toxins.

At no point during the preparation is it appropriate to hose down or wash the pig. The act of hosing or washing the pig actually increases the risk of cross-contamination. Bacteria can be transferred to nearby surfaces through the water used to wash the pig. In addition, the bacteria can travel through the air on tiny water droplets, a process referred to as aerosolization. This aerosolization spreads the bacteria around the area where the pig is being washed and may not be visible due to the small size. Since these bacteria-contaminated droplets may not be visible, they may not get cleaned appropriately. Do not hose down or wash the pig.



Bacteria aerosolization after washing a chicken. Washing a pig would create greater aerosolization of bacteria. Picture from New Mexico State University at: https://aces.nmsu.edu/dontwashyourchicken/index.html

Similar guidance is provided for chickens. As shown in the picture, bacteria (depicted by the green coloring) were splattered onto the counter and the person's clothing.

Some people choose to dry the pig prior to cooking. Drying can make the pig less slippery and easier to handle. It can also increase the browning of the skin during the cooking process. If drying is done, use disposable paper towels instead of a kitchen towel. Bacteria can survive on the kitchen towel and increase the risk of cross-contamination. Be sure to throw the paper towels in the trash immediately after use. Do not set them down on countertops or other food preparation surfaces where they could leave behind bacteria from the pig.

Another part of preparation includes wrapping the ears and snout in aluminum foil. If the eyes have been removed, then place crumbled aluminum foil into the eye sockets. While this is not a food safety hazard, these areas are prone to burning and creating a smoky, undesirable ash. The aluminum foil can be removed near the end of cooking.

An apple or wood block may be placed in the mouth. While this is not required, it keeps the mouth open and improves heat circulation through the thicker head regions.

Special Considerations If Stuffing a Pig

Best practice is to cook the pig unstuffed to be ensure proper cooking in the shortest time possible with minimal temperature variations and risk to safety. However, when feeding a large number of people, it is not uncommon for the pig to be stuffed with additional meat, vegetables, or grains if cooking multiple pigs is not possible due to space or availability.

Stuffing uncooked pigs with any food will increase the length of time it takes to cook. It also increases the food safety risk, as the stuffing is the slowest to cook and the hardest to get accurate temperatures. If the pig needs to be stuffed, then the safest method is to cook the stuffing to the appropriate temperature prior to stuffing the pig and place the stuffing inside the pig's abdominal cavity immediately before service and only after both the pig and the stuffing have been separately and thoroughly cooked.

If the pig will be stuffed prior to being cooked, loosely pack the pig's abdominal cavity. Overly packing the stuffing will slow down the heat disbursement. Regardless of the stuffing used, it should be moist, not dry, because heat destroys bacteria more rapidly in a moist environment (USDA Stuffing and Food Safety, https://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/poultry-preparation/stuffing-and-food-safety/ct_index). Stuffed raw pigs must be cooked to an increased internal temperature of 165°F (FDA Model Food Code 3-401.11 (A)(3)). Refrigerate the cooked pig and stuffing within 2 hours. It is best to remove any stuffing when cooling to speed the cooling process.

Cooking

Now that the fire is hot, and the pig is prepared, it is time to cook the pig. Depending on weight of the pig, it can take several hours for the pig to reach its final temperature. Most people estimate one hour of cook time per ten pounds of weight, but time will vary depending on the breed and size of the pig, type of heating element, distance from heat source, weather conditions, etc.

The amount of work required during cooking depends on the method of cooking. If cooking the pig underground in an imu, then once the pig has been properly covered to ensure minimal heat / steam loss, there is not much left to do until the pig comes to the proper temperature. If cooking in a closed oven, then it is imperative to maintain the heat in the oven. If cooking over an open fire, then it is imperative to maintain the fire and rotate the pig. Since the open fire utilizes a direct method of cooking, the pig will need to be rotated frequently so all parts of the pig are heated evenly and the parts facing away from the fire do not cool between rotations.

Some people prefer to baste the pig during the cooking phase. Basting is a preference and is not performed to meet any food safety criteria. Basting will help the skin retain moisture and provide brown color. However, it can also make the skin leathery. Ensure the basting solution has been properly cooked and cooled appropriately prior to use so that it does not contaminate the pig. Keep the basting solution in the refrigerator between applications. If the pig is not basted, then the fats in the skin will make it crispy. If using a closed pit to cook the pig, then opening the lid to apply basting solution will allow heat to escape and increase the cooking time.

For food safety purposes, the entire pig needs to reach a minimum temperature of 145°F and hold that temperature for at least four minutes (also known as a rest period). This will ensure the bacteria and parasites in the meat are destroyed, provided that the pig was not temperature-abused earlier. The challenging part, though, is that some areas of the pig will heat up faster than others. For that reason, it is necessary to take multiple temperature readings. The hams, shoulders, and in between the shoulders are the thickest portions and the last to heat up. If the pig was stuffed with meat or vegetables, the stuffing will heat up even slower than the hams and shoulders. To ensure appropriate depth, the thermometer should be placed all the way down to the bone and then pulled back just enough so that the thermometer is not resting on the bone. That way, the temperature is taken at the deepest part of the meat. If the thermometer is resting on the bone, the temperature will not be representative of the meat.

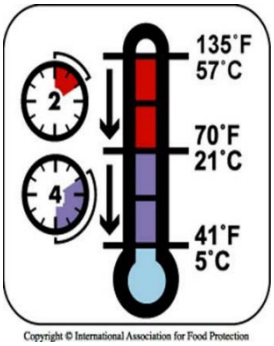
Many people will cook the pig to higher temperatures, such as 180°F to 200°F. The increased temperatures break down the collagen within the meat, especially in the hams and shoulders. This makes the meat more tender. It also helps to ensure all parts of the pig reach the minimum 145°F, just in case the thermometer missed a cold spot. And with higher temperatures, rest periods will be less or not necessary for food safety purposes, depending on the temperature achieved (USDA Cooking Guide (under *Salmonella*); FDA Model Food Code subparagraph 3-401.11(B)(1)). However, the rest period allows for the protein to break down and make the meat juicier.

Temperatures and Thermometers

- It is necessary to take multiple temperature readings.
- Hams, shoulders, in between the shoulders, and stuffing (if added) are the last to reach a proper cooking temperature.
- Stuffing the roaster pig with meat or vegetables will increase the needed cooking time.
- The thermometer should be placed all the way down to the bone and then pulled back just enough so that the thermometer is not resting on the bone.
- If possible, use a thermometer probe than can be left in the pig during the cooking process. This will help ensure the pig is being cooked appropriately throughout the process.

Serving and Leftovers

Once the pig has finished cooking, it is time to eat. But it is important to not forget about food safety while everyone is enjoying the meal. Bacteria can start to grow once the temperature of the pig drops below 135°F. It is recommended to place a thermometer into the pig to monitor temperature. Once the temperature drops to 135°F, the pig will either need to be consumed within four hours (FDA Model Food Code paragraph 3-501.19(B)) or be in the refrigerator to start its cooling process. If it appears there are going to be leftovers, start cutting up the pig into small pieces and place in small, shallow containers for placement in the refrigerator. Deeper dishes will slow the cooling process, which could allow bacteria to grow. In addition, it is better to place hot food directly into the refrigerator and leave the lid loose to allow for efficient cooling, as opposed to letting the food come to room temperature prior to placing in the refrigerator. If



the refrigerator is full or unavailable, then seal the food in food storage bags and immerse the bags in an ice bath. Full refrigerators can limit the cold air flow and slow the cooling process. In order to prevent bacteria from growing, the food needs to be cooled from 135°F to 70°F within 2 hours and from 70°F to 41°F within 4 hours (FDA Model Food Code paragraph 3-501.14(A)).

Clean Up and Preventing Cross-Contamination

It is important to prevent cross-contamination and the spread of bacteria from raw meat to food preparation surfaces, equipment, and utensils. Cross-contamination is where contaminants are transferred from one object or food to another object or food. As discussed in History of Associated Illnesses and Lessons Learned, cross-contamination is one of the major risk factors leading to foodborne illness. Cross-contamination can be prevented by maintaining good hygiene practices, separating raw foods from cooked foods, and properly cleaning equipment and food contact surfaces.

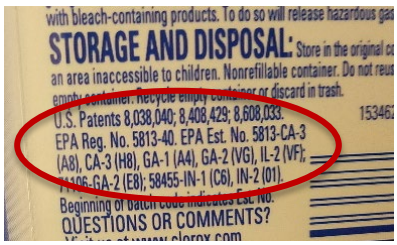
In food safety, good hygiene practices involve not working when sick, good handwashing practices, and the use of gloves or other tools to prevent hand contact with food. Wash hands in soap and water for at least 20 seconds with a full rinse. This will remove visible and invisible contamination from the hands. Dry hands with a clean towel or disposable paper towel to further remove contamination. Wash hands after handling raw product, prior to handling cooked product, and whenever the hands become dirty. After washing hands, wear gloves. Gloves will prevent bacteria from transferring to the hands when handling raw foods. They also prevent the transfer of bacteria from the hands to cooked foods. Waterless hand sanitizers do not remove contamination and may become inactivated when the hands are visibly contaminated and are not recommended to replace handwashing.

In addition, good hygiene practices also include handling of roaster pigs. Roaster pigs present a unique challenge in maintaining good hygiene practices because of the size and shape. It is recommended to wear clean or disposable aprons when preparing the pig for cooking. Once the pig is on the fire, it is recommended to remove the apron and gloves as well as change clothes if possible to prevent these objects from contaminating other food items or the cooked pig.

Separating raw foods from cooked or ready-to-eat foods will help prevent the raw food from contaminating the other food items. This includes refrigerating the raw pig in a separate location from other foods, using separate utensils and cutting boards for handling raw food, and cleaning all equipment and food contact surfaces between preparing raw and ready-to-eat foods.

When cleaning the equipment and food contact surfaces, be sure to clean all coolers, sinks, cutting boards, knives, countertops, roasting pans, or other equipment that come into contact with raw meat using these three steps:

1. Wash in hot, soapy water to remove all visible material.
2. Rinse in running water to remove all soap and visible material.
3. Sanitize with an EPA-registered sanitizer. EPA-registered sanitizers will have the EPA number and directions for use printed on the label. An effective sanitizer commonly used for food equipment is a solution of 1 teaspoon of plain bleach in 1 gallon of cold water.



When cleaning equipment and food contact surfaces, all visible material should be removed prior to applying a sanitizer. Sanitizers may become ineffective when organic material such as food, juices, and dirt is present. By not removing all visible material, the sanitizers may not be able to kill the bacteria, thereby increasing the risk of foodborne illness.

General Safety

While not directly related to food safety, the roasting of a whole pig can present some physical safety hazards. Safety hazards should be considered when beginning the project of preparing, cooking and serving a roaster pig. Many roaster pigs are over 50 pounds, thus making handling difficult. Physical injuries can be prevented by having the proper equipment for lifting and handling the pig.

Most cooking methods use a form of open flame or charcoal. Precautions should be in place to prevent injuries or damage from open flames, especially if it is windy. Flame control may also become challenging if the fat from the pig is dripping onto the fire. Minimizing the amount of fuel supplied to the fire to minimize flame development, wind blocks, and use of a drip pan to catch the fat from the pig will help reduce accidents. Even with measures in place to control the flame, accidents can happen. Be prepared and have a water hose readily available with the water spigot already turned on (can have a nozzle on the end of the hose to prevent water from continuously running) or a fire extinguisher. Remember to aim at the base (bottom) of the flames and not the top.

Once the pig is fully cooked, it will be hot. Use tongs and knives to pull the meat from the bone to prevent burns to the hands. Using clean tongs and knives have the added benefit of minimizing cross-contamination from the hands to the food.

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Roaster Pig Safety

Preparing roaster pigs takes special planning to prevent foodborne illness. Follow these safe handling and cooking tips to help ensure your special event is safe, happy, and healthy.

PLAN

Roaster pigs have unique food safety risks.

- ❑ **How big is the party?** Plan 1-2 pounds dressed weight per attendee.
- ❑ **How big is the pig?** Big pigs are harder to keep cold, awkward to handle, difficult to fit in equipment, and take longer to cook.
- ❑ **Fresh or frozen?** Frozen pigs take several days to thaw.
- ❑ **To stuff or not to stuff?** Stuffing increases risk and cooking time.
- ❑ **Cooking in a pit, a box, or on the grill?** Make sure the weather is right and you have enough fuel to keep the pig cooking for hours.

WASH

Wash hands, utensils, and cutting boards with soap and water often.

- ❑ **Cleanliness is key.** Stop the spread of germs by using soap, running water, and disposable towels.
- ❑ **Cooking outside?** Be sure to take soap, water, and disposable towels where the action is to wash your hands and the food prep area.
- ❑ **Step up your game.** After washing surfaces, you may also use a food-grade sanitizer to help reduce risk.

SEPARATE

Take care! Bacteria can spread to you and your equipment.

- ❑ **Will the store give you the pig in a water-proof bag?** A bag will help keep the pig juices from contaminating your equipment.
- ❑ **Using a kitchen sink, an ice chest, counter, or bathtub?** Wash and sanitize the area after handling the pig to destroy illness-causing bacteria.
- ❑ **Don't wash the pig!** Splashing water on the pig will spread germs around.
- ❑ **Dress the part.** A raw pig can spread germs to your clothes. Consider wearing a disposable apron while preparing the pig.

COOK

Roaster pigs cook unevenly. Make sure all parts get 145°F or hotter!

- ❑ **Cooking time varies by the pig, the weather, and cooking method.** Plan for at least 1 hour of cooking for every 10 pounds of meat.
- ❑ **You can't tell by looking.** Use a thermometer to check for doneness.
- ❑ **Take several temperatures.** The hams, shoulders, stuffing, and between the shoulders take the longest to get fully cooked.

COOL

Have leftovers? Get them cold to keep bacteria at bay.

- ❑ **Shallow is better!** Shallow, uncovered containers cool faster than thick layers of food in the refrigerator.
- ❑ **No refrigerator?** Serve or discard all of the food within 4 hours of cooking *or* immediately cool the foods in small containers with ice.

CHECKLIST

PURCHASE THE PIG

- ❑ Fresh or frozen
- ❑ Intact or eviscerated
- ❑ Water-tight bag for transport

KEEP IT COLD (41°F OR COLDER)

- ❑ Keep at store until day of event
- ❑ Store in refrigerator
- ❑ Use ice chest/bathtub: Buy ice

PREVENT CROSS-CONTAMINATION

- ❑ Keep pig away from other food and equipment (and don't wash the pig!)
- ❑ Wash hands and equipment with soap and water after handling the pig
- ❑ Use a sanitizer
  - ❑ Mix 2 Tsp unscented bleach in 1 gallon water
  - ❑ Buy EPA-labeled food-grade sanitizer

GET IT HOT

- ❑ Imu/In Ground (Keep pig covered)
- ❑ Open pit (Rotate pig frequently)
- ❑ Closed pit/smoker (Make sure pig fits)

KNOW IT'S HOT (AT LEAST 145°F)

- ❑ Buy a food-grade thermometer
- ❑ Measure the hams, the shoulders, between the shoulders, and in areas away from the heat source

LEFTOVERS

- ❑ Cool in uncovered containers or ice immediately after cooking
- ❑ Plan to serve or discard food in 4 hours after cooking