

# Safer Management Practices for Small Poultry Processors

By Kevin Backes



The Backes family has been in the business of raising and processing chickens and turkeys since 1932, beginning on the family farm. Their plant, located in Loose Creek, MO, has been with USDA and MO State Meat Inspection Program for over 40 years and has been used by both to train inspectors and giving helpful advice to individuals interested starting their own processing businesses. Backes Poultry raises and processes their own chickens as well as providing custom butchering services to other raisers. Over the past few years, the custom part of their business has increased substantially as individuals want to raise their own chickens and sell at farmers markets or directly to consumers who want to buy fresh poultry.

In the State of Missouri, if poultry raisers want to sell at farmers markets or health food stores, their chickens need to be inspected and labeled. It is also an option for poultry raisers to process no more than 1,000 chickens on the farm and sell to customers at their farm, without government inspection. This is an advantage for these producers and has helped to establish a growing livelihood for many small family farms with added income for a limited amount of investment. We want to educate these producers by offering advice on how, following regular safety practices, they can provide their customers the highest quality product possible.

It is extremely important that every precaution be taken when handling fresh poultry, as there are several bacterial contaminants that live naturally in poultry, and if they are not reduced or eliminated, can lead to sickness and death. If a bacteria outbreak would occur as a result of on-farm processing, these operations could be prohibited. There is no scientific data that indicates that a natural or pasture raised chicken has less chance of becoming contaminated than a confined bird. Environment plays a role in how well chickens are grown, but the final step for exposure to bacteria is still in the processing area.

The United States Department of Agriculture and the Missouri Department of Health and Senior Services have set up guidelines to regulate the safety of all fresh food sold throughout Missouri. We will try to express, starting at the farm, then through the processing operation and selling to consumers, that you too can have a product that is safe and free of bacteria by following some very basic rules of sanitation and common practices.

### **Most Common Types of Bacteria Found in Poultry:**

- 1. Salmonella**
- 2. E. coli**
- 3. Campylobacter**
- 4. Listeria**

### **Characteristics of Common Types of Bacteria Found in Poultry**

#### Salmonella

Salmonella is a single-cell bacilli organism that lives in the intestinal tracts of infected animals and humans and is naturally in the environment. It lives best above 40° Fahrenheit. It is passed from the feces of animals and humans to other people and animals. Safe handling of raw poultry can prevent the bacteria from multiplying. If present in food, it does not usually affect the taste, smell, or appearance of the food but it is the most common reported cause of food-borne illnesses. If safe cooking procedures are followed, it can be destroyed by getting meat to a high internal temperature and killing the organism.

#### E. coli

It is a normal inhabitant of the intestinal tract of animals and is harmless as long as it is kept in check by other intestinal bacteria. The infection of E. coli in poultry is very much related to the environment they live in and how stressed the chicken's immune system becomes. The best approach to E. coli infection is prevention rather than control. E. coli also can be reduced to a safe level for humans, if proper cooking procedures are followed.

#### Campylobacter

It is one of the most common causes of diarrhea illness in humans. Most often it is caused by cross-contamination with other food juices. Preventing the cross-contamination and using proper cooking methods reduces infection chances of this bacterium.

#### Listeria

It is a food-borne bacteria that is responsible for more food-poisoning fatalities than any other. Listeria is found in up to 10% of human intestinal tracts, as well as mammals and birds. The Listeria bacterium is unusually stubborn and can multiply even in foods stored in refrigerators. In meat processing plants, its growth is usually associated with damp areas, such as drains or water hoses where moisture is constantly present. Standard cooking, refrigerating, drying or heating procedures are not always effective at eradicating it.

## **Other Infections Seen in Chickens During the Processing Stage**

One common infection is known as Air Sac Syndrome. This is an infection of the sinus cavities of the live poultry. It begins in the houses where the chickens live and can cause high mortality rates prior to processing. The chickens appear to have cold-like symptoms or respiratory problems. When the chickens become ill from Air Sac, they lose their appetite, become droopy and stop growing. During the evisceration procedures, the disease is noticeable in the heart sac and lung area. These birds are condemned at the inspected plants. Another disease in chickens is Newcastle, which they are vaccinated against as baby chicks at many hatcheries as it too affects the lung and respiratory system of the chickens.

When chickens are raised in unhealthy conditions, it can lead to infections both on the inside and outside of the bird. Another problem seen in chickens raised in unhealthy conditions that leads to condemnation is the Water Belly chicken. Fluid begins to build up in the heart sack, then lungs and fills body cavity with yellow fluid.



*Cornish Cross  
Chickens are best  
for meat  
production*

## **It All Starts With the Right Bird**

The first step toward a good end product is to start with a good bird, mainly the right breed of chicken. In our years of raising chickens, we have found the Cornish Cross breed of chicken has been the most dependable breed for our needs. They are a cross between a White Cornish and a White Plymouth Rock and are considered the champion of the meat production line. Because they grow at a fast pace they resist most diseases, grow with a better feed conversion and have a more even temperament, which leads to less stress on the entire flock. A happy chicken is usually a healthy chicken. They like a sedentary life style, have a broad breast and because of early harvesting, have a lower volume of feathers, thus they also are the easiest to process. The feathers on the Cornish Cross do not seem as dense or deeply rooted as some other breeds and if scalded correctly, come completely free of feathers more readily.

The type of feed used also makes the Cornish Cross a better meat chicken. We use commercial broiler feed, but many farmers use corn or a grain mix from their farm and have good results as well. Having fresh water and abundant feed available for them is the key to a fast growth rate and also keeps their immune systems in balance. Our customers like a 3lb. chicken. We have flocks of 1500 at a time and begin processing them at 4.5 weeks of age, over a 4 day period. By the 4<sup>th</sup> day, some may weigh closer to 4 lbs.



*Cornish Cross on  
Left at 6 wks/4 lbs.  
Mixed-breed  
Frying Pan Special  
on Right 11 wks/2  
lbs.*

### **The Raising Environment is Important**

Because all chickens are born with bacteria naturally in their digestive systems, it is vital to keep this under control during both the raising and processing in order to give the consumer the healthiest chicken with the least amount of bacteria possible. No matter if the chickens are pasture raised or confinement raised, most begin their lives in a building of some sort on a bed of straw, sawdust litter or some type of material designed to keep them dry. It is very important to keep the moisture level as low as possible for the chickens, as this helps keep the Salmonella level low as well. The two best ways to ensure low moisture levels is with good ventilation and by avoiding over-crowding. Allowing plenty of space in pens and sheds for the chickens to grow ensures that too much waste does not accumulate, thus preventing the chickens from sitting on litter that is wet and eating wet litter and feed, both of which can negatively affect their immune systems. Keeping our chickens in confinement the whole time, we allow approximately 1 square foot of space per bird.



*A healthy environment for chickens is 1 square foot of space per bird*

**Best environment for chickens:**

- 1. Good air flow**
- 2. Avoid over crowding of birds**
- 3. Keep moisture level low**

A wet living environment for the chickens can cause the buildup of ammonia levels which cause burns to the chickens' skin and they develop unsightly blisters or lesions which can lead to bacteria entering their systems. In inspected plants, these areas are trimmed off and this would cause the appearance of the chicken to be downgraded when selling. Providing more space to grow also prevents the chickens from piling up, smothering, and fighting with each other. Good air ventilation for the birds is one of the best ways to avoid lung and respiratory diseases. These diseases can reduce the ability of their immune systems to fight off bacterial infections which could cause higher mortality rates. If using any heat source when chicks are little, it needs to generate enough warmth that they won't pile up on each other to stay warm and it will keep litter dry as well. If you are planning on raising several flocks of poultry, adequate time or rotation should be allowed between each flock in order to air out the sheds, pens or any equipment that was used. Litter that has gotten wet from around water fountains or rain coming into the building should be removed immediately. The chickens will peck this material and it adds bacteria to their system, and this causes their immune system to breakdown.



*Wet Litter Effects  
on Birds*

The pastured poultry practices are very good ways of showing how effective air flow is. The frequent movement of pens is good for the chickens so the waste deposits do not build up. Healthy birds can be raised in confinement too if good management practices are followed concerning air movement and attention is given to the inside environment. A thorough cleaning of all the equipment used is very important especially if you believe the previous chickens could have had any type of illness. We have seen birds coming in to our plant from both confinement raisers and pastured poultry raisers that have abnormalities that could have been prevented if better safety practices had been followed while the birds were being raised.

Some other practices that the raiser can follow to help prevent bacteria levels and infection rates from getting higher are common sense practices such as the following:

1. Limit the number of individuals who come in contact with the flocks
2. Never go from another animal feed lot into the chicken pens or buildings with the same footwear & dirty clothing. This can cause cross-contamination from fecal material and is a leading cause of Salmonella growth
3. If feed is delivered by an outside source, have large, dry bins located where the feed can be unloaded directly into them without having the delivery person walk through the building or pens, as your delivery might have been one of many that day.
4. Pellet feed has less chance of Salmonella growth in it compared to the meal type of feed, as the meal type tends to cake up when it gets wet and stays wet so bacteria grows more easily. Feed that has had animal protein added to it may contain higher levels of Salmonella because the animal protein is from waste materials which could have been from infected animals. Keeping the feed dry will help prevent the growth of Salmonella.
5. The water should also be clean and free-flowing or changed often to prevent bacteria growth. Some growers have found that nipple fountains are less likely to transmit Salmonella than cup or bell drinkers. If you have a farm deep well, have it tested periodically if you have other animals on the farm that could contaminate your ground water source through waste.
6. Control outside rodents or wild birds from mixing with the flocks of chickens. These rodents and pests can also spread bacteria and disease.

7. One of the most important ways to fight the spread of infections is a good thorough hand-washing by anyone in contact with the animals. This is a very effective practice when handling any type of food product, no matter at what level of food preparation.

## **Management Practices Just Prior to Processing**

### Well Timed Feed Withdrawal & Keeping the Birds Clean

When chickens are ready to be processed, feed and water should be withdrawn from them 8-14 hours before the chickens are to be processed. The birds should be caught at night with the lighting turned off as the chickens will be less stressed and stay calmer. Early morning catching should be done only if not processing until late in day, but feed should still be withheld. If they are fed up to a few hours before slaughtering, the feed doesn't have time to be digested and causes a full crop. With a full crop, there is a greater risk of the crop rupturing during processing and spreading contamination to both the inside and outside of the bird. Birds also release fecal material during processing, thus good feed withdrawal practices greatly reduce this source for possible contamination. The equipment used to scald the birds and remove the feathers will also collect waste materials and this waste can build up with bacteria, which can lead to contamination on the evisceration tables and rinse tanks. Washing procedures will not eliminate all the bacteria if the fecal material has been allowed to spread throughout the body cavity of the bird. Economically, giving the feed to the birds just prior to slaughtering is not profitable, as weight will not be gained from undigested food. If birds come in to be processed and have noticeable amounts of dry or wet fecal material on them, rinsing them off prior to slaughtering could be a way of reducing the risk of contamination to equipment and the product. If the birds get rained on in between the time they are caught and the time they are processed, they can get more wet fecal material on them from their confinement in a wet cage. Rinsing the birds off just prior to slaughtering could lessen the risk of bacteria from the wet fecal material that could have accumulated on them.



*Birds pictured were not withdrawn from feed long enough before processing. If crop with feed is ruptured, contamination can occur.*

### Transportation Can Cause Contamination

When flocks are transported for processing, it is better to only move them a short distance as the birds release fecal materials and Salmonella is spread to other birds on the truck or trailer. Most poultry raisers also raise other livestock and many use the same equipment to move all the animals from place to place. If a stock trailer or truck has been used by other animals, it should be washed thoroughly before it is used for the chickens to reduce the risk of cross-contamination. One way to handle poultry that is ready for processing is to have them in dry wood or plastic cages that are used for poultry only. These cages should be rinsed off after their use and left to air dry before using again for more poultry.

Air flow is important after the birds have been caught and caged because with better air flow, much of the bird's waste material will dry out, which reduces the potential for bacteria growth. Over-crowding should also be avoided when hauling the birds because any bacteria present can spread easily from bird to bird. If the chickens do not have enough room they can easily injure or possibly smother each other. If you haul chickens in wet weather, they should be protected with a tarp or other covering. Catching the chickens and moving them from their living environment will cause them stress and can affect the quality of meat so they need to be loaded several hours before processing to give them time to adjust. If it is a hot day when doing the processing, try the best that you can to keep the chickens protected from the heat or sun, as this can cause heart attacks in heavy birds. A chicken that dies just prior to its slaughtering, will not bleed out properly so it is recommended not to be eaten or sold.

### **Places where Contamination can Occur Prior to Processing:**

- 1. Birds Left on Feed too Long**
- 2. Cross-contamination in Transportation**
- 3. Abundant Fecal Material on Birds**



*Cages used specifically for poultry have less chances of contamination than a multi-used stock trailer*

### **Sanitation Procedures at Processing Plants**

In processing plants nationwide, that are under the supervision of the state and federal governments use a Standard Operating Procedure plan (SOP) which is constructed to fit each individual plant as their way



of addressing sanitation and controlling Salmonella growth. This SOP is a daily checklist system that the workers in the plants follow to ensure that these procedures are done and the required steps taken to turn out a safe, high quality product. The SOP outlines how all equipment used for the processing of birds should be completely cleaned after each day's use. This would include the area where cages are brought in, the killing tunnel, scalding tanks, picking machines and all evisceration equipment. Knives, aprons, rinse tanks and floors would also have to be washed and rinsed before starting each day.

On-farm processors may have an inside building or can use an outside shed or covered area in the shade to do the slaughtering and even though they do not have a SOP plan, the sanitation procedures that the inspected plants use can be fitted to their operations. A concrete pad is an excellent area on which to perform the actual killing of the birds outside as it can be washed off and the waste water can drain away. If a trailer or portable slaughtering operation is used and moved to different areas in a field or farm, it should have plenty of potable water available to wash any contamination from the equipment or birds. After processing, a hot and cold water source is needed to be effective when completing the cleanup and rinsing of all equipment.

**Whatever type of processing operation you have, you need to create two distinct areas:**

- 1. A dirty area – where the actual slaughter, bleeding, scalding and removal of feathers takes place.**
- 2. A clean area – where the evisceration, chilling and final packaging takes place.**

**Both areas need to be cleaned and well maintained so bacteria growth is kept to a minimum or completely eliminated.**

Inspected plants also have a Hazard Analysis Critical Control Point Plan, or HACCP, which addresses all the different points in the processing operation that could cause bacteria to come in contact with the raw poultry and how the workers control these areas. Both of these plans emphasize that all equipment be kept in good working order and sanitized prior to each kill and also that a check system be in place to keep pest and rodents out of the facilities. Good employee hygiene should be required as well, thus preventing contamination for sources such as open wounds on hands, loose hairs and dirty clothing. Head covering such as hair nets or hats could be worn and also rubber gloves if necessary. A hand washing station should be available for all employees, and should be equipped with hand soap and hot water, preferably from a free-flowing faucet. If a restroom facility is on the premises where the processing is done, it should be separated from the actual area where any contact with the product is possible.

If any flocks appear to have more waste material on them than others, or if they appear to be ill, these should be processed last after all of the other birds are done, to prevent the spread of any bacteria from them to others by way of the equipment or rinse tanks.

## Clean Processing Equipment is Essential



*Equipment pictured just before processing, must be cleaned thoroughly prior to each day's use*

Cleaning of all processing equipment is very essential to avoid contamination from previously processed birds. All the processing equipment should be scrubbed after each use. Hot, soapy water should be used to clean the stainless steel tables, knives, rinse tanks and aprons after completing the killing each day as well. Prior to beginning a new day of slaughtering, a solution of bleach/water disinfectant should be sprayed on surfaces and then rinsed again. Household bleach mixed with water is approved for use and does a good job of killing bacteria. A brush may be used to get into small areas on the knives and corners to get all loose particles from surfaces. If you or your customers are using small insulated coolers to hold the processed birds, they should be thoroughly washed, dried and aired out prior to filling with chickens. If any mold has been noticed in the coolers between uses, scrub out with bleach water, rinse and air dry before using again.

## Beginning the Processing Operation

**There are two methods of processing birds, batch and continuous. Most plants find that it is most productive to kill, eviscerate and chill during the first hours of operation. Eviscerating is usually the most time-consuming part of the process. The type of equipment also factors into the time it takes to complete the process. The more time it takes from killing to chilling, the more exposure to bacteria is possible.**

## Killing the birds

There are two types of killing procedures for poultry that plant operators use. The larger plants use a stunning process, electrical, mechanical or chemical. This is considered the cheapest and most effective for the large plants. For most small operations, the bleeding out method is the most practical, as it ensures a quick death and less flapping. Some processors use funnel shaped metal or plastic cones to place the birds in to be slaughtered. The cones should be the correct size for the birds so they fit snugly and cannot flap around as this may cause injury or bruising to the flesh. Other plants use shackles to

hang birds prior to killing. The most common method used in smaller plants and on-farm processing is by making a deep cut in the carotid artery or the jugular vein on the side of the bird's neck so a fast bleed will occur. We leave the head on the bird and do not cut the spinal cord, as then the neck feathers are picked more easily. The esophagus should also not be cut as this could lead to contamination from any leakage.

**This is why it is so important to have the feed withdrawn from the chickens 8-14 hours prior to the killing. It decreases the amount of feces expressed and prevents fecal cross-contamination on the surfaces of the carcasses, in the scald tank and on the feather removal equipment. By doing this it also decreases the level of Salmonella and Campylobacter carried forward into the next steps.**

Depending on the chicken's size, the bleeding out time for the birds takes 1 to 3 minutes after the throat is cut. They are then moved to the scalding part of the processing. If bleeding is not complete before moving them to the scalding step, the birds will retain blood in their skin color and in the inside cavity after evisceration. Air flow and traffic control in this area of processing are important too, because if too much moisture builds up here, it can increase the bacteria levels as well. The number of people in this space should be limited also as they can carry bacteria on their clothing which could spread to a higher level of cross-contamination on the equipment. If a person working in the slaughtering area, or "dirty space," moves to the evisceration area, or "clean space," they should change aprons and be sure their clothing does not carry any bacteria material from one area to another.



### **Scalding of the birds**

Birds are scalded to loosen the feathers. The heat breaks down the protein holding the feathers in place and depending on the density and volume of the feathers and type of birds, the time for this process may vary. There are two methods of scalding, steam-spraying and immersion. Steam spray systems work by applying a mixture of steam and air at a temperature and pressure specifically designed to scald the surface of the carcasses. Immersion-scalding is carried out by placing the whole carcasses into a tank of hot water. Immersion is the more common method used by small operations and on-farm processors. Under the right conditions, both methods can reduce Salmonella on carcasses. There are also two types of scalding, hard scald and soft scald.

**The best method to ensure correct temperature for scalding water is to test with a calibrated thermometer prior to beginning the scalding of the first bird and several times during the process.**

### **Common Scalding Times & Temperature for Various Classes of Poultry**

Broiler (hard scald)	30-75 seconds	138.2-147.2° F (59-64°C)
Broiler (soft scald)	90-120 seconds	123.8-129.2° F (51-54°C)
Turkeys	50-125 seconds	138.2-145.4° F (59-63°C)

The hard scald is the most preferred and takes the less time at higher temperatures compared to a soft scald. This allows better removal of the outer layer of skin (epidermis). The soft scald chickens have a yellow color, and the hard scald chickens have a more whitish color. Maintaining the correct water temperature for the appropriate amount of time is critical to prepare the carcasses for feather removal. This also reduces dressing effects. When the water temperature is too high, the carcasses become oily which makes it easier for Salmonella to stick to the surface of the skin. If the carcasses are over-scalded, the meat may start to cook and the carcasses may be marked unacceptable and rejected by inspectors in a government plant. If the temperature is too low, the tank becomes a breeding ground for bacteria. Most Salmonella organisms cannot grow at temperatures higher than 116.6° F (47° C) and that should be sufficient to control their growth. However, sometimes due to the high volume of bacteria on some chickens, and the large number of chickens processed, the temperature sometimes cannot stop the growth. The bacteria will then carry forward into the next steps of the processing.

A constant flow of hot water into the dunker is needed to keep the water level at a height that the whole chicken will stay immersed during the procedure maintaining the correct temperature. We use a propane gas heating element to control the dunking tank temperature. The water should be drained or changed if too much dirt or fecal material is on the chickens to ensure that bacteria doesn't contaminate birds as they pass through this process.

### **Picking or Feather Removal**

The feather removal process is designed to remove the feathers and the outermost layer of the skin before evisceration. The quality of the picking step of the operation has a lot to do with how good the scalding procedure was. If the temperature of the scald was correct, then the feathers come out easily. If the water was too hot, the skin will tear in the picker. If the water was too cold, the feathers won't loosen. Some on-farm operations do hand picking of the feathers, while others have a small drum-like picker with rubber fingers that de-feathers the birds much faster. The drum pickers could be table top or free-standing models and have the rubber fingers mounted on the inside walls, with water flowing into drum. Large plants use a continuous process, however smaller plants use a batch or manual process for low volume operations.

Turkeys, older hens and water fowl birds, take longer to de-feather as the feathers are harder and some have oil in their feather shaft. The feathers of colored birds tend to leave pigmentation on the skin, while white Cornish Cross birds do not. Some on-farm processors have homemade scalding and picking equipment made from old washing machines or plastic barrels and if they do the job, that is acceptable. Equipment can also be purchased from dealers or from area individuals. The most important condition

for the type of picker is that it can be cleaned and sanitized after every use.

**The recommended best practices for this step as ways to control the bacteria that may be on the chickens, are to avoid feather buildup on the equipment and to have sufficient rinse water spraying on the carcasses as they go through the picking process.**

Fecal material is released from the chickens when the picking fingers agitate and rub the carcasses and can lead to cross-contamination between carcasses. Regular equipment sanitation and maintenance are recommended to minimize cross-contamination when either using the manual, batch or continuous picking methods. When the chickens are released from the picking machine, they should be deposited onto equipment that also has water flow that will keep the area clean of feathers and dirty water. Stainless steel equipment is required in government plants as it can be cleaned easily and often. In our plant the slaughtering is done on an upper level and when being released from the picking equipment, they slide down to a lower level, which has an opening for the soiled water and feathers to exit.

The feet can be removed after being released from the picker and before they are sent to the evisceration table, as a way for the evisceration table employees to stay caught up with the person doing the slaughtering, depending on the number of employees working. If the feet are to be kept for the customers, they should be cleaned and have the skin removed along with the toenails clipped off. If chickens lay too long on the table, they dry out, become stiff and bacteria can grow on the carcasses. If any fecal material is seen on the birds as they come from the picking machine, it should be washed off immediately. Also depending on the heat in the plant, water can be sprayed on the carcasses to keep them cleaner and prevent their skin from becoming dried out. Good air flow is helpful when doing the slaughtering as it helps with the odors associated with the operations and slows down bacteria growth. Flying insects are a problem associated with processing and measures should be taken to prevent their appearance near the operations.



*Chickens are sent down the chute from the picker in the “dirty” area on to a table where they can be rinsed and feet clipped before being moved to the evisceration table*



*Wash hands regularly and have a clean apron & equipment in evisceration area*

## Evisceration of Birds

Evisceration begins at the transfer point from the picker equipment and ends when the carcass enters the chiller. The evisceration area should be cooler than the slaughtering area; using fans can help with this. The evisceration process removes the internal organs and any trim or processing defects from the poultry carcasses in preparation for chilling. In our plant, all the evisceration for one bird is done by one person.

We are not allowed to keep the head for human consumption, so it is discarded first. **The next procedure we do is to clip the back of the neck. This has to be done in just the right location so the windpipe, trachea, esophagus and craw are not severed.** The earlier mentioned feed withdrawal practices come into play at this step, because if one of those organs is severed, the feed or fluid in these areas could leak into the carcasses, causing a high level of Salmonella contamination. Some processors leave neck on or cut from the front. This is not a practice we recommend as the trachea, esophagus and craw contents could leak into the bird, causing contamination.

In every step of the evisceration, it is important that the knives, clippers and other utensils that are used are cleaned and sanitized before each day's use to avoid bacteria growth. Good employee hygiene standards are also vital, as well as clean aprons, clothing and equipment.



*Bar cut on left & J cut on right*

The methods of processing from here vary to some degree, but as follows, these are the basic steps we use after the head and feet are removed:

1. Remove neck, rinse and place in pan of water.
2. Remove the windpipe & discard. Remove oil gland & discard.
3. Slice open the flesh under vent, loop finger under & cut around vent.
4. When cutting to open the body cavity, there are two methods we use. A J-cut is slitting the skin forward, which is used on chickens under 4 lbs.; the Bar –cut is slicing across the skin, which is used on bigger chickens and turkeys.
5. Extract the viscera, including all lungs.
6. Harvest the giblets. The gallbladder is removed from the liver by pinching it off, wash liver and place in the water pan. Most livers are a mahogany color, but can be a yellowish brown depending on the type of feed used, how recent the chicken was fed and the digesting of the feed. Either

colored liver is fine for eating.

7. If the heart is saved, it should be trimmed and blood clots removed, then placed in pan.
8. The gizzard can be saved and cleaned later, but it needs to be trimmed from the viscera. Place these in a separate area to be cleaned when finished with a flock of chickens.

If at anytime during the evisceration procedures, a rupture of an organ happens and leakage drains onto the birds, it should be washed immediately before it is placed in an immersion rinse tank as other birds in the rinse can also be contaminated. If the gallbladder breaks and the green fluid from it comes in contact with the skin of the bird, it will cause discoloration. Care has to be taken so the gallbladder fluid does not get into the eyes of the employees handling the birds as this is very bitter, causes stinging and can produce an infection in the eye. Some processors use safety glasses for this reason to avoid injury.

### **Rinsing or Washing of the Chickens**

This step is one of the most important as it is the final chance to remove any trace of bacteria that was missed in the earlier processing methods. There are two types of rinsing that are recommended by the inspection program, they are as follows:

1. Flushing Method - Each bird is washed under a running water source with the employee's hand inserted in cavity before placing in chill tank.
2. Immersion Method - The individual bird is placed in a pan of water then dunked and washed out by hand. Several birds can be placed in the pan at a time, as long as each is washed before placing in the chill tank. The rinse water may be used repeatedly, but changed when it becomes discolored. If your earlier processing methods have been free of exposure to fecal wastes and other materials, this method is acceptable.



*Flushing Rinse Method*



*Immersion Rinse Method*

During the rinsing, the carcasses should be washed both on the inside and outside to get any fecal material or blood from it, as well as any imperfections on the skin trimmed off and any remaining feathers should be removed. Most on-farm processors use hoses to wash. Small plants use a continuous flowing water source to wash out the birds and tables. It is again noted that the person doing the washing should have an apron on that is clean of any fecal material as not to get any on the bird. The person's hands should be washed any time they touch anything away from the evisceration table. Any

knives or other equipment if dropped onto the floor should be cleaned separately as well. The number of people in this area should be only those who are working on the processing line.

## **Chilling Procedures**

Whatever type of processing operation you have; small, large, or on-farm, once the carcasses are washed, the most important procedure is to lower the body temperature of the bird quickly to prevent bacteria growth. There are two methods of chilling the birds; air-flow chilling and immersion chilling. The immersion chilling is used by most processors nationwide. To get the results that are necessary for fast chilling, the water has to be plentiful and cold with lots of ice. In our plant we use a 300 gallon tank filled with a mixture of cold water and approximately 1 lb. of ice per bird to cool them down quickly. In large plants they have a constant flow of water and augers or paddles to keep the water moving, as this increases the chilling effect. Some on-farm processors use bulk milk coolers or plastic or stainless steel tubs to chill the birds. Chickens carcasses can be at a temperature of over 100° F after washing and need to get to 40° F in order to keep Salmonella and Campylobacter bacteria eliminated and E. coli reduced. The USDA requires that the poultry carcass chilling needs to be done within 4 hours of being immersed.

### **Time Guidelines for poultry to get to 40° F:**

- **4 lb bird within 4 hours**
- **4-8 lb bird within 6 hours**
- **8 lb or larger bird within 8 hours**

**Check the birds with calibrated thermometer**



*Water needs to be near freezing and requires about 1 lb. of ice per bird*



*Birds needs to be chilled to 40° F*



The birds should be checked with a calibrated thermometer and the probe should be inserted into the breast of the bird and checked after 2-3 hours in the tank, so you will know if you need to add more ice to get it lowered to 40° F in the required time. The calibrated thermometers can be purchased at most local hardware stores for approximately \$20.00. Some on-farm processors use a two step tank method to chill, with cold water and a little ice in the first tank, then more ice in the second tank. We have found that crushed ice is better than the cubed ice and we have an ice machine with a bin that runs continuously. On days that we do not process, we let the ice machine run and store ice in the freezer or walk-in cooler to have enough for days we do process. On-farm processors need to have ice from a source that is made from potable water or has been tested and is safe and free of bacteria. Manual agitation of the water can be done to help keep the chilling process moving faster.

If you have harvested the giblets from the birds, they also need to be kept in the ice/water mix to avoid bacteria growth on them. The giblets can be put back in the chickens after the chickens are properly chilled and before customers pick them up. When we do custom slaughtering which will not be resold to anyone, the individuals will stay and wait for the chickens to be processed. We ice the chickens down in their coolers and place the giblets in small plastic bags inside the coolers.



*Birds should be checked with a Calibrated Thermometer before removing from tank to packaging.*

### **Killing Bacteria in Chill Process:**

The importance of reaching 40° F in the chill tank is a set guideline by both state and federal government health organizations, as that is the temperature that most Salmonella bacteria is destroyed and E. coli is greatly reduced. As Salmonella outbreaks are happening more often in our food supply, concern is growing too that more could be done to prevent them from occurring. In the past few years, small plants as well as large facilities have been able to add chlorination to their chill tanks as a safety measure. Because we have a private well, not on a city water supply that is chlorinated, we are allowed to add up

to 32 oz. of chlorine in our 300 gallon tank. The fast chilling time also prevents the chlorine from being absorbed into the chicken, and doesn't effect the meat or taste of the chicken. As a state inspected plant, we are required to have Salmonella and E. coli tests performed on our birds. The Salmonella test is done by the inspector and paid for by the State of Missouri at one of their lab facilities. We do the E. coli tests and they are sent to the state lab also, but at our expense. Both tests are done with a water rinse and the chickens are picked at random out of our chill tank. The Salmonella test is a positive/negative test, while the E. coli test measures the level of contamination, with a certain required amount you have to stay under. If you fail these tests, you would have to make changes to your processing operations to try to find out where the contamination occurred and what you can do to correct the problem.

Sometimes, the fact that the birds processed were covered in fecal material or feed was not withdrawn from the live chickens long enough prior to processing, would be the first places to look for where the bacteria originated. It is important to keep records of any birds you process and any problems you saw with them prior to slaughtering as a way to know where a problem might have existed if your finished product would have suspected bacteria. This information could be helpful if a possible bacteria infection was found in them and sickness occurred, as you could possibly prevent it from happening again.

### **Safe Handling Practices Used When Selling to Customers**

Most on-farm processors generally sell their poultry as whole carcasses to their customers soon after processing. Usually the least amount of handling of fresh meat products is the safest way to ensure that it is not contaminated after processing. The packing should be done in a space that is cooler than the processing area. The tenderness of a chicken comes with a brief aging period. Most chickens after 4 hours have reached the stage of tenderness that is thought to be its peak. When we do custom slaughtering for people who are going to be taking the chickens home with them immediately after processing, we ice down the birds and tell them to add water to the ice and let them set for several hours before putting in the freezer. Some people feel that a chicken is most flavorful a day or two after processing, and we recommend that fresh chickens should be kept in the refrigerator no more than 4 days after processing without freezing.

When customers bring in birds to be processed and want to take them home soon after, they are usually placed in the customer's coolers. These coolers should be properly cleaned and free of dirt, mold or any other matter that could possibly contaminate the fresh poultry. For chickens we raise, process and sell, after they have been properly chilled, we stuff them with the giblets and they are placed in wax boxes for each individual, weighed and iced packed. We have an inspection label that is placed on each waxed box of chickens of our own and on the individual coolers customers bring in. This label is a requirement of the government inspection program and has our plant name and number on it.

### **Labeling for Farmers Market Sale:**

Much of our custom business comes from individuals who want to sell their chickens at farmers markets or health food stores, and in order to do this, the chickens are required to be processed at a state inspected facility. Each individual chicken must be chilled to 40° F and bagged at our plant and have a label on it telling from where it came and the plant where it was processed. These individuals have to make up their label, send it to the MO Department of Agriculture to get it approved, and we keep a copy

of it on file. Some farmers markets require that the chickens be frozen as an added precaution to avoid the meat from becoming contaminated. Many of these raisers take orders in advance, so most of the chickens are sold before they reach the markets.

Each raisers package their birds differently, some use an ordinary plastic bag and place a label on them, while others use the air-vac bags and label. The chilled birds are then placed in chest-type coolers or individual coolers with ice.

We also have many customers who want to sell their chickens from their farms, but do not want to invest in the processing equipment. They do not need to have their own label, but have to use our label to prove that the chickens were processed at our plant. These chickens are ice packed by us and taken to their farm in clean individual coolers or tanks. It is the responsibility of anyone handling the fresh poultry to make every effort to ensure that the product you are selling to the customers is of the highest quality possible. If sickness or a contamination outbreak would happen, usually the first place that is looked at is the processing plant. Safe handling by the consumers is also vital, from the storing to the cooking procedures to ensure that bacteria growth is prevented.

## **Final Cleanup and Sanitizing**

After all the chickens are removed from the processing plant, the final clean up takes place. The slaughtering and picking equipment is usually cleaned up shortly after processing is done and while chickens are chilling. The SOPs that each inspected plant follows is a good guideline to ensure that all areas are cleaned after each use. These SOPs are designed to fit each plant and are good practices to eliminate contamination areas from the birds. All the equipment and tables used for any of the procedures should be washed with hot, soapy water and rinsed. Some plants use pressure washers or you can use a hose to spray the area. When the plant is under government inspection, a sanitation procedure plan is in place and by following the steps outlined, no area is missed. By setting up a step by step sanitation plan of your own, the employees would all know exactly who is doing what procedure. This is a way all the areas would be cleaned and ready for next operating day. Spraying with a sanitizing mixture of water and bleach on the tables is an added precaution that eliminates bacteria. All tables and areas where the carcass' skin comes in contact, should be sprayed and rinsed with water before processing begins next time.

The waste by-products from the processing need to be taken out of the plant and disposed of as soon as possible to avoid insects which can cause bacteria to grow at facilities. Some on-farm processors compost their waste then spread on their land. Others incinerate the waste, if permitted in their area. Small processing plants like ours pay a rendering company to pick up the waste and they in turn use it to make by-products, such as pet food or bone meal for livestock. We have a refrigerated cooler that is separate from our processing operation in which we keep the waste until it is picked up.

The amount of water used in the processing procedures is quite large and has to be disposed of in a manner that is allowed and environmentally acceptable. The estimation for the amount of water used per bird during the processing varies between 4-8 gallons. Most small inspected plants have a lagoon system that the waste water flows into. The on-farm processors usually dispose of the waste water on their farm or they use portable processing equipment that can be moved to different areas on the farm to avoid a drainage problem in one area. The blood is usually separated from the waste water and put with the composing material as it has a high potential for pollution and can draw insects and rodents that

spread contaminates. Land disposal of the wastes have several advantages if you have a large tract of land available, as it provides nutrients to the soil, as well as irrigation for future crops.

## **In Conclusion**

The key to having a good business is to have a good reputation, whether small or large. If you put out a good quality product, people will want to buy it. By following the cleaning practices and other safety methods we have outlined, you should be able to give your customers the safest and healthiest poultry possible.

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In an effort to promote better safety practices in poultry processing, Backes Poultry gives hands-on workshops, trains processors and their employees, and provides tours of the Backes Poultry processing operation. Please contact us for more information.



*Herb and Joan Backes with their family in front of their plant in Loose Creek, MO. The Backes family business was started in 1932. They have earned respect for both their knowledge of the poultry business and for the high quality product they sell, all while doing a job they truly enjoy.*

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