

# Wisdom Gleaned from Project “A” – Dry Cured, Fermented, Salami - 2011

(portions of the following originally published on Wedliny Domowe during Chuckwagon’s tenure as Moderator)

## Topic List - Project “A” – Dry Cured, Fermented, Salami –

- **Introduction, Worries Over Equipment (6/8/2011)**
  - **Proposed Recipe. Materials. (6/12/2011)**
  - **Cast of Characters and Raw Materials Order Placement (6/12/2011)**
  - **And the Project Begins. Reading. (6/13/2011)**
    - Updated List of Participants
    - Equipment reading
    - Fermented Sausages reading
    - Cultures reading
    - Safety Hurdles reading
    - Standards reading
    - Traditional Method reading
    - Collected Readings:
      - Food Poisoning,
      - Safety ‘n’ Savvy,
      - Major Causes of Food Poisoning,
      - Bacterial Types,
      - Food Spoilage Bacteria,
      - Yeasts,
      - Molds,
      - How Bacteria Multiply,
      - Parasites,
      - Declaring War on Bugs,
      - pH Acidity Measurement,
      - Water Availability,
      - Sterilizing Spices,
      - Beneficial Bacteria
    - Equipment Testing Begins
    - Fresh Air Requirements
  - **Marianski: Sausage Observations**
  - **Reference Page for Project “A” (6/16/2011)**
    - Recipe & Procedure
    - Participants
    - Meat Starter Culture Bactoferm T-SPX
    - Bactoferm Mold 600
    - Note on calculating fair speed & flow
    - Call for Test Runs
  - **Test Runs (6/18/2011)**
    - Cleanliness
    - Air-tightness
  - **Let’s look at what we are attempting to do with our “fermentation chambers” (6/19/2011)**
    - Bacteria
    - Acidity increase
    - Water Activity (Aw)
    - Using a notebook/logbook

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  - **And So It Begins (6/20/2011)**
    - Progress reports from some, others quiet
    - Case hardening possibility? (Fan speed explained)
    - Using ice
    - “Lag phase” before mold dip
  - **Diffusion and Evaporation (6/23/2011)**
    - Balancing the two.
    - Case Hardening
    - Drying less difficult at lower pH
    - More on keeping logs
    - (Uwanna) Wally’s tips and photos
  - Keep that temperature up, Wally
  - The 75 hour mark
  - Dipping vs. spraying. Sanitizing.
  - **Controlling Your Fermentation Chamber (6/24/2011)**
    - Line Voltage Thermostat
    - In-Line Humidistat
    - Down one degree every two weeks, until 54 degrees. Humidity down to 80%
    - “The Science of Chamber Control” by Ross Hill
    - Sling psychrometer
    - Holding extra mold culture?
  - **Status reports (July 2011)**
    - Weight checks
    - Air speed concerns
  - **Observations (7/10/2011)**
    - Mixing Recipe for Mold 600
    - Color fixing and flavor forming cultures
    - Effects of: sugar, temperature
    - Acidity vs. sugar amount
    - Fermentation stops when no more “free” water or sugar is present
    - Some air movement is necessary to prevent “slime” formation
    - Lactobacillus and pediococcus are used at different temperatures
  - **Problems**
    - Scabs on pin holes
    - Ammonia smell

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  - **The Home Stretch (7/14/2011)**
    - Various comments on molds
    - Chorizo recipe link (Marianski)
    - Salt amount 2-1/2% for fermented sausages
  - **Report (7/28/2011)**
    - Video by “Mac” Stanuszek at SausageMaker
    - Uwanna(Wally)’s pictures
    - Cause of excessive weight loss- excessive drying?
    - Ssorrlih’s case hardening pictures
  - **Analysis of Bad Batches (8/5/2011)**
    - Ross’s Batch: Spoilage
    - Partycook’s Batch: hand mixing?
    - Attention to detail in logbook
    - Wally’s thoughts and advice
  - **Staphylococcus & Micrococcus Bacterium In Dry-Cured Sausage (9/8/2011)**
  - **The Last Hold-Outs (9/15/2011)**
    - More analysis and recommendations
    - Smearing, fat content
    - Fat and bacterial action
    - More Detailed Advice from Wally
    - Tight packing slows drying. Also grind particle size.
  - **After-word (6/29/2012)**
- Appendices:**
- **Are “Fermentation Chambers” And “Curing Chambers” Really Necessary?**
  - **Troubleshooting Guide for Fermented Meats**
  - **Prescribed Treatment of Pork and Products Containing Pork to Destroy Trichinae**

[Chuckwagon](#) 

▣ Posted: Wed Jun 08, 2011 09:10 **Project "A"**

### **Project "A" – Dry Cured, Fermented, Salami**

*6/15/11 – 9/15/11*

Project "A" was named for Salame di Alessandra. This sausage is also known as Genoa Salami. In June 2011, nine website members decided to undertake this 3-month, dry-cured salami project together while keeping accurate notes for comparison and recording their results for the future reference of those yearning to try their hand at making fermented type sausages in the future. The **project** began on June 15th and ended on September 15th. Participants were required to "sign up" and invest in a certain amount of basic equipment. We fully intended to show our fellow members that quality salami could be crafted without spending a fortune on specialized equipment. Members were asked to make a cabinet for fermenting, purchase a hygrometer and thermometer, cellulose casings, and Bactoferm™ T-SPX starter culture. Members were also asked to read and study a minimal amount of information provided on the homepage by Stan Marianski. Moderator "Chuckwagon" also provided material to be read by those participating. To be fair to participating members, it was requested that the general public refrain from writing in "Project A" after June 15th.

The project was not intended for beginners in the hobby. Crafting dry-cured, fermented, salami requires prior experience in grinding, mixing, stuffing, and other skills honed by good old-fashioned trial and error in making basic sausages such as fresh cased links, cured-smoked-cooked links, and others.

Some of the member's projects succeeded, others did not. All the members succeeded in providing much information to those who will attempt making dry-cured sausages in the future. All participants should be congratulated for some very fine work and great ingenuity. All indeed succeeded as their information will ultimately be of great value to those just starting out.

Project A is a very valuable learning resource to those trying their hand at it for the first time. As a learner reads through the information, he may simply avoid the mistakes, oversights, and errors made by these pioneers. There is much technical information recorded, along with photos and remarks. Congratulations to the participants are in order. Thank you gentlemen. Your posted information will help others for a long time to come.

My Very Best Wishes,  
Chuckwagon

Hello smoke addicts!

I've had an idea in mind for some time and would like to have your opinions. Why not make a dry-cured salami TOGETHER? I believe that many of you good folks are hesitating to make the plunge into "*fermented type sausage*" for several different reasons. I've included a few possible "rationalizations" below. Let's see if you recognize any of them. 😊

I am proposing that we open a forum topic solely for the purpose of making a batch of dry-cured salami **together** – with everyone starting at the same point with the same 'lack' of equipment, and limited bucks. We'll take it step-by-step, allowing everyone a few days to view this message and ponder it over. Then there will have to be some time allowed to order Bactoferm and a hygrometer (\$14.95) from your supplier. While you're waiting for the mailman, you could shop for some great beef chuck and some luscious pork butts. We can share

information as we go along and discuss each member's plans for fermenting and curing and then for storing. We'll have much to talk about and discuss, and no doubt the forum will be fairly active – but shucks, that's what we really want... lots of participation and input as we go along. We'll act as a group and do everything together at the same time. For instance, we will all grind the same day and all of us will stuff casings the same day etc. We could exchange ideas and share thoughts until at last, we each have made a properly air-dried salami.

Today at lunch, I sliced off a thick slice of salami and put it on a sandwich. I had just “pulled” it from the storage chamber and found myself thinking, *“This is the best salami I've ever tasted”*... *“Why aren't the folks on the website tasting this quality sausage every single day?”* Bragging? Naw! Is Ol' Chuckwagon just makin' noise because he 'knows how'? Nope! That's not it at all. Shucks, it is simply that I bothered to make my own “quality” air-dried product rather than settling for the mass-produced and hurried-along crap they put in the grocery stores these days, made with inferior ingredients. And you can do it too! Heck, why not use real paprika instead of flavoring oil, and real ingredients rather than flavored chemicals? And for goodness sakes, REAL Boston butt and choice fatback.

OK, have I got your interest and attention? Would anyone out there be willing to participate in this experiment with ALL OF US making a dry-cured salami at the same time? Think of **the advantages**:

1. You'll learn how to make dry-cured salami – at last!
2. It will bring several of us much closer together.
3. It will be fun.
4. It will be a motivational step you may never have again to finally get around to makin' the stuff!

OK, Here are **a few reasons to talk yourself right out of it!** Some of that reasoning might include:

1. I'm afraid it requires too much “specialized knowledge”. I might have to read and study a little. And, isn't there a ton of stuff to memorize?
2. I'm afraid it will fail and I cannot justify the expense if it does fail.
3. It's expensive and requires too much specialized equipment.
4. It takes too long to cure.
5. I'm too old to learn how to do it, and if I fail, my wife will say, “See, I told you so”.
6. I don't have the time to make fermented sausage.
7. The process is too tedious.
8. I hate mold. After all, won't that stuff kill ya?

On the ranch, we have a saying for every single one of the excuses listed. It's only one word but it sums it up. The word is “bullsnot”! Uh... sort of! If you think you are too old, or it takes too much time, or think you will fail... all I can say is “bulls\*\*t”. If you think it requires a little special knowledge, you're right. But hours of study? Nope... hey, this isn't rocket science! Memorize stuff? Nope. You don't have time? Again, all I can say is “bulls\*\*t”. And I'm sorry that you will never be able to taste the exquisite flavor of genuine, hand-crafted salami – something many of you will never have the opportunity of trying.

If we decide to make this project work, then get ready to experience an entirely new taste in meat flavor. In my opinion, it will absolutely be worth the effort and the time. There's just no reason why you shouldn't be able to experience success in making air-dried sausages, especially now that we have Bactoferm™ bio-cultures on the market.

How about expressing your opinions here? Also, let me know if you'd like to take part in this project.

Best Wishes,  
Chuckwagon

[ssorllih](#) 

▣ Posted: Wed Jun 08, 2011 15:10

Ok . I am willing. Is a five pound batch reasonable size? I only have 30 mm casing do I need larger? I have time. even though as I mentioned it is summer here. I will never be too old to learn something new. So that takes care of the rest of the member excuses concerning age. I have a refrigerator that is used for overflow food storage and I can adjust the thermostat for most any temperature. It is frost free so the humidity is always very low. My house is air conditioned and kept below 80 degrees F.  
What am I lacking?

By the way I think that you have a good plan.

Ross- tightwad home cook

[ssorllih](#) 

▣ Posted: Thu Jun 09, 2011 05:39

Chuckwagon, I am a craftsman and I make things work. My Dad taught me that a poor workman blames his tools for poor results. but a skilled craftsman can produce good results with the tools at hand. I have told you what I have for tools, mostly, I have a torsion balance that can resolve .01 milligram. So I can measure very small quantities of almost anything. I know how to dilute a milligram in a litre of water and use 5 cc's. please teach me how to use the tools that I have to make good sausage. I read well and have taught myself many skills from books.  
Thanks,

Ross

[Chuckwagon](#) 

▣ Posted: Thu Jun 09, 2011 09:27

Hi Ross,  
You wrote:

**Quote:**

I have a refrigerator that is used for overflow food storage and I can adjust the thermostat for most any temperature. It is frost free so the humidity is always very low. My house is air conditioned and kept below 80 degrees F. What am I lacking?

Ross, your refrigerator might not work for a curing chamber as it may need to be kept warmer than the controls are designed to keep it. Also, we need to raise the relative humidity rather than keep it low. You would have to disconnect the frost-free mechanism. How about reading the material found at the bottom of this article, titled **Are “Fermentation Chambers” And “Curing Chambers” Really Necessary?**

As you are a craftsman, you may wish to build a box of plywood and line it with thick-gauge plastic sheeting. You may possibly be able to place a pan of salt and water in the bottom to produce enough humidity to support fermentation. It will be necessary to also heat the box slightly, using some type of heater - perhaps a slow-cooker heating unit or an aquarium heater. We'll cross that bridge in a few days. Can you give me an idea how much relative humidity you have where you live?

Ok, we'll do it. I just got an email from another member (Rand) and he wants to join the venture project. I'd like to wait just a couple of days and see if some other folks might want to take part in the venture also. Let me see if I can intimidate a couple of more prospective salami makers.

Best Wishes,  
Chuckwagon

[jbk101](#) 

▣ Posted: Thu Jun 09, 2011 09:42

Hey Chuckwagon,  
I am also willing! But I do have a couple of worries. As you know I am a rookie willing to try and learn but like to have my ducks in a row before I start shooting them down.

I like your idea a lot and also like the idea of a minimal investment to start out with so here are some of my concerns.

What basic equipment is needed? I don't have a good area to cure in so what alternatives could you suggest. I have seen where an old ice box is converted into a humidity cabinet are there other alternatives? If so what's your thoughts on them?

If you could give a basic run down of the required equipment and the process in general it might be helpful and even motivate a few to join in 😊

[Chuckwagon](#) 

▣ Posted: Thu Jun 09, 2011 11:37

Hey, hey John!

I know most everyone has the same concern over rushing right out and purchasing a bunch of equipment. In this economy... forget it! But there's always more than one way to skin a cat. Actually, the only real expense would be a hygrometer (\$14.95), a reliable thermometer, a used computer fan, possibly the expense of an old cabinet of some type, and some plastic sheeting to line it with. The cabinet doesn't have to be very large. These days, office equipment stores even have plastic storage boxes at very reasonable prices. Bactoferm T-SPX has gone up just like everything else and although it is \$16.99 for a 25-gram packet, it will cure 400 pounds of meat! We'll probably start with ten pounds of salami so you'll have to freeze the remainder (it has a shelf life of 6 months when frozen). That will give you a half-year to make 390 more pounds of pepperoni and salami! Bactoferm "Mold-600" is \$19.99 for a 25-gram packet and will give you enough penicillium nalgiovense to cover the statue of liberty a few times with white, flaky, mold. The remainder may be frozen up to six months also. We will need a few 3" synthetic fibrous casings and the mahogany-colored ones come in bundles of 20 and are 2 feet long. Each casing will hold 5 pounds of meat, so you'll have 18 casings left over for the next bunch of bewildering, belated, batches. The bundle of 20 costs 15.99.

Our fellow member "Rand" said he picked up a hygrometer at a hardware store for only about six bucks. If you find one locally, you may want to start checking out the relative humidity in your basement or another damp area of about 80% for the 2 to 3 month drying period. Your "curing chamber" will have to be about 90% humidity for 72 hours at about 68° F. (20° C.). We'll drop the temperature for the 2-3 month drying period by ten degrees, down to about 58° F. (14° C.). Does all this sound feasible to you?

Best Wishes,

Chuckwagon

[ssorllih](#) 

▢ Posted: Thu Jun 09, 2011 15:45

This would be a better **project** for the fall season. Right now we have temperatures in the 90's and dew points above 70. I have a thermometer hung near an A/C outlet and it reads 75 degrees.

I can get foil faced urethane insulation boards 1 1/2 inches thick and 4x8 feet. That could make a 16 x24 inch cabinet 4 feet tall with lid and floor. It can be "nailed" with long dowels sharpened in a pencil sharpener. That cost would be about 25 dollars. The housing on a crock-pot has a small heater in it that would be plenty for the times when we need to heat. I could probably figure out a way to duct chilled air from my refrigerator. Do you remember the swamp air chillers that were used in the west before mechanical A/C? Florists use a soft porous foam for supporting flower stems. This foam would provide a large surface area for evaporation for humidity control in the chamber.

I presume that adding salt is to prevent a biology demonstration in the swamp. 😊

Ok. If I convert this from obstacles to challenges and apply myself diligently I think that I can make it work. Some of the crock-pots have digital temperature controls that could be used for the chamber

Ross- tightwad home cook

[ssorllih](#) 

▢ Posted: Thu Jun 09, 2011 16:31

Challenge Number one: control the temperature in the cooling chamber.

Solution go low tech. My refrigerator can make about 100 pounds of ice per week. Humidity water pan in bottom of chamber can be an open ice chest. I routinely freeze water for the ice box on my boat so I can just as easily make ice for the curing chamber. 20 ounce soda bottles are convenient sizes as are 2 litre bottles. Five pounds of ice per day keeps my ice box cold on the boat so a pound per day will probably keep the chamber at 58 degrees. The heater from a crock-pot can supply all the heat I need.

Ross- tightwad home cook

[Dave Zac](#) 

▢ Posted: Thu Jun 09, 2011 17:57

Okay, I'll try to be in. I share the same concerns as the others though...I don't think I am equipped to do this right.

Teach me master

Dave

[ssorllih](#) 

▢ Posted: Fri Jun 10, 2011 01:37

Long before there were refrigerators there were ice houses and men cutting ice on lake in the winter time. Before we had electronic hygrometers there was wet bulb, dry bulb systems to determine relative humidity.

I believe that if we put our collective minds to work on this we can make this affordable for everyone. We just have to use our heads more and our wallets less.

The advantage that I see in making a curing chamber with foiled foam insulation is that we can pull the pins and store it flat if we choose to put it away. Knocked down it would be just 2 feet wide 4 feet long and slightly less than 8 inches thick.

Ross- tightwad home cook

[uwanna61](#) 

📅 Posted: Fri Jun 10, 2011 02:19

Bullshot I'm in! I have a working fridge set up as an incubator, with temp controller and a humidifier with controller. This is right up my alley I have the recourses just need the experience \ practice! The cracked pepper salami sounds interesting.. 😊

[charcutebrew](#) 

📅 Posted: Fri Jun 10, 2011 06:19

Ross, I've been thinkin' the same about the foil foam board. Meant to pick some up last weekend but got sidetracked by another **project**. For warming up, a lightbulb can do the trick handily. For a large converted cooler a 7.5 watt bulb seemed to do the trick, for what it's worth. I was trying to think of a good way to get a small quantity of ice in the chamber, I like the idea of a 20-oz bottle of ice or something...

Just spitballin' without censoring right now, it seems like you could rig up a little computer fan, maybe baffle it a little so it didn't blow directly into the chamber... & even run a bit of ductwork to that inlet so you could use the chamber as a cold-smoke chamber? Though maybe the smoke smell would be too intense for non-smoked meats later?

### **Proposed Recipe**

[Chuckwagon](#) 

📅 Posted: Fri Jun 10, 2011 06:57

OK Sausage makin' Dudes! Let's go for it. As we say out here... Yeeee Hawww! 😄 And Ross, half the people in the west, still use a "swamp cooler" for air conditioning. It really raises Cain with their piano tuning, but puts that moisturized glow back into delicate facial skin – so vitally important to those grizzly cowboys and other meadow-muffin kickers out here. 😏

Shucks pards, I'm glad to see you folks joinin' us for the "project" – We really shouldn't call it an *experiment* though. How about we call this thing, "**The A – Project**" (for Alessandra – meaning "Genoa" type salami). Geeze, "Alessandra" sounds soooo much more sophisticated than just plain ol' "Genoa" salami – although it is exactly the same stuff! Here's what I'm **proposing**:

### **Salami di Alessanddra by Stan Marianski**

2.0 kg (4.4 lbs.) pork butt  
2.0 kg (4.4 lbs.) beef chuck  
1.0 kg (2.2 lbs.) pork back fat (or fat trimmings)  
140 g. salt (3%)  
12 g. cure #2 (do not use cure #1 in this recipe)

10 g. powdered dextrose (glucose)  
15 g. sugar (3%)  
15 g. white pepper  
0.6 g. (1/4 tspn.) Bactoferm™ T-SPX  
----- Bactoferm™ Mold 600

**Optional:** Note: To make 5 kg. sausage, about 7 g. of spices and 4 g. of herbs are needed.

120 ml. (1/2 cup) quality red burgundy or other dry red wine (Do not exceed 1/2 cup).  
4 parts coriander (spice)  
3 parts mace (spice)  
2 parts allspice (spice)  
1 part fennel (spice)  
3 parts marjoram (herb)  
1 part thyme (herb)  
1 part basil (herb)

### **Instructions:**

Preliminary steps: Keep a logbook! Record everything you do. Write down dates, times, measurements, etc. Believe me, you'll refer back to it several times during the process. Save your notes for the next batch. They will be invaluable. Don't ignore this step. It only takes a few seconds to write down the information you may really need later on.

Thaw the Bactoferm™ T-SPX following the directions on the package. Measure .6 gram (1/4 teaspoon) of the culture and mix it with a little distilled water, allowing the bacteria to "wake up". Freeze the back fat and nearly-freeze the lean meat. Freeze the grinder plate and blade (20 minutes is plenty). Cut the meat and fat into cubes.

1. Grind the pork and back fat through a 3/8" plate (10 mm). Work in small batches and refrigerate the meat and fat at every opportunity. Grind the beef using a 3/8" plate then again using a 1/8" plate.
2. Mix all the ingredients with the ground meat and develop the primary bind. Fold in the fat particles.
3. Stuff the mixture firmly into beef middles or 46-60 mm. protein-lined fibrous casings, making links about 16 to 20 inches long. (Protein-lined fibrous casings shrink with the salami as the sausage dries.)
4. Weigh each salami and record its "green weight". Keep a log book!
5. Ferment at 68° F. (20° C.) for 72 hours, in 85% to 90% humidity.
6. Hang the salamis in the drying chamber and mix the Mold 600 according to the directions on the package. Spray the sausages with a misting sprayer or dip them into a solution. Dry the salamis at 57° F. (14° C.) in 80-85% humidity for 2 to 3 months (until 30-35% weight loss is achieved).
7. The salamis are stored at (+or- 4°) 55° F. (13° C.) in 75% humidity.

OK salami makin' hombres! This is YOUR party, so we don't *have* to make this particular salami if you have another recipe in mind. I'm just makin' a suggestion. I like this one because it will give you experience with most aspects of the craft. How do you folks feel about this recipe?

Best Wishes,  
Chuckwagon

PS. So far we have:

Rand  
ssorllih



JBK  
DaveZac  
uwanna61

charcutebrew... are you in?

Anyone else want to become part of the action? Pretty soon we'll have to order supplies. While we're waiting on them, some of you will be making your curing chambers. It's not too late to sign up. The reason I'd like to see folks "sign up" is because once we start the **project** and get lots of dialogue going, I don't think it would be fair to those participating to have unsolicited remarks made from those choosing not to participate. What do you folks think about this?

[ssorlih](#) 

▣ Posted: Fri Jun 10, 2011 14:11

I will pick up a sheet of foam board today and a couple of digital instant thermometers(wet bulb/dry bulb) I have several computer fans including one used just for cooling the main processor it is about 2 inches square. If I put a small light on a dimmer switch I can controll the heat. I guess hanging the bottle of ice from the same sticks as the sausage would be convenient.

Do you think that 4 feet tall is too much? Would 3 Feet be a better choice considering top access? Making it 3 feet tall would allow me to make it 2 feet square. Almost 12 cu.ft. Very light weight and easily moved when not in use.

Ross- tightwad home cook

[uwanna61](#) 

▣ Posted: Fri Jun 10, 2011 22:05

Butcher Packer order complete today just need some beef chuck, already have the pork and fat. Do we have a start date?:

[ssorlih](#) 

▣ Posted: Fri Jun 10, 2011 23:18

I can't find a source for dextrose locally but I can find glucose( AKA Karo syrup). What is the conversion factor?

Edit to add: Adding bottled ice will remove moisture from the air by way of condensation. If I wrap the bottle of ice in wet burlap will that solve that concern?

I ordered casings and culture from Butcher and Packer.

Ross- tightwad home cook

[NorCal Kid](#) 

▣ Posted: Sat Jun 11, 2011 01:28

This sounds like a great project & I do want to eventually make my own dry cured salami. However, I think I'll take a seat in the bleachers and watch this play out, notebook in hand. I've already exceeded my sausage budget both monetarily and time-wise for this month. Just ordered an new smoker too...

Good luck everybody. I look forward to seeing the progress!

-kevin

[Chuckwagon](#) 🗨️

📅 Posted: Sat Jun 11, 2011 01:55

Ross, Karo corn syrup also contains fructose, water, additional salt (we don't know how much), and vanilla. No vanilla in my sausage please. 😊 May I suggest you order a little powdered dextrose when you send for your Bactoferm? Some recipes call for corn syrup solids, but this isn't one of them. Powdered dextrose is ideal and not all that expensive. We can get a couple of pounds of the stuff for \$7.99 and have plenty left over for your next salami. 🍷

Best Wishes,  
Chuckwagon

[ssorllih](#) 🗨️

📅 Posted: Sat Jun 11, 2011 02:01

Ok. New question How critical is casing size? 2.55 OK?

Ross- tightwad home cook

[Chuckwagon](#) 🗨️

📅 Posted: Sat Jun 11, 2011 07:42

Are they protein lined?

Dry-cured sausages are ideally cured in synthetic fibrous, protein-lined casings that shrink as the salami loses moisture. Of course you can stuff other types as they have done for centuries, but for convenience and optimum appearance, protein-lined synthetic fibrous are hard to beat. The fiber in them runs lengthwise and makes the casing so strong you can beat the stuffing in with a hammer if you so desire. If we make ten pounds of the stuff, you may wish to give one away to your best friend when you find out how good it is going to taste. In that case, it would be nice to have a really nice looking product to present to someone else. They even make them in models that look like braided string and one that even looks like white textured mold (in case you wish to smoke them and don't develop mold on it). 😊 Shucks, you can even buy them with Santa and his reindeer on them for Christmas presents.

[Maz](#) 🗨️

📅 Posted: Sat Jun 11, 2011 08:57

Hi Chuck,

I have been wanting to try my hand at salami for a long time unfortunately right now I am over my head at work so have very little time for any thing 😊 But i think it is a brilliant idea and will follow, if I do get a chance will bail in at some point. 😊

[SikaStag](#) 🗨️

📅 Posted: Sat Jun 11, 2011 10:02

What a great idea Chuckwagon.

I would love to get involved in doing this.

I was thinking of getting a Bottle fridge like you would see in Bars. I have seen this type fridge used by others fermenting sausages.

I will have a read up on what else I require to get a system ready to start making Salami's.

I will follow this post with great interest.

I would like to make venison Salami, unfortunately this is not the season for Sika deer, they will be calving in the next few weeks, The Stags come into season on the 1st of July, A young pricket would be an ideal candidate.

Good luck to all that are having a go.

[ssorlih](#) 

▣ Posted: Sat Jun 11, 2011 14:31

The casing that I ordered is called mahogany fibrous summer sausage casing. 2.56x24inches will hold 2.5 pounds. This would allow 4 pieces when stuffed. Ordered from Butchers and Packers.

Ross- tightwad home cook

[Dave Zac](#) 

▣ Posted: Sat Jun 11, 2011 16:20

Okay, Bactoferm t-spx and Bactoferm mold 600, mahogany fibrous casings, and dextrose ordered from sausagemaker.com.

Looking back, the mahogany casing (15.99) is not protein lined. Big deal? I'm trying to work with them to change order for a protein lined casing. Sorry to say I have had some trouble with them in order changes in the past.

Otherwise I think I have a cabinet I can retrofit to work. I think I'm close to being in business.

Dave Zac

[ssorlih](#) 

▣ Posted: Sat Jun 11, 2011 17:01

I guess that we will find out in a few months.

Ross- tightwad home cook

[charcutebrew](#) 

▣ Posted: Sat Jun 11, 2011 17:19

Chuckwagon, great idea. It'd be a fun project... I don't think I can swing the money right now, though. In addition to ingredients I resolved not to use that hand-crank grinder/stuffer again, so I need to build or buy another. If I can get everything in by the time you guys start, great, & if not I'll follow along with interest.

[ssorlih](#) 

▣ Posted: Sat Jun 11, 2011 18:36

As with all the tools I buy I work my way up the scale of sophistication as my needs and use dictate. I mortised many hinges into doors and door jambs with a hammer and a sharp chisel before I spent 400 dollars for the fixtures that allow me to use a router and do a better and faster job. But that is the way I earn a living.

I am going to have about 100 dollars invested in this summer sausage effort which will bring the cost up to about 13 dollars per pound. That is just a bit more than market for some of the better locally made sausage. The more successful batches that I make and eat the sooner I amortize the cost. One hundred pounds would bring the equipment and specialty products cost down to a dollar per pound over the cost of the meat. Even if it take ten years to do it the return on the investment is good.

Ross- tightwad home cook

[ssorllih](#) 

▣ Posted: Sat Jun 11, 2011 20:41

Found and ordered some 2.375 x 24 inch protein lined casing. I can use the other for some other purpose.

Ross- tightwad home cook

[ssorllih](#) 

▣ Posted: Sun Jun 12, 2011 05:58

Now that I have a supply of fibrous casing on order that is not suitable for dried sausage I will use some of it to make ham sausage from the "BOOK" but using a turkey that I bought today for .69 per pound. Grind some, cut some into chunks and stuff into the casings and proceed as for ham sausage. I will process the whole bird, teeth, hair and eyeballs. 😊

Ross- tightwad home cook

## **Cast of Characters and Raw Materials Order Placement**

[Chuckwagon](#) 

▣ Posted: Sun Jun 12, 2011 10:33

Hi Guys,

Is the Salami Alessandra recipe ok with everyone? If so, maybe we should think about ordering our supplies on Monday and close the "sign up" sheet on Monday evening. I sent some emails to several members who won't get them until they go to work on Monday. Let's give them a chance to respond on Monday.

After that, while we're waiting on the postman, allow me to present some written stuff for you to review. After that, I'd like to open up a discussion for the questions that arise concerning temperature, humidity, fermentation, curing, etc., and just a bit about bacteria and what they do. I'll outline exactly what we will be doing and then later in the week, we should start thinking about our fermentation chambers. (Although I've got blinking neon, hot-stuff, iron-clad, glow-in-the-dark, professional equipment, I'm going to build one right along with you). Right now, we'd probably better consider our expenses and the items we'll be needing. Some of you have ordered already, and that is just fine – you'll have the jump on the **project** by a few days.

It looks as though we will have the following sausage wranglers participating: (in alphabetical order)

1. Rand Iowa
2. ssorllih Maryland
3. JBK Indiana
4. DaveZac New York
5. uwanna61 Vermont
6. SikaStag Scotland
7. Gray Goat Illinois
8. Party Cook Wisconsin
9. Chuckwagon Utah

Lets start thinking about ordering or rounding up the following items:

- Bactoferm T-SPX.....\$16.99 for 25 gr.
- Bactoferm Mold-600.....\$19.99 for 25 gr.
- Casings 3” x 24”.....\$15.99 for 20 protein-lined fibrous type
- small pocket notebook..... minimal expense
- hygrometer.....\$14.95
- thermometer..... \$14.95
- used computer fan.....expense varies
- extension cord.....expense varies
- flat, lipped, cookie sheet.....expense varies
- salt for “humidifier”.....expense varies

\*You’ll need an old cabinet of some type, or you can even build your own. You’ll need some thick plastic sheeting to line it with unless you use an old refrigerator. The cabinet doesn’t have to be very large, just big enough to hang 4 salamis that are nearly 20 inches long when stuffed. These days, Wal-mart and such stores even have plastic storage boxes at reasonable prices.

Bactoferm T-SPX has gone up just like everything else and although it is \$16.99 for a 25-gram packet, it will cure 400 pounds of meat! We’ll start with just ten pounds of salami so you’ll have to freeze the remainder (it has a shelf life of 6 months when frozen). That will give you a half-year to make 390 more pounds of pepperoni and salami!

Bactoferm “Mold-600” is \$19.99 for a 25-gram packet and will give you enough *penicillium nalgiovense* to cover the Statue Of Liberty a few times with white, flaky, mold. The remainder may be frozen up to six months also.

We will need a few 3” synthetic fibrous casings and you don’t *have* to have protein-lined type, but they are certainly more presentable as they shrink with the sausage as it dries. They available at no additional price and come in bundles of 20 and are 2 feet long. Each casing will hold 5 pounds of meat, so you’ll have 18 casings left over for the next bunch of bewildering, batches. The bundle of 20 costs 15.99.

Your “curing chamber” will have to be about 90% humidity for 72 hours at about 68° F. (20° C.). We’ll drop the temperature by ten degrees for the 2-3 month drying period, down to about 58° F. (14° C.) while we reduce the humidity to about 80% for the 2 to 3 month drying period following the fermentation period.

Hey pards, I just thought of something. This has just got to be the world’s most unique and “spread out” batch of salami ever made! 😄Shucks pards, we just might be makin' history! I can see us all on the News At Ten!

Best Wishes,

Chuckwagon

P.S. Ross, either casing you prefer will work out. The 2-3/8" will just finish a little faster than the rest. And shucks, back when I was making these things with the cavemen at the Alamo, during the War of 1812, we didn't have any protein-lined fancy stuff either. 😊

[toolmann](#) 

📅 Posted: Sun Jun 12, 2011 15:09

Hi all , I would be very interested to but unfortunately right now i can't do . am getting divorced and all my equipment is at the house an i am not there anymore till this thing gets sorted out so sorry, i think it is a very good idea do

[ssorllih](#) 

📅 Posted: Sun Jun 12, 2011 19:34

Chuckwagon, How close to airtight should I make this chamber. If I peek in once a day is that enough ventilation?

Ross- tightwad home cook

[Dave Zac](#) 

📅 Posted: Sun Jun 12, 2011 22:37

I think I'm on my way. I used an old TV stand with cabinet underneath. Tore out the shelf, put on a new back and new doors to fit the space.

The chamber is 24" high, 22" wide, and 15" deep. Still need to wrap inside with plastic and mount computer fan in back. Best part is, this cost me \$0. Just about 2-3 hours of my time this morning. I think I have plastic around here somewhere, and a fan at work.

Any other suggestions?



[ssorlih](#) 

▣ Posted: Sun Jun 12, 2011 23:36

Just slather on a coat of epoxy resin. Or even polyester resin but my first choice would be epoxy It is practically completely waterproof.

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Ross- tightwad home cook

[Chuckwagon](#) 

▣ Posted: Mon Jun 13, 2011 08:58

Hey Siggie, We're sorry to learn of the divorce in your life. Will you watch for my email? You've got pals here toolman, and we're all hoping you quickly get back on your feet with any problems behind you. Stay in touch please.

I also heard from our ol' friend Gray Goat. He has been unable to log on to our site for some time but we didn't know about it until this evening. We'll save a spot on the Project-A for you Wayne. We might have to have you re-register with a slight variation in your handle.

ssorllih, you don't have to make it completely air-tight, but it should keep out a stiff nor'easter! When we get underway, you'll understand why you want to have complete control over how much air exchange (called air speed) you'll have to have. For right now, just make sure it is fairly tightly closed up.

DaveZac, you've outdone yourself. That's incredible! And you can't beat the price eh? Now, you may wish to glue in or screw in a couple of notched furring strips along the top inside to hold a few hardwood dowels or rods – whatever you can scrape up. For your smokesticks, be sure not to use a treated-wood or a broom handle or anything like that. New, clean, wooden dowels would be ideal. Or clean steel rods.

Wow, Dave. That's a first-class job sir! Just like all your other projects my friend.

P.S. Ross is right about the epoxy. Lots of folks have even used stainless sheet metal or even acrylic paints as well as the new epoxy paints used by folks who make aquariums at home. With the paint, you'll have to "break it in" a bit to eliminate odors. I like the idea of sheet plastic for easy removal of mold later on. With my "pro" model, I have to scrub out the old mold every time I make a new batch of sausage. I'm wondering if somehow you could "peel off" a layer of plastic sheeting and just throw the mold away.

OK folks, almost time to get underway. By the way, do you know where the cowboys' phrase "Yeee Haww" came from? When you drive a team of horses pulling a wagon or stagecoach, you yell out "Gee" to have them turn right. "Haw" gets them to turn left. Shucks, I've always wondered if you yelled out "gee" and "haw" at the same time while they were crossin' a creek, would they turn "starboard" or "port"? 🤔

Best Wishes,  
Chuckwagon

### **And the Project Begins**

[Chuckwagon](#) 📧

📅 Posted: Mon Jun 13, 2011 13:11

Hi Everyone,  
Here we go... Yeeeee Haaaaww!

#### **1. Equipment:**

Let's start out by reading some basic information by Seminole (Stan Marianski) that he has graciously shared with us. Some of it gets a little involved but it is great info. Most of us won't be ordering the electronic controls quite yet, but it won't hurt to glance through the material and know it's there for later reference. Other information near the end of this article is very much worth studying a bit. Here's the link to Stan's article: <http://www.meatsandsausages.com/sausage-types/fermented-sausage/equipment>

Most of us will use a simple curing box with humidity boosted by salt spread out on a lipped cooking sheet. We'll put in just enough water to cover the salt and take reading of the relative humidity at several different intervals before we even put the salami inside.

Remember to jot down any questions in your notebook as you read the article. How about hashin' it over Monday evening?



Next, in a few days, let's go to:

## 2. Fermenting Sausage:

Here's some basic material that Seminole (Stan Marianski) has written about fermented sausages. Read it again if necessary, to grasp as much as you can. When questions arise... jot them down in your notebook and post them here so everyone can benefit from our dialogue. This is the very basic information you'll need to understand what's happening inside that gorgeous curing chamber you've been building. Click on this link for Stan's article: <http://www.meatsandsausages.com/sausage-types/fermented-sausage>

Best Wishes,  
Chuckwagon

[ssorllih](#) 

▣ Posted: Mon Jun 13, 2011 13:33

There is a food wrap product called 'press and seal' that is slightly adhesive on one side. That might be just the thing for a peelable chamber lining.

Ross- tightwad home cook

[Dave Zac](#) 

▣ Posted: Tue Jun 14, 2011 03:12

Chuckwagon wrote:

DaveZac, you've outdone yourself. That's incredible! And you can't beat the price eh? Now, you may wish to glue in or screw in a couple of notched furring strips along the top inside to hold a few hardwood dowels or rods – whatever you can scrape up. For your smokesticks, be sure not to use a treated-wood or a broom handle or anything like that. New, clean, wooden dowels would be ideal. Or clean steel rods.

Wow, Dave. That's a first-class job sir! Just like all your other projects my friend.

Done. Screwed in two notched furring strips as suggested. I was going to use hooks to hang salami from. Your suggestion made me think straight. Hardwood dowels will be better for my Kabonasy to hang from too. I really like the press-n-seal idea too. Gonna try that.

Dave

[ssorllih](#) 

▣ Posted: Tue Jun 14, 2011 04:13

A little cart before the horse here but as we are planning a 30 percent weight reduction(?) in the finished sausage I presume that it is prudent to weigh and label each link at the start.

This would indicate the need for a scale somewhat more accurate than the bathroom scale.

Smoked sausage is often shown hanging two links middled and touching a little while in the smoke. It is better that these planned links don't touch one another. Yes? Even better that they not be crowded but have plenty of elbow room even though they lack elbows?

Ross- tightwad home cook

[partycook](#) 

Posted: Tue Jun 14, 2011 04:32

Hi Chuckwagon

I don't know if you have received my reply . (no way to tell if my answer has been sent )  
Lets make dry cured salami together

yes I would like to join you in doing this.

John

[Chuckwagon](#) 

Posted: Tue Jun 14, 2011 05:08

Hey Partycook,  
Good to have you aboard. Are you ready to make some great salami?

Did you send another note? Perhaps an email? Telegraph? Pony Express Rider? 😊

We didn't receive any other note - just in case you need to check your computer.  
OK partycook, remember to check out the topic "Project A" each day. Right now it's in Hyde Park (chat) but we'll be moving it soon to a more appropriate forum. Glad you're with us Partycook!

Best Wishes,  
Chuckwagon

[Chuckwagon](#) 

Posted: Tue Jun 14, 2011 09:43

Hi Sausagemakers, Our "**Project A**" participants include:

1. Rand..... Iowa
2. ssorllih..... Maryland
3. JBK..... Indiana
4. DaveZac..... New York
5. uwanna61..... Vermont
6. SikaStag..... Scotland
7. Gray Goat..... Illinois
8. Party Cook..... Wisconsin
9. Chuckwagon..... Utah

We should outline our intentions and make the project a little more clear for those having questions remaining. Project "Allysandra" is a way to make Genoa type salami (Allysandra) on a shoestring. As most of us are on a budget, it's difficult to lay out several hundred bucks for first class equipment – especially in this economy. I'm suggesting that you can cut a few corners and still enjoy making some great tasting dry-cured salami. We'll have to make our own cabinets or find an old refrigerator. (See "equipment" below). We'll have to do without electronic controls but we can get around them although it is not as convenient as having automatic regulators. Later on, we'll add moisture by placing a bed of salt in a lipped pan and barely covering it with water. We'll have to monitor the humidity so a hygrometer will have to be purchased along with a thermometer.

OK everyone, we should have ordered our supplies today (Monday) or by Tuesday noon at the latest (6/14/11). Order Bactoform T-SPX, and Mold-600. Make sure you have some casings (see the dialogue above for the type), a hygrometer and a thermometer. You might also need some hog rings if you use them. Please let us know when you receive them.

Again, while we're waiting, let's study a bit! During the next couple of days, I'd like to have you read some material. Let's take the following items in sections. Please read numbers one and two by Thursday or Friday. Jot down notes in your notebook. Also, write down any questions you'd like to ask on the forum. I'd like to post some questions for you to consider while you read. If you'd prefer, you could read the material, then answer them to let yourself know how you are doing in understanding the material.

No one expects you to go deep into the theory of fermentation or delve way down into the issue of bacteria. But I think you'll agree, you should at least know a few basics and read a bit about just what in the heck we are doing! Although our own health and safety are vitally important, the health and safety of other people who are consuming our hand-crafted product, becomes paramount! You surely wouldn't want to injure anyone, so please read and understand the basics. And for goodness sakes... don't be afraid to ask questions. There are no silly questions, and by asking a simple question, you don't have to feel embarrassed in any way.

### **1. Equipment:**

Let's start out by reading some basic information by Seminole (Stan Marianski) that he has graciously shared with us. Some of it gets a little involved but it is great info. Most of us won't be ordering the electronic controls quite yet, but it won't hurt to glance through the material and know it's there for later reference. Other information near the end of this article is very much worth studying a bit. Here's the link:

<http://www.meatsandsausages.com/sausage-types/fermented-sausage/equipment>

### **2. Fermenting Sausage:**

Here's some basic material that Seminole (Stan Marianski) has written about fermented sausages. Read it again if necessary, to grasp as much as you can. When questions arise... jot them down in your notebook and post them here so everyone can benefit from our dialogue. This is the very basic information you'll need to understand what's happening inside that gorgeous curing chamber you've been building. Click on this link:

<http://www.meatsandsausages.com/sausage-types/fermented-sausage>

### **After a few more days, we'll move on to these topics, one at a time:**

#### 3. Cultures:

Lets click on another link and talk about bio-cultures. Again, Stan has shared much information with us. It's important to know what Bactoform is doing inside our salamis. Here's the link for understanding cultures:

<http://www.meatsandsausages.com/sausage-types/fermented-sausage/cultures>

#### 4. Safety Hurdles:

This article addresses the information we need to know so we don't poison ourselves! It is most interesting and sure to bring up lots of questions. Click on this link: <http://www.meatsandsausages.com/sausage-types/fermented-sausage/safety-hurdles>

It would also be beneficial to review the FSIS regulations regarding the calculation of nitrates and nitrites in meat products. Their handbook is available to us in its entirety at this link:

<http://www.fsis.usda.gov/...ives/7620-3.pdf>

#### 5. Standards:

Here are the definitions and the rules that go along with this type of sausage making. Click on this link:  
<http://www.meatsandsausages.com/sausage-types/fermented-sausage/standards>

6. Traditional:

Traditionally made fermented sausages are made without starter cultures or sugar and rely entirely on bacteria present in meat and in the surrounding microflora. Interesting reading. Click on this link:  
<http://www.meatsandsausages.com/sausage-types/fermented-sausage/traditional>

Best Wishes,  
Chuckwagon

[Chuckwagon](#) 

▣ Posted: Tue Jun 14, 2011 11:48

Hi Ross,

Yes, we'll weigh and number each sausage as we initially place it into the CC. I use little cardboard tags with strings to tie to the end of each sausage, then use a PENCIL to record the "green" weight of each one. (Ink will run and smudge in a high-humidity chamber).

It's also a good idea to record their weight in your notebook along with the date it went in and the humidity of the chamber at the beginning of the process. And yes Ross, a bathroom scale won't do it. About your next question. There are no "links" in this type of salami. They are sausages almost two feet long, clamped with hog-rings or tied with heavy cotton string. There is a special knot to learn how to tie at the top end. We'll even tie support loops with "half-hitches" on them to hold them while hanging.

Of course, spacing the salamis is quite important as air circulation is a major factor in carrying away evaporated moisture (with the help of your computer fan). Why, I've even heard that down in Texas, they space them so far apart, you could drive a buckboard between 'em!

Best Wishes,  
Chuckwagon

[Dave Zac](#) 

▣ Posted: Tue Jun 14, 2011 14:35

Some reading of of the first article indicates that I may want to find a potentiometer to control my fan speed. \$3-\$5 probably at radio shack. One thing I admit I am not good at is electronics and electricity. How do I know I am buying the right "pot" for my fan. In my limited research I have read stories of guys burning up their pots because the motor had too much draw.

What do I need for my computer fan? Any electrical guys out there? I have a 2.2 W fan.  
<http://sound.westhost.com/pots.htm>

Dave

[ssorllih](#) 

▣ Posted: Tue Jun 14, 2011 15:05

Dave is your fan rated for 12 volts DC or 115 volts ac?

Ross- tightwad home cook

[Dave Zac](#) 

□ Posted: Tue Jun 14, 2011 15:26

**ssorllih wrote:**

Dave is your fan rated for 12 volts DC or 115 volts ac?

12 V DC. I plan to power it from an old computer power supply.

Dave

[ssorllih](#) 

□ Posted: Tue Jun 14, 2011 23:09

200 ohms at 2 watts should be good but if you can get a 4 or 5 watt pot for a fair price go for that. Connect the power supply to one of the outside terminals and one lead of the motor to the center terminal.

Ross- tightwad home cook

[ssorllih](#) 

□ Posted: Wed Jun 15, 2011 01:42

I read the description of the equipment needed and I believe that I can pretty much make do although some of my stuff may seem a bit archaic. My gram scale is good for 120 grams by .01 milligram torsion balance and my larger scale is a double beam baby scale that will resolve 1/8 ounces to 32 pounds.

Ross- tightwad home cook

[Chuckwagon](#) 

□ Posted: Wed Jun 15, 2011 09:37

Hi sausage makers working on Project-A!

While we are reading about bad bugs and bad manners, how about allowing me to expand just a bit on some of the material you've read about microorganisms and their effect on our fermented meat products and possible effects upon our bodies. I do not expect you to remember all the data I've presented here. I just thought I'd put the following information together for your further reading in case you'd like to know more about the bugs we are contending with. I'd like to present **three pages** for you to read at this point in our project. You may wish to copy n' paste these three pages for your reference notes. The first deals with the causes of food poisoning. The second describes some of the most vicious pathogenic bacteria we have to deal with. The third page describes yeasts and molds, and such tough-to-get-rid-of microorganisms as spores and even some of the non-bacterial contamination we may encounter, such as *trichinella spiralis* – a microbial, nematode worm!

### **Food Poisoning - Page 1 –**

Each year in the United States food borne diseases cause approximately 76 million illnesses and 325,000 hospitalizations\*. Of this number, more than 5,000 Americans painfully suffer the clearly evident indications and symptoms of preventable food contamination, breathe their last breath, and agonizingly die!

\* *statistics from Center For Disease Control*

Three pathogens in particular - *Salmonella*, *Listeria*, and *Toxoplasma* - are responsible for 1,500 deaths annually. Many of the pathogens of greatest concern today, were not even recognized as causes of food borne illness merely twenty years ago! They include *Campylobacter jejuni*, *Escherichia coli O157:H7*, *Listeria monocytogenes*, *Cyclospora cayetanensis*, and others.

Other pathogenic bacteria of concern to sausage makers include *Clostridium botulinum* whose spores produce the deadliest toxin known to man, and *Clostridium perfringens* - both of which grow without oxygen present. *Staphylococcus aureus* is present in the mouth, nose, and throat as well as on the skin and hair of many healthy people who never suspect it. One cough or sneeze may be accountable for the sickness of countless individuals. *Shigella*, also a rod-shaped pathogenic bacterium, is closely related to *E.coli* and *salmonella*. Usually ingested, it is the cause of severe dysentery. Also rod-shaped pathogens of bacteria genus bacillus include *Bacillus cereus*, which causes a foodborne illness similar to that of *staphylococcus*.

We live in a microbial world in which there are limitless opportunities for pathogenic or spoilage microorganisms to contaminate food whether it is produced in huge commercial kitchens or prepared “from scratch” at home. Food borne microbes are present (usually in the intestines) in healthy animals raised for food and the slightest contact with even small amounts of intestinal contents may contaminate meat or poultry carcasses during slaughter. Others are passed along by any number of means. As a result, worldwide each year, over two million people die from diseases attributed to contamination of food and drinking water, many being painful diarrhoeal diseases. Even in industrialized countries, up to 30% of the population have reported suffering from foodborne diseases annually.

Recently in Europe, two and a half million pounds of beef were recalled due to salmonella contamination. In the United States, a single ice cream producer affected 224,000 persons when salmonella contaminated products were placed on the market. Earlier, an outbreak of hepatitis A, resulting from the consumption of contaminated clams, affected some 300,000 individuals in China. In the United Kingdom, two million cases, (about 3,400 cases per 100,000 inhabitants), of food contamination are reported each year. In France, three quarters of a million people (1,210 cases for 100,000 inhabitants), report food contamination sicknesses annually. Australia reports an estimated five and a half million cases of food-borne illness every year, causing 18,000 hospitalizations and 120 deaths. The problem creates an enormous social and economic strain on people in every country. In the United States alone, diseases caused by the major pathogens are estimated to cost over \$35 billion dollars annually in medical costs and lost productivity.

So, why am I including this ghastly information in the midst of our sausage making **project**? Frankly, to scare the daylights out of you! What better place to print explicit and even graphic details in which every responsible sausage maker should become familiar before undertaking the business of feeding or preparing sausage for other people? A trusted sausage maker or cook may either promote or recklessly endanger the health of other human beings. I openly cringe whenever I hear someone repeat the words “he’s just a cook”. Inside our ranch kitchen, cowboys helped with dishes and treated the cook as if he were royalty. After all, although he was “just the cook”, all hands depended upon the “biscuit wrangler” to feed us fresh, tasty, and safely prepared food. Shucks pards, we all knew he could have easily slipped a little something extra into the chocolate pudding anytime he had revenge on his mind. We also trusted and relied upon him to help keep harmful bacteria out of the sausage and meat products we devoured like hungry wolves.

## **Safety n’ Savvy**

Before you begin making sausages in your own ranch or home kitchen that others will consume, you **MUST** become familiar with the basics of food handling safety and gain at least a fundamental insight of microorganisms and their behavior. Without this knowledge, you may very easily harm someone most

seriously. Making fresh sausage involves the use of immaculately clean utensils and low processing temperatures. We must take advantage of every opportunity to lower the temperature of the meat during the various steps of processing sausage. Those of the cured, cooked, and smoked variety, require the same essentials, but further include the use of sodium nitrites and nitrates, higher salt content, and of course, higher cooking temperatures. If you wish to make any type of dried or semi-dried sausage, a basic understanding of the fermentation process becomes necessary, along with an elemental knowledge of unique, acid-producing, microorganisms and their behavior. In other words, because the meat in these sausages is not cooked during preparation or even upon consumption, a bit more “bacteria savvy” is required. Further, in making those great tasting, tangy, “fermented” sausages, familiarity with a few unique safety procedures involving yeast and mold microorganisms is essential. They include at least an elemental understanding of:

1. Water activity ( $A_w$ ) - a measure of how much “bound” water is available to microorganisms.
2. pH acidity - (potentiometric hydrogen ion concentration) - a measure of acidity or alkalinity in food, developing resistance against microbiological spoilage.
3. Microbiology, including:
  - a. molds
  - b. yeasts
  - c. bacteria of three types:
    1. pathogenic
    2. beneficial
    3. spoilage

## **The Major Causes Of Food Poisoning**

### 1. Pathogenic Bacteria

Of the three microorganisms affecting food (bacteria, yeasts, and molds), pathogenic bacteria, existing virtually everywhere in our environment, remain the greatest cause of food poisoning. Sausage makers and food handlers must be aware of the strains of (a.) food spoilage bacteria, (b.) pathogenic bacteria, and (c.) beneficial bacteria. Millions of microbes may be found on unwashed hands and dirty utensils and under the right conditions, multiply at an alarmingly incredible rate.

As sausage makers, we must constantly be aware of the primary factors necessary for bacterial growth. We must also know how to change any dangerous circumstances immediately. Bacteria need merely four elements for growth:

- (1.) *moisture*- Did you ever imagine that meat is comprised of three-quarters water? If we freeze the water in meat, we give it temporary defense against bacteria by “binding” the moisture. Moisture is the primary reason meat spoils. Will dehydrating meat preserve it? We’ve been doing just that for thousands of years!
- (2.) *nutrient*- Meat, (mammalian muscle) consists of roughly 75% water, 19 % protein, 2.5% fat, 1.2% carbohydrates, and 2.3% non-protein substances such as amino acids and minerals. Exposed to the atmosphere, meat becomes a virtual feast for bacteria.
- (3.) *warm temperature*- Bacteria thrive at body-temperature! Called the “danger zone”, the range from 40°F. (4°C.) to 140°F. (60°C.) is the optimum temperature periphery for bacteria to multiply. It is interesting to note that bacteria are restricted from growing at 130°F. (54°C.) but actually start to die at 140°F. (60°C.).



(4.) *lack of oxygen*- Aerobic bacteria need oxygen; anaerobic bacteria do not. Certain pathogenic bacteria in sausage being smoked certainly present a risk. Casings also cut off a certain volume of oxygen as does the “overnight curing” covered with plastic wrap inside a refrigerator. Remember the first rule of sausage making: Don’t smoke it if you can’t cure it! (meaning the use of actual cures of sodium nitrate or sodium nitrite).

Bacteria, have been named mostly in Latin or Greek, for their shape. Spherical bacteria are called *cocci*. Rod-shaped bacteria are known as *bacilli*. Curved bacilli (resembling a comma), are called *vibrio*. If they are spiral-shaped, they are called *spirilla*, and if the bacilli is tightly coiled, it is called *spirochaetes*. Many bacteria exist simply as single cells. If they are found in pairs, they are *neisseria*. The *streptococcus* form chains while the *staphylococcus* group together in clusters resembling grapes.

If a specific bacterium is a *facultative anaerobic*, it is most active in oxygen but can survive without it. On the other hand, an *obligate anaerobe* cannot grow in the presence of oxygen. Bacteria do not grow in size - they multiply in number. And they do it very quickly! Without oxygen, the addition of sodium nitrates or sodium nitrites is necessary to prevent botulism. It also becomes crucial that meat be removed from the “danger zone” temperature range as quickly as possible during any preparation or cooking process. This includes grinding, mixing, and stuffing sausages, procedures often supported using ice, ice water, or refrigeration and freezing. As bacteria need moisture to multiply and meat is about three-quarters water, it becomes an ideal environment for the growth of bacteria, even when it is mostly dried. However, there is a point in which meat can lose so much “available” water, *it will no longer sustain bacteria*. This point differs within each particular type bacterium. We’ll discuss this “water activity” later as well as another bacteria destroying process known as *potentiometric hydrogen ion concentration*... 🤪... or simply “pH acidity”.

Our first line of defense continues to be the application of extreme temperatures applied to meat either being cooked or frozen. As sausage is prepared, it is essential to work with only small batches at a time outside the refrigerator. Very often, meat is partially frozen before it is put through a grinder and bacteria at this temperature remain mostly inactive. In the grinder, ice chips are sometimes added to keep the temperature down as the friction of grinding actually warms the meat. Out of the refrigerator, most bacteria begin to wake up as the temperature rises above 40°F. (4.4°C.). At 50°F. (10°C.), it is safe to work with the meat only temporarily before it goes back into the refrigerator. At this point, salt in the amount of 2.5% - 3% is frequently added to partially restrict pathogenic and spoilage bacteria growth, as beneficial bacteria go to work producing protective acidity within time. Most bacteria thrive at the temperature of our bodies (98.6°F. / 36.6°C.). As temperatures rise much above the “danger zone”, their growth becomes restricted until around 140°F. (60°C.), they begin to die. Yet, strains such as *Clostridium botulinum*, may survive heating up to 250°F. (121°C) by producing heat-resistant, isolating envelopes called spores - nature’s way of protecting the organism by sheltering the bacteria from other unsympathetic environmental conditions.

- Page 2 -

### Clostridium botulinum - The Killer

*Clostridium Botulinum* is a common obligate anaerobic bacterium microorganism found in soil and sea sediments. Although it can only reproduce in an oxygen-free environment, when it does reproduce, **it produces the deadliest poison known to man - botulinum toxin**. One millionth of a gram ingested means certain death - **about 500,000 times more toxic than cyanide**. Onset of symptoms can occur quickly and include nausea, stomach pain, double vision, and spreading paralysis, ultimately reaching the heart or respiratory organs. If treatment is given and the dose is low, half of those affected may survive, but recovery may take months or years. Although fatalities occur yearly, especially in countries where home canning is popular, the risk of acquiring botulism is very, very low. However, the lethal consequences of poisoning may make you wish to



reconsider the proper addition of sodium nitrate/nitrite in your products to almost eliminate the risk. Worldwide, there are about 1000 cases of botulism each year.

The rod-shaped bacterium was first recognized and isolated in 1896 following the poisoning of several people who had consumed bad ham. It was later discovered that due to the enzyme superoxide dismutase, the bacterium might actually tolerate very small traces of oxygen. *Botulinum* spores are extremely persistent and will survive heating up to 250°F. (121°C), freezing, smoking, and drying. Insidiously, they lie in wait for the right conditions to occur and give no foul smell or taste, making it even more treacherous. In non-cooked fermented sausages, the microorganism must be destroyed using a combination of salt, a drop beyond 5.0 pH, and a minimum drop in Aw water activity to 0.97 or less. Placing fresh vegetables or un-sterilized (garden fresh) spices into sausage is not recommended as *botulinum* spores are not uncommon on leafy herbs, peppers, beans, chilies, and corn. Cut off from oxygen by being stuffed into casings and placed in a smoker, the smoking temperatures are ideal for bacteria growth. The risk using fresh garlic is less, but cases of *botulism poisoning* have been reported after people have eaten home-canned garlic cloves in oil - the ideal environment for anaerobic bacterial growth!

The most commonly recognized foodborne infections are those caused by the bacteria species *campylobacter*, *salmonella*, and *E.coli*, along with a group of viruses called *calicivirus* also known as the *Norwalk* and *Norwalk-like* viruses. *Campylobacter* remains the most common bacterial cause of diarrheal illness in the world and incredibly, most raw poultry meat has *campylobacter* on it. *Salmonella* is also a bacterium widespread in the intestines of birds, reptiles, and mammals. Its infection, known as *samonellosis*, typically includes fever, diarrhea, and abdominal cramps. *E.coli* 0157:H7 is a bacterial pathogen infecting cattle and other similar animals. Human illness typically follows consumption of food or water that has been contaminated with microscopic amounts of cattle feces. The illness it causes is often a severe and bloody diarrhea with painful abdominal cramps, but without much fever. In 3% to 5% of cases, a complication called hemolytic uremic syndrome (HUS) can occur several weeks after the initial symptoms. This severe complication includes temporary anemia, profuse bleeding, and kidney failure.

*Norwalk* and *Norwalk-like* virus (*calicivirus*) is an extremely common cause of foodborne illness, though it is rarely diagnosed, because its laboratory test is not widely available. It causes an acute gastrointestinal illness, usually with more vomiting than diarrhea, that resolves within two days. It is believed that *Norwalk-like* viruses spread primarily from one infected person to another. Infected kitchen workers can contaminate a salad or sandwich as they prepare it, if they have the virus on their hands. Infected fishermen have contaminated oysters as they harvested them. **Sausagemakers, wash your hands!**

Although other routes usually transmit them, some common diseases are occasionally produced by foodborne bacteria. These include infections caused by *shigella*, *hepatitis A*, and the parasites *giardia lamblia*, and *cryptosporidia*. Even “strep throats” have been transmitted occasionally through food.

Indeed, we live in a microbial world with countless opportunities for food to become contaminated as it is produced and prepared. Many food borne microbes are present in healthy animals (usually in their intestines) raised for food. In the kitchen, microbes may be transferred from one food to another food by using the same knife, cutting board or other utensils to prepare both without washing the surface or utensil in between. Worse, a food that is fully cooked can become re-contaminated if it touches other raw foods or drippings from raw foods that contain pathogens.

A “*strain*” is a sub-group within the species of a particular bacterium having unique characteristics distinguishing it from other strains. These differences are often detectable only at the molecular level; yet, they may result in changes to the physiology or lifecycle of the bacterium. Some strains develop pathogenic capacity becoming hostile to our food supply.

Many bacterial microbes need to multiply before enough are present in food to cause disease. The way food is handled after it is contaminated can also make a difference in whether or not an outbreak occurs. Given warm moist conditions and an ample supply of nutrients, merely one reproducing bacterium dividing itself every half hour can produce 17 million progeny in only 12 hours! As a result, lightly contaminated food left out overnight can be highly infectious by the next day. If the food were refrigerated promptly, the bacteria would not multiply at all. In general, freezing prevents nearly all bacteria from growing but merely preserves them in a state of “suspended animation”. However, this general rule has a few surprising exceptions. Two foodborne bacteria, *listeria monocytogenes* and *yersinia enterocolitica* can actually grow at refrigerator temperatures! As we shall see, high salt, high sugar, or high acid levels keep bacteria from growing, which is why salted meats, sweetened jam, and pickled vegetables are traditionally preserved foods.

## **Staphylococcus Aureus**

*Staphylococcus aureus* is a particularly infamous nasty strain of bacteria that thrives at 98° Fahrenheit, causes intense vomiting, and much like clostridium botulinum, it is capable of producing toxins that remain in meat even after the microorganism is destroyed or removed. Most often found around the nose and throat or on sores, the foods most often contaminated with *staphylococcus* are moist and high in protein, such as meats and cheeses. The bacteria are usually passed onto food by the hands. “Staph” is even more dangerous because there is no tangible way to tell if meat is infected - taste, aroma, and appearance all seem normal. Moreover, it is highly resistant to drying and in the presence of oxygen, it can survive in Aw water levels down to an incredible 0.86. Worse, it can withstand a whopping 15% salt! Proper temperature management is essential - no, it is critical - in avoiding the spread of *staphylococcus* microorganisms. Cooked foods that are not cooled quickly enough or that are allowed to stand at room temperature are susceptible to infection. In fermented (not cooked) sausage, a rapid drop to less than 5.3 pH is required for its demise. In fresh or smoked-cooked-cured sausage, normal cooking temperatures exterminate the bacterium.

## **E. coli**

The rod-shaped, facultative anaerobic, *E. coli* (*escherichia coli*) bacteria are commonly but not always confined to the lower intestine of warm-blooded organisms. Most are harmless and one strain in particular has been used in the development of probiotic medicine developed to treat gastrointestinal infection. However some strains, such as serotype 0157:H7, 0104:H21, and 0121, can cause potentially lethal toxins. The **strain 0157:H7** especially may cause serious food poisoning in humans, as well as other life-threatening complications. The ability of *E.coli* bacteria to survive for brief periods outside the body makes them ideal candidates for fecal contamination. The bacteria survive freezing and acidic environments down to 4.0 pH and a minimum drop in Aw water activity to 0.95. Untreated water, unwashed hands, flies, or vermin can then spread the bacteria. As plants are eaten, the cycle continues. As with *staphylococcus aureus*, it is best destroyed using heat.

## **Salmonella**

*Salmonella* bacteria do not produce spores, are not destroyed by freezing, and are *facultative anaerobic*, meaning they are active in oxygen but can survive without it. This is the nasty bug that causes Typhoid Fever! In food, it is the cause of *salmonellosis*. The rod shaped bacteria live in the intestinal tracts of humans and animals and are passed in the excreta of an infected host. Untreated water, unwashed hands, flies, or vermin can then spread the bacteria. *Salmonella* can survive for weeks outside a living body and have even been found in dried excrement after nearly three years. The foods most commonly infected with bacteria are poultry, eggs, and all kinds of meat. Thorough cooking of these foods at a temperature of at least 165°F. (74 &ordm;C) will destroy the *salmonella* bacterium. Each year, about 40,000 Americans are infected with food borne salmonella and develop *salmonellosis*. Amazingly, another 142,000 are annually infected with *Salmonella enteritidis* solely

from consuming raw chicken eggs! About 30 die. In non-cooked fermented sausages, the microorganism must be destroyed using a combination of salt, a drop to less than 3.8 pH, and a minimum drop in Aw water activity to 0.94.

### **Clostridium Perfringens**

*Clostridium perfringens* bacteria, like *salmonella*, is present in the intestines of humans and animals, but like *clostridium botulinum*, it is an *obligate anaerobic* and cannot grow in the presence of oxygen. The bacteria forms spores that survive very well in soil - thus vegetables may carry the organisms. *Clostridium perfringens* bacteria are most commonly found in raw foods, especially meats and poultry, and proper temperature management is fundamental in avoiding the spread of the microorganisms. In non-cooked fermented sausages, the bacteria must be destroyed using a combination of salt, a drop to a point less than 5.5 pH, and a minimum drop in Aw water activity to 0.93.

### **Listeria Monocytogenes**

In October 2002, a major poultry producer in Franconia, Pennsylvania, recalled more than twenty-seven and a half million pounds of turkey and chicken “ready to eat” products they had already placed on the market. Following an outbreak of *listeriosis*, several other meat companies voluntarily shut down operations until the source could be identified. Unfortunately, *listeria* infection (*listeriosis*) in several northeastern states had taken its toll, initiating several deaths, sicknesses, miscarriages, and stillbirths.

Each year in the United States, an estimated 2,500 persons become seriously ill with *listeriosis*. Another 500 die, causing listeriosis to be the leading cause of death from food borne bacterial pathogens! Twenty to thirty percent of infections result in death! *Listeriosis* infection is caused by eating food contaminated with the bacterium *Listeria monocytogenes*. Pregnant women are twenty times more likely to contract listeriosis than other healthy adults and account for a third of all reported cases. The elderly, and persons with weakened immune systems due to cancer, diabetes, kidney disease, and other diseases, are especially at risk.

The rod-shaped *Listeria monocytogenes* bacteria do not produce spores and are found in soil and water. Most often, the bacteria get into food using manure as a fertilizer from animals having the infection yet displaying no ill symptoms. The bacterium is destroyed by heat while cooking or preparing food. Uncooked meats and vegetables and unpasteurized (raw) milk or foods made from unpasteurized milk may contain the listeria monocytogenes bacteria. Foods to be concerned about include soft cheeses and cold cuts at the deli counter, and many ready-to-eat foods such as hot dogs and raw vegetables. These items must be thoroughly cooked until they are steaming hot! Check the labels on Feta, Brie, and Camembert, any blue-veined cheeses, and Mexican cheeses such as Queso Blanco, Queso Fresco, and Panela. Unless labels clearly state they are made from pasteurized milk, avoid them. It is always a good idea to eat smoked seafood only in cooked dishes such as casseroles.

Whenever making fresh sausage from any raw meat, protection from *listeria monocytogenes* is dependent upon cooking the meat until the recommended internal meat temperature of at least 152°F. (66.6°C.) is reached. In non-cooked fermented sausages, the microorganism must be destroyed using a combination of salt, a drop to less than 4.4 pH, and a minimum drop in Aw water activity to 0.92. Sausage making is completely safe only when the rules are stringently followed.

### **Campylobacter Jejuni**

It is now estimated that half of the chickens produced in America contain the spiral rod-shaped *campylobacter jejuni* microorganism that infects 13 persons in one hundred thousand. The bacterium does not produce spores.

World wide, it affects about two and a half million people annually or 0.8% of the population. Most people who become ill with *campylobacteriosis* get diarrhea, cramping, abdominal pain, and fever within two to five days after exposure to the organism. The diarrhea may be bloody and can be accompanied by nausea and vomiting. The illness typically lasts one week. Although comparatively few people die from the disease (about 125 each year), the symptoms are harsh and painful, usually requiring medical attention. Many chicken flocks are infected with campylobacter but show no signs of illness. In non-cooked fermented sausages, the microorganism must be destroyed using a combination of salt, a drop to less than 4.9 pH, and a minimum drop in Aw water activity to 0.98. *Campylobacter* may be easily spread from bird to bird through a common water source or through contact with infected feces. When an infected bird is slaughtered, *campylobacter* organisms are easily transferred from the intestines to the meat.

## Shigella

Reactive arthritis is autoimmune condition that develops in response to an infection in another part of the body. People developing an infection having come into contact with *Shigella* bacteria, often develop severe dysentery and reactive arthritis. Infection is made through fecal-oral contamination and as few as ten cells may trigger the disease *shigellosis*. The rod-shaped bacterium does not produce spores, is closely related to *E.coli*, but is found naturally only in man and apes. It does not affect other animals. In non-cooked fermented sausages, *Shigella* bacteria must be destroyed using a combination of salt, a drop to less than 4.0 pH, and a minimum drop in Aw water activity to 0.91.

## Bacillus cereus

*Bacillus cereus* is a rod-shaped bacterium that develops *spores*. Some strains are harmful to humans when survival of bacterial *endospores* takes place whenever food is improperly cooked. This problem is compounded when food is then improperly refrigerated, allowing the spores to germinate. Infection causes severe nausea, vomiting, and diarrhea. In non-cooked fermented sausages, *bacillus cereus* must be destroyed using a combination of salt, a drop to less than 4.3 pH, and a minimum drop in Aw water activity to 0.91.

Other strains of *bacillus cereus* can be beneficial as probiotics. The bacteria are *facultative anaerobic* (most active in oxygen but can survive without it) and are found mostly in the soil. The bacterium is difficult to identify, as it closely resembles *staphylococcus aureus* and other pathogens. *Bacillus cereus* is also known to cause problematic skin infections in humans that can be quite damaging, and difficult to eradicate.

## 2. Food Spoilage Bacteria

Mother Nature has always employed an efficient and practical means for reducing and eventually eliminating waste. Surplus organic material (without preservatives) no longer needed or not consumed while fresh, simply wastes away with the infection of several types of bacteria. Most often, a product simply falls apart and eventually disintegrates. Meats spoil by *food spoilage bacteria* breaking down proteins and fats. *Brochetrix thermosphacta*, *pseudomonas spp.*, or a host of other spoilage-type bacteria, usually cause not only slime and discoloration, but also objectionable odors, terrible tastes, and intolerable textures as well. Each has its preferred temperature range for quick reproduction and some are most active inside a refrigerator. Others are active at room temperature or even smokers, heated up to 140°F. (60°C.). Although spoilage bacteria may not be life-threatening, they may certainly make life miserable for a week or two, if ingested in spoiled food. How do we stop food spoilage bacteria? Sometimes we can't before it does its damage. However, most cannot survive a drop below Aw 0.85. Dried foods? Most are very palatable but not always preferred or practical.

You may wonder how the Great Plains Indians kept fresh buffalo meat from spoiling. Without salt, and plenty of it, bison jerky did indeed spoil! Rarely did they have freshly killed meat as an alternative to tough, chewy,

dried buffalo jerky and most often it had to be soaked a few hours just to relieve enough of its salt content to make it palatable.

Although the spoilage bacteria is unpleasant, it is the pathogenic bacteria with which we are most concerned, as its presence in contaminated food is not always made evident by irregular odor, color, texture, or other normally perceptible means.

- Page 3 -

### Microorganism Type 2. (Yeasts)

It is estimated that only 1% of all yeast species have been described. *Yeasts* are microscopic fungi that grow as single cells. They will grow on the surface or near the surface inside non-cooked, air-dried, fermented sausages, while *molds* grow only upon the surface. Neither yeasts or molds are affected by the pH drop during the fermentation stage of sausage making and as long as a high degree of humidity is sustained, they will grow within a wide temperature boundary. However, the two microorganisms grow much slower than bacteria and during the drying process, they develop much later. Both yeast and molds are entirely part of traditional sausage making as both metabolize some of the lactic acid created during fermentation. Increasing the pH, thus lowering acidity, the flavor of slowly fermented sausage is greatly enhanced. Yeasts are not as sensitive to increased levels of salt as are lactic acid bacteria and they need little oxygen to survive. Two yeasts especially tolerant of salt are *Debaromyces hansenii* and *Candida formata*.

Unlike bacteria, there are no known species that grow only *anaerobically* (obligate anaerobes). Yeasts grow best in a neutral or slightly acidic pH environment but are able to grow in foods with a low pH, (5.0 or lower) and in the presence of sugars, organic acids, and other easily metabolized carbon sources. During their growth, yeasts metabolize some food components and produce metabolic end products. This causes the physical, chemical, and sensory properties of a food to change, as the food is spoiled. The yeast of the *Zygosaccharomyces* genus have long been associated with the food industry as a spoilage yeast. These species are able to grow in some of the more commonly used food preservation concentrations including ethanol, acetic acid, sorbic acid, high sucrose, benzoic acid, and sulfur dioxide.

### Microorganism Type 3. (Molds)

Molds are microscopic fungi that grow in the form of multicellular filaments called *hyphae*. Ubiquitous in nature, molds are aerobic and grow on the surface of sausages. Wild growing “white” molds have been used for centuries on sausage surfaces to help prevent oxygen from penetrating the sausage and to help regulate or temper the drying cycle. Mold also oxidizes lactic acid - increasing pH, and it consumes oxygen to produce *catalase*, thereby reducing lipid oxidation and rancidity of fats. *Penicillium nagliovense* in particular, promotes *lipolytic* (breaking down of fats) and *proteolytic* (breaking down of proteins) development, greatly improving the flavor of fermented, air-dried sausages. **In order to grow, molds need 75% humidity** or more and higher temperatures facilitate their development. The sausage maker’s favorites include *penicillium nagliovense* and Fleming’s *penicillium chrysangenum*, from which the miraculous antibiotic penicillin was developed.

### Spores And Mycotoxins In Molds

Some molds also produce *spores* and subsequently, *mycotoxins*. When mold spores are present in large quantities, their *mycotoxins* can certainly present a health hazard to humans and animals, potentially causing allergic reactions and respiratory problems. Exposure to (or consumption of) high levels of mycotoxins can lead to neurological problems and in some cases... death! *Molds of color, especially green, should be wiped away with vinegar immediately*. Although it is generally accepted that wild white mold is safe, it yet remains a wild

mold and therefore its safety remains a gamble. For this reason, it is suggested that starter cultures, purchased from a reputable company, be used in sausage making to control microorganisms. I prefer and recommend the very fine Chr. Hansen Bactoferm™ products made in Denmark and distributed in Germany. To start a mold culture on sausage, most sausage makers dip them into a solution just before they go into the fermentation room or chamber having raised temperature and higher humidity - ideal growing conditions for fungi. I like to spray them using an atomizer. And yes, you really should put a little ventilation into your curing chamber. A couple of well placed 30-30 rounds should do the trick! 🤪

There will always be skeptical ol' timers and hardy, dogmatic ol' folks who may say, "*We've never used that 'newfangled bio-culture stuff' to make salami - our good ol' mold has been successful for years, and we haven't killed anybody yet, so what's the big deal*"? Well, I have but one question... and I've wondered about it for some time. Just how many folks over the years have died of "*natural causes*"? 🤪

## **How Bacteria Multiply**

Microorganisms do not grow in size - they multiply in number. And they do it very quickly! Lets take a look at the bacteria count of two particularly infamous nasty strains - *E.coli 0157:H7* and *staphylococcus aureus* - both bacteria thrive at 98° Fahrenheit. It is crucial that meat be removed from this temperature range as quickly as possible during any sausage making preparation or cooking process. Because *staphylococcus aureus* bacteria are most often found around the nose and throat or on sores, and the foods most often contaminated with *staphylococcus* are moist and high in protein (such as meats), hands must be scrubbed, a hairnet or hat worn, and any contact with the mouth, nose, or acne sores etc., must be eliminated. **Coughing or sneezing is inexcusable and indefensible during any phase of the sausage making process!** The bacteria are usually passed onto food by the hands. "Staph" is even more dangerous because there is no tangible method to indicate whether the meat is infected; the taste, aroma, and appearance all seem normal. Proper temperature management is not only necessary, it is critical in avoiding the spread of *staphylococcus* microorganisms. Cooked foods not cooled quickly enough or are allowed to stand at room temperature too long, are susceptible to infection. How quickly do bacteria develop? Left on a table top on a warm late spring day, bacteria actually double each twenty minutes! In other words, *E.coli* and *Staphylococcus aureus* bacteria in "sterile meat" may easily number above 25,000 in three short hours without refrigeration. Worse, if the meat is ground into burger, the increased surface area increases the risk exponentially!

## **Non-Bacterial Contamination - (Parasites)**

### **Trichinella Spiralis**

*Trichinella spiralis* is a parasitic roundworm whose larval form may be present in the flesh of pork or wild game and its painful infection is known as *trichinosis*. The best way to irradicate the dangers of the *trichinella spiralis* larva is to simply cook the meat thoroughly. However, not all sausagemaking procedures allow the meat to be fully cooked or even cooked at all. In these cases, "*certified pork*" must be used; pork that has been deeply (sub-zero) frozen for a prescribed amount of time. Because of new USDA regulations in American hog production during the 1970's and 80's, the disease in modern America has mostly been eradicated. For decades preceding the new rules, many hog producers fed hogs the entrails of other butchered hogs as the cycle continued until the modern rules were put into effect. By public demand over an extended period of time, American pork has become less fatty and mostly trichinae free. It is interesting to note that in England, as well as in many other hog producing countries, *trichinella spiralis* is virtually unknown.

Always follow the recommended cooking temperatures in recipes. The internal temperature of cooked fresh pork must reach at least 150 &ordm;F. (65.5 &ordm;C.) All hot smoked sausages should be cooked to 155

°F. (68 °C). Cold-smoked or air dried sausages, whose formulas contain Prague powder #2, should be cooked to 120-135 °F. (49-57 °C). Never judge by looks alone, whether meat is cooked sufficiently, and always check the internal temperature using an accurate meat thermometer.

## **Cryptosporidium Paryum**

*Cryptosporidiosis* is a diarrheal disease caused by the microscopic parasite *cryptosporidium paryum*. Both the disease and the parasite are known as "*crypto*", and there is no effective treatment or cure for the nasty stuff. The parasite lives inside the intestines of humans and animals and is passed in the stool of both once infected. Most people with healthy immune systems will recover on their own having been infected. So why is it such a concern? Many people affected with other diseases as cancer etc., have weakened immune systems. Worse, the Crypto parasite has a protective outer shell allowing it to survive outside the body for long periods and makes it very resistant to the chlorine disinfection of any city's water supply. Within the past two decades, *cryptosporidium paryum* ("crypto") has become recognized as one of the most common causes of waterborne disease (drinking and recreational) in humans in the United States. The parasite is found in every region of the United States and throughout the world. Millions of Crypto bacteria may be released in just one bowel movement of an infected human or animal. People may become infected after accidentally swallowing the parasite inside a recreational facility as a swimming pool or by simply eating uncooked food contaminated with *cryptosporidium paryum*. As food is prepared with water taken from a "chlorinated and disinfected" city's reservoir supply, Crypto yet thrives. Cooks must destroy any possible contamination by completely cooking any food. How much heat? The USDA recommends at least 152 degrees F.

## **"Declaring War On The Bugs"**

How are we to defeat pathogenic and spoilage bacteria in sausage? Is it possible to starve them? What about salt? How much should we use? We also know that bacteria cannot survive in an environment without moisture, so may we limit the amount of water available to bacteria to destroy them?

All good questions! However, contrary to popular certainty, **salt does not destroy bacteria**. It doesn't even force water to evaporate. It does, however, *immobilize* or *bind* a specific amount of free water, preventing it from interacting with bacteria (or anything else). The measurement of "bound" water (not available to bacteria) is called "*water activity*", and is abbreviated Aw. How about serving a bacterium a dose of salt at first, while we deprive it of moisture? It works. For thousands of years, it has worked! How did your grandparents preserve fresh pork hams and bacons? Perhaps they were pioneers heading westward across the plains in a wagon with bacon, hams, or other cured meats in the larder. Salted hams were dried then "revived" in water before use. Bacon was cured with salt, smoked, and par-cooked. Your grandparents certainly knew that salting and par-cooking meats were positive steps adverse to microorganism survival! They were also aware that if they smoked meat, it not only tasted better but it was not likely to develop mold on its surface. Of course, they had to soak the salt from the flesh just to make it palatable. Nevertheless, it was meat - consumed along the trail, months after it had been initially prepared.

How about introducing acidity as protection against pathogenic and spoilage microorganisms? Bacteria hate acidity, right? But how much is enough? Doesn't acidity affect the taste of the final product? It's true, another effective method of preserving meat involves acidity introduced by various means. Of course acidity affects flavor and the addition of an acid is not just a simple resolution for every type of meat. Yet, without *lactic acid - producing bacteria*, we wouldn't have wonderful, fermented type sausage. As we **lower the pH factor**, we **increase** acidity. Are microorganisms able to survive inside acidic foods? Not when the acidity is increased in a sausage by a drop below 4 pH. Lets investigate a most effective way of preserving non-cooked, fermented sausages such as salami and pepperoni, using *lactobacillus* or *pediococcus* - lactic acid bacteria.

## pH - The Measure Of Acidity

Roughly, pH is the measurement of acidity or alkalinity in any substance using a scale from zero to fourteen. Pure water is said to be very close to neutral, having a pH nearly 7.0 at 77° F. Foods with pH less than 7 are said to be *acidic*, while foods having a pH greater than 7 are said to be *alkaline* or “base”.

## Aw The Availability Of Water

Not all the water in the cells of meat is available to microorganisms. Some of it is “*bound*” by salt, or other restrictive elements as sugar. The remaining water is known as “free water” and it is the only moisture available to bacteria as well as yeasts and molds. By adding salt or sugar to a sausage, we are able to restrict the amount of “available water” to pathogenic bacteria. Unfortunately, it also restricts available water to beneficial bacteria as well. Freezing water into ice is simply another method of “*binding*” or keeping water restricted from harmful bacteria. The measurement of “*bound*” water (not available to bacteria) is called “*water activity*” or *Aw*. *Water Activity* is measured on a scale from 0.00 (called “bone dry”) to 1.00 - the measurement of pure water. Adding salt immediately binds a large amount of water.

## Sterilized Spices In Sausage

The risk of bacterial contamination is the primary reason the meat industry uses only extracts of spices in cured meat products. In Europe, most dried spices are irradiated with intense gamma rays before packing, effectively killing the spores. Although irradiation for meat was approved in the 1990’s under the Clinton administration, it has been slow to catch on in the United States. The U.S.D.A. recommends the long-established procedure, and declared it to be entirely safe. Herbs and spices freshly picked and plucked from your own garden are fabulous when washed and prepared in foods for immediate consumption. However, a little fresh, non-sterilized basil or oregano, fresh from your prize-winning garden, may rapidly spoil jerky or meat used for sausage in a matter of only a few hours, producing any number of bacteria types. Whenever storing meat overnight for casing sausages, fresh spices will invariably begin to produce pathogenic and food spoilage bacteria, quickly devastating your product. For health’s sake, it is of utmost importance that you use only sterilized spices and herbs purchased from a reputable company, in making sausage.

Is bacterial contamination the only type of food poisoning? Absolutely not. Consider the toxins of poison mushrooms. Many are fatal. Recently in Salt Lake City, an entire Vietnamese family was tragically poisoned having made a mushroom soup from wild mushrooms found in a nearby canyon. Consuming the soup in one picnic meal on an outing, the entire family agonizingly died. Each year, many people become ill having eaten poisonous reef fishes, me included! Pesticides claim their toll also. Similarly, fresh fruits and vegetables can be contaminated if they are washed or irrigated with water that is contaminated with animal manure or human sewage.

## 3. Beneficial Bacteria

Binding available water (*Aw*) in sausage effectively confines it to a point where harmful *pathogenic bacteria* are no longer able to survive. The process is known as *dehydration* or limiting water activity. For centuries, this process, along with the chance addition of lactic acid-producing bacteria to increase acidity, has been responsible for safely preparing air-dried, fermented, sausages. Today, by adding carefully chosen strains of *lactobacilli* or *pediococci*, reducing the pH acidity to safe levels in fermented sausage has been most effective in destroying competing pathogenic bacteria. Historically, as the sausage maker unwittingly created ideal conditions for competing beneficial bacteria to thrive, pathogenic bacteria were deprived of nutrients, being literally crowded out of the way. Providing optimum temperatures and relative humidity for any number of previously unknown *lactobacilli* and *pediococci* bacteria, safe and tasty fermented air-dried sausages have been



crafted for hundreds of years. Only since about the middle of the nineteenth century has man known what was actually taking place inside the fermentation process. Without beneficial bacteria declaring war on pathogenic bacteria, we would not have salami, pepperoni, summer sausage, or any number of other tangy, fermented air-dried sausages.”

The *staphylococcus* genus includes thirty-two species and eight sub-species. *Staphylococcus Aureus* remains one of the most dangerous pathogenic bacterium known and can even survive an incredibly massive dose of fifteen percent salt! However, at least one of its strains has proven to be beneficial by promoting color fixing and flavor forming qualities in air-dried sausages. Closely related to *Micrococcus*, the two micro-organisms provide *beneficial* qualities to fermented air-dried sausages.

Best Wishes,  
Chuckwagon

[Dave Zac](#) 

▣ Posted: Wed Jun 15, 2011 14:26

My order is in the house. Just waiting on pot for fan now.

After the required reading I have a few questions:

Seminole says:Bactoferm™ T-SPX - slow culture for making traditional sausages and targeted for temperatures not higher than 24° C (76° F).

Use sugar.

Recipe says use Dextrose. My reading indicates dextrose in fast and medium fermented sausages. Sugar in slow fermented.

Also, thanks for making me read. For some reason I had it in my head that we are using cure 1. The reading indicates (and directions on my BactofermT-SPX) that maybe we should be using cure 2 because of the long term drying and no need to refrigerate when done. Your homework assignment straightened me out on that.

Dave

[ssorllih](#) 

▣ Posted: Wed Jun 15, 2011 19:30

I think the dextrose is in there to jump start the Bactoferm T-SPX.

My question is if you know what they fed the pig and you know there was no raw garbage in the feed, will the meat be free of Trichinae? If not how long and how cold Kills the little beasties?

Ross- tightwad home cook

[ssorllih](#) 

▣ Posted: Wed Jun 15, 2011 22:09

I have assembled my fermentation chamber. Added the salt marsh and fan. With a gallon jug of ice covered with a wet towel I have 66 degrees and 91 % RH.

The jug of ice gets a lot of condensate if I don't cover it with a wet towel. Now I have to see if I can get the temperature down below 60.

Ross- tightwad home cook

[Chuckwagon](#) 

▣ Posted: Thu Jun 16, 2011 00:56

Hi Dave.

Do you recall reading about the difference in fermentation between American (short dry / sour (tangy) and European (long dry / no sour)? I must confess, the reason I suggested this particular recipe is that we are using the slowest culture – thus more subtle, aromatic flavor – a perfect example of the flavor so many people have never encountered in their lives. They just don't sell this stuff in the markets of the world. However, we have to “wait” for it. Almost 3 months. But every bit worth the wait – you'll see. Chr. Hansen says: “*T-SPX is particularly recommended for the production of Southern European type of sausages, low in acidity with an aromatic flavor*”.

Relatively low temperatures below 76°F. are typical for this type of salami because we just don't need a high fermenting temperature for such lengthy fermentation. (Short-term 'sour' fermentation uses high temperatures in a cure box).

Dextrose is only 70% as sweet as sugar and it is the ideal nutrient for *pediococcus pentosaceus* and *staphylococcus xylosus*. High volumes of dextrose (glucose) are never used in long-term fermentation. The reason it is recommended for the fast-fermented sausages is that there is not sufficient time for lactobacilli to break down the sugars. Sugar may be used in a long-term fermentation because it has the time to be reduced. However, dextrose is “ready to go” in any case and utilized immediately.

The reason we use cure #2 in a non-cooked, air-dried sausage, is that we need a reservoir of nitrate to be slowly broken down over time into nitrite. The nitrite in the formula goes to work immediately and is quickly reduced to nitric oxide – the substance that actually cures the meat. By the way, can you name the type of bacteria that must be present in order to react with nitrate to break it down into nitrite?

Hi Ross, You asked:

quote:

**Quote:**

My question is if you know what they fed the pig and you know there was no raw garbage in the feed, will the meat be free of Trichinae? If not how long and how cold Kills the little beasties?

No one can guarantee such a thing Ross. There are just too many variables. The only positive method would be to look at it through a microscope. However, Trichinae Spiralis has been almost wiped out in this country. When I was a boy, it was still a threat. Luckily, the USDA made laws prohibiting the sale of pork from pigs that had been fed the entrails of previously butchered pigs. The law had an almost immediate effect on the quality of the meat available to the consumer. As consumers “demanded” further changes in pork, within a few short years the product contained very much less fat also. Most sausage makers believe that this endeavor was a mistake as pork fat equals flavor. Today, you are pretty much safe in buying pork in a store. However, some farmers still practice the old style feeding habits with the attitude that “it never hurt their daddies – why should it hurt them?”

Ross, I'm glad you're experimenting with your chamber. That is our next move. I was going to have everyone finish up their chamber by the middle or end of next week so we can begin testing for humidity and temperature stability. I recommend... any method you can come up with for producing a variable temperature and humidity exchange. Keep testing and be sure to RECORD your findings. Nice going pard!

Oh yes, about your question concerning the destruction of the beasties... see the bottom of this article, titled [“Prescribed Treatment of Pork and Products Containing Pork to Destroy Trichinae.”](#)

Good work, Wranglers!  
Best Wishes,  
Chuckwagon

[Dave Zac](#) 

▣ Posted: Thu Jun 16, 2011 02:27

One more quick question on chamber and fan. I have cut a 2" hole in the back of my chamber and mounted the computer fan to the back of the chamber. After doing this I started to wonder if the hole will be a detriment to humidity and temperature control. Seems to me most I have seen have a fan sitting inside the chamber.

Should I re do the back to eliminate the opening and install the fan inside the chamber? My first thought was fresh air circulation would be good. I guess the other option is to simply watch it after I get started. I really don't want to be messing once I'm started though.

[ssorlih](#) 

▣ Posted: Thu Jun 16, 2011 03:25

I still must attach the stick racks.. I am allowing 3- 24 inch long sticks on 6 inch centers starting 3 inches from the walls. My casings are somewhat smaller at 2.4 inches. I figure this will work out to about 6 sausages instead of four.

Will I need to prolong the drying time to develop the flavors? Or is the drying time dependent on diameter and mass?

The madness in my method was/is that I can get more slices from a smaller diameter.

After I have proved the food safety involved by eating some and living to tell the tale I may share some with those near and dear.

Where is it written that each sausage must be a single full length. Is it permitted to tie the casing in the middle so that with the six expected full casings I will get 12 pieces? I see in the stores many times 6, 8, 12 and perhaps 15 inch cased products.

Ross- tightwad home cook

[ssorlih](#) 

▣ Posted: Thu Jun 16, 2011 03:36

Dave, My box is fairly tight with the air simply circulating inside. The temperature rises rapidly and the humidity drops when I open the front.

My read on the needs is that for the first 3 days it wants to be pretty damp about 68 degrees in there and then we start slowly dropping the temperature and the humidity.

I am still trying to chill mine down to the upper fifties. I think that I have a handle on the humidity .

I made this with a full inch of foil face foam.

I am thinking that a load of wet sausage or laundry will make control easier. When I get my sticks in there I may hang 10 pounds of wet towels inside and see how it works.

Ross- tightwad home cook

[Chuckwagon](#) 

□ Posted: Thu Jun 16, 2011 06:36

Hi Salami Crafters,

We'd sure like to hear how everything is working out for all of you. How's it coming along guys? Did you do some reading? If not, why not take a half hour and catch up?

How are your curing chambers coming along? Everyone should have their supplies ordered by now. We need to hear from **Rand** in Iowa, **JBK** in Indiana, **uwanna61** in Vermont, **SikaStag** in Scotland, **Gray Goat** in Illinois, and **Party Cook** in Wisconsin. Are you guys making progress? Anybody hankerin' for a slice of the best salami you've ever tasted? Time to ask questions guys.

Best Wishes,  
Chuckwagon

[Chuckwagon](#) 

□ Posted: Thu Jun 16, 2011 09:08

**Hi Dave,**

Sausages actually dry a bit quicker at slightly elevated temperatures but to prevent bacterial growth, drying must be done at lower temps usually between 53° F. and 59° F. The rate of the drying is never constant during the process but is fastest as fermentation begins because there is so much moisture to alleviate. Later on, it slows down to a point where the air is barely moving at all. To start out, the speed should be about 2.2 miles per hour or about a meter per second. Our ultimate goal would be to consistently remove the same amount of moisture being evaporated from the sausages. In reality, this will not happen. But we can come close!

The location of the fan is totally up to you. Use your best judgment. I've seen both inside and outside. I chose *inside* myself just because I can easily restrict the "egress" using a swiveling metal disk to block the vent in varying degrees while still being able to circulate the air inside somewhat. However, we must remember that initially, we need to vent out much of the evaporated moisture so it does not collect on the casings, in which case they will develop slime. If that happens, nasty strange molds may develop. If the sausages are wet during fermentation, the humidity must be lowered.

You wrote:

**Quote:**

Should I re-do the back to eliminate the opening and install the fan inside the chamber? My first thought was fresh air circulation would be good.

Some fresh air is not only good, it's vital. No, don't plug the hole. Make it "variable" by restricting the egress as described above. You need it to vent out moisture into the atmosphere. Now let me ask you a question. How would you remedy the "ingress" of air if it were at the same humidity as the egress? I live in an area so dry that we never have to consider such a thing. But I know what elevated humidity feels like. I traveled east once in an air-conditioned car to see the Royals play. It was great until I stepped out. I thought I was going to die! I took a

shower and still couldn't get dry. I couldn't wait to get back to my high mountain desert where it is so dry that the bushes follow the dogs around! 😬

Hi Ross,

You wrote:

Quote:

My casings are somewhat smaller at 2.4 inches. Where is it written that each sausage must be a single full length. Is it permitted to tie the casing in the middle so that with the six expected full casings I will get 12 pieces? I see in the stores many times 6, 8, 12 and perhaps 15 inch cased products.

Ross, that's a great question. It is absolutely NOT written that each sausage must be full length. The drying rate depends upon the diameter of the sausage. Make them any length you desire. It is nice, however, to have them fairly similar so they will finish about the same time. If you need to have some ready at different stages of completion, start a new batch.

### **Observations on Sausage by Stan Marianski.**

This would be a good time to introduce some observations made by our friend Stan Marianski. On page 104 of his book, "*The Art Of Making Fermented Sausages*", Stan lists several interesting facts:

1. The length of the sausage has no influence on drying time.
2. Sausages should be dried at a rate not higher than the moisture losing ability of the sausage.
3. Traditionally made sausage have pH of about 5.3 and Aw about 0.88 at the end of the drying process.
4. The drying chamber should not be overloaded as a uniform air draft is needed for proper drying and mold prevention.
5. The higher the air speed, the faster the drying.
6. Larger pores in certain type casings facilitate faster drying
7. The more fat there is in a sausage, the faster it will dry.
8. The larger the meat particle size, the faster it will dry.
9. The larger the diameter of a sausage, the slower it will dry.
10. A fully loaded chamber will dry slower as air movement is restricted.
11. Molds will develop more quickly if there is no air draft at all.
12. Excessive drying hardens the surface and closes the casing pores.
13. If the casing becomes greasy, wipe it off with a warm cloth, otherwise it may inhibit drying.

OK sausage wranglers. Let's hear from you. Get a discussion going with plenty of questions. That's how we're going to iron out problems and learn during the process.

Best Wishes,

Chuckwagon

[jbk101](#) 🗨️

📅 Posted: Thu Jun 16, 2011 09:17

Hey Guys,

A little behind the eight ball. I am getting ready to order my supplies and have been searching around for some of the items that i might have lying around.

I have started building the cabinet! It will be made out of a 1/4 inch 4 x 8 sheet of plywood that I am going to line with a heavy plastic. I have several old computer fans and a power supply that I will use to power them. I also have some old light fixture to use as a heat source.

I do have a couple of questions 🤔

- 1.) Is the Fan, just mounted inside the cabinet to "just move" the Air around the inside of the cabinet or does it need to be mounted in a way that will either expel or inlet air into the cabinet?
- 2.) Which way is best to mount the heat source? Top - Bottom or on the sides about half way up?
- 3.) Would it be better to mount more the 1 fan in the cabinet? I have a lot of old computer fans at my disposal and the power supply that I have would run several at a time without any problem?
- 4.) If it is okay to mount multiple fans would a configuration as follows be acceptable?
  - a.) One fan to just move the air around inside the cabinet!
  - b.) One fan to draw air into the cabinet when needed!
  - c.) One fan to expel any air (or excess heat) when needed!

Note: In option b. and c. I would fashion a cover to seal the cabinet when the fans are not needed or in use!

The finished cabinet is going to be 2' Wide x 3' Tall x 2' Deep

Thanks,  
John

[Chuckwagon](#) 🗨️

📅 Posted: Thu Jun 16, 2011 09:52

Hello JBK! Sounds like you're cookin' with gas. 😄 And just think... you're only a couple of months away from having ten pounds of great tasting Alysandra Salami!

You wrote:

**Quote:**

I have started building the cabinet! It will be made out of a 1/4 inch 4 x 8 sheet of plywood that I am going to line with a heavy plastic. I have several old computer fans and a power supply that I will use to power them. I also have some old light fixture to use as a heat source.

Great questions John. All sausage makers should be aware that light hastens the spoilage of fat in sausage. It drives butchers crazy all over the world as neon lights especially, tend to change the color of fresh meat very quickly. For this reason, sausage is often made with corn syrup solids which tend to slow down lipid decomposition. However, many home sausage makers use incandescent bulbs to produce heat when needed. This may be the best choice for many reasons, economy being the first. Other methods of heating include electric barbecue starters, crock-pot heater elements, soldering irons, aquarium heaters etc. Oh, and yes... heat rises... mount the source at the bottom of the cabinet. Use your judgment and don't burn the house down fellars!

JB, check the above response I made for Dave. He asked some of the same questions about inside fans and fresh air etc. One fan should suffice. Too much air circulating will dry out the casings too quickly and seal the moisture inside the sausage. When it can't get through the casing to evaporate, it is trapped inside and will eventually spoil the sausage.

John, you also asked:

**Quote:**

If it is okay to mount multiple fans would a configuration as follows be acceptable?

- a.) One fan to just move the air around inside the cabinet!
- b.) One fan to draw air into the cabinet when needed!
- c.) One fan to expell any air (or excess heat) when needed!

What a terrific idea! In a larger application, I'm sure it would work very well. However, in our smaller chambers, we only need to move about a meter per second and one fan should handle it easily. I really like the dimensions of your cabinet 2' Wide x 3' Tall x 2' Deep. That should really do the trick!

Terrific John,  
Best Wishes,  
Chuckwagon

[ibk101](#) 

▣ Posted: Thu Jun 16, 2011 10:22

Chuckwagon,

Thanks for the response! I noticed that right after I asked my questions that you had just finished posting a response to Dave and that we had some similar questions! Great minds think alike 😊 I am hoping to have the cabinet completed by tomorrow night 😊 I will take a couple of pictures and post them for your review!

Thanks again,  
John

[Chuckwagon](#) 

▣ Posted: Thu Jun 16, 2011 10:25

### **“Reference Page” for Project A.**

#### **THE RECIPE:**

*Salami di Alessanddra by Stan Marianski*

2.0 kg (4.4 lbs.) pork butt  
2.0 kg (4.4 lbs.) beef chuck  
1.0 kg (2.2 lbs.) pork back fat (or fat trimmings)  
140 g. salt (3%)  
12 g. cure #2 (do not use cure #1 in this recipe)  
10 g. powdered dextrose (glucose)  
15 g. sugar (3%)  
15 g. white pepper  
0.6 g. (1/4 tspn.) Bactoferm™ T-SPX  
----- Bactoferm™ Mold 600

#### **Optional:**

*Note: To make 5 kg. sausage, about 7 g. of spices and 4 g. of herbs are needed.*

120 ml. (1/2 cup) quality red burgundy or other dry red wine (Do not exceed 1/2 cup).  
4 parts coriander (spice)  
3 parts mace (spice)  
2 parts allspice (spice)

- 1 part fennel (spice)
- 3 parts marjoram (herb)
- 1 part thyme (herb)
- 1 part basil (herb)

**Instructions:**

**Preliminary steps:** Keep a logbook! Record everything you do. Write down dates, times, measurements, etc. Believe me, you'll refer back to it several times during the process. Save your notes for the next batch. They will be invaluable. Don't ignore this step. It only takes a few seconds to write down the information you may really need later on.

**Thaw** the Bactoferm™ T-SPX following the directions on the package. Measure .6 gram (1/4 teaspoon) of the culture and mix it with a little **distilled** water, allowing the bacteria to “wake up”. Freeze the back fat and nearly-freeze the lean meat. Freeze the grinder plate and blade (20 minutes is plenty). Cut the meat and fat into cubes.

1. **Grind** the pork and back fat through a 3/8” plate (10 mm). Work in small batches and refrigerate the meat and fat at every opportunity. Grind the beef using a 3/8” plate then again using a 1/8” plate.
2. **Mix** all the ingredients with the ground meat and develop the primary bind. Fold in the fat particles.
3. **Stuff** the mixture firmly into beef middles or 46-60 mm. protein-lined fibrous casings, making links about 16 to 20 inches long. (Protein-lined fibrous casings shrink with the salami as the sausage dries.)
4. **Weigh** each salami and record its “green weight”. Keep a log book!
5. **Ferment** at 68° F. (20° C.) for 72 hours, in 85% to 90% humidity.
6. Hang the salamis in the **drying** chamber and mix the Mold 600 according to the directions on the package. Spray the sausages with a misting sprayer or dip them into a solution. Dry the salamis at 57° F. (14° C.) in 80-85% humidity for 2 to 3 months (until 30-35% weight loss is achieved).
7. The salamis are **stored** at (+or- 4°) 55° F. (13° C.) in 75% humidity.

Process:.....Temp:.....Humidity:.....Length Of Time:  
 Fermentation..... 68° F.....85-90%.....72 Hrs.  
 Drying..... 57° F.....80-85%.....2 – 3 months  
 Storage..... 55° F.....75%.....until consumed

**Participants:**

1. **Rand**.....Iowa
2. **ssorllih**.....Maryland
3. **JBK**.....Indiana
4. **DaveZac**.....New York
5. **uwanna61**.....Vermont
6. **SikaStag**.....Scotland
7. **Gray Goat**.....Illinois
8. **Party Cook**.....Wisconsin



## 9. Chuckwagon.....Utah

### **Meat Starter Culture Bactoform™ T-SPX**

(Slow: Assists with drying a month or more) Also: Semi Dry Cured

Bactoform™ T-SPX is a freeze-dried culture well suited for all fermented sausages where a relatively mild acidification is desired. T-SPX is particularly recommended for the production of Southern European type of sausages, low in acidity with an aromatic flavor. The culture is suitable for molded as well as smoked fermented sausages. (Semi Dry Cured)

Each 25-gram packet of Bactoform™ T-SPX will treat 440 pounds (200 kilo) of meat. You can use the whole packet in 100 pounds of meat or use half of the packet and refreeze remaining culture. Use ¼ of a packet in any production under 50 pounds of meat. Note: Cultures must be stored in freezer and has a shelf life of 14 days unrefrigerated and 6 months frozen.

Contains: *Pediococcus pentosaceus* and *Staphylococcus xylosum*

### **Bactoform:Mold 600** (Previously M-EK-4)

Meat culture for production of moulded dried sausages with a white/cream colored appearance. Mold-600 is a single strain culture containing spores of *Penicillium nalgiovense* in a convenient freeze-dried form.

*P. nalgiovense* is a fast growing, traditional white mold culture for controlling the surface flora.

Mold-600 is particularly recommended for the production of traditional sausages dried at low temperature and/or low humidity.

Mold-600 suppresses the growth of undesirable organisms such as indigenous molds, yeasts and bacteria. The culture has a positive effect on the drying process by preventing the emergence of a dry rim. Furthermore, the mold degrades lactic acid during maturation resulting in a pH increase and a less sour flavor.

Note: Cultures must be stored in freezer and has a shelf life of 14 days unrefrigerated and 6 months frozen.

[Chuckwagon](#) 

▣ Posted: Thu Jun 16, 2011 10:40

You're very welcome John. Oh, by the way fellers... When you get a few batches of experience under your belt, and folks have had a chance to taste your wonderful salami, you'd better be ready for a little notoriety in the neighborhood! People will be asking you to make a salami for them. Allow me to present a question to you here. Do you realize what this stuff is worth? 😊 You can't even buy it in markets in this country. I don't know about other countries.

You will have mastered a craft that is almost gone. Sure, right now it seems a little overwhelming. Don't let it be intimidating to you. Read the information and remember what my ol' pappy told me: "The man that doesn't TRY, doesn't DO anything"!

In Europe, the Polish folks have done much to keep the home crafted sausage techniques alive. I am most grateful to these people for sharing their knowledge with others rather than keeping it secret. Shucks pards, guys like Marianski and Gebarowski can share my campfire anytime, and ride my pony too! 😊

Best Wishes,  
Chuckwagon

[ssorllih](#) 

▣ Posted: Thu Jun 16, 2011 13:53

If you plan to use an incandescent light bulb perforate a large tin can and control the light with a dimmer switch. Water dripping on a hot light bulb will break it.

Ross- tightwad home cook

[Dave Zac](#) 

▣ Posted: Fri Jun 17, 2011 01:35

Really dumb question? How do you know your fan is running at 2 MPH? Seems I have read somewhere that there is a paper test for this or something.

Chamber is done, Fan and pot working. Gotta figure out right speed though. Testing humidity and cooling ability now just as Ross is.

[ssorllih](#) 

▣ Posted: Fri Jun 17, 2011 01:40

Dave light a candle and walk around slowly with it and watch the flame. Then put it in the box away from the direct blow of the fan and watch the flame. Light an incense stick and watch the smoke curl and drift. One to two MPH is pretty slow. It won't ripple the water on a pond.

Ross- tightwad home cook

[ssorllih](#) 

▣ Posted: Fri Jun 17, 2011 04:00

Some simple physics will help us to deal with some of the questions we must have.

Air is heavier than water vapor. Air weighs about .076 pounds per cubic foot. Water weighs about 64 pounds per cubic foot. Air and water have a specific heat of about one BTU per pound. The air in my chamber weighs about 12 ounces. The water in my chamber will weigh about twenty pounds and the meat will weigh about ten pounds as a result the mass of water and meat will be about 40 times the weight of the air. Therefore when I open the chamber I will spill 3/4 pounds of air and replace it with room temperature air. The thermal inertia of the mass of material in the chamber will very quickly cool the new air to the temperature of the material.

We won't hold the doors open for an hour so the loss of control will be very short term. I was having extreme control problems when the chamber was empty but for bottle of ice. The more mass that I add the more stable the temperature and humidity become.

Ross- tightwad home cook

[uwanna61](#) 

▣ Posted: Fri Jun 17, 2011 04:06

Hey all

Chuckwagon is there a specified start date? My order arrived yesterday, Bactoferm™ T-SPX and Bactoferm™ Mold 600 along with Protein-lined fibrous casings. I do have one dilemma, it's my wifes b-day this Sunday, and well, kind of gotta do the right thing! If the plan is to start this weekend, I will just play catch up, no biggie! 😊

Another note, my eyes are dropping from all the reading 🤪

[ssorllih](#) 

▣ Posted: Fri Jun 17, 2011 06:00

Awww come on now . Anything less than a hundred pages a week is accidental reading. My Bactoform also arrived today with a paper that told me of a minimum 12 month shelf life if kept below zero degrees F. Same for the mold spores. This is encouraging because using more than one batch will reduce the cost of each batch. 32 dollars for flora plus the cost of the meat and the seasonings and the casing makes one batch hellishly expensive. But if I make enough in the next twelve months to use all of the casings, in my case three more batches would make four batches total will bring the material cost down to about a dollar per pound. Add three dollars for meat it is still only four bucks a pound for fine dry cured sausage.

Ross- tightwad home cook

[Chuckwagon](#) 

▣ Posted: Fri Jun 17, 2011 06:13

**Ross** wrote:

**Quote:**

If you plan to use an incandescent light bulb perforate a large tin can and control the light with a dimmer switch. Water dripping on a hot light bulb will break it.

That's one of those, "Now why didn't I think of that?" answers. What a great idea... and you could even cut some of the glaring light down using the can. Most folks stay away from the light type heater so the fat won't go rancid. One of the reasons I recommended this particular recipe was because of the low temperature for the fermentation step. If you have a cellar, room temperature might already be achieved. We need about 68° F. for 72 hours. After that, we need to drop the temperature about 10 or 11 degrees for the next 2 or 3 months. Your "heater" will surely be useful as you go on to craft other products, especially fast-fermented type salami or pepperoni where the fermentation temperatures are upwards of 100 degrees Fahrenheit.

**Ross** also wrote:

**Quote:**

Dave, light a candle and walk around slowly with it and watch the flame. Then put it in the box away from the direct blow of the fan and watch the flame. Light an incense stick and watch the smoke curl and drift. One to two MPH is pretty slow. It won't ripple the water on a pond.

Wow Ross, where are you coming up with all this good stuff? That is terrific.

**Dave** wrote:

**Quote:**

How do you know your fan is running at 2 MPH? Seems I have read somewhere that there is a paper test for this or something.

Dave, that is a great question. If you are good with math, you may enjoy figuring out the finer points of air exchange at this updated link: <http://www.comairrotron.com/engineering-tools>

However, to be honest with you, most people never do bother to actually measure it. I think the math scares a lot of folks away. Remember that the symbol for "greater than" is > and the symbol for "less than" is <

Most people simply adjust their fan (or rather, the volume of outflow of the air called "egress"), so that it just barely keeps the moisture from collecting on the casings. Although my fan keeps running, I close the vent

partially with an adjustable metal disk swinging over the air escape hole at the rear. This of course, allows the air to circulate inside the chamber rather than being exhausted.

OK folks, **Uwanna** 61 would like to know if we have a specific start date. This is YOUR project so you folks should decide what is most convenient for yourselves. I'm just the guide who will make recommendations. Right now, I would suggest that we all test our chambers for humidity and temperature variation. Ideally, this would require about 2 days but it sounds like Ross and Dave have got 'em tested and are ready to go. John and a couple of others might need an additional day or so. The rest of us could start reading about cultures (Part 3). If I'm not mistaken, Uwanna already had his curing chamber in place at the beginning of the project. How do you folks feel about getting started with the grinding and stuffing? Check in please 😊

Best Wishes,  
Chuckwagon

[jibk101](#) 🗨️

📅 Posted: Fri Jun 17, 2011 08:49

Hey Guys,

I have almost completed the cabinet. It is built the Fan mounted and running the Heat Source is in and working! I still have to line it with Plastic and Fashion a cover over the Light Bulbs I also need to Mount my Dowel Rods. Here are some pictures. [NOTE: *They've gone missing.*] Any comments or suggestions for changes etc. would be appreciated 😊

The Finished Cabinet is 17-3/4" Deep x 24" Wide X 36" High

The inside Showing the Lamp and Fan Locations and a Basic Temp/Humidity Gage that I found laying around.

I Drilled holes around the Fan Housing as opposed to cutting out the one Big Hole.

Close up pic of the Basic Temperature / Humidity Gage That I had Laying Around.

4 inch Computer Fan that is being powered by an Old Computer Power Supply.

Pic of the Power Supply that I used and Mounted on Top of the Cabinet.

[Chuckwagon](#) 🗨️

📅 Posted: Fri Jun 17, 2011 09:21

John, that is absolutely gorgeous! Very nice indeed. You fellars are an inspiration to the rest of us. By the way, we still need to hear from Rand, SikaStag, GrayGoat, and Partycook. Before we actually start grinding and mixing meat, there are a few more items to consider:

1. *Distilled water* - All the chemicals used to treat your town's water supply, can really raise hello with the bacteria we need in Bactoform. You can purchase distilled water, but home crafters like us can easily make our own. See how at this link: <http://www.wikihow.com/Make-Distilled-Water>

2. We should go into *section 3 (Cultures)* and read a little about Bactoform and what it does. It's at this link:

<http://www.meatsandsausages.com/sausage-types/fermented-sausage/cultures>

It's not complicated, nor is it lengthy. I realize there's been a lot of reading lately, but these are things you should have tucked away in your sausage savvy. I look at it this way: For centuries, man had no idea what was

happening inside salami and certainly had no concept of fermentation due to lactobacilli. I'm just happy to be living in a time where we have the technology to understand such "saddlebum science" and craft better products because of it. We don't have to memorize the names of the microorganisms or even learn how to pronounce them, but we should have a little knowledge concerning them so we'll know what is happening inside the curing chamber. Let's take advantage of the great information Stan Marianski has so generously provided (at no cost).

3. We should be finishing up the details on our fermenting chambers. Let's test run them before we begin. For this particular recipe, we will not be using the heaters in your new fermenting cabinets. Later on, making a fast-fermented sausage, you may need to heat the chamber as high as 115° F.

4. Soon, we should read *section 4* so we don't end up poisoning ourselves. It is called "Safety Hurdles" and is at this link: <http://www.meatsandsausages.com/sausage-types/fermented-sausage/safety-hurdles>

Can someone suggest a time schedule for these items? We can go as slow or as fast as your schedules permit. In my opinion, it doesn't make much sense to be "rushing without reading". Any way you look at this project, we'll be eating "long-term, fully dry-cured, southern European style" Salami Alysandra about the middle of September.

Best Wishes,  
Chuckwagon

[Dave Zac](#) 

▣ Posted: Fri Jun 17, 2011 13:57

I'm ready and anxious to go. But, if the group consensus demands, I will wait.

I am having trouble getting humidity up, but as Ross explained, perhaps with more than a frozen bottle of water and small pan of salt and water I will be successful.

Dave

[ssorllih](#) 

▣ Posted: Fri Jun 17, 2011 15:19

After I get my racks in place I am going to hang wet towels from hooks on the racks. I can keep them wet for three days and then either allow them to dry or remove them.

On another note .

Chuckwagon, I am always interested in connections. Making sauerkraut involves the natural fermentation of shredded cabbage with lactic acid producing bacteria. How do you like a connection of cross contamination between the sausage maker's lunch and the meat he was grinding? Just a little sauerkraut in the sausage mix would add the right bacteria for a start.

---

Ross- tightwad home cook

[uwanna61](#) 

▣ Posted: Fri Jun 17, 2011 18:15

Hehehe! Maybe if I schmooze the wife Saturday, then when she's not looking on Sunday, I can make some salami! 🤪

**Quote:**

Uwanna already had his curing chamber in place at the beginning of the project. How do you folks feel about getting started with the grinding and stuffing? Check in please  
[/quote]

Yes my chamber is ready to go! I just cut a piece of Genoa salami last night made last April. Added some Cabot monetary jack and crackers, yum yum! The Genoa taste fine but I must confess, I did not use Protein lined casing, but will on project A.[/quote]

[Chuckwagon](#) 🗨️

📅 Posted: Fri Jun 17, 2011 22:20

Hi Guys,

It sounds like we're ready to go. Dave, how much humidity are you able to sustain? Did you put a tray of salt in the bottom and barely cover it with water? It should really make a difference. The more surface area, the higher the humidity will be. It will probably level off at about 75%. To bring it all the way up to 85-90% you may have to hang wet towels or do what I did - use a baby's room plug-in humidifier. I rigged it so it would start n' stop at adjustable levels. Controls for doing this are expensive and I had to mortgage a kid to get them. 🤪 The ideal solution is to start at 90% and slowly, over the period of 72 hours, drop the humidity to 85%. This can be a challenge. If you can come close to 85%, you should be ok. Perhaps the wet towels plus the pan of salt water would do the job.

You may wish to hang a few wet towels over a pan of watered salt and test the humidity for a while before we start.

OK gang, we could shoot for Monday on the grinding and stuffing. I'd like to present some questions to you on Saturday or Sunday. Sort of a "self-check up" you can take so you can see if you are understanding the process. I'll give you the answers and you can correct your own quiz. No need to embarrass ourselves here eh? 😊 If you flubbed on one or two, we can discuss them with the group. Nobody will have to know how many or which ones you missed - not even me 🤪 Or... we can skip the "check up". It's up to you. Another option is to go ahead and grind & stuff over the weekend, then do the reading n' check up later in the week. Let's make this comfortable for you fellows. My schedule is pretty flexible these days. How about some suggestions for our timetable.

P.S. Hey Uwanna, I've got it 🤪 I've got it 🤪 Hmm... sometimes I astound myself! 🤪 I could come over and schmooze your wife while you grind salami 🤪

She'll be sure to go for my great lookin' moustache. It's a babe magnet! I just have to fight off the females even at my age! 😊

Best Wishes,  
Chuckwagon

[jbk101](#) 🗨️

▣ Posted: Fri Jun 17, 2011 22:27

Chuckwagon,  
Have another question(s) 🤔 So here goes!

- 1.) What type of salt is to be used in the pan inside the curing Chamber? Can it be just good old Rock Salt that I use to melt the snow off my sidewalk in the Winter or does it need to be a food grade type of salt?
- 2.) How much is recommended to start out with. I'm sure it will depend on the area your in and what the relative humidity is but I am looking at a ballpark recommendation!
- 3.) Will a ph meter and an Aw meter be needed during this process or are they just luxury items (wish list for future endeavors)?

So far that's all that comes to mind.

[Dave Zac](#) 🗨

▣ Posted: Fri Jun 17, 2011 23:44

**Chuckwagon wrote:**

Hi Guys,

It sound like we're ready to go. Dave, how much humidity are you able to sustain? Did you put a tray of salt in the bottom and barely cover it with water? It should really make a difference. The more surface area, the higher the humidity will be. It will probably level off at about 75%. To bring it all the way up to 85-90% you may have to hang wet towels or do what I did - use a baby's room plug-in humidifier. I rigged it so it would start n' stop at adjustable levels. Controls for doing this are expensive and I had to mortgage a kid to get them. 😊 The ideal solution is to start at 90% and slowly, over the period of 72 hours, drop the humidity to 85%. This can be a challenge. If you can come close to 85%, you should be ok. Perhaps the wet towels plus the pan of salt water would do the job.

You may wish to hang a few wet towels over a pan of watered salt and test the humidity for a while before we start.

I was only getting to 65%. I noticed as my temp went down, so did the humidity. I will use more salt and less water covering it in a larger pan, together with some towels. I'm hoping that when I line the wood box with Press n Seal that may help with humidity too.

**Quote:**

OK gang, we could shoot for Monday on the grinding and stuffing.

Um, as much as I would love being home during the week, I gotta work 😊 I could cut and be ready to grind and stuff Monday night probably. My preference is over the weekend though. Sunday is Father's Day so I get to do what I want 🙌

[Chuckwagon](#) 🗨

▣ Posted: Fri Jun 17, 2011 23:45

Hi John,  
Great questions.

The reason we use salt is to keep the water from developing slimy, nasties that go sour. I used plain ol' table salt before I got a fancy-schmancy, humidity-controlled unit with flashing lights that also washes the dishes, tends



the kids, and figures out the income tax! 😊 I'm sure good ol' rock salt would be fine as long as it doesn't contain other snow-melting ingredients. I realize it's not pure, but after all, it's not going INTO the sausage in any case. Put about a pound of it on a lipped cookie sheet or you can even put a little more into a shallow plastic 10 x 12" lug. Barely cover the salt with water. At the minimum, this will give you > 70% humidity right off the bat. Add water as needed over the curing period and watch the hygrometer.

The reason we have so much moisture up front during the fermentation phase, is that bacteria just love water. In the meat, ALL bacteria just thrive – the good AND the bad. Without the salt in the recipe, the bad guys would win out. The salt “binds” their available water supply and allows the good guys to receive nourishment and multiply. As we drop the humidity, the meat begins to dry out slowly. When it drops below Aw 0.85, bacteria is no longer a threat and the meat is ready to consume.

Additionally, we add a lactobacilli to produce lactic acid. This is secondary insurance. As the pH drops and the acidity increases, the pathogenic bacteria are no longer able to survive and again...the sausage becomes safe to consume. Think of all the products we eat that are pickled in vinegar. They are safe because of the acidity.

Most home producers do not use the “Pawkit” because it costs about three hundred bucks – last I checked. Most folks gauge the finish by the loss of 30% weight. This is the reason it is important to weigh the salamis just before they go into the curing chamber. This is their “green weight”.

To test the pH, many folks use a small strip of cheap litmus testing paper dipped into a mixture of 1 part finely chopped meat with 2 parts distilled water. The color of the paper is matched on a chart telling us how much acidity we have achieved. You can see what they look like at this link near the bottom of the page:

<http://www.meatsandsausages.com/sausage-types/fermented-sausage/equipment>

However, most people I know, even skip this test and depend wholly upon the 30% weight loss and their taste buds to “pull” the sausage. I like to remind folks that the test of the proper acidity is not in the length of time it has been in the chamber, but the actual measurement of pH in the product. The “Hanna” professional testing kit is also so expensive that most home producers do not purchase one. On the other hand, litmus paper testing strips are available in rolled lengths of 15 feet for \$12.99 and a roll of it will last a home-producer a very long time. It's available through most suppliers in a dispenser with a color chart on its side.

Good goin' John. How does your timetable look? Are you getting ready to grind?

Best Wishes,  
Chuckwagon

[Chuckwagon](#) 

📅 Posted: Sat Jun 18, 2011 00:18

Hi Dave,  
You wrote:

**Quote:**

I'm hoping that when I line the wood box with Press n Seal that may help with humidity too.

I thought you had the lining in. Yes, you can bet a dollar against an inside straight that the humidity will climb with the plastic sheet in place. (The bare wood is absorbing water) 🚫

I would even paint that wood with epoxy paint when you have a chance after this batch is removed. Then you may wish to use a removable plastic even then, to simply throw away the mold.



Remember, sometimes, in some recipes of northern Europe and the U.S. etc., mold is not used and smoking deters the formation of bad molds. We MUST avoid any green colored mold if it develops. It can be removed with a little salty vinegar solution on a towel.

Ya know, in America, people prefer smoking as a bad mold deterrent rather than forming a penicillium white mold. In the San Francisco area, for some reason, it is far more popular to develop plenty of white mold on salami.

Should we plan on grinding and stuffing on Sunday then? Sounds like Uwanna could do it then as I will have his wife out to dinner and a picture show! 😊

I believe Ross is ready to go and JBK also. Even if we can't get together on the exact same day, we'll be alright. I would like to have everyone's sausage in the fermentation chamber by about Wednesday or Thursday to keep on a similar drying timetable.

Dave, I believe you're going to have a long July and August, with your drooling tongue hangin' out! ha ha 😊 Shucks pard, mark my words, the time will actually shoot by and we'll be tradin' photos all over the place.

Best Wishes,  
Chuckwagon

[ssorllih](#) 🗨️

📧 Posted: Sat Jun 18, 2011 01:51

I can be ready to grind Sunday. Working has been taking up a lot of my time. Tomorrow we want to get the boat ready to launch on monday. But that should that less than 4 hours. My next imperitive is making the sticks and installing the racks.

Ross- tightwad home cook

## **Test Runs**

[uwanna61](#) 🗨️

📧 Posted: Sat Jun 18, 2011 02:03

Chuckwagon

I'm not sure if you could schmooze her any more than I, including with the moustache. 😊 When I'm grinding she tends to find something to amuse herself. My wife reads and writes, book worms are in their own world, in this case lucky for me 😊

On another note: just made 10lbs of venison pepperoni, mixed and in the fridge, ready for the smoker tomorrow. Need to clean the venison out of the freezer !

As for the start date, I will keep in touch over the weekend, to review the notes, and shoot for Sunday evening, or at the latest Monday evening for grinding and mixing.

[partycook](#) 🗨️

📧 Posted: Sat Jun 18, 2011 04:40

Hi Chuckwagon,

Sorry I have not responded to your emails although I have been keeping up with the site

as far as doing my reading. I am currently in the process of helping my grandson with some remodeling on his new house,(removing walls etc). I have previously made a fermenter from a old freezer, I have also built a digital controller to regulate my temperatures. I use a ultrasonic humidifier and a Green Air for controlling my humidity. I have also built a curing cabinet from an old refrigerator and have purchased a controller for controlling the temperature. This unit also has a computer fan and a variable voltage supply for controlling air speed. I know I am a bit ahead as far as some of the equipment I have.

I would have enjoyed building a box unit and experimenting with different ways of controlling temperature and humidity but due to these other obligations I just don't have the time to build a unit.

Party Cook  
John

[Chuckwagon](#) 

□ Posted: Sat Jun 18, 2011 07:42

Hi Partycook,

You wrote:

**Quote:**

I have been keeping up with the site as far as doing my reading.

Good to hear from you. Sounds like you're pretty busy. It also sounds like you've got a real handle on your fermenting and dry-curing chambers. Old refrigerators are terrific for this purpose and I'm sure yours will do just fine. Have you used them quite a bit before, or are you just starting into the fermented type sausages? What are your thoughts about the recipe we're using and about our time schedule? I think the guys are ready to grind and stuff this weekend and get them into the fermenting chambers they've made. Once we do that, we can concentrate a little more on some of the reading and get into some good discussions. Keep in touch John.

Best Wishes,  
Chuckwagon

[uwanna61](#) 

□ Posted: Sat Jun 18, 2011 14:38

Chuckwagon

As for the recipe "Salami di Alessanddra" on the optional note is an alternative to the above recipe, can you explain? Do we add whatever seasoning meets our fancy from the optional to the above recipe? Also, the recipe calls for sugar, is this table sugar?

I never had any luck fermenting salami with wine added to the recipe! I believe this may be the reason my last pepperoni batch went south, probably among other things. Like I mentioned in my last post, I made fermented Genoa salami this past April, and with the exception of not using protein lined casing it came out pretty good. I also used simple seasoning like white pepper, salt, and dextrose, but the bactoform was the LHP, the cure time with 2.5" casing took about 2 months. If I had used the protein casing it would have come out perfect.

I put on my mustache and schmoozed the wife last evening, with a picture show. 😊

[ssorlih](#) 

📅 Posted: Sat Jun 18, 2011 16:16

I have been working with and on my fermentation chamber this morning and discovered that salt water had escaped from the swamp and gone wandering. Be aware that this can happen and either watch for it or make a big plastic tray for the chamber.

Ross- tightwad home cook

[partycook](#) 

📅 Posted: Sat Jun 18, 2011 19:09

Hi everyone,

I'm in the process of doing a dry run on my temperatures and humidity levels. I was wondering what you guys would suggest as a final rinse after washing the fermenter/curing chamber and tools with soap and water. I know some folks that use a diluted bleach solution. I have tried this and it seems to leave a bleach odor, or am I mixing it to strong? I also would like to know if a fan is needed in my fermenting chamber (freezer 22 cu. feet)? I guess I worry about food safety. I had a party last year and a friend brought a dish to pass, 12 people got sick . It took the health department weeks to figure out what the source of the food poisoning was .

John

[Dave Zac](#) 

📅 Posted: Sat Jun 18, 2011 22:17

**partycook wrote:**

Hi everyone,

I'm in the process of doing a dry run on my temperatures and humidity levels. I was wondering what you guys would suggest as a final rinse after washing the fermenter/curing chamber and tools with soap and water. I know some folks that use a diluted bleach solution. I have tried this and it seems to leave a bleach odor, or am I mixing it to strong? I also would like to know if a fan is needed in my fermenting chamber (freezer 22 cu. feet)? I guess I worry about food safety. I had a party last year and a friend brought a dish to pass, 12 people got sick . It took the health department weeks to figure out what the source of the food poisoning was .

John

This close to fermentation I would use only hot water and soap. I would hate to mess up this beautiful process with a little bleach.

I got my chamber lined with Press n Seal early this afternoon. First check 4 hours later my humidity has zoomed to 90% 🙌 I'm ready

[ssorlih](#) 

📅 Posted: Sat Jun 18, 2011 22:40

If we can use vinegar to wipe the mold off the sausage why not use vinegar to clean the chamber walls? A little acid and a little salt should make the walls clean enough for the next batch. Hydrogen peroxide and baking soda is also an effective cleaner for bacteria.

Ross- tightwad home cook

[partycook](#) 

▣ Posted: Sat Jun 18, 2011 23:13

**ssorllih wrote:**

If we can use vinegar to wipe the mold off the sausage why not use vinegar to clean the chamber walls? A little acid and a little salt should make the walls clean enough for the next batch. Hydrogen peroxide and baking soda is also an effective cleaner for bacteria.

Yes I have heard that peroxide works well against bacteria. when I worked in the brewery we used chlorine inside the fermenters and all the hoses were rinsed with an iodine solution before we added yeast.

John

[ssorllih](#) 

▣ Posted: Sun Jun 19, 2011 07:11

I spent a little time closing seams and joints in my workmanship on the chamber. I am becoming convinced that this needs to be rather air tight and we must have control of the ventilation and not leave it to chance. If you have built your chamber and have difficulty with control I think that caulking the seams and joints would be a first step. Nature tries to restore a balance in all things. When we build a chamber such as this we are creating an environment that is not normal. All of the forces of nature will try to balance the temperature and humidity inside with the temperature and humidity outside.

Ross- tightwad home cook

[Chuckwagon](#) 

▣ Posted: Sun Jun 19, 2011 08:10

Hi Guys,

I hope everyone is aware of the [sodium nitrite & sodium nitrate] conversion page we have at our disposal. Here is a link: <http://www.meatsandsausages.com/sausage-recipes/cure-calculator>

Uwanna wrote:

**Quote:**

Do we add whatever seasoning meets our fancy from the optional to the above recipe? Also, the recipe calls for sugar, is this table sugar?

We can add 7 grams of any spices you'd like to put together and 4 grams of your favorite herbs. Not everyone likes the same flavors of certain herbs and spices, so we are given an option of using any combination as long as 7 grams are spices, and 4 grams are herbs. The sugar in the recipe is good ol' table sugar.

Uwanna, your Bactoerm™LHP is completely on the other end of the scale from the slow T-SPX we are using. The LHP is considered to be an "extra fast" culture and can drop a sausage to pH 5.0 in only 2 days! When this happens, the pediococcus acidilactici and pediococcus pentosaceus leave a very pronounced sour flavor behind. It is also fermented at 100° F. (32° more than our recipe using T-SPX). For pizza pepperoni, that kind of "tang" is alright for me, but in a salami... I'd suggest we go for the full-flavored, long-term, southern European style Genoa Salami called Alysandra. I really do like your idea of using only a bit of white pepper, salt, and dextrose, however. That kind of treatment could only make it yummy good. As you probably know, old timers

will always tell beginners that they tend to use way too many spices, but it seems like ALL beginners must learn that lesson the hard way. At least I did.

Best Wishes,  
Chuckwagon

[Chuckwagon](#) 

📅 Posted: Sun Jun 19, 2011 09:00

Our buddy Partycook wrote:

**Quote:**

I was wondering what you guys would suggest as a final rinse after washing the fermenter/curing chamber and tools with soap and water. I know some folks that use a diluted bleach solution. I have tried this and it seems to leave a bleach odor, or am I mixing it too strong?

Unless you've previously had a problem with mold build-up in your fermentation chamber, it should be clean enough with just good ol' soap and water. If you've had traces of any "colored" mold, go ahead and use a mild bleach solution if you are using a porcelain or plastic surface. Rinse it well. After that, rinse it well. Then before you put any meat in the thing, rinse it well. 😊 A few years ago, after a stint in the hospital, I came home only to discover that some bad mold had started and I thought I'd never get that crap out of the fermentation chamber (it has a white plastic interior). I finally had to scrub it out using a little mild vinegar-water solution. After a day, with the door open, I used a little Pine-Sol and water and rinsed it very well. The next time I made salami, the good ol' white *penicillium nalgiovense* took over again and crowded out anything else.

Partycook also wrote:

**Quote:**

I also would like to know if a fan is needed in my fermenting chamber (freezer 22 cu. feet)? I guess I worry about food safety. I had a party last year and a friend brought a dish to pass, 12 people got sick. It took the health department weeks to figure out what the source of the food poisoning was.

Your fermentation chamber should absolutely include a fan. Read back through the previous posts in this particular forum for that information. We will start out by removing air at about 2.2 MPH and drop to just a little over 1.5 by the end of 72 hours. Also be aware that during this time, the temperature is dropped slightly also.

Oh, and Uwanna commented about using wine in his sausage. I agree with him that it is perhaps best to just leave it out. The stuff denatures proteins (unravels them) and causes a loosening of the texture somewhat. You must remember that this is an old Italian recipe and those folks put wine in everything. I'm married to one and so are all my siblings! Italians are great people and good ol' burgundy is fine... in the spaghetti sauce! Just as a recommendation, I'd leave it out of your first batch and try adding a little later as you become more experienced. Never, never, ever... use a "cooking wine". That stuff is so full of salt it will ruin your salami. I wouldn't even use that crap to put out a good campfire!

Best Wishes,  
Chuckwagon

[Chuckwagon](#) 

📅 Posted: Sun Jun 19, 2011 11:13

Ross wrote:

## Quote:

I spent a little time closing seams and joints in my workmanship on the chamber. I am becoming convinced that this needs to be rather air tight and we must have control of the ventilation and not leave it to chance. If you have built your chamber and have difficulty with control I think that caulking the seams and joints would be a first step.

Ross, ol' buddy, I've been chuckling for a couple of hours. 😊 Seems, you have learned something the hard way. Yes, it must be "rather air-tight", or at least "fairly" air tight. Enough so there's not an "ingress" of uncontrolled air. In a wooden cabinet chamber, this could be a challenge. Silicone caulking is a good idea.

## Let's look at what we are attempting to do with our "fermentation chambers".

We are going to **purposely spoil meat...** but it will be *controlled* spoilage called fermentation. Many foods are prepared in such a manner. And what causes this "spoilage"? Bacteria. In meat, we use *lactobacillus* and *pediococcus*, feeding on sugar (carbohydrates) to produce lactic acid. This bacteria competes for nutrition with the undesirable spoilage bacteria (*brochotrix thermosphacta* and *pseudomonas spp.*) et. al., as well as pathogenic bacteria of several varieties. Of greatest concern are *staphylococcus aureus*, *clostridium botulinum*, *listeria monocytogenes*, *escherichia coli*, *salmonella*, *clostridium perfringens*, *campylobacter jejuni*, *shigella*, and *bacillus cereus*.

What makes these bacteria safe when consumed in meat, cheese, or any fermented food? *Acidity!* Bacteria do not do well in an acidic environment. In meat, *lactobacilli* produces acidity and when it increases, dropping to a point between 3.8 and 5.5 on the pH scale, it becomes safe to consume. The acidity of a sausage is determined by the amount and the type of sugar placed into the recipe. The *speed* of the fermentation period is *increased* as the temperature is increased inside the chamber. It ceases when no more lactic acid is produced. This happens when there is no more sugar available to the *lactobacilli*. It will also stop when the temperature is lowered below 53° F., or heated beyond 120° F. Fermentation will also discontinue when there is no longer *free water* available to the *lactobacilli*. In other words, if the sausage dries too quickly due to either (a.) *low humidity*, or (b.) *too fast an air speed*, while in our fermentation chambers, fermentation will cease. We must also remember to use a specific amount of nitrate/nitrite to combat any possible *clostridium botulinum*. The toxins of the spores are deadly. Measure carefully.

OK wranglers, while the increase in acidity is taking place, we must contain the growth of the pathogenic and spoilage bacteria somehow (while the *lactobacilli* go to work). The most convenient method is to simply lock up or "*bind*" their water supply. This is accomplished by the use of salt, and a prescribed amount will bind their reserve. As the "*water activity*" drops to a point below Aw 0.86, a meat product has dried enough to consume safely.

You may be wondering why the salt doesn't affect the lactic acid-producing bacteria also. Well, it does... but not to the same degree. *Lactobacilli* and *pediococci* are somewhat resistant to salt. Not only that, but they perform rather well having a limited water supply.

Summing it all up, we allow the sausage to ferment as lactic acid microorganisms go to work producing acid. This is where we get the "tang". When it reaches proper acidity, it become safe to consume. While this is happening, we also start drying the sausage to achieve a point below .86 Aw. All this takes *time*... time in which pathogenic and spoilage bacteria may also grow in number by competing with the food supply. As we "*bind*" their supply of water, they start to die and the beneficial bacteria eventually take over. So... in essence, there are **TWO** things going for us. Acidity and dehydration. Both work! They've worked for thousands of years. But they **MUST** be controlled.

OK guys, it's time to start grindin' and stuffin'. Please obey all the rules of cleanliness, cover your hair, and don't cough! **Wash and scrub your hands!** Good luck and I'll check in with you in about 12 hours. 🍀

Best Wishes,  
Chuckwagon

[Dave Zac](#) 📧

📅 Posted: Sun Jun 19, 2011 20:32

Well, here we are. This is my son holding our baby! He helped my stuff and has always had a growing interest in sausage making and self sufficiency.



Hanging and ready to close the door for the day. Oh yeah...while I was grinding, mixing, fermenting and curing, I decided to do a Spanish chorizo too. (Hanging on left) er bottom...I'll be darned if I can get this image to display correctly.





[Chuckwagon](#) 

▣ Posted: Mon Jun 20, 2011 03:33

That is just gorgeous work Dave! Did you dip or spray the B-600? Did you remember to record everything in a notebook? Write down every little possible detail you can remember. You won't believe how handy this info will become later on. Hey, that's a mighty handsome buckaroo holding the salamis. My wife thinks he's "adorable". That's a word old folks like us use for other people's youngsters! 😊 Did he help grind and stuff?

Hey Dave, I've got your photo trouble figured out. Just hold your camera at a 90 degree angle next time! 😊 har, har, har! That's terrific work Dave. Now, could you explain what you did and also what is happening inside the chamber if someone were to ask you?

Keep up the good work pal!

Best Wishes,  
Chuckwagon

[ssorlih](#) 

▣ Posted: Mon Jun 20, 2011 04:28

I have my meats and fat ground but ran out of time, energy, and enthusiasm. Because variety is the spice of life and because Longaniza, slow fermented Pepperoni and Genoa Salami all have the same curing schedules I have decided to make two kilos of each instead of five kilos of salami. Will mix, season, and stuff tomorrow.



