

## High Altitude Smoker Operation

### (with Thoughts on Using a Water Pan)

**Intro:** To start, have a look at <http://blog.bbqaddicts.com/grilling/basics-high-altitude-grilling/>, “The Basics of High Altitude Grilling,” for general grilling instructions. Two things are at issue here:

1. Water boils at a lower temperature, so it takes longer to cook any given item.
2. The air is drier at higher elevations, so evaporation is faster.

As a result, meats tend to dry out and get too crispy on the outside, yet not get cooked enough on the inside. There is a large body of literature on high altitude baking, but little on grilling and smoking. Let’s look further.

**(Altitude and )Rain and Wind and Fire:** A nice little article by the Weber grill folks gives some hints for grilling at altitude, or in wind and cold <http://www.weber.com/weber-nation/blog/grilling-in-the-elements> in which they say that it takes longer at higher altitudes with indirect heat, but not direct heat. So, why is that? ...and what should we do about it?

A well-written article at <http://culinaryarts.about.com/od/culinaryfundamentals/a/highaltcooking.htm> explains things a bit better, and is worth quoting:

“Because the reduced atmospheric pressure of high altitudes affects the boiling point of water, it’s moist-heat cooking techniques that are affected the most. Dry-heat cooking techniques like roasting or grilling are not affected in the same way because high altitudes don’t alter the way air is heated. So a roasted chicken recipe shouldn’t require any adjustment at higher elevations.

“On the other hand, since water evaporates more quickly at high altitudes, meats cooked on the grill will tend to dry out more quickly than when cooked at sea level. Note that the *temperature* isn’t affected, just the moisture content of the food. So a grilled steak might be more dry at high altitude than at sea level — even if it’s not overcooked temperature-wise.

“There’s not much you can do about that, other than to make sure that you give grilled and roasted meats a chance to rest before serving them.”

But as inveterate tinkerers, we smoke fanatics would like to do something about moisture content. For smoker operation, closing your vent to 25% or so (which you would do anyway) will help retain moisture. Using a water pan, as some advocate, will add more moisture, but (as follows) I find that it usually adds too much. Then there’s that pesky “stall,” the internal meat temperature staying the same rather than climbing, sometimes for hours, which people try to avoid by wrapping the meat in foil (also known as the “Texas Crutch.”) What gives? Let’s have a closer look.

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**Water Pan?** : I recently tried using the water pan that came with my Masterbuilt to smoke some sausage. The objective was to see if the casing toughness could be reduced somewhat. (*The tests were run at lower altitude, but the trend is the same.*) The pan was placed between the heater element and the sausage. Vent setting was my usual 25%. Result: the sausage was water-logged. I made a smaller pan out of foil and placed it on the floor of the smoker, beside the heating element. The smoker performed better, but the temperature stalled at 141 degrees F for hours.

That’s not really disastrous - - the FSIS guidelines for cooked meat products allow for processing time at various temperatures. (*See the table in Marianski’s “The Art of Making Fermented Sausages” on page 128, which says that ten minutes at 141 degrees F is sufficient for a 7-log-10 reduction in Salmonella.*) ...but I prefer to go to 150 – 155 degrees reasonably quickly, especially with sausages, then pull them out of the smoker and cool them in a water spray.

**Water pan conclusions:** (1) The sausage remained more moist than usual, but cooking time increased considerably, and (2) subsequent grilling toughened the casing anyway. Application to high-altitude smoking: adding a water pan will lengthen an already-lengthened cooking time, but do little else. Overall note: cooling with water tends to re-hydrate the casing anyway, so why bother with a water pan?

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**The “Texas Crutch”:** One thing that you CAN do is, when “the stall” occurs, wait a while, then wrap the meat in foil. What is happening is that the moisture in the meat has to be removed, but is removed by evaporation, which cools the meat, which... (insert “vicious circle” joke here.) However, if the moisture is retained inside the foil and near, but not on, the outside of the meat, evaporative cooling is just about eliminated. The result- - the meat stays at a higher temperature longer, and therefore cooks faster (braises, if you will, in the retained moisture). The downside: the moisture may extract much of the flavor into the braising liquid. The answer (mine, anyway), is to open up the foil for the last hour or so of cooking, letting the water evaporate and the juices reabsorb.

When the only partially-wrapped meat hits target temperature (150 for sausages, 204 or so IMT for brisket) pull the meat out. For sausages, shower them with cool water at this point. For brisket, close up the foil again, asset the packet aside (or in a warming oven) and let it rest so the rest of those juices have time to be reabsorbed. You can hold the brisket in a warm oven, say at 175 degF or so, until time to serve. The trick is to time it so that you have a nice, tender but firm, texture rather than mush. That takes practice. ...and it worked fine at about 7500 feet altitude.

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**My conclusions for High Altitude Smokers:** smoke as usual, same temperature, 25% vent opening, but expect it to take longer. Don’t use a water pan unless you normally do.

**My General Conclusion:** Try using the “Texas Crutch” toward the end of the stall, for both sausages and brisket. Unwrap for the last hour or so. For brisket, close up the foil again and keep the meat warm until ready to serve.