

Freezing Game and Fish

The Cold Hard Truth

By [Steve Jones](#), author of [KillerNoms.com](#)



How long will game stay good in your freezer? I'll bet either much longer or much shorter than you think. The good news is that you have some control over the key variables: temperature, air and time.

Temperature

Sorry, we need to start with a little science. Temperature is a measurement of energy. The more energy, the faster molecules in the meat move around.

When water is heated beyond 212°F the molecules fly around so fast they exceed the force of their natural attraction and transform from liquid to gas. Steam.

Cooled to below 32°F those same molecules slow down until their attraction causes them to come together to form crystals, transforming from a liquid to a solid. Ice.

Here is where the science starts to become important to this topic. Even molecules in ice are still moving around quite a bit. The colder it gets the slower they go, but the motion doesn't stop until absolute zero, 0° on the Kelvin scale. That's -459° Fahrenheit. As cold as it gets.



Com = Commercial Freezer, CF = Chest Freezer, RF = Refrigerator Freezer

Consumer freezers deal in a small range of that temperature scale. Even in that narrow range it's easy to demonstrate the massive change in molecular motion. Just try to scoop ice cream at both 0°F and -20°F. You'd need a jackhammer to scoop from a -20°F carton, but it scoops ok at 0°F, easier at 5°F, and gets downright soft at 10°F.

Another factor is that, unlike in an ice cube, the water inside of food is not alone. It also carries dissolved goodies like sugars, soluble proteins and amino acids. This extra stuff can keep the water from forming a stable crystal as it freezes, giving the molecules even more opportunity to move around.

That constant molecular movement along with some enzymes play a role in deterioration of the quality of the food: taste, texture and smell. Even the nutrients. The issue in the freezer isn't safety — it's quality. How long the food can be stored before reduction in the quality could be noticed on your plate.

So how cold should your freezer be? From a quality standpoint, as cold as you can make it. Adjusting to its lowest possible setting provides the best long term storage. On my chest freezer that's about -20°F. Zero°F is the highest temp you should consider for long term storage.

Yes it takes more energy to set it colder. You can reduce that by locating your chest freezer in a cool non-drafty area. A sheet of insulating foam on the lid can help too - just don't do the same along the sides - they play a part in dissipating the heat generated by the compressor.

Air

Air is bad bad bad for frozen foods.

When water molecules moving near the surface of frozen food contact air, they tend to form a new crystal. Once that crystal starts more water piles on. Even though frozen, some of that exposed water "sublimates" into the air inside the freezer (think of it as evaporation) leaving the food and collecting on the freezer walls as frost.

That is freezer burn. It desiccates the surface of afflicted foods, damaging texture and flavor.

Freezer burn is inevitable when meat is not protected from the air. Good wrapping material and technique can help a lot, such as wrapping first in plastic wrap before freezer paper. But vacuum sealing mostly eliminates the problem.

And lastly, Time. And Time.

Time actually factors into the equation in two very different ways.

First the speed at which the meat initially freezes, and second how long it is kept frozen.

How fast meat freezes is a key factor in the quality of the meat when thawed. The transformation from liquid to solid takes time. Ice crystals form during that phase. The slower the process, the larger and more jagged the crystals - leading to more damage to cellular walls. Damaged cells leak when thawed.

That's why a steak tossed into a freezer at 0°F oozes a lot of liquid —and flavor— when thawed. That same steak will do a much better job holding on to its goodies if originally frozen at -20°F with good air circulation all around the package.

Commercial frozen foods are originally frozen in blast freezers, super cold chambers with fans to keep the air flowing and make the freezing process as short as possible. If you're familiar with how a convection oven works, think of them as a convection freezer.

You can't mimic the conditions in a blast freezer at home, but the closer you get the better your result will be. After wrapping or sealing and before moving to the freezer, first get it as close to freezing as you can by staging in the fridge until thoroughly chilled. When you place it in the freezer keep good air circulation all around the package. Placing it on a rack or grate until frozen works well. Once it's frozen solid you don't need the air circulation any more and can remove the racks and arrange the packages to your convenience.

These cautions apply to any meat but are most important when freezing a large item, like a roast. For the same reason it is important to not pile new packages in the freezer. The ones in the middle take a long, slow time coming to a hard freeze.

So, how long will your meat stay good? Published lists of freezer storage times are based on typical wrapping and storage techniques in the freezer compartment of the average home fridge/freezer.

I believe you can double typical published estimates, maybe even more, if you vacuum seal and quick freeze the food then hold it at -20°F. I've eaten 4 year old venison I cannot tell from fresh.

OK one more thing. Fat.

This is not usually an issue with game meats. But frozen fats - especially surface fats - lose quality faster than lean meats. Off flavors or smells (rancidity), granular texture, etc. are all possible. Controlling the usual suspects — temperature, air and time — can limit the problem.

Still, fatty meat like Fall bears, some feral hogs, and fatty/oily type fish may not last as long in your freezer. Best thing to do is trim most surface fat and plan on shorter storage time than your lean meats.

The bottom line

Think about the time, expense and energy you put into acquiring that meat. Put just a little more effort into your storage methods and that treasure should be ready when you are.

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