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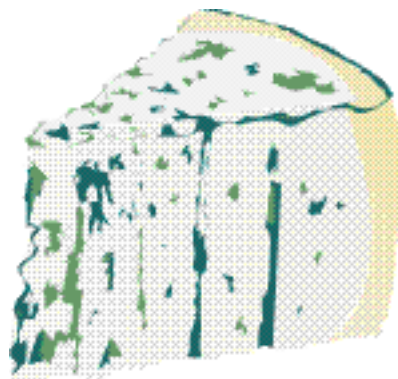
## Molds in Food

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Molds are fungi just like mushrooms and yeast. Also like mushrooms, they reproduce by releasing spores into the air that land on everything, including your food and food storage containers. When those spores begin to grow, they create thin threads that spread through out their growing medium. These threads are the roots of the mold fungus, called mycelium. The stalk of a mold fungus is the portion above or on the surface of the food. It produces the spores and gives the mold its color. We've all seen examples of this when we discover a dish of something or other left way-y-y too long in the refrigerator and has become covered in mold fuzz.

Molds can grow anywhere they have a growing medium (their food), sufficient moisture and enough warmth. Some can even grow at refrigerator temperatures, albeit more slowly than they would if it were warmer. They can also withstand much more salt and sugar than bacteria, which is why you sometimes find mold in jellies and jams with their high sugar content and on cured products like ham or bacon with their high salt content.

In the past, it was often felt a slight amount of mold was harmless and the food could be consumed anyway. For molds that were intentionally introduced into the food, such as the mold in bleu cheese, this is just fine. For the unintentional molds, it can be



a very serious error in judgment. These unwanted molds might just be producing a toxic substance called a "mycotoxin" which can be very bad indeed. Mycotoxins are produced around the root or mycelium of the mold and the mold roots can penetrate very deeply into the food. These mycotoxins can survive for a long time in foods, and unfortunately most are not destroyed by cooking. The molds probably best known for this are the various *Aspergillus* varieties which produces a mycotoxin known as "aflatoxin", but there are other dangerous molds as well, such the *Fusarium* molds. Both of the above affect grain and some legumes.

**IMPORTANT NOTE:** In wet pack foods such as your home canned goodies, molds can do something else, possibly leading to lethal consequences. If they are present in wet pack food by reasons of improper procedure or contamination after the fact, they can consume the natural acids present in the food. The effect of this is to *raise* the pH of the food in the container, perhaps to the point that it becomes possible for spores of *Clostridium botulinum*, better known as "botulism", to become active and reproduce. If you're not already aware of the consequences of botulism poisoning, please read the bacterial spoilage section below where it has an entry all its own. There are few kinds of food poisoning with as deadly serious consequences. For this reason, moldy wet pack foods should be safely discarded.

## Minimizing Molds

You can do a number of things to minimize unwanted mold growth in your kitchen, food storage areas and refrigerators. If your kitchen is at all like mine, it is the refrigerator that is going to collect the most fungal growth. This can be dealt with by washing the inside every couple of months with a tablespoon of baking soda dissolved in a quart of warm water. Rinse clean and allow to dry. The black mildew that grows on the rubber door gaskets and other places can be dealt with by wiping down with a solution of three tablespoons of household bleach in a quart of water. I generally use a soft bristle brush for this.

The rest of the kitchen can be kept mold free by keeping it clean, and dry and by

spraying occasionally with a product such as Lysol. Patches of mold growing in spots can be eliminated with the bleach solution used on the refrigerator doors.

Try not to purchase more fresh food than you'll be able to eat in a short period of time. This will keep you from having to deal with the moldy remains that didn't get eaten. If food does go moldy, *don't sniff it*. This is a good way to give yourself respiratory difficulties if you are at all susceptible to mold allergies. Moldy food should be disposed in such a manner that your animals and children won't be able to get into it. Mycotoxins are every bit as bad for your animals as they are for you.

Obviously, you don't have to throw out everything that shows a spot of mold on it. Some foods can be safely dealt with and still partially saved if they show signs of fungal growth. Below is a set of guideline from M. Susan Brewer, Ph.D., R.D., a specialist in food safety. Her articles and works are found in many state university extension services publications lists.

If the food shows even a tiny mold spot, follow these guide lines:

1. Hard or firm foods with tiny mold spots can be trimmed; cut away the area around the mold (at least an inch) and rewrap in clean wrap. Make sure that knife does not touch the mold.
2. Soft foods such as cheese slices, cream cheese, sour cream and yogurt should be thrown away.

## Toss

- Soft Cheeses, (Mozzarella Brie)
- Sour Cream, Yogurt, Cottage
- Bacon, Hot dogs, Sliced lunch meats
- Meat pies
- Opened canned ham
- Most left-over food
- Bread, Cakes, rolls, flour, pastry
- Peanut butter
- Juices, berries
- Jam, Jellies, Syrups
- Cucumbers, Tomatoes
- Spinach, Lettuce, other leafy vegetables
- Bananas, Peaches, Melons
- Corn-on-the-cob
- Stored nuts, whole grains, rice

## Trim

- Hard Cheese (Cheddar, Swiss)
- Bell Peppers, Carrots, Cabbage
- Broccoli, Cauliflower, Brussels Sprouts
- Garlic, Onions
- Potatoes, Turnips
- Zucchini
- Apples, Pears

## Molds in Canned Goods

If good equipment and proper technique are used, then it is unlikely you will ever have mold growth in your unopened canned goods. If you do have such, then there was either a flaw in the procedure you used, or something affected the jar or can after the fact to break its seal. In any event, once the food has molded, it is past saving and should be discarded in such a way that children and animals will not be able to get into it.

The most likely home canned products to show mold growth are jams and jellies sealed with paraffin wax. There are a number of points in the canning process where this can occur:

1. In the time after the jar is taken out of its boiling water bath, but before it is filled
2. In the time between when the jar is filled and covered with the melted wax
3. When the wax cools, if it pulls away from the side of the jar, leaving an opening for the mold to get in
4. If bubbles form in the paraffin, which break and leave holes.

It is for this reason that most canning authorities no longer recommend using this technique. If you must use it, the jelly jars should be boiled for at least 10 minutes before the jelly is poured into the jars. The filled and wax capped jars should then be covered with some sort of protective lid. The book, \*Putting Food By\* has excellent instructions on this or see the applicable section of the rec.food.preserving FAQ by Leslie Basel.

## Molds in Grains and Legumes

It's long been known that eating moldy grain is bad for your health. The ugly consequences of eating ergot-infected rye probably make the best known

example. It's only been for about thirty years, though, that intensive study of these grain fungi have been carried out on other varieties of molds and their respective mycotoxins. Fortunately, for those of us in the U.S., the USDA and the various state departments of agriculture go to a great deal of trouble to detect grain and legumes infected with these toxic fungi. In some of the less developed countries, the citizenry are not so lucky. Still, it is good to have something of an understanding of what one should do to prevent mold growth in one's stored grains and to have an idea of what to look for and ask about when purchasing grains and legumes.

The one fungal type that has caused the most commotion in recent history are the various *Aspergillus* species of molds. Under certain conditions with certain grains, legumes and to a lesser extent, nuts, they can produce a mycotoxin called "aflatoxin". This is a serious problem in some parts of the world, most especially in peanuts, occasionally in corn. There have been no deaths I am aware of in the United States from aflatoxicity, though other countries have not been so fortunate. What makes aflatoxin so worrisome in this country is that it is also a very potent carcinogen (cancer causing agent).

In addition to the *Aspergillus* molds, there is also a very large family of molds called *Fusarium* and these can produce a wide variety of mycotoxins, all of which you do not want to be eating directly or feeding to your animals where you will get it indirectly when you eat them.

The Federal government and the various state governments continuously monitor food and forage crops. Those products which are prone to mold growth and toxin production are not allowed to be sold for food. Once purchased however, it is up to you to keep your food safe from mold growth. If you have already found mold growth in your whole grains, meals, flours or other grain products, they should be discarded. Most mycotoxins are not broken down or destroyed by cooking temperatures and there is no safe way to salvage grain that has molded.

## **Preventing Mold Growth In Stored Grains and Legumes**

The easiest method to prevent mold growth in your stored grains and legumes is simply to keep them too dry for the mold to grow. The *Aspergillus* and *Fusarium* molds require moisture contents of 18% and above to reproduce. This is subject to some variability, but in all grains and soybeans, they must have a moisture content of that level. If you are storing raw (not roasted) peanuts, in the shell or shelled, you want to get the moisture content to less than 8% as peanuts are particularly susceptible to mold growth. The recommended moisture content for all other grain and legume storage is no more than 10%. (Please see part 2.A.3.1

Grains and Legumes for a method to determine moisture content.) At 10% moisture, it is simply too dry for fungi to grow. (Please see [Storing Grains and Legumes](#) for a suitable packaging technique.)

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