

**MEAT PROCESSING**  
**Submitted by Rita Snyder**

**Nitrates**

Nitrates and nitrites have been used as curing agents for meat for more than 2,000 years. They have the ability to retard the growth of microorganisms, but they also used for flavoring and coloring. They give hot dogs, cold cuts, and ham their characteristic pink color. Without nitrites, these products would have a grayish-brownish color.

The growth of certain microorganisms, such as *Clostridium botulinum*, in meat products sold in cans or oxygen-free packages (vacuum packs) is inhibited by the addition of nitrite.

The controversy concerning the use of nitrites is founded upon their possible link to cancer. However, these compounds occur naturally in vegetables and in amounts much higher than those added to bacon, hot dogs, or ham.

**Tenderizing processes**

Tender meat is usually the most expensive cuts of meat. So how can you tenderize less tender cuts of meat? Popular ways are: 1) marinating; 2) using a commercial tenderizer; and 3) physical disruption (round steak is one cut that is often tenderized using this method and sold as “cube steak”). Marinades often have three common ingredients: 1) an acidic liquid, such as vinegar; 2) oil; and 3) spices. Vinegar is an acid, called “acetic acid”. Its’ purpose in a marinade is to soften the meat to make it more tender and easier to cut and chew. The outside of the marinated meat is softer than the inside. Other acidic foods include sour cream or tomatoes. Lemon and limejuice are acidic, but they do not always tenderize meat. Marinades may also contain proteolytic enzymes that will disrupt the meat protein integrity or structure. Some newly developed marinades may contain calcium, which activates natural occurring enzymes in the meat. It’s important to remember that acidic liquids and foods do not protect a food from bacterial growth. Always refrigerate marinating foods. The oil in the marinade keeps the meat from drying out during cooking.

Commercial tenderizers contain enzymes, such as papain.

1. What is papain and it’s origin? \_\_\_\_\_
2. How do you use it? \_\_\_\_\_
3. What food safety precautions do you need to follow when you use commercial tenderizers?  
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**Activity: Cured meat pigments**

**Materials:** 200 g raw hamburger  
 2 plastic bags  
 1 g sodium nitrite  
 2-250 mL beakers  
 plastic wrap

**Divide** 200 g of raw hamburger into two equal batches.

**Put** one batch of hamburger into a plastic bag. Dissolve 1 g of sodium nitrite into 100 mL of water then add 1.6 mL of the solution to the meat. **DO NOT** pipette by mouth. (The instructor, not students, should handle the sodium nitrite).

**Mix** thoroughly by kneading the bag for about 3 minutes.

**Stuff** each batch of hamburger into a labeled beaker. Pack it down tightly to get rid of as much air as possible. Cover the beakers with plastic wrap.

**Place** the beakers in a refrigerator overnight (NOTE: This could be done beforehand). The next day, remove the beakers from the refrigerator and observe the color of the surface and the interior of the meat.

**Cook** the meat by heating the beakers in a boiling water bath for 15 to 20; observe the color of the surface and the interior of the meat. (NOTE: This could be done beforehand).

**Data:** Construct a table in your notebook similar to the one below.

<u>Control (No Nitrite)</u>		<u>Experimental (With Nitrite)</u>	
<u>surface</u>	<u>interior</u>	<u>surface</u>	<u>interior</u>

Before storage \_\_\_\_\_

After storage \_\_\_\_\_

After cooking \_\_\_\_\_

**Conclusion:**

What effect does the addition of sodium nitrite to fresh meat have on the color before and after cooking? \_\_\_\_\_

