

Considerations for Shipping Meat Products Sold Directly from the Farm

Rob Holland
Director, Center for Profitable Agriculture
University of Tennessee Extension

Nathan Miller
Extension Assistant, Department of Food Science
University of Tennessee Extension

Mark Morgan
Professor, Department of Food Science
University of Tennessee Extension

Megan Bruch Leffew
Extensions Specialist, Center for Profitable Agriculture
University of Tennessee Extension

CONTENTS

Introduction.....	Page 1
Packaging Materials.....	Page 2
Coolant.....	Page 3
Transportation.....	Page 4
Budget Concerns.....	Page 4
Common Customer Questions and Concerns Regarding Shipping.....	Page 5
Summary.....	Page 5
Sources.....	Page 6

Introduction

Livestock producers engaged in direct marketing of meat products often consider making their products available to distant customers via e-commerce, catalog sales and from other venues that would necessitate shipping. While shipping meat products offers opportunities to target customers beyond local face-to-face buyers, there are several shipping factors that should be considered. This fact sheet addresses many of the factors that farm-direct meat marketers should contemplate. For the ease of discussion, the considerations have been grouped under five primary categories: 1. Packaging materials, 2. Coolant, 3. Transportation, 4. Budget concerns, and 5. Common customer questions and concerns regarding shipping.

Packaging

Two basic shipping practices that farm-direct meat marketers should first consider are (1) shipping frozen products and (2) utilizing a 24-hour/overnight delivery service. Starting with a frozen product and restricting delivery to overnight will enhance the quality of the delivery and of the delivered product. Starting with a frozen meat product will allow coolants (gel packs and/or dry ice) in the package to be more effective. Under some conditions and with additional coolant in the package, meat may ship well to destinations within a 2-day delivery period but restriction to 24-hour delivery is considered ideal. While frozen meat may thaw during the delivery process and be maintained at 40 degrees Fahrenheit or less, it would be impossible to know the inner packaging temperature for certain. Shipping thawed products or allowing meat to thaw during shipping is not suggested. Shipping frozen product contributes to product wholesomeness and to better internal quality. Shippers are encouraged to maintain the frozen state of meat products during transport which will require maintaining an internal shipping temperature of 0 degrees Fahrenheit or less. Shippers should develop a policy on how to deal with meat that arrives to consumers thawed and or spoiled.

There are four significant supplies to consider when preparing to package frozen meat products for shipping:

1. Boxes -- For shipping, boxes are the most common outer material of the package. A cardboard or corrugated box may surround a variety of inner materials that are used to keep products cold. The outer shipping box may have a special built-in insulated or Styrofoam liner or the insulation product may be separate. Regardless of the precise combination of outer box and inner insulation that is used, boxes and insulation work together to keep products cold, keep heat out and provide protection from puncture and damage.
2. Insulation and Other Internal Filler – Styrofoam boxes and various insulated liners are often used to insulate the inside of an outer shipping box. Air-filled insulated liners, insulated pads and corrugated boxes of various thickness may also be used in various combinations to keep products cold and heat out. In addition to insulation, other items (often called filler) should be considered for packaging and securing products from movement and shifting during transit.
3. Packaging Tape – Packages must be secured for transportation. Taping boxes is an important part of securing the package, enhancing its longevity during transport and is an expense associated with shipping that should not be overlooked.
4. Package Label – Labels are an essential part of preparing packages for shipping. A label is more than the address of the product destination. The label should withstand the shipping and delivery process and should accurately convey the delivery destination and return address information. The package should also be labeled as perishable, keep frozen or refrigerate. For more details on how to properly package meat products, contact the shipping company directly.

Overall, the right packaging should be selected to secure meat products for transit, keep heat out, and maintain a cold internal environment. Packaging should be as compact as possible. While weight will be the most significant cost factor for shipping, the size of the package is another cost consideration for some shippers. Some shippers base cost on a dimensional weight which factors both the size of the package and its weight.

Coolant

In addition to selecting an outer box and internal insulation, supplemental coolant materials such as gel packs or dry ice will be needed to maintain the safe and wholesome integrity of the meat products. Most gel packs or gel blocks are non-toxic and safe to use for shipping foods (images of cold packs and gel block are provided in Figure 1). Regular ice should not be used to pack meat products for shipping. Ice will melt causing numerous complications to packaging and be detrimental to the meat products. In addition, most shipping companies will not allow shipments which include ice unless they are completely sealed. Any leaking packages may be returned or disposed of by the carrier.

Figure 1. Example of cold packs and gel blocks.



The number of gel packs or the amount of dry ice needed will vary with the size of the container and the amount of product being shipped. Various guides are available for selecting the amount of dry ice that will be needed for various size products and the estimated time the product will be in transit.

Dry ice is frozen carbon dioxide and considered a hazardous material for air shipments and must be handled safely and carefully. It also requires extra considerations for labeling and selecting a shipper. Some shippers have special label requirements for products containing dry ice and some will not ship dry ice by air. Contact your shipping provider regarding their specifications for packages containing dry ice. Dry ice is often available for purchase online, from various supermarkets and grocery stores.

Dry Ice

Dry ice is made through a process known as sublimation where carbon dioxide goes from a solid to a gaseous state without the intermediate liquid phase. This in turn is how we get the name dry ice. When dry ice is made, the carbon dioxide gas is pressurized and cooled to form a liquid. Once the liquid has been formed, it is injected into a block mold or pelletizer to form the size and shape desired. When the pressure is released, the liquid changes immediately to a hard ice-like product at -109 F (-78.5 C). Be careful handling dry ice as it can “burn” your bare skin almost instantly at this temperature.

As the dry ice absorbs heat, it will undergo sublimation and shrink in weight at a rate of 5 to 10 pounds every 24 hours depending on the quality of the insulated container. The shipping container cannot be airtight and must let the CO_2 gas escape. The dry ice should be placed directly on top of the product in the insulated shipping container. This sublimation breakdown rate will need to be considered when purchasing and packing frozen products on dry ice. Higher ambient temperatures (i.e. in the summer months) and air space in the container will speed the sublimation of the dry ice shortening the time

products remain cold/frozen during shipping. Filling air spaces with newspaper, Styrofoam peanuts, or bubble packs will help slow the sublimation.

Dry ice can be purchased at your local grocery store or straight from the manufacture. Some local grocery stores include: Kroger, Publix, and Food City. These stores sell dry ice in the range of \$1.50 to \$3.00 per pound. If larger quantities are need, it is recommended to purchase the dry ice straight from the manufacture. Setting up an account and purchasing bulk quantities will likely lower the cost per pound. Shipping to your location is available from the manufacture via freight. If the freight load is too large, you can pick up smaller quantities, 500 to 600 pound bins, at the manufacture's locations where a deposit will need to be made for the bin. The deposit will be refunded once the bin has been returned. Creating a partnership with a local retail chain or manufacturer is always beneficial in getting the best value.

In general, the thicker the wall of the shipping box and insulation, the less coolant needed. Sturdy, insulated containers should be selected to hold meat products and ice packs or dry ice. If there is any likelihood of moisture developing in the package due to melting or thawing, be sure to use a proper lining and or a moisture absorbent pad or mat.

Additional reading on how to ship foods with dry ice is recommended. The following sources provide additional information and details about dry ice and shipping with dry ice:

- A Guide to Dry Ice Shipping (by United Parcel Service)
<https://www.ups.com/us/en/services/knowledge-center/article.page?kid=art16a454e6661>
- Dry Ice (by Continental Carbonic Products)
<https://www.continentalcarbonic.com/dry-ice.html>
- Dry Ice Calculator (by the Iceman)
<http://the-iceman.com/dry-ice/dry-ice-calculator/>
- dryiceInfo.com
<https://dryiceinfo.com/>
- Dry Ice Safety (by Continental Carbonic Products)
https://www.continentalcarbonic.com/cmss_files/attachmentlibrary/Safety-Tri-Fold-7-30-13.pdf
- How do I keep my mailed item cold or refrigerated (from US Postal Service)
<https://faq.usps.com/s/article/How-Do-I-Keep-My-Mailed-Item-Cold-or-Refrigerated>
- Packaging Perishable Shipments. FedEx.
https://www.fedex.com/content/dam/fedex/us-united-states/services/Perishables_fxcom.pdf

Transportation

The most-often used shipping service providers are UPS (United Parcel Service), FedEx and the US Postal Service. Specific transportation costs and shipping requirements vary by shipping provider. Shipping costs are often based largely on the weight of the product, the size of the package, destination and the delivery time specified. Heavy products, in large packages, shipped long distances with 24- hour guarantee will be relatively expensive.

Shipping time is critical to perishable foods. Overnight delivery is often ideal and less than two-days is considered a maximum for some. Some carriers have designated regions that they will deliver overnight or within two days. Similarly, some have pre-determined regions or zones for 3-day, 4-day and other delivery times.

Two other factors to consider when selecting a shipping partner are tracking options and where the product can be dropped for pick-up by the shipper. Some shippers have local drop stations while others may only take perishable items at certain locations.

Budget Concerns

While acquiring customers from a website and other distant methods provides opportunities to expand a local customer base, the overall cost of getting the product to the customer must be carefully evaluated. In addition, the decision of how the cost will be covered must be made. That is, will the cost be factored into the sales price of the meat or will the cost be added to the customer's overall bill. There are various schools of thought on whether to factor shipping costs with meat prices or whether to add the costs as a separate line-item on the customer's billing. Some meat marketers offer free shipping on bulk orders.

The overall cost of shipping meat products to customers will vary based on numerous specific details and factors. The primary categories of expenses for shipping include:

- Outer container
- Inner insulation (Styrofoam)
- Coolant (dry ice or ice packs)
- Tape
- Label
- Transportation (shipping company)
- Packaging labor
- Labor and transportation to drop
- Product loss

It should be noted that shipping costs are often expensive relative to the cost of meat purchased. For example, overall shipping costs for small-quantities of meat purchases may exceed the customer's cost of the meat. This may be a deterrent to some customers purchasing meat online. Anecdotal observations from some online meat marketers indicate that some customers will abandon their online shopping cart once shipping costs are factored into their bill. Careful and detailed budgeting for shipping meat products is recommended.

Common Customer Questions and Concerns Regarding Shipping

The following are some frequently asked questions from on-line shoppers regarding shipping meat products. These questions should be considered by farm retailers who are contemplating shipping meat product to customers.

- Are shipments to Post Office boxes possible?
- How will the meat be kept cold during transport?
- Can the shipping container be re-used?
- Will the meat be frozen when it arrives?
- What is the refund/return policy if the meat arrives spoiled?
- Who is the shipping provider?
- Is tracking available on the shipment?
- Does someone have to be home to receive the delivery?
- How long will it take for my purchase to be delivered?

Summary

Offering to sell meat products from an online system or from some other distance-based system provides direct marketers opportunities to find new customers. Careful consideration should be made as to how products purchased from these methods will be delivered. The costs and details of shipping the purchased meat through a shipping partner such as FedEx, UPS or US postal service should be carefully evaluated and communicated with customers. Meat products must be packaged for shipment in a manner that instills safety and wholesomeness and packages should be marked as keep frozen, refrigerate and/or perishable. The overall cost of packaging materials, coolants and transportation should be carefully calculated. Rules, regulations and requirements of shipping companies must be evaluated.

Sources

A Small Business Guide to Shipping Perishable Food, Taste Profit Consulting, LLC. 2020.

<https://tasteprofit.com/a-small-business-guide-to-shipping-perishable-food/>

Can I ship Meats? How? Where can I find packing materials to ship meats? Niche Meat Processor Assistance Network.

<https://www.nichemeatprocessing.org/can-i-ship-meats-how-where-can-i-find-packing-materials-to-ship-meats/>

How to Ship Food So It Stays Fresh, UPS Staff Writer, United Parcel Service. January 2018.

<https://www.ups.com/us/en/services/knowledge-center/article.page?kid=d746b8ce>

Mail Order Food Safety, USDA Food Safety and Inspection Service.

https://www.fsis.usda.gov/wps/wcm/connect/9020369a-247f-423c-8486-7e31ca6bcfc3/Mail_Order_Food_Safety.pdf?MOD=AJPERES

