

A Koch Equipment White Paper

KOCH

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The Advantages of Vacuum Tumbling

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Introduction

The purpose of this document is to educate meat, poultry, and seafood processors of all sizes about the advantages of vacuum tumbling—a newer method of brining/marinating meat, poultry, and seafood to produce ready-to-cook, value-added products. The advantages of vacuum tumbling will be reviewed, including reduced labor content and increased yields, which result from improvements to product slice ability, cure color evenness, and overall product juiciness and tenderness.

Problem Statement

Without vacuum tumbling, marinating requires one hour to five days of soaking time. Many meat, poultry, and seafood processors still utilize this manual production process to add flavor, juiciness, and improve the overall cure distribution of their products. Using older technology results in “dead zones” and “hot spots” (uneven flavor/ingredient distribution) as it does not allow for protein extraction. Additionally, this process requires an extraordinary amount of cooler space while products are soaking. Brine, marinade, and ingredients are also wasted as you must pickle the product entirely during the brining/marinating process.

Solution

Today’s consumers no longer have the time to prepare elaborate meals. Through the use of vacuum tumbling, you can provide consumers with premium, ready-to-cook, value-added products for which they will not only be willing to pay a premium, but will purchase more product, which results in increased profitability. Vacuum tumbling provides meat, poultry, fish, and seafood processors with a number of advantages, including:

- **Reduced direct labor costs** – vacuum tumbling is a semi-automated process that reduces the handling and processing time. For example, it takes only 20 minutes to fully marinate some products in a vacuum tumbler as opposed to one hour or five days of manual soaking. Some vacuum tumblers are also equipped with automatic lifts or vacuum loading to reduce loading and unloading time.
- **Improved product quality and consistency** – vacuum tumbling enables optimum protein extraction by opening the cell structure of the meat allowing the brine or marinade to penetrate evenly throughout the product, which produces a juicier, more tender, and flavorful product with better slice ability and an even cure color.
- **Reduced supplies costs** – vacuum tumbling eliminates the need of additional brine or marinade and ingredients to cover the product during soaking, saving on supply expenses.
- **Improved production control** – many vacuum tumblers are designed with a programmable control to save product programs that control the tilt, speed, and spinning direction of the drum, the temperature of the cooling system, and tumbling and rest cycles.

Implementation

Examples of various applications are presented to provide an overview of the requirements for implementing a vacuum tumbler.

Small Diameter Products

Small (below 2.5 inches in diameter) products can be marinated in minutes by adding the meat and the corresponding marinade to the vacuum tumbler, pulling a vacuum and tumbling the product at a low speed (r.p.m.).

Large Diameter Products

Large (2.5+ inches or larger in diameter) products can be marinated using a combination of injection and vacuum tumbling. Water soluble spices can be used in the marinade for injection. Then, a vacuum tumbling cycle can be used to improve the distribution of the injected marinade throughout the entire product.

Bone-in Products

Small bone-in products, such as chicken parts, may be marinated in a vacuum tumbler. These items must be tumbled at a low r.p.m. to prevent damage to the skin and/or external appearance of the product.

Large diameter items, such as bone-in hams, may be injected and vacuum tumbled at a low r.p.m. to distribute the curing solution throughout the product. Vacuum tumbling large diameter bone-in products will result in better brine distribution and is not intended to incorporate more solution into the product.

Cured Products

Small diameter products may be cured with a brine solution (containing sodium nitrite and other ingredients) using similar processes as those described above. **Note:** Cured products may be held under refrigeration overnight or a few days to further develop cure color.

Larger diameter products need to be injected, vacuum tumbled, and rested for a period of time.

Whole Muscle Boneless, Restructured, Chunk and Formed Products

Larger whole muscle boneless, restructured, or chunk and formed products may be injected before vacuum tumbling. However, smaller products may be vacuum tumbled without the prior use of injection. The primary purpose of tumbling these types of products is for optimal protein extraction, which makes individual pieces of meat stick together during the cooking process. Tumbling time will vary depending on the size of the pieces, percentage of marination pick-up, ingredients used, etc. Fat and connective tissue (including silver skin) must be completely removed to facilitate binding of product.

Summary

Through the use of vacuum tumbling, meat, poultry, fish, and seafood processors can produce ready-to-cook, value-added products while reducing labor content and increasing product yields and profitability from improvements to product slice ability, cure color, and overall product juiciness and tenderness.

Following is a list of products that are ideal candidates for the vacuum tumbling process:

- Beef brisket, fajita meat, jerky, and ribs
- Corned beef
- Italian beef
- Marinated steak
- Roast beef
- Babyback ribs
- Bacon
- Bone-in or boneless ham
- Picnic ham
- Pork fajitas, loins, ribs, and steak
- Chicken breasts and fajita meat
- Barbecue chicken
- Buffalo wings

Koch Equipment offers two different complete lines of stainless steel vacuum tumblers to support the above product needs of small- to mid-sized meat, poultry, fish, and seafood processors, including:

- **LT Series Vacuum Tumblers**
 - Four different models to choose from with working capacities ranging from 40 to 800 pounds
 - Variable speed control
 - Tumble timer
 - Made in USA

- **Inject Star Vacuum Tumblers – Magnum Series**
 - Six different models to choose from with drum filling capacities ranging from 900 to 10,000 liters
 - Automatic lift holds 200-liter buggies
 - ISC-B20 touch-screen computer control with Ethernet interface stores up to 99 product programs. Remote connection enables collection of production data, including:
 - Massaging speed and duration
 - Rotation direction and position of drum
 - Processing time / Rest time
 - Vacuum / Ventilations
 - Temperature
 - Thawing time (optional)
 - Personnel identification
 - Many options available – consult with our processing specialists

- **Inject Star Vacuum Tumblers – Europa Series**
 - Seven different models to choose from with drum filling capacities ranging from 620 to 3,300 liters
 - Some models feature insulated cooling
 - Manual emptying (optional lift for 200-liter buggy available)
 - Frequency drive control via friction rollers
 - ISC-B20 touch-screen computer control with Ethernet interface stores up to 99 product programs. Remote connection enables collection of production data, including:
 - Massaging speed and duration
 - Rotation direction
 - Processing time / Rest time
 - Vacuum / Ventilations
 - Temperature

For more information about vacuum tumbling or supporting equipment, visit our web site at www.kochequipment.com.