



BY AMERICAN MEAT SCIENCE ASSOCIATION

Tips for Improving Burger and Meatball Shape and Texture

Forming fresh, ground meat products with acceptable texture can be difficult. Formed meat develops and retains shape and texture in response to ingredients, process, and handling. First, let's review the USDA definition of meatballs and burgers so we are on the same page:

Burgers

Uncooked or cooked pork, beef, veal, and lamb formed into a patty. The type of burger must be noted and labeling requirements vary for different burgers. The major difference between meatballs and burgers is meatballs generally contain various meat and added ingredient mixtures, whereas burgers generally are made from a single meat type and have less added ingredients.

Meatballs

Uncooked or cooked pork, beef, veal, and lamb, and other ingredients in a ball form.

1. Product must contain at least 65 percent meat.
2. Binders and extenders are limited to 12 percent of the total product. 6.8 percent of isolated soy protein is considered the equivalent to 12 percent of the other binders or extenders. The permitted binders and extenders include, but are not limited to, cereal, bread crumbs, cracker meal, soy flour, soy protein concentrate, isolated soy protein, and textured vegetable protein.
3. Cheeks, hearts, and tongues are not allowed, but product may contain head meat, cheek meat, heart meat, and tongue meat when declared in the ingredients statement.
4. Partially defatted chopped (PDC) (species) may be used up to 25 percent of the meat block. PDC (species) can be identified as (species) in the ingredients statements.

Next a review of what makes meat stick together during forming and gives meat texture when eaten. There are a limited number of ways that fresh meat develops “bind” and texture.

- The most common way to develop bind is the addition of salt to the meat with some mechanical force applied via mixing or grinding to extract proteins to the meat surface. These extracted proteins are sticky and will bind pieces of meat together when cooked. The best examples of this principle are emulsified sausages. Binding with salt, mechanical action, and cooking will result in a consistent product; however, the texture will tend to be more “sausage-like” and less crumbly. Meatballs and burgers are usually associated with a “crumbly” texture; therefore care must be taken to not overmix these products. The timing of the addition of the salt is also important. The earlier in the grinding and mixing process, the ingredients are added, the tighter the bind will be. If the salt is added later, the texture will be looser.

(USDA Food Standards and Labeling Policy Book, Feb., 2024)



Binding Quick Tips

- Salt and mechanical action are vital for meat binding, resulting in consistent texture while avoiding overmixing for crumbly meatballs and burgers.
- Avoid overmixing which can create a tight, rubbery texture due to excessive protein extraction.
- Proper freezing is crucial for maintaining the bind in fresh meat products like meatballs and burgers during packaging and shipping.
- Binders like soy proteins, vegetable flours, starches, and seaweed-derived colloids enhance meatball and burger texture, sometimes requiring label declaration for certain burger types.



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- **The second way to achieve bind in fresh meat is to freeze the formed products quickly after forming.** The meat will usually have some stickiness due to protein extraction, but will not hold together during packaging and shipping if they are not cooked or frozen. Proper freezing is as important as the formulation when making meatballs and burgers.
- **The third method of binding meatballs and burgers is through the use of binding ingredients.** Several ingredients are available that will work as binders. Added ingredients work as binders because they have gelling properties, which form throughout the meat. Some common ingredients that will gel are soy proteins, vegetable flours and starches, and seaweed derived colloids and gums, all of which are allowed in meatballs, but must be declared on the label for most burger types.

Formulation tips for improving shape and texture:

- **To obtain consistent results, each incoming batch of meat must be inspected for quality of processing characteristics.** High connective tissue meats, such as shanks, heels, plates, or cheek meat will require different formulations and processing than higher quality meats such as bull meat or subprimal trimmings. In general, the higher the connective tissue the earlier salt must be added to the process and the greater need to binding ingredients. Ideally, you have accounted for the quality of the meat block during ordering and won't need to adjust on the fly. The amount of salt and phosphate used also will vary depending upon the product being made, the equipment being used, and freezing or cooking method. Some research and development time may be useful to determine the correct formulation for your process. Least cost formulation using collagen content or bind value is a useful tool to accomplish this.
- **Fat content must be determined.** Fat has no binding value, so leaner products will need less binders or protein extraction than those with a higher fat content. Consider adding binders such as soy proteins to assist with texture retention. Products labeled Ground Beef or Hamburger or Burger cannot have more than 30% fat. If the binders are added, then the product cannot be labeled ground beef and if labeled as Hamburger/Burger, the extra ingredients must be declared on the label.
- **The amount of several binding ingredients is set by regulatory standard, but the maximum amount allows isn't always the best for texture and binding properties.** Again, it is usually up to the individual plant to determine the formulation that works best.

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Formulation Quick Tips:

- **Quality inspection of meat batches is crucial, especially for high connective tissue meats, requiring different formulations.**
- **Adjustments in salt and binding ingredients are necessary based on meat fat content, with leaner products needing fewer binders.**
- **Optimal texture and binding may require plant-specific formulation adjustments despite regulatory standards on binding ingredient amounts.**

