

# ProteoMeat™: Technical Guide for Meat Substitution in Food Processing

A comprehensive technical manual for food scientists and meat processing professionals on the functionality, applications, and optimization techniques for INTABIOTECH's advanced meat substitute.



# Rehydration Protocol

## Water Temperature

Use cold or warm water (5–20°C)

## Rest Period

Allow 10–15 minutes for hydration

Stir halfway through for even absorption

## Ratio

1:2 (dry weight of ProteoMeat™ : volume of water)

Example: 1kg ProteoMeat™ + 2L water

## Drainage

Drain excess water thoroughly for standard applications

Drain lightly if increased water retention is desired

The rehydration process is critical for activating ProteoMeat's™ functional properties. Proper hydration ensures optimal fibrous structure and water-binding capacity.

# Mixing & Cooking Specifications

## Meat Replacement Guidelines

- Replace 15-40% of meat muscle with rehydrated ProteoMeat™
- Example: For hamburgers with 60% meat, 30% fat, 10% water/binders, substitute 20% raw meat with rehydrated ProteoMeat™ (approximately 10% by weight of final product)
- Reduce free water in formula by ~5-8% of total to compensate for ProteoMeat's™ water retention properties

## Processing Requirements

- Include stabilizers/emulsifiers: carrageenan, phosphates, or plant protein isolate (1-2%) for optimal cohesion
- Salt content: minimum 1.5% in raw material (final weight) to enhance plant protein functionality
- Mixing sequence: Add ProteoMeat™ in third stage after fat and spices using paddle mixer or cutter



# Thermal Processing Parameters

## Forming

Shape into final product format:

- Hamburgers
- Meatballs
- Sausages

## Cooking Temperature

Internal temperature must reach minimum 72°C for pasteurization

For optimal texture and consistency, slow cooking at 75-80°C for 20-30 minutes in cooking bath is recommended

Proper thermal processing ensures both food safety and optimal textural development in ProteoMeat™-enhanced products. The fibrous structure stabilizes during cooking, creating the characteristic meaty mouthfeel.

# Product-Specific Formulations



## Hamburgers (80g net)

**Substitution level:** 12% rehydrated ProteoMeat™ replaces ~20% of muscle meat

**Key considerations:** Adjust added water according to ProteoMeat™ retention capacity



## Meatballs in Sauce

**Substitution level:** 15-25% of lean meat

**Key considerations:** Can combine with hydrated breadcrumbs for fluffier texture; reduce egg or added starches by 1-2%



## Frankfurters/Bologna

**Substitution level:** 20-30% of meat

**Key considerations:** Excellent functionality in emulsified systems; requires casing and high-speed vacuum cutter or emulsifier



# Industrial Hamburger Formula

Ingredient	% Total Weight
Lean meat	48%
Fat (pork/beef)	24%
Rehydrated ProteoMeat™	12%
Water/Ice	10%
Salt and spices	4%
Others (binders, phosphates)	2%

This formulation achieves optimal texture and juiciness while maintaining processing functionality. The 12% rehydrated ProteoMeat™ effectively replaces approximately 20% of the muscle meat, providing significant cost savings without compromising product quality.



# Technical Quality Control Parameters

## Critical Control Points

- **System pH:** Maintain between 5.8-6.2 to optimize protein-water binding and product firmness
- **Protein content:** Ensure final product contains >15% protein to meet regulatory requirements in most jurisdictions
- **Microbiological stability:** Apply standard meat product thermal treatments; add nitrite/nitrate and antioxidants as applicable

## Quality Assessment Methods

- **Sensory enhancement:** Add flavor enhancers (umami, natural glutamates) to compensate for plant-based notes
- **Physical testing:** Evaluate water retention via cooking loss measurements
- **Texture analysis:** Assess firmness via texturometer and evaluate perceived juiciness through sensory panels

# Competitive Advantages vs. Traditional TVP

## Texture Profile

ProteoMeat™ delivers superior fibrous texture compared to traditional textured vegetable protein (TVP)

Less granular mouthfeel and more authentic meat-like structure

## Flavor Profile

Reduced plant-based off-notes requiring fewer masking agents

Lower requirement for additional flavorings to achieve acceptable sensory characteristics

## Functional Properties

Enhanced emulsifying capacity with superior water and fat binding

Requires fewer additional stabilizers for optimal product cohesion

## Allergen Status

Free from declarable allergens, unlike soy-based TVP

Provides competitive advantage for clean-label applications

# Technical Summary



## Core Processing Parameters

- Rehydration: 1:2 water to ProteoMeat™ ratio, 10-15 minutes
- Lean meat substitution: 15-40% depending on product type
- Water adjustment: Reduce free water by 5-8% to maintain moisture balance
- pH control: Maintain 5.8-6.2 for optimal functionality
- Stabilizers: Include 1-2% for proper cohesion
- Mixing: Use paddle mixer or cutter; form before cooking
- Cooking: Minimum internal temperature 72°C; optimal uniformity at 75-80°C

# Adaptability for Various Applications

ProteoMeat™ formulations can be tailored to specific requirements based on:

1

## Meat Type

Adaptation for beef, pork, or poultry applications with specific textural requirements

2

## Product Profile

Adjustments for low-fat, high-protein, firm texture, or juicy texture variants

3

## Regulatory Requirements

Customization to meet local regulations for protein content, additives, and labeling requirements

- ❏ ProteoMeat™'s superior functionality in meat emulsions and molded products provides significant advantages over traditional TVP, especially in high-moisture applications.

# Updated Rehydration Protocol

## Enhanced Rehydration Process

- **Ratio:** 1 part ProteoMeat™ to 2 parts water (e.g., 1 kg ProteoMeat™ + 2 L water)
- **Time:** Extended to 15-20 minutes with gentle agitation halfway through
- **Water temperature:** 10-20°C (cold to warm water)
- **Post-hydration:** Drain excess water only if necessary; ideally use directly with all absorbed water
- **Yield:** 1 kg dry ProteoMeat™ → approximately 3 kg hydrated product



## Substitution Calculations

For a product with 100 kg meat mass, replacing 20% lean meat:

- Remove 20 kg meat
- Add ~7 kg dry ProteoMeat™ hydrated with 14 L water
- Result: 21 kg of functional ingredient

# Formula Adjustment Guidelines

## Water Content

Reduce free water in the recipe based on ProteoMeat's™ high retention capacity (absorbs ≈200% its weight)

## Fat Levels

Maintain standard fat levels (15-30% depending on product) as ProteoMeat™ replaces lean meat, not fat functionality

## Salt Content

Include minimum 1.5% salt (NaCl) to optimize protein solubilization and functionality

## Additives

Use phosphates or emulsifiers (0.3-0.5%) to enhance cohesion and water retention

Reduce starches or vegetable fibers by 10-20% when using ProteoMeat™

The high water-binding capacity of ProteoMeat™ requires careful adjustment of formula components to maintain proper product consistency and processing characteristics.

# Application-Specific Formulations



## Standard Burger Formulation (80g unit)

Ingredient	% Total weight
Lean meat (beef/pork)	45%
Animal fat	25%
Hydrated ProteoMeat™	20% (≈7% dry)
Additional water/ice	6%
Salt + spices + additives	4%

**Performance metrics:** Juicy texture, cooking loss <20%, final protein content >15%

# Advanced Applications

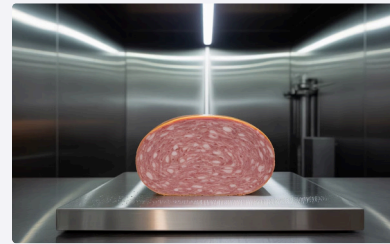


## **Meatballs (35g each, for sauce)**

15-25% lean meat substitution with hydrated ProteoMeat™

Reduce breadcrumbs or starches by 15-20%

Results in fluffier structure with improved sauce absorption



## **Frankfurter/Mortadella Sausages**

25% hydrated ProteoMeat™ (≈8.5% dry)

High-speed cutter or emulsifier essential for proper integration

Creates more stable emulsion with reduced post-cooking syneresis

# Technical Best Practices

## Critical Processing Parameters

- **Target pH:** Maintain 5.8-6.2 for optimal water retention
- **Emulsion temperature:** Keep below 12°C during chopping/emulsifying to prevent protein denaturation
- **Cooking parameters:** Minimum internal temperature of 72°C for food safety

## Sensory Optimization

For authentic meat profile enhancement:

- Incorporate natural meat flavors (0.3-0.5%)
- Consider autolyzed yeast extracts (0.3-0.5%) for umami enhancement
- Conduct trained panel sensory evaluation with standard references



# Competitive Advantage Analysis

## ProteoMeat™ vs. Standard TVP (Textured Vegetable Protein)



### Superior Texture

More fibrous and homogeneous structure that more closely mimics muscle tissue



### Improved Flavor Profile

Significantly reduced plant-based off-notes requiring less flavor masking



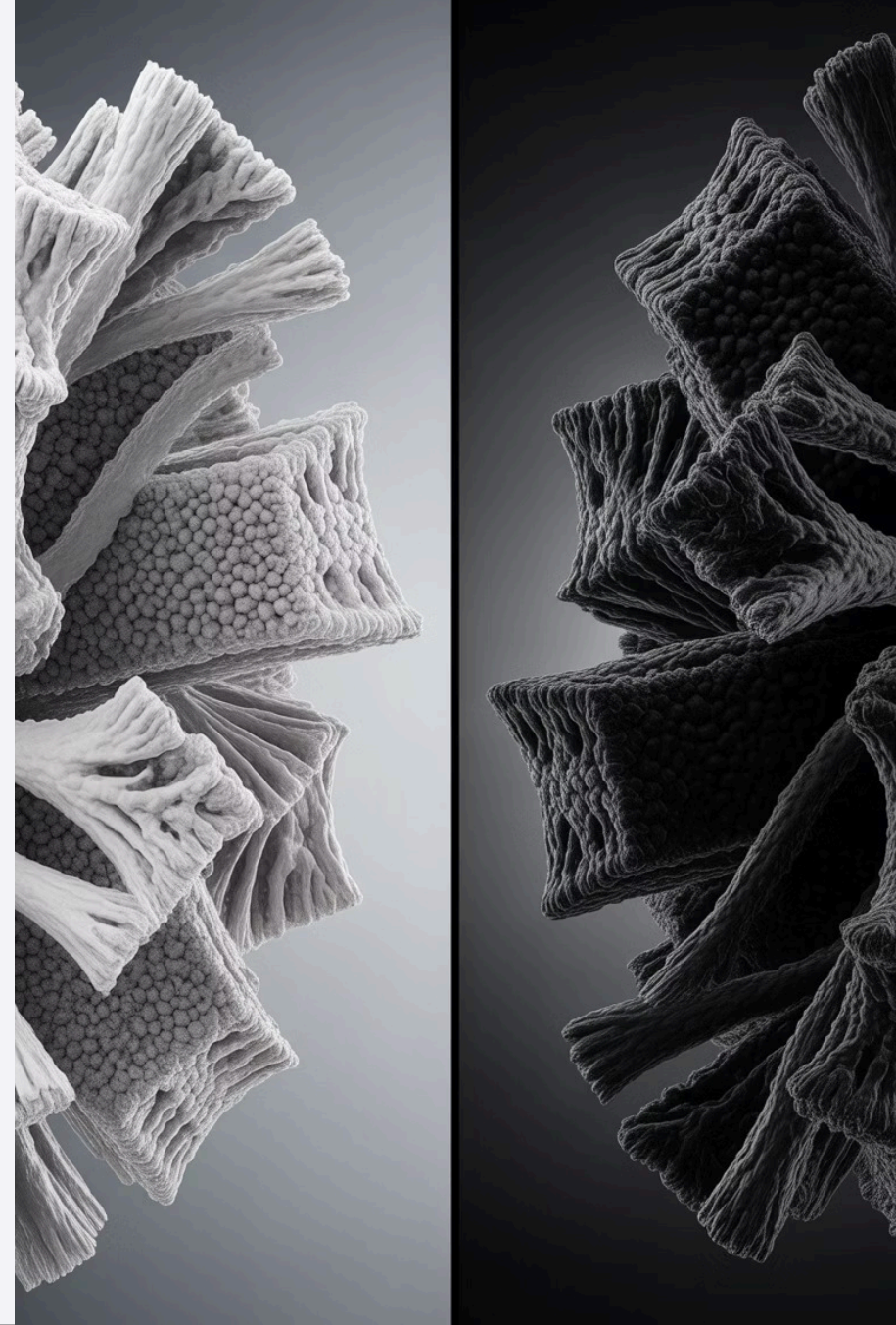
### Enhanced Functionality

Superior water retention capacity resulting in improved juiciness and yield



### Better Cohesion

Reduced need for external stabilizers due to improved binding properties



# Base Formulas for 100kg Batch Production

## Burger Formula

- Lean meat: 45 kg
- Animal fat: 25 kg
- Dry ProteoMeat™: 7 kg
- Rehydration water: 14 L
- Additional water/ice: 6 kg
- Salt + spices + additives: 3 kg



## Meatball Formula

- Lean meat: 50 kg
- Animal fat: 20 kg
- Dry ProteoMeat™: 6 kg
- Rehydration water: 12 L
- Breadcrumbs/starch: 5 kg
- Additional water/ice: 4 kg
- Salt + spices + additives: 3 kg

## Frankfurter Formula

- Lean meat: 35 kg
- Animal fat: 25 kg
- Dry ProteoMeat™: 8.5 kg
- Rehydration water: 17 L
- Additional water/ice: 10 kg
- Phosphates/stabilizers: 1.5 kg
- Salt + spices + additives: 3 kg

# Substitution Level Variations

Formulations can be adjusted based on desired substitution level. The table below provides recommended adjustments for 15%, 30%, and 40% substitution levels in burgers (per 100kg batch):

<b>Ingredient</b>	<b>15% Substitution</b>	<b>30% Substitution</b>	<b>40% Substitution</b>
Lean meat	60.5 kg	49 kg	42 kg
Animal fat	25 kg	25 kg	25 kg
Dry ProteoMeat™	3.5 kg	7 kg	9.5 kg
Rehydration water	7 L	14 L	19 L
Additional water/ice	6 kg	6 kg	6 kg
Salt + spices + additives	3 kg	3 kg	3 kg

Remember to maintain critical process parameters: pH 5.8-6.2, emulsion temperature below 12°C, and minimum internal cooking temperature of 72°C for all formulations.