

The Complete Technology Book on Meat, Poultry and Fish Processing (2nd Revised Edition)

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India is endowed with the largest livestock population in the world. Livestock and poultry in Indian tropical and sub tropics play a critical role in agriculture economy by providing milk, meat, eggs etc and provide flexible reserves during period of economic stress and buffer against crop failure. Mutton and Chicken is an important livestock product which in its widest sense includes all those parts of the animals that are used as the food by the man. So, with increase in population there is also an increasing consumer demand for food products that are low in fat, salt and cholesterol at local, national and international levels. Food manufacturers need to be able to produce meat, poultry and fish products which are considered to be healthy and that can meet the consumer demands. Meat industry, although is a very developing stage in India, is the top food industry in the world. Processed meat products are poised for continuous growth in the country. Poultry is one of the fastest growing segments of the agricultural sector.

The main aim of this book is to provide complete guide on meat, fish and poultry processing. Owing to the wide variety of products and type of processes and treatments (curing, dry curing, fermentation, cooking smoking etc), this products need particular analytical methodologies for proper consumption. It examines the nutritional principles behind the drive for reductions in fat, salt and cholesterol in our diet, and illustrates formulations and procedures utilized to produce such products. The reader would get to explore brief discussion regarding the Indian meat industry followed by the next chapter which includes structure, composition and nutritive value of meat tissues, postmortem changes and some meat quality parameters are also added in the preceding chapters. It also discuss about meat cutting and packaging, processing of meat and meat products, microbial and other deteriorative changes in meat and their identification, chemical composition and nutritive value of poultry meat, pre slaughter handling, transport and dressing of poultry, fish products, freezing fish fillets, miscellaneous fish dishes, spreads, salads, loaves fish spreads for appetizers, sandwiches, shellfish and miscellaneous marine products, meat removal and pre freezing treatment, packing and freezing, classes and sizes of fresh and frozen oysters, freezing whole raw lobsters etc. The book contains manufacturing processes of various meat, chicken and fish products in much illustrative manner. Special content on machinery equipment photographs along with supplier details has also been included.

It is anticipated that, it turns out to be a resourceful book for entrepreneurs, technocrats, food technologists and others linked with this industry; as this would be an invaluable reference

source for meat, poultry and fish processors, and food industry personnel involved in the development and marketing of new products.

1. INDIAN MEAT INDUSTRY

Livestock Resource

Meat Production

World Scene

Processed Meat Industry

2. STRUCTURE, COMPOSITION AND NUTRITIVE VALUE OF MEAT TISSUES

Structure of Muscle Tissue

Skeletal Muscle and Associated Connective Tissue

Smooth Muscles

Cardiac Muscles

Composition of Muscle Tissue

Water

Protein

Lipids

Carbohydrates

Minerals

Vitamins

Nutritive Value of Meat Tissues

3. POSTMORTEM CHANGES

Loss of Homeostasis

Postmortem Glycolysis and pH Decline

Rigor Mortis

Loss of Protection from Invading Microorganisms

Degradation due to Proteolytic Enzymes

Loss of Structural Integrity

4. SOME MEAT QUALITY PARAMETERS

Meat Colour

Water Holding Capacity

Marbling

Quantum of Connective Tissue

Firmness

Meat Storage Conditions

Cold Shortening

Thaw Rigor

Antemortem Factors Affecting Meat Quality

5. MEAT CUTTING AND PACKAGING

Wholesale Cuts of Lamb Carcass

Wholesale Cuts of Buffalo or Beef Carcass

Grading

Packaging

Overwraps

Tray with Overwrap

Shrink Film Overwrap

Vacuum Packaging

Modified Atmosphere Packaging

6. PROCESSING OF MEAT AND MEAT PRODUCTS

Basic Processing Procedures

Cured and Smoked Meats

Hams
Commercial Processing of Ham
Cooked Ham
Country Ham
Prosciutto
Bacon
Commercial Processing of Bacon
Sausages
Classification
Processing Steps
Formulations of Some Sausages with Special Features
Intermediate Moisture and Shelf Stable Meat Products
Humectants
Basic Processing Techniques
Stability of Intermediate Moisture Meats
Hurdle Concept
Restructured Meat Products
Other Popular Meat Products
7. MICROBIAL AND OTHER DETERIORATIVE CHANGES
IN MEAT AND THEIR IDENTIFICATION
Sources of Microbial Contamination of Meat
Growth of Microorganisms in Meat
Deteriorative Changes in Meat
Identification of Meat Spoilage
8. FRAUDULENT SUBSTITUTION OF MEAT AND
ITS RECOGNITION
Recognition of Fraudulent Substitution or Adulteration
Physical Methods
Anatomical Methods
Dentition
Bone Percentage of Carcass
Ribs on the Thorax
Characteristics of Long Bones
Histological Methods
Chemical Methods
Composition of Body Fats
Immunological/Serological Methods
Electrophoretic Methods
Isoelectric Focusing
Enzyme-Linked Immuno Sorbent Assay (ELISA)
9. CHEMICAL COMPOSITION AND NUTRITIVE
VALUE OF POULTRY MEAT
Chemical Composition
Moisture
Protein
Fat
Carbohydrate
Vitamins
Minerals
Nutritive Value
10. PRE-SLAUGHTER HANDLING, TRANSPORT
AND DRESSING OF POULTRY
Pre-slaughter Care and Handling

Transport
Dressing of Poultry
Slaughtering
Scalding
Defeathering
Singeing
Washing
Removal of Feet and Oil Gland
Evisceration
Chilling and Draining
Washing
Grading
Packaging
Storage

11. ANTEMORTEM AND POSTMORTEM EXAMINATION OF POULTRY

Antemortem Inspection of Poultry
Postmortem Inspection

12. PROCESSING OF SOME CONVENIENCE POULTRY PRODUCTS

Tandoori Chicken
Chicken Barbecue
Chicken Seekh and Shami Kababs
Chicken Kofta
Poultry Pickle
Chicken Samosa
Chicken Sausage
Chicken Patties
Chicken Tikka

13. ROLE OF MEAT AND POULTRY PRODUCTS IN HUMAN NUTRITION

14. CURED MEATS

General Recommendations
Thawing Frozen Cuts
Sanitation is Important
Curing Cellar Temperature
Curing Methods for Large Meat Cuts
Artery Pumping
Injecto Curing
Sweet Pickle Cure
Dry Cure
Curing Pickle Ingredients and Government Regulations
Permitted Moisture Content
Phosphates
Ascorbates
Flavourings
Preparing Pickles for Curing
Pumping Pickles
Using Sodium Erythorbate (or Sodium Ascorbate)
Without Phosphate and Sodium Erythorbate
When Phosphates are Used
Government Regulations Concerning Destruction of Trichinae
Boneless Pork Loins and Loin Ends

Coppa
Freezing to Destroy Trichinae
Management Assistance in Safeguarding Processed Meats
Hams and Picnics
Curing Whole Smoked Hams
Arterial Pumping of Pickle
Pumping Scales
Pumping
Fast Cure
Full Cure
Procedure for Smoking
Marketed as Uncooked Hams
Ready to Eat Fully Cooked Hams
Artery-Pumped Smoked Picnics (Shoulders)
Ready-to-Eat Fully Cooked Picnics
Boneless Oval Shaped and Elongated Ready-to-Eat
Smoked Hams in Fibrous Casings
Processing Procedure
Boneless of Bone-in-Pear-Shaped Ready-to-Eat Smoked
Hams Processed in Stockinette
Processing Procedure
Export Hams and Picnics
Processing Procedure
Boiled Hams
Processing Procedure
Canned Hams (Pear-Shaped and Pullman)
Processing Procedure
Washing and Boning
Smoke is Optional
Filling and Pressing
Cooking
Cooling
Keep Under Refrigeration
Prosciutti (Italian-Style Hams)
Processing Procedure
Pork Butts and Loins
Capocollo (Italian-Style Cured Butts) (Also Capicola, Capacola)
Dry Cure Procedure
Fully Cooked Ready-to-Eat Capocollo
Curing
After-Cure Treatment
Smoking
Final Treatment
Twins Wrapping
Smoked Boneless Butts
Processing Procedure
Dewey Hams (Loins)
Processing Procedure
Canadian-Style Bacon
Curing
Stuffing (Encasing)
Smoking
After-Smoke Treatment

Bacon (Bellies)
Continuous Process with Overnight Cure
Box Dry-Cured Bacon
Processing Procedure
Dry Penetronic-Cured Bacon
The Penetronic Machine
Processing Procedure
Injecto-Cured Bacon
Injecto Process
Cured Beef Products
Beef Bacon
Dried Beef for Slicing
Dried Beef for Slicing (Fast Method)
Processing Procedure
Kosher-Style Corned Beef Brisket
Curing Pickle
Curing
Packaging
Cooked Corned Beef Rounds
Curing Pickle
Curing
Boning
Aging and Flavour Development
Molding and Cooking
Chilling and Stuffing
Peppered Beef Rounds
Boning
Aging
Smoking and Cooking
Packaging
Pastrami
Curing Pickle
Curing
Rubbing
Smoking and Cooking
Chill and Package
Cured and Smoked Beef Tongues
Artery Pumping and Curing
Cover Pickle Curing
Smoking
Cured and Cooked Beef Tongues Canned in Tin or
Glass Containers
After-Cure Treatment
Packaging
Processing
For Tin Containers
For Glass Containers
15. SAUSAGES
Fresh Sausages
Low Temperatures are Important
Practice Strict Sanitation
Destruction of Trichinae
Avoid Smeary Texture

Use of Spices
Shelf-Life
Casings and Stuffing
Processing Procedure
Hot Whole Hog Sausage
Processing Procedure
Procedure
Seasoning Formulas
Meat Selection
Grinding and Mixing
Italian-Style Sausage
Processing Procedure
Fresh Chorizos
Bockwurst (White Sausage)
Bockwurst using Nonfat Dry Milk
Dry and Semidry Sausages
Government Regulations
Selection of Meats
Cleanliness of Kitchen and Equipment
The Sausage Making Procedure
Dry Salami
Processing Procedure
Genoa Salami
Processing Procedure
Salami De Milano
Salami Dâ€™Arles
Processing Procedure
Dried Farm Sausage
Processing Procedure
Pepperoni Sticks
Processing Procedure
Dried Chorizos
Processing Procedure
Tiroler Landjager Sausage
Processing Procedure
Mortadella (Dry Process)
Mortadella-Style Sausage using Nonfat Dry Milk
Krakauer Dry Sausage
Cervelat Summer Sausage
Cervelat Sausage using Nonfat Dry Milk
Thuringer-Style Sausage using Nonfat Dry Milk
Semidry Sausages using Lactic Acid Starter Culture
Suggestions for Producing a Semidry Sausage with Lactacel
Lactic Acid Starter Culture
Meat Formulation
Spice Formulation
Grinding and Mixing
Addition of Starter Culture
Stuffing
Smoking Schedule
Cervelat Summer Sausage with Lactic Acid Starter Fermentation
Smoking Procedure for Both Methods
Thuringer Summer Sausage with Lactic Acid Starter Fermentation

Thuringer Sausage using Lactic Acid Starter Culture
Meat Formulation
Spice Formulation
Hot Bar Sausage using Lactic Acid Starter Culture
Critical Factors Related to the Use of Starter Culture (Lactacel)
Cooked Smoked and Unsmoked Sausages (Frankfurters, Weiners, Bologna Types)
MID Regulations Concerning Added Materials in
Sausage Products
New FDA Ban on Premixed Commercial Seasoning Containing Sodium Nitrite
Outline of Rapid Processing Procedure for Skinless Frankfurters Through Conveyor System
Bologna-Type Sausages: Jumbo, Long, and Ring
Chopping Operation using Grinder
and Conventional Chopper
Chopping Operation when High-Speed Chopper is used
Chopping Operation when Grinder, Conventional Chopper,
and an Emulsifier are used
Chopping Operation when High-Speed Chopper and
an Emulsifier are used
Chopping Operation using Grinder, Mixer, and an Emulsifier
Other Added Materials
Stuffing
Smoking and Cooking
Fast Process using Combination of Glucono Delta Lactone or Sodium Acid Pyrophosphate and
Sodium Erythorbate
Frankfurter Sausages (Wieners)
Chopping Operation using Grinder and Conventional Chopper
Chopping Operation when High Speed Chopper is used
Chopping Operation when Grinder, Conventional Chopper and Emulsifier are used
Chopping Operation when High Speed Chopper and
Emulsifier are used
Chopping Operation using Grinder, Mixer, and Emulsifier
Added Materials
Stuff
Smoke and Cook
Fast Process using Combination of Glucono Delta Lactone with or without Sodium Acid Pyro-
phosphate and Sodium Erythorbate
Oil Spice for Smoked Meat Flavor
Ring Bologna using Nonfat Dry Milk
Large Bologna using Nonfat Dry Milk
Bologna Formulas using Soy Protein
High Grade Frankfurter using Nonfat Dry Milk
Processing Data
Frankfurter using Soy Protein Concentrate
Hot Dogs Extended with Textured Vegetable Protein
Skinless Frankfurters using Nonfat Dry Milk
Skinless Cheesefurters using Nonfat Dry Milk
Cooked Salami (Salami Cotto)
Cooked Salami Cotto (Perishable) Finest Quality Cooked
Salami in 3- or 6-LB Cans
Salami Cotto using Nonfat Dry Milk
Kosher and Kosher-Style Salami
Minced Ham
All Meat Smoked Sausage

Smoked Link Sausage with 3½ % Cereal and Nonfat Dry Milk Added
• Smokies • Pork Sausage
New England Style Smoked Sausages
Smoked Italian-Style Hot or Mild Sausage
All Meat Polish Sausage
Polish Sausage in Vinegar Pickle
Polish Sausage Containing 3½ % Cereal and Nonfat Dry Milk
Polish Style Sausage with Textured Soy Protein
Polish-Style Sausage using Nonfat Dry Milk
Blood Sausage
Cure Pork Tongues
Cure Beef Blood
Cure Beef Shank Meat
Cure Pork Snouts
Cure Pork Jowls or Backfat
Precook Meats
Grind, Chop, and Mix
Stuff and Tie
Cook
Chill
Smoke Bung-Encased Sausages
Keep Product Refrigerated
Liver Sausage Smoked or Unsmoked
Keep Product Refrigerated
Braunschweiger Liver Sausage
Braunschweiger-Style Liver Sausage with Soy Protein
Braunschweiger with Isolated Soy Protein
Braunschweiger-Style Liver Sausage using Nonfat Dry Milk
Kosher-Style Liver Sausage
Farmer-Style Liver Sausage
Bohemian Liver Sausage
Homemade German-Style Liver Sausage (Housmacher Leberwurst)
Hungarian-Style Rice Liver Sausage
Ring Liver Pudding
Cooked Krakauer Sausage
Berliner Sausage using Nonfat Dry Milk
Knockwurst
Thuringer Knockwurst
Knoblauch Sausage using Nonfat Dry Milk
Acme Sausage using Nonfat Dry Milk
Miscellaneous Sausages
Heat-and-Serve Pork Sausage
Best Quality Canned Pork Sausage
Canned Bulk Breakfast Sausage with 3½ % Cereal Added
Sausage Canned in Vegetable Oil (Good Quality)
Suggested Process
Final Chill
Canned Chorizos in Lard
Canned Vienna Sausages
Canned Imitation Vienna Sausage
Canned Vienna Sausages with Beans and Tomato Sauce
Prepare Vienna Sausages
Prepare Beans

Prepare Sauce
Fill Cans
Suggested Process
Vienna Sausages Packed in Barbecue Sauce
Canning Procedure
Suggested Process
Cocktail Frankfurters in Glass Jars
Retort

Suggested Process

16. FISH PRODUCTS

Separating Fish Flesh from Bones and Skin Mechanically
Yield of Flesh and Waste from some Pacific Ocean Fish Passed through a Laboratory-Model
Flesh Separator
Reducing Drip Loss in Fish Fillets
Treatment for Freezing
Results of Tests on Fresh Fish
Manufacturing Fish Flour (Fish Protein Concentrate)
Salted and Pickled Fish
Salting Fish
Salting of Cod, Lusk, Haddock, Hake, and Pollock
Cleaning
Salting
Drying
Skinning and Boning
Salting Mackerel
Salting Salmon
Salting Mullet
Dry-Salting
Brine-Salting
Bismark Herring and Variations
Cut Spiced Herring
Pickled Herring for Rollmops, Cut Spiced, or Bismark Herring
Herring in Wine Sauce
“Scotch-Cured” Herring
Rollmops
Herring in Sour Cream Sauce
Matjeshering
Gaffelbiter
Gabelebissen
German Delicatessen Anchovies
Scandinavian Anchovies
Russian Sardines
Potted Herring
Fish Pickled in Wine
Pickled Haddock Fillets
Pickled Salmon
Pickled and Spiced Mackerel Fillets
Pickled Eels
Canning Frozen-at-Sea Tuna
Canning Fresh Tuna
Canning Salmon
Canning Mackerel
Canning Sardines in Oil

Canning California Sardines
Canning Herring
Canning Shad
Canned Salmon Caviar Canape Spread Base
Canned Fish Chowder
Make a Fish Broth First
Fill Cans
Suggested Process
Canned Norwegian-Style Fish Balls (Fiskeboller)
Suggested Process
Canned Salmon or Tuna Loaf in 12-oz or 3-or 6-Lb Oblong Cans
Canned Fish Cakes
Frozen Fish
Freezing Minced-Fish Blocks
Preparation of Minced Fish Flesh
Preparation of the Frozen Blocks
Freezing Ready-to-Heat-and-Eat Fish Sticks
Forming Fillet Blocks
Freezing Fillet Blocks
Cutting the Fish Sticks
Coating the Sticks
Frozen Foods Dipping Batter Mix
Frozen Foods Breading Mix
Cooking the Sticks
Cooling and Packaging the Cooked Sticks
Freezing
Freezing Fish Fillets
Fillets or Pieces of Breaded Fish
Freezing Halibut and Salmon Steaks
Steaking the Frozen Whole Fish
Freezing
Frozen Heat-and-Eat Fried Fish
Frozen Fish Chowder
Frozen Fish Stew
Frozen Tu-Noodle
Frozen Swordfish au Gratin
Smoked Fish
Smoking Salmon
Hard-Smoked Salmon
Barbecued Sablefish (Kippered Black Cod)
Canned Smoked Salmon Spread
Suggested Process
Processing Kippered Salmon
Processing Kippered Herring
Canning Kippered Herring
Smoking Herring
â€œBloatersâ€•
Smoking Halibut
Smoking Haddock (Finnan Haddie)
Finnan Haddie (Scotch Method)
Smoking Alewives or River Herring
Smoking Mackerel
Smoking Sturgeon

Smoking Eels
Smoking Carp
Miscellaneous Fish Dishes, Spreads, Salads, Loaves
Fish Spreads for Appetizers, Sandwiches
Fish Loaf
Fried Fish Cakes
Marinating Fried Small Fish
Fish Sausage
Salmon Salad
Alternatives
Tuna Salad
Tuna Salad with Textured Vegetable Protein
Smoked Herring Salad
German-Style Herring Salad
Italian-Style Herring Salad
Alaska-Style Herring Salad
Tuna Souffle
Salmon Loaf
Tuna Noodle Casserole
Lutefisk
Standard Cooking Procedure
17. SHELLFISH AND MISCELLANEOUS MARINE PRODUCTS
Shrimp
Freezing Shrimp
Preparation of Raw Shrimp
Blast Freezing Shrimp
Freezing Glazed Shrimp
Freezing Cooked Shrimp
Canning Shrimp
Suggested Process
Frozen Shrimp in Creole Sauce
Frozen Shrimp Bisque
Frozen Shrimp Creole
Frozen Curried Shrimp
Frozen Shrimp Patties with Textured Vegetable Protein
Flavour Base for Rice Pilaf with Freeze-Dried Shrimp
Smoked Shrimp
Pickled Spiced Shrimp
Clams
Preparing Clams for Freezing
Soft Clams
Hard Clams (Quahog)
Surf Clams
Freezing
Canning Razor Clams
Canning Clam Extract
Canning Clam Nectar
Maryland Fried Clams
Canned Clam Chowders
For Manhattan Chowder
For New England Chowder
Batch Process
Canned Clam Stew (Hot Pack)

Frozen New England Clam Chowder
Made from Fresh Clams
Made from Canned Clams
Packaging
Canned Manhattan Clam Chowder
For Condensed Canned Chowder
Frozen Manhattan Clam Chowder (Batch Process)
Frozen Clam Patties
Crabs
Canning Pacific Crab Meat
Freezing Blue Crab Meat
Cooking
Meat Removal
Freezing Soft-Shell Crabs
Freezing King Crab Meat
Freezing King Crab Legs in the Shell
Freezing Dungeness Crab in the Shell
Freezing Dungeness Crab Meat
Cooking
Meat Removal and Prefreezing Treatment
Packing and Freezing
Frozen Crab Cakes
Frozen Deviled Crabs
Packaging
Frozen Crab Cakes
Frozen Deviled Crab Pastries
Frozen Crab Imperial
Prepare White Sauce
Prepare Crab
Package and Freeze
Chesapeake Bay Crab Imperial
Frozen Crab Cocktail Balls
Frozen Crab Patties
Frozen Crabburgers
Oysters
Freezing Oysters
Classes and Sizes of Fresh and Frozen Oysters
Canning Oysters
Frozen Oyster Stew
Prepare Base
Prepare Oysters
Package
Chesapeake Bay Oyster Stew
Frozen Oyster Patties
Virginia Pickled Oysters
Lobsters
Freezing Whole Raw Lobsters
Freezing Spiny Lobsters
Canning Lobster
Frozen Lobster Chowder
Frozen Lobster Newburg
Frozen Lobster Bisque (Batch Process)
Miscellaneous Marine Products

Freezing Sea Scallops
Shucking and Washing
Bagging and Icing
Freezing and Storing
Frozen Seafood Croquettes
Crayfish Bisque
Prepare the Crayfish
Prepare a Dressing
Prepare the Bisque
Fill and Process
Canning Mussels
Pickling Mussels
Pickled Mussels
Canned Pickled Mussels
Preparing Abalone Steaks
Frozen Batter-Dipped Abalone Patties
Fresh-Grain Russian Caviar
Pickled Grainy Caviar
Pasteurized Caviar
Preparation of the Roe
Pasteurization
Dried Mullet Roes
Freezing Sea Urchin Roe
Freezing Turtle Meat
Canned Terrapin Stew
Suggested Process
Canned Snapping Turtle Stew
Preparation of Agar-Agar
Dried Shark Fins
Shark-Flesh Paste

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