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National and International Standards for Meat and Meat Products

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Introduction

Regulation of the quality of meat placed in trade is essential to ensure uniformity in quality;and pricing of meat and meat products based on their quality, Microbial standards are necessary to ensure safe meat is made available to consumers. A microbial specification is amicrobiological criterion that is applied as a condition of acceptance for a food or ingredient by a food manufacturer. Microbiological specifications are generally contractual agreementsbetween a manufacturer and purchaser to check whether the foods are of required quality.

The major law involved in governing meat trade in India is Meat Food Products Order, 1973 and the most recent development governing Food Safety in India is the Food Safety and Standards Act, 2006.The major standards governing international food trade is ISO 22000 standard and microbial standards are set by International Committee on Microbial Specification on Foods (ICMSF), and European Economic Community.

National standards

BIS standards for the meat industry

Quality control departments frequently utilise the reliable methods and techniques for establishing the standards. A standard can be referred as carefully drawn specification withrespect to a food product. The specifications give comprehensive instructions to ensure correct and reliable process control. The compliance of specifications increases the confidence of top executives in the production and marketing of perishable food items.

Bureau of Indian standards (BIS)

Established in 1947 as Indian Standard Institution (ISI) as a joint venture of Government ofIndia and Industry took up the responsibility of preparing and promoting the general adoption of standards in the country. The erstwhile ISI constituted the Meat and Meat products Sectional Committee, AFDC 18 under the Agricultural and Food Products DivisionCouncil in 1958 to prepare Indian Standards for meat industry. This committee represents the scientists, technologists, manufacturers, government agencies and consumers.

The standards are prepared keeping in mind the needs of industry protecting the interests ofboth producers and consumers and are reviewed periodically. These BIS specifications are voluntary but an adherence to these

guidelines definitely improves the quality of processed products.

Microbiological standards help to improve plant sanitation, ensure safety of the products andprevent losses due to microbial spoilage. Microbiological specifications for meat processingplants as suggested by Marks and Spencer, UK, are presented in the following table.

Microbial Standards for Meat of Icmsf and Eec

Sampling plans and recommended microbiological limits for rawmeat (ICMSF, Microorganisms in Foods.Vol.2, 1986).

S.No	Product	Test	n	c	m	M
1.	Carcase meat, before chilling	APC	5	3	10^5	10^6
2.	Carcase meat. chilled	APC	5	3	10^6	10^7
3.	Edible offal, chilled	APC	5	3	10^6	10^7
4.	Carcase meat, frozen	APC	5	3	$5x10^5$	10^7
5.	Boneless meat, frozen (beef, pork, mutton)	APC	5	3	$5x10^5$	10^7
6.	Comminuted meat, frozen	APC	5	3	10^6	10^7
7.	Edible offal, frozen	APC	5	3	$5x10^5$	10^7
8.	Raw chicken, fresh or frozen	APC	5	3	$5x10^7$	10^7

- **n** = number of samples to be taken from the lot,
- **c** = number of samples permitted to fail,
- **m** = microbial count below which the sample is considered to be satisfactory
- **M** = microbial count above which the sample is considered unsatisfactory.

Provisions of Directive 88/657/EEC (with reference to fresh meat)

S.No	Organism	n	c	m	M
1.	Aerobic mesophile (total viable count) bacteria	5	2	$5x10^5$	$5x10^6$
2.	E.Coli	5	2	$5x10^2$	$5x10^3$
3.	Cl. Perfringens (sulphite-reducing anaerobes)	5	1	10^2	10^4
4.	Staphylococci	5	1	$5x10^2$	$5x10^3$
5.	Salmonella	5	0	Absence in 25g	

- **n** = number of samples to be taken from the lot,
- **c** = number of samples permitted to fail,
- **m** = microbial count below which the sample is considered to be satisfactory
- **M** = microbial count above which the sample is considered unsatisfactory**arcass Grading**

Type A, Fresh Carcass

Type B, Fresh, Chilled Carcass

- The carcass shall be chilled, so that the temperature at the deepest portion of the meat near the bone shall be 4 ºC or less and shall show no evidence of deterioration.

Type C, Fresh, Frozen Carcass

- The carcass, shall be frozen solid (-18 ºC) when delivered and shall show no evidence of deterioration.

Type D, Cuts, Fresh

- These shall be prepared from fresh carcasses of Type A. The cuts shall be well trimmed and cleaned with surplus fat removed.

Type E, Cuts, Fresh, Chilled

- These shall be obtained from the carcasses of, Type A or Type B within 36 hours and chilled

Type F, Cuts, Fresh, Frozen

- These shall be obtained from the carcasses of-Type A or Type B within 36 hours and frozen solid. The cuts shall show no evidence of refreezing or deterioration.

Grades

1. **Prime** - Prime beef or buffalo meat is the top quality, produced from young and well fed bovine animals.
   Prime grade carcasses and wholesale cuts are thick, blocky and compact. The fat covering of the carcass varies depending upon the age of the animal, from slightly thin in young animal to moderately thick in mature animals.
   The colour of the meat usually ranges from light-red to slightly dark red.

2. **Good** - Good grade beef or buffalo meat carcasses and wholesale cuts are moderately thick-fleshed, slightly compact and blocky in appearance. 'The fat covering of the carcass may be somewhat soft or slightly oily and varies from thin in young animals to slightly thick in more mature animals.
   The colour of the meat varies from light red to slightly dark red.

3. **Commercial-** Commercial grade beef or buffalo meat carcasses vary, over a fairly wide range, in conformation, finish and quality. Young animals are angular and slightly thin-fleshed, mature animals are slightty thick fleshed but irregular in COD tour.

- Fat covering varies from thin in young animals to slighlty thick in mature animals and may be patchy or wasty. It is moderately soft or oily in young animals and usually firm in mature animals.The rib muscle of young animals is soft and watery, whereas in mature animal sit is coarse.

FSSAI standards

In order to consolidate the laws relating to food and to establish the Food Safety and StandardsAuthority of India for laying down science-based standards for articles of food and to regulatetheir manufacture, storage, distribution, sale and import, to ensure availability of safe and wholesome food for human consumption and for matters connected therewith or incidental thereto, the Govt. of India has enacted new food laws known as "The Food Safety and Standards Act, 2006". This Act was passed on 23rd August, 2006. It extends to the whole of India. However, the Act came in to force only recently in 2011. This Act consolidates various acts &orders that have hitherto handled food related issues in various Ministries and Departments.

Composition of Food Safety and Standards Authority of India

The Food Authority consists of a Chairperson and the following twenty-two members out of which one-third shall be women, namely: -

Seven Members, not below the rank of a Joint Secretary to the Government of India, to be appointed by the Central Government, to respectively represent the Ministries or Departmentsof the Central Government dealing with -

(i) Agriculture, (ii) Commerce, (iii) Consumer Affairs, (iv) Food Processing, (v) Health, (vi) Legislative Affairs, (vii) Small Scale Industries

Two representatives from food industry of which one shall be from small scale industries, two representatives from consumer organizations, three eminent food technologists or scientists, five members to be appointed by rotation every three years, one each in seriatim from the zonesas specified in the First Schedule to represent the States and the Union territories, two personsto represent farmers' organizations, one person to represent retailers' organizations.

Punishment for unsafe food under FSSAI

Any person who, whether by himself or by any other person on his behalf, manufactures for sale or stores or sells or distributes or imports any article of food for human consumption which is unsafe, shall be punishable,–

(i) where such failure or contravention does not result in injury, with imprisonment for a term which may extend to six months and also with fine which may extend to one lakh rupees;

(ii) where such failure or contravention results in a non-grievous injury, with imprisonment for a term which may extend to one year and also with fine which may extend to three lakh rupees;

(iii) where such failure or contravention results in a grievous injury, with imprisonment for a term which may extend to six years and also with fine which may extend to five lakh rupees;

(iv) where such failure or contravention results in death, with imprisonment for a term which shall not be less than seven years but which may extend to imprisonment for life and also with fine which shall not be less than ten lakh Rupees.

Penalty for sub-standard food

Any person who whether by himself or by any other person on his behalf manufactures forsale or stores or sells or distributes or imports any article of food for human consumption which is sub-standard, shall be liable to a penalty which may extend to five lakh rupees.

Penalty for possessing adulterant

(1) Subject to the provisions of this chapter, if any person who whether by himself or by any other person on his behalf, imports or manufactures for sale, or stores, sells or distribute any adulterant shall be liable –

(i) where such adulterant is not injurious to health, to a penalty not exceeding two lakh rupees;

(ii) where such adulterant is injurious to health, to a penalty not exceeding ten lakh rupees.

(2) In a proceeding under sub-section (1), it shall not be a defence that the accused was holding such adulterant on behalf of any other person.

Standards for Meat Sausages

Sausage is a product obtained by stuffing minced meat (pork, poultry or meat from other food animals) and other ingredients (fat/oil, salt, water, extenders, spices etc.) in casings (natural/artificial) which may be marketed as fresh (raw), fermented, cooked and/or smoked.

S. No. (1)	**Parameter (2)**	**Requirement**		
		Fresh (3)	Cooked/Smoked (4)	Dry fermented (5)
1	Meat, Minimum (w/w)	50%	60%	65%
2	Moisture, Maximum (w/w)	65%	60%	50%
3	Total ash, Maximum (w/w)	3%	3%	3%

Food Safety and Standards (Contaminants, Toxins And Residues)Regulations, 2011

Food additives	Product name	Tolerance limit mg/kg (ppm)
Lead	Canned meats, edible gelatin, meat extracts and hydrolysed protein, dried or dehydrated vegetables (other than onions)	5.0
	Corned beef, Luncheon meat, cooked ham, chopped meat, Canned chicken, Canned mutton and Goat meat and other related meat products	2.5
	Meat of cattle, sheep and pig (also applies to fat from meat)	0.1
	Pig, edible offal of	0.5
	Poultry fats	0.1
	Poultry meat	0.1
	Poultry, edible offal	0.5
Copper	Edible gelatin	30
Tin	Canned fish products	200
	Cooked cured chopped meat (for products in other containers)	50
	Cooked cured chopped meat (for products in tinplate containers)	250
	Cooked cured ham (for products in other containers)	50
	Cooked cured ham (for products in tinplate containers	200
	Cooked cured pork shoulder (for products in other containers)	50
	Cooked cured pork shoulder (for products in tinplate containers)	200
	Corned beef (for products in other containers)	50
	Corned beef (for products in tinplate containers)	

		200
	Corned beef, Luncheon meat, cooked ham, Chopped meat, Canned chicken, Canned mutton and Goat meat	250
	Luncheon meat (for products in other containers)	50
	Luncheon meat (for products in tinplate containers)	200

Antibiotic and other pharmacologically active substances

S.No.	Name of Antibiotics	Tolerance limit mg/kg (ppm)
1.	Tetracycline	0.1
2.	Oxytetracycline	0.1
3.	Trimethoprim	0.05
4.	Oxolinic acid	0.3

Antibiotics and veterinary drugs are not permitted to be used at any stage of processing of meat and meat products, poultry and eggs, sea foods including shrimps, prawns or any variety of fishand fishery products.

The Extraneous Maximum Residue Limit of 0.001 mg/kg will be applicable except for Chloramphinicol for which it shall be 0.0003 mg/kg (0.3 ug/kg).

Nitrofurans including (Furaltadone, Furazolidone, Nitrofurnatoin, Nitrofurazone) and other drugs like chloramphenicol, sulphamethoxazole, chloroform, chloropromazine, colchicine, dapsone, dimetridazole, metronidazole, ronidazole, ipronidazole, diethylstibestrol, glycopeptides, stilbenes and other steroids, crystal violet, malachite green and carbadox

Packaging

Packaging requirements for Canned Meat Products

- The cans shall be lacquered internally; they shall be sealed hermetically after filling. The lacquer used shall be Sulphur resistant and shall not be soluble in fat or brine.
- Cans used for filling pork luncheon meat shall be coated internally with edible gelatin, lard or lined with vegetable parchment paper before being filled.
- Meat products packed in hermetically sealed containers shall be processed to withstand spoilage under commercial conditions of storage and transport

AGMARK

Animal Casings Grading and Marking Rules

Grade Calibration designation		Special characteristics	General characteristics
PQ	By flat measure-	The casings shall :	
	(i) In steps of 5mm e.g. 35mm and below, above 35mm to 40 mm, above 40 mm to 45 mm and so on upto65mm and above 65mm" or	(I) Be of uniform natural colour, lustrous throughout, without any spot and shall be free from discoloration.	a) (i) Be obtained from healthy animals slaughtered in licensed premises and subjected to ante mortem and post- mortem inspections according to the prescribed procedure.
	(ii) In steps of 2 mm e.g. 35 mm and below, above 35mm to 37 mm, above 37mm to 39 mm. and so on up to 65mm and above 65 mm";	(Ii) Be in-tact, freefrom any tear or laceration.	(ii) Be prepared under hygienic conditions, wholesome, and otherwisefit for human consumption.
	or (iii) As agreed, to between the purchaserand the exporter.	(Iii) Be perfectly rolled.	(iii) Be free from parasitic infestation and from scarsof healed up wounds.
		(Iv) Be free from salt burns, rust, domestics, black nodes, slime, mucus, dung, moulds or fungus infestation.	(iv) Not have been subjected to any bacterialactivation or fermentation
		(V) Be free from defects like holes, blisters, lacerations, nodules and cicatrices	
Grade I	(i) As per PQ. except that a slight deviation incolour and folds and a few black nodes shall bepermitted; Total fat streaks shall not exceed 40 per meter A streak of fat shall not exceed 3 cm. in lengthand I cm. in breadth.		(b) "Preservatives other than edible substance approvedby the Agricultural marketing adviser to the Government

		of India shall not have been used".
Grade II	Casings not conforming to PQ. or Grade I due to defects in rolling and or having larger black nodes, rough texture or streaks of fat not exceeding 60 in a meter.	
Grade III	Short pieces of any or all the above grades and/or having fat streaks in excess of 60 in a meter.	

Dry-ready—to wet" sheep casings (including goat casing) known commercially as"sheep casings" and produced in India.

Grade designation	Calibration	Special characteristics	General characteristics
1	2	3	4
PQ or Grade I	"(1) 12 to 26mm in steps of 2mm e.g., up to 12 mm., above 12 mm. to 14 mm., above (2) 13 to 27 mm in steps of 2mm, e.g. up to 13 mm, above 13 mm to 15 mm, above 15 mm to 17mm. etc.": or (3) as agreed to between the purchaser and the exporter.	The casings shall : (i) be free from defects like holes, blisters, lacerations, nodules and cicatrices. (ii) be intact and not torn or lacerated (iii) be free from rust, domestics black nodes, slime, mucus, dung and moulds or fungus infestations. (iv) not burst when filled with air or water to its normal capacity and slightly pressed. bacterial activation or fermentation.	The casings shall : (i) be obtained from healthy animals slaughtered in licensed premises and subjected to ante mortem and post mortem inspection according to the prescribed procedures. (ii) be prepared under hygienic con ditions as per patented process Nos. 90469 (National Research Deve-lopment Corporation of India) (iii) be wholesome and otherwise for human consumption. (iv) be free from parasitic infestations and from scars of healed up wounds, (v) not have been subjected to any

Grade II	**The casings shall :**
"(1) 12 to 26 mm in steps of 2mm e.g.. up to 12mm to 14 mm, above 14mm to 16mm etc. **(2) 13 to 27mm in steps of 2mm.** e.g., up to 13 mm above 13mm to 15mm, above 15 mm to 17 mm, etc". or	(i) be free from defects like holes, blisters, lacerations, nodules, and cicatrices,
	(ii) be intact and not torn or lacerated,
	(iii) be free from rust, domestics black nodes, slime, mucus,dung and moulds or fungus infestations,
	(iv) not burst when filled with air or water to its normal capacity and slightly pressed. A slight deviation shall be allowed in respect of the above items. The material should be fit for use in preparation of sausages.

(3) as agreed, to between the purchaser and the exporter.	
Grade III **"(**1) 12 to 26 mm in steps of 2mm e.g., up to 12 mm, above 12mm to 14mm, above 14mm to 16 mm etc. or (2) 13 to 27 mm in steps of 2 mm e.g., up to 13 mm., above 13mm to 15mm, above 15mm to 17 mm etc."; or (3) as agreed to between the purchaser and the exporter	The Casing shall:- (i) be free from defects like holes, blisters, lacerations, nodules and cicatrices, (ii) be intact and not torn or lacerated, (iii) be free from rust domestics, black nodes, slime, mucus, dung and moulds or fungus infestations, (iv) not burst when filled with air or water to its normal capacity and slightly pressed.

Pork Casings

Grade designation	**Calibration**	**Special characteristics**	**General characteristics**
	28mmabove 28mm to 30mm etc.	(i) without any discoloration. (ii) be free from defects like holes blisters, lacerations, nodules and cicatrices.	slaughtered in licensed premises and subjected to ante mortem and post mortem inspections according to the prescribed procedures.
	or	(iii) be intact and torn or lacerated	(ii) be prepared under hygienic conditions, wholesome, and otherwise fit for human consumption.
	(2) as agreed to betweenthe purchaser and the exporter.	(iv) be free from salt-burns, rust, domestics, black nodes, slime, mucus, dung and moulds or fungus infestations.	iii) be free from parasitic infestation and from scars of healed up wounds.

		(v) not burst when filled with air or water to its normal capacity and slightly pressed.	(iv) not be subjected to any bacterial activation or fermentation
		(b) The rings or hanks shall have been cured properly with common salt.	(b) preservatives other than edible common salt shall not have been used.

International Standards

Codex

The Codex Alimentarius Commission (CAC) was established by FAO in 1961. CAC is an intergovernmental body with 158 member Governments as on 31st August, 1997. The Codex Alimentarius ('Food Code' or 'Food Law' in Latin) is a collection of food standards, codes of practice and other recommendations presented in a uniform way. Codex standards, guidelines and other recommendations ensure that food products are not harmful to the consumer and can be traded safely between countries. The Codex Alimentarius has resulted in evaluation of the safety of over 760 food additives and contaminants and setting of more than 2500 maximum limits for pesticide residues and more than 150 for veterinary drug residues.

CAC has adopted the guidelines for the application of the Hazard Analysis Critical Control Point (HACCP) system through its committee on Food Hygiene. It has recognized HACCP as a tool to assess hazards and establish control systems that focus on preventive measures instead of relying primarily on end product testing.

The Uruguay Round of Multi-lateral Trade Negotiations which concluded in 1994 established the World Trade Organization (WTO) to replace the General Agreement on Tariffs and Trade(GATT).

- The Agreement on the Application of Sanitary and Phyto Sanitary Measures (SPS Agreement) The SPS Agreement confirm the right of WTO member countries to apply measures necessary to protect human, animal and plant life and health.
- The Agreement on Technical Barriers to Trade (TBT Agreement). The TBT Agreement basically provides all technical standards and regulations.

Standard for cooked cured pork shoulder

Meat Content - Average percentage meat-protein on fat-free basis > 17.5% - Minimum percentage meat-protein on fat-free basis = 16.0% (absolute minimum) CODEX specifications for transportation

Sr.no	Type of meat	Specifications for transportation
1	Fresh	Vehicles having impervious flooring and side walls, if distance exceeds over 100kms suitable arrangements should be made to maintain 6ºc.
2	Chilled	Transported in insulated or refrigerated vans maintaining a temperature no less than 6ºc.
3	Frozen	Transported in insulated or refrigerated van. Temperature of the carcass or meat should not exceed -7ºc.

Specification for buffalo beef or meat

Buffalo beef shall be obtained from healthy animals and slaughtered in slaughter houses. The animals shall be subjected to ante-mortem and post-mortem inspections by Veterinarians designated and/or of recognized local agency in respective states by the Agricultural MarketingAdviser. It shall not be treated with colures, dyes, additives, preservatives and chemicals.

Types Buffalo beef or meat shall be of the following types.

- Type A Fresh, Chilled Carcass
- TYPE B Fresh Frozen Carcass
- Type C Buffalo beef (bone-in), fresh, chilled
- Type D Buffalo beef (bone-in) fresh, frozen
- Type E Buttalo (boneless) beef, fresh, chilled.
- Type F Buffalo (boneless) beef fresh, frozen

Commercial name	Grade	Special characteristics	Bacteriological standards
Buffalo meat	Standard grade	Lean, good texture, bright red incolour	Sample per loat drawn and tested shall fulfil the following requirements
		Free from tears, lacerations, slime discolorations, mal odour and structural alterations	total plate count not exceeding 10 microorganisms per gram
		Firm consistency i.e., no pit on pressure	Ecoli not exceeding 100 microorganisms per gram
		Minimum connective tissue	Salmonella absent

		Boneless cuts should be entirely free from bone pieces, wood dust and other undesirable matter	

Specification for buffalo calf meat or veal

Buffalo calf meat or veal shall be obtained from healthy animals slaughtered in slaughter houses. The animals shall be subjected to ante-mortem and post-mortem inspections by a Veterinarians designated and or of recognized local agency in respective states by the Agricultural Marketing Adviser. It will not be treated with colures, dyes, additives,preservatives and chemicals.

Types Buffalo calf meat or veal shall be of the following types

- Type A Fresh Chilled Carcasses
- Type B Fresh Frozen Carcasses
- Type C Buffalo veal (bone in fresh, Chilled
- Type D Huffalo veal thone-mi fresh, frozen
- Type E Buffalo veal cuts (boneless; fresh, chilled
- Type F Buffalo veal cuts (boneless) fresh, frozen

Commercial name	**Grade**	**Special characteristics**	**Bacteriological standards**
Veal	Standard grade	Lean, good texture, bright pink to pinkish in colour	Sample per lot drawn and tested shall fulfil the following requirements
		Free from tears, lacerations, slime, discolorations, mal odour and structural alterations	total plate count not exceeding 07 microorganisms per gram
		Firm consistency i.e., no pit on pressure	Ecoli not exceeding 100 microorganisms per gram
		Minimum connective tissue	Salmonella absent
		Boneless cuts should be entirely free from bone pieces, wood dust and other undesirable matter	

Specification for mutton (sheep) and chevon (goat-meat)

Mutton and chevon shall be obtained from healthy animals and slaughter in slaughtered houses. The animals shall be subjected to ante-mortem and post-mortem inspections by Veterinarians designated and/or of recognized local agency in respective states by the Agricultural MarketingAdviser. It shall not be treated with colures, dyes, additives, preservatives and chemicals

Types Mutton shall be of the following types

- Type A Fresh Chilled Carcasses
- Type B. Fresh, Frozen Carcasses
- Type C (bone-in) fresh, Chilled
- Type D (bone-in) fresh, Frozen.
- Type E Deboned (boneless) fresh, chilled
- Type E Deboned (boneless) fresh, frozen

Commercial name	**Grade**	**Special characteristics**	**Bacteriological standards**
Mutton & chevon	Standard grade	Lean	Sample per lot drawn and tested shall fulfil the following requirements
		Free from tears, lacerations, slime, discolorations, mal odour and structural alterations	total plate count not exceeding **10 microorganisms per gram**
		Firm consistency i.e., no pit on pressure	Ecoli not exceeding 100 microorganisms per gram
		Minimum connective tissue	Salmonella absent
		Boneless cuts should be entirely free from bone pieces, wood dust and other undesirable matter	

Specification for minced meat (keema)

Minced meat derived from buffalo beef or veal or mutton or chevon which shall have been obtained from healthy animals and slaughtered in slaughter houses.

The animals shall be subjected to ante-mortem and post-mortem inspections by a veterinarians

designated and/or of recognized local agency in respective states by the Agricultural MarketingAdviser, the buffalo beef or veal or mutton or chevon shall not have been treated with colours,dyes additives, preservatives and chemicals.

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