Another accelerating or "catalytic" effect is the addition of **ascorbic acid**, which slightly lowers the pH of the meat mixture. However, the dosage of ascorbic acid must be low (0.05%), just to provide the slightly acid conditions for the reduction of $NaNO_2$ to NO. A pronounced reduction of the pH would negatively affect the water binding capacity of the product which is not desirable.

Fig. 62: Adding of nitrite curing salt during initial phase of meat mix fabrication

Curing of entire meat pieces

Besides the curing of chopped meat mixtures, **entire pieces of muscle meat** can be cured. However, due to size the curing substances cannot instantly react with the meat pigments as is the case in chopped meat mixes. Hence various curing techniques are applied.

The final products of curing entire meat pieces are either **cured raw fermented products** or **cured cooked products** (see page 98). The curing system to be used depends on the nature of the final product (uncooked or cooked). There are two systems for curing entire meat pieces, dry curing and wet curing ("pickling") and the type of the final product determines which system will used.

In **dry curing** a curing mix is prepared containing salt or nitrite curing salt, together with spices and other additives. The pieces of meat are rubbed with this curing mix (Fig. 63, 64, 214, 215) and packed in tanks. The curing mix gradually permeates into the meat, which can be a lengthy process ranging from several days to several weeks. For more details see page 173).

Dry curing is exclusively used for the fabrication of cured raw fermented products, in particular those with a long ripening period.

Fig. 63: Application of dry curing mix (curing salt, curing accelerators, spices) on fresh ham (pork leg)

Fig. 64: Ham is uniformly covered by curing mix

The second method of curing meat pieces is **wet curing**, also called **pickling**, which involves the application of **curing brine** to the meat. For the manufacture of the brine, curing salt and spices, and other additives if required are dissolved in water (see page 179). The meat cuts are packed in tanks and brine is added until all pieces are **completely covered** (Fig. 65). A temperature of +8 to +10°C for the curing room is recommended as lower temperatures may retard curing. For equal penetration of the brine, the meat is cured for periods ranging from several days to two weeks depending on the size of the cuts and curing conditions. After completion of the curing, ripening periods for the products follow for taste and flavour build-up (for more details see page 175).

Fig. 65: Wet curing

Wet curing by immersion of meat pieces in brine is primarily used for the fabrication of cured raw fermented products with shorter ripening periods.

An alternative and quick way of wet curing is to accelerate the diffusion of the curing substances by pumping brine into the meat tissue ("**injection curing**"). For this purpose brine injectors with perforated hollow needles are used. The injection of brine into the muscles can be done manually by using simple pumping devices (Fig. 43, 44, 66, 67). At the industrial level semi-automatic multi-needle brine injectors (Fig. 45, 46, 68) are used which achieve very even distribution of the curing ingredients and can reduce the curing period (equal distribution of the curing substances or "'resting period") to less than 48 hours.

Fig. 66: Manual brine injection using a large syringe

Fig. 67: Brine injection with a manual curing pump

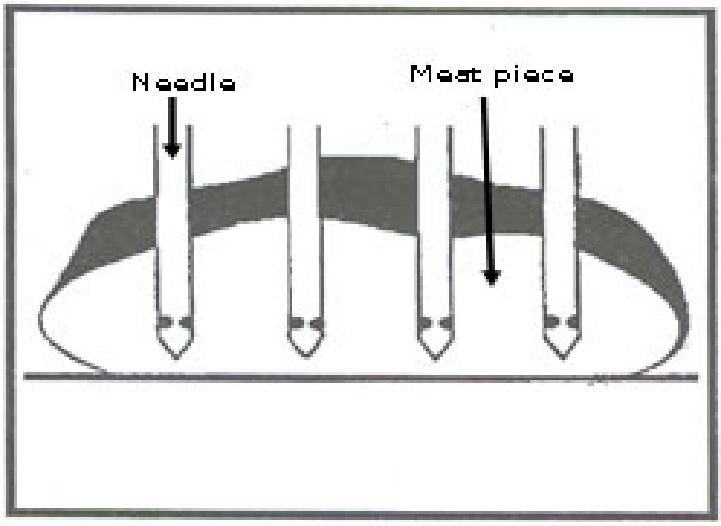


Fig. 68: Multi-needle brine injection (principle)

In addition, most injection cured meat pieces which are to be processed into cured-cooked products (such as cooked hams etc), are submitted to a tumbling process (see page 28, 184). Tumbling further accelerates the brine penetration throughout the meat prices and “resting periods” are not necessary.

Wet curing by brine injection is used for the fabrication of cured cooked products (see page 177).

3. Smoking

Smoke for treatment of meat products is produced from raw wood. Smoke is generated through the thermal destruction of the wood components **lignin** and **cellulose**. The thermal destruction sets free more than **1000** desirable or undesirable firm, liquid or gaseous components of wood.

These useful components contribute to the development of the following desirable effects on processed meat products:

- Meat preservation through aldehydes, phenols and acids (anti-microbial effect)
- Antioxidant impact through phenols and aldehydes (retarding fat oxidation)
- Smoke flavour through phenols, carbonyls and others (smoking taste)
- Smoke colour formation through carbonyls and aldehydes (attractive colour)
- Surface hardening of sausages/casings through aldehydes (in particular for more rigid structure of the casing)

The most known **undesirable effect** of smoking is the risk of **residues of benzopyrene** in smoked products which can be carcinogenic if the intake is in high doses over long periods. With normal eating habits, a carcinogenic risk is normally not associated with moderately smoked food such as smoked meat products.

Depending on the product, smoke is applied at different temperatures. There are two principal smoking techniques:

- Cold smoking
- Hot smoking

The principle of both methods is that the smoke infiltrates the outside layers of the product in order to develop flavour, colour and a certain preservation effect.

Cold Smoking – This is the traditional way of smoking of meat products and was primarily used for **meat preservation**. Nowadays it serves more for **flavour** and **colour formation**, for example in sausages made from precooked materials such as liver sausage and blood sausage (see page 153, 161).

The combination of cold smoking and drying/ripening can be applied to fermented sausages (see page 124) and salted or cured entire meat pieces (see page 176), in particular many raw ham products. In long-term ripened and dried hams, apart from providing colour and favour, the cold smoking has an important preservative effect as it prevents the **growth of moulds** on the meat surfaces.

The optimal temperature in "cold" smoking is 15 to 18°C (up to 26°C). Sawdust should be burned slowly with light smoke only and the meat hung not too close to the source of the smoke. Cold smoking is a long process which may take several days. It is not applied continuously, but in intervals of a few hours per day.

Hot Smoking – Hot smoking is carried out at temperatures of +60 to 80°C. The thermal destruction of the wood used for the smoking is normally not sufficient to produce these temperatures in the smoking chamber. Hence, **additional heat** has to be applied in the smoking chamber.

Fig. 69: Hotdogs are placed in the smokehouse for hot smoking (pale colour before smoking)

Fig. 70: After completion of the smoking process (brown-red colour after smoking, see also Fig. 42)

The relatively high temperatures in hot smoking assure a rapid colour and flavour development. The treatment period is kept relatively short in order to avoid excessive impact of the smoke (too strong smoke colour and flavour).

Hot smoking periods vary from not much longer than 10 minutes for sausages with a thin calibre such as frankfurters to up to one hour for sausages with a thick calibre such as bologna and ham sausage and products like bacon and cooked hams (see pages 142, 143).

Products and smoking – Cold smoking is used for fermented meat products (raw-cured ham, raw-fermented sausage) and precooked-cooked sausage (liver and blood sausages). Hot smoking is used for a range of raw-cooked sausages, bacon and cooked ham products. Smoke treatment can only be applied, if meat the products are filled in casings permeable to smoke (see page 248, 261). All natural casings are smoke permeable, as are cellulose or collagen basis synthetic casings.

Smoke permeable casings can also be treated using a new technology, where a liquid smoke solution is applied on the surface. This can be done by dipping in solution, showering (outside chamber) or atomization (spraying inside chamber). Polyamide or polyester based synthetic casings are not permeable to smoke. If smoke flavour is wanted for products in such casings, small quantities of suitable smoke flavour (dry or liquid) are added directly to the product mix during manufacture.

Production of liquid smoke

Liquid smoke can be used as an ingredient to sausages in smoke impermeable casings in order to achieve a certain degree of smoke flavour. As impermeable casings do not allow the penetration of gaseous smoke, liquid smoke can be added to the sausage mix during the manufacturing process. The starting point for the production of liquid smoke is natural smoke, generated by burning/smouldering wood under controlled temperatures with the input of an air supply. There are basically two different methods used for the subsequent processing of liquid smoke:

- direct condensation of natural wood smoke to liquid smoke
- penetration of the smoke into a carrier substance on the basis of water or oil and using this “smoked” carrier substance as an ingredient for meat products

SELECTION AND GRADING OF RAW MATERIALS FOR MEAT PROCESSING

The *two main components of processed meat products* are *animal muscle meat* and *animal fat*. Apart from pure muscle tissue, **muscle meat** (see page 2) also contains some connective tissue and inter- and intra-muscular fat, which determine the quality of muscle meat. **Animal fats** (see page 10) are of firmer or softer texture depending on their location in the animal body. In addition to the animal species, the texture of fats determines their processing quality. **Edible animal by-products** such as skin, internal organs and blood also play a role as raw materials for meat processing. By-products are not generally used; they are part of specific processed meat products (described in “Precooked-cooked meat products”, see page 149).

The first preparatory step for processing of meat into meat products is the product-oriented selection of raw animal materials, taking into account their quality and processing suitability and the characteristics of the meat products to be fabricated. Some meat products require lean meat without adhering fat or connective tissue, while others have a higher fat and/or connective tissue contents. Other products require firm animal fats, for others soft fats are better suited. Choosing appropriate raw materials is indispensable for efficient meat processing and is best done by visual **selection and grading** according to the tissue-specific properties.

Meat processors are advised to develop **enterprise-specific standards** of raw material composition for each meat product fabricated. The proper grading of raw materials, which needs skills and experience, has a decisive impact on the quality of the meat products and resulting revenues which can be generated.

For the needs of small to medium sized meat processing plants, simple grading schemes are described hereunder, with raw materials from pigs, cattle/buffaloes and other ruminants as well as poultry.

Selection and grading of manufacturing meat from pigs

The below proposal for selection and grading of pig meat refers to the utilization of the entire carcass for **meat processing**. Naturally, in many meat plants, valuable meat cuts may be excluded from further processing and marketed as **fresh meat**.

In these cases only the remaining carcass meat is used for **further processing**. Common cuts for fresh meat sales are tenderloin, loin, rump, the entire ham or parts of the ham (topside, silverside, knuckle) and parts of the neck and shoulder (Fig. 71, 72).

The proportion of carcass meat going into fresh meat sales or into further processing is decided by the operator on a case-by-case basis. If higher amounts of lean meat are required for further processing, more primal cut meat will be used for this purpose and vice versa.

Hereunder, a **grading scheme** for manufacturing-meat from pigs consisting of six grades is proposed (Fig. 73). This standard can be refined or simplified as determined by consumer demand.

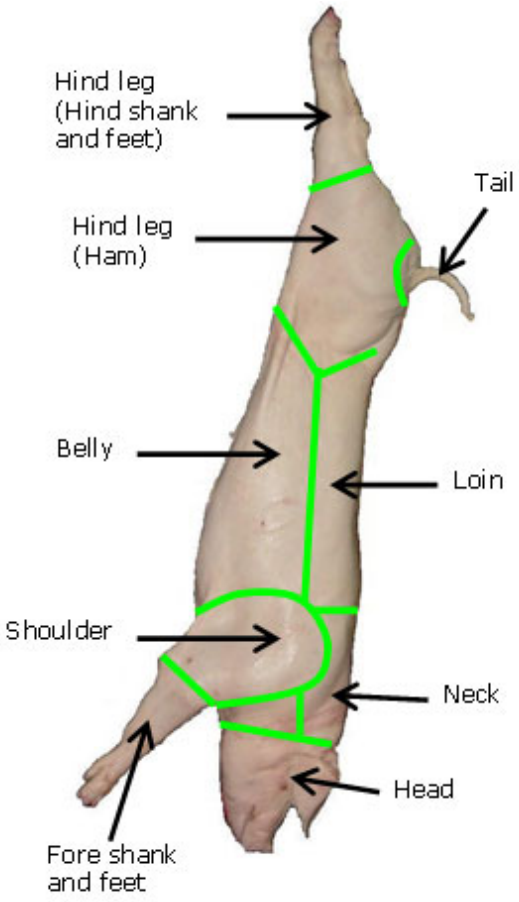
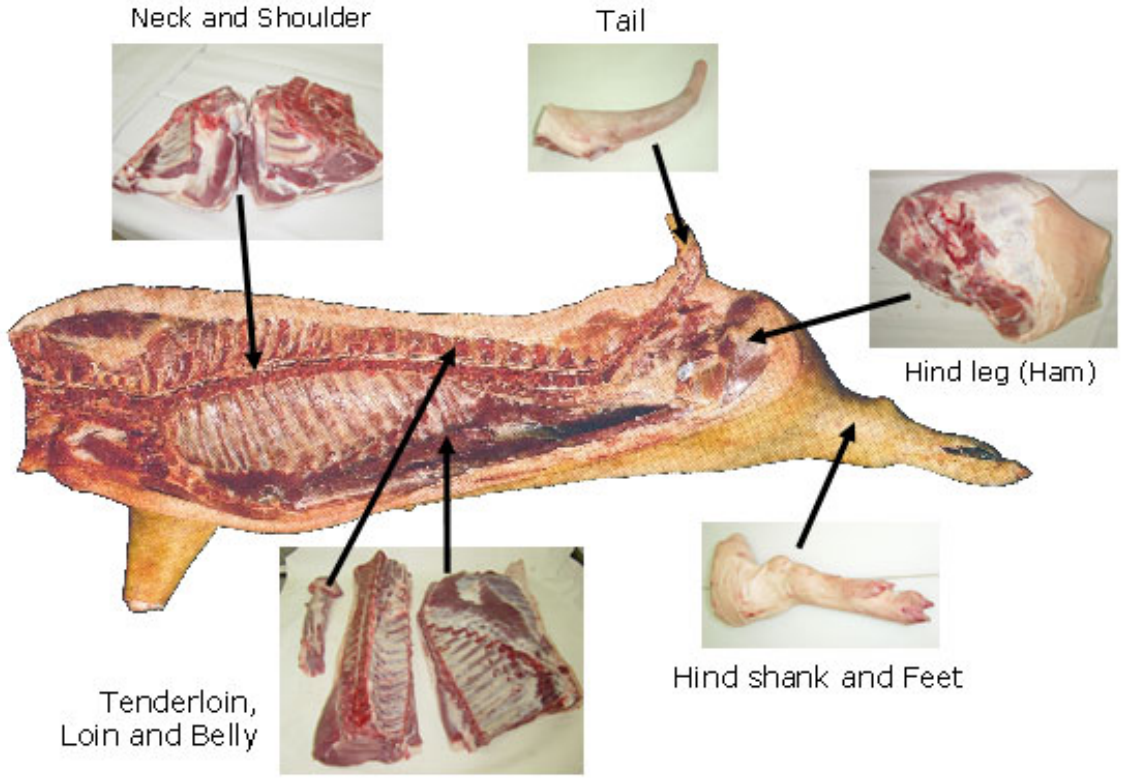


Fig. 71: Pork carcass schematic



Grade Pork 1 (P1)
Pig meat, all visible fats and connective tissues removed

Grade Pork 2 (P2)
Pig meat, 15-25 % firm body fats, visible connective tissues removed

Grade Pork 3 (P3)
Pig meat, 10 % visible firm and soft fats and some soft connective tissues

Grade Pork 4 (P4)
Pig fat, back fat (firm tissue)

Grade Pork 5 (P5)
Pig fat, body fats (soft tissue)

Grade Pork 6 (P6)
Pig skin, free of hair and fatty tissue

Fig. 73: Grading scheme for manufacturing-meat from pigs

GRADE Pork 1 (P1) **Lean muscle meat with all visible fat and connective tissues (hard and soft) removed**

This meat is derived from body parts with large muscle groups such as loin (loin, tenderloin), hind leg (topside, silverside, rump) and shoulder. P1 meat is obtained during the preparation of choice cuts, when portions are trimmed off from the cuts for fresh meat sales. Given the case that

more of this P1 meat is needed for processing, some of the above mentioned cuts can be used completely for this purpose. Muscle groups with a high connective tissue content (neck, thin shoulder) are not considered suitable for P1. Grade *Pork 1* meat is used for whole muscle hams (raw-fermented, cured-cooked) and all products where the meat structure remains visible (coarse sausages, reconstituted hams).

GRADE Pork 2 (P2) **Muscle meats with some solid fats embedded and connective tissue removed**

This manufacturing-meat category mainly comes from the leaner parts of the belly (near the loin) and pieces trimmed off from the hind leg. The fat content of grade P2 meat should not exceed 25%. The embedded fatty tissue must be firm and dry, as this meat is normally used for coarse products where meat and fat particles remain visible and can be sensed during chewing. For the same reason all visible hard and soft connective tissues should be removed. Typical products are fresh sausages, dry fermented sausages and luncheon meat and, to a certain extend, reconstituted hams (see page 108, 117, 127, 183).

GRADE Pork 3 (P3) **Muscle meat trimmings with low fat content, but larger amounts of soft connective tissue**

The meat trimmings for grade P3 can originate from all body parts, but its main source is the front quarter. As these meat trimmings usually contain smaller or larger amounts of soft connective tissue, they are mainly used as raw material for finely-chopped meat mixes. The hard connective tissue should be removed. The embedded fatty tissue can be of soft or firm texture, but its content must not exceed 10 % to allow for preparation of lean batter for further processing (see chapter “Raw-cooked meat products” page 127).

GRADE Pork 4 (P4) **Pork back fat**

The fatty tissue derived during cutting of pork carcasses and preparation of choice cuts can be divided into soft and firm tissue. The firm and dry fat for grade P4 is exclusively from the fatty layer under the skin on the backside of the pork carcass, hence the name “back fat”. Back fat is primarily used as the fat portion of raw-fermented sausages (see page 115) and for the manufacture of finely chopped meat mixes of the raw-cooked type (see page 127). For coarse fresh meat products, where usually P2 meat is taken, back fat in combination with meat P1 can be used instead, as with such a blend the same fat content as contained in P2 can be achieved.

GRADE Pork 5 **Soft fatty trimmings**
(P5)

Apart from the firm fatty tissue (grade 4 pork), a variety of soft fatty tissues are obtained from the pork carcass. Because of their oily and wet appearance, they are unsuitable for manufacture of coarse products, but can be incorporated in finely chopped meat mixes of the raw-cooked type in quantities of up to 25% of the overall fat portion added (page 127). It can also be used as fatty material for some precooked-cooked products (page 149).

GRADE Pork 6 **Pork skin**
(P6)

Pork skin is normally used as food unlike other animal skins which are used in leather production. As the skin is exposed to contamination during slaughtering and cutting, special attention must be given to obtain pork skin of good hygienic quality. On its outer side pork skin should be free of hair and other impurities and on the inner side the connected fatty tissue must be thoroughly removed. Pork skin is collagen rich and in precooked form a valuable material for the manufacture of some meat products of the precooked-cooked type (page 147). Occasionally pork skin is also used in raw form in processed meat products normally shredded to small particles and either used as an ice/pork skin emulsion or as dry granules. However, this is an application for large industries. Pork skin can also be used for gelatine production (page 70).

Selection and grading of manufacturing-meat from cattle

Similar to pork, valuable meat cuts (choice cuts) from beef are usually excluded from further processing and marketed as fresh meat. The most common fresh meat cuts are tenderloin, sirloin, topside, silverside, rump and parts of the neck and shoulder (Fig. 74, 75). The rest of the carcass meat as well as trimmings derived during the preparation of the above mentioned choice cuts are used as manufacturing-meat for all types of processed products.

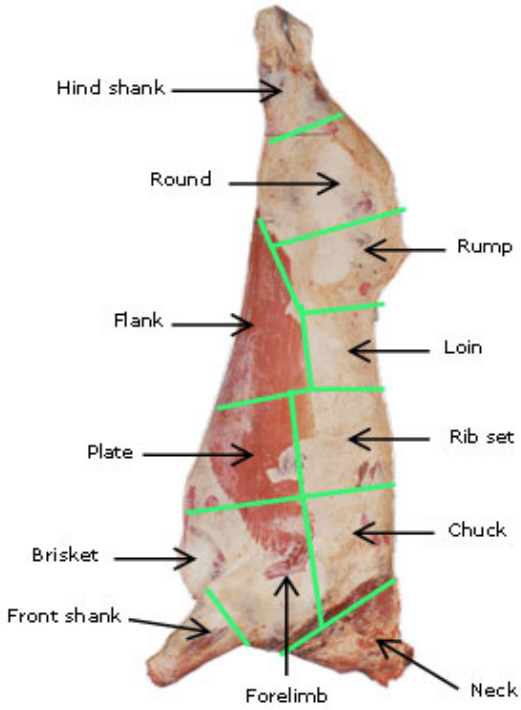


Fig. 74: Beef carcass schematic

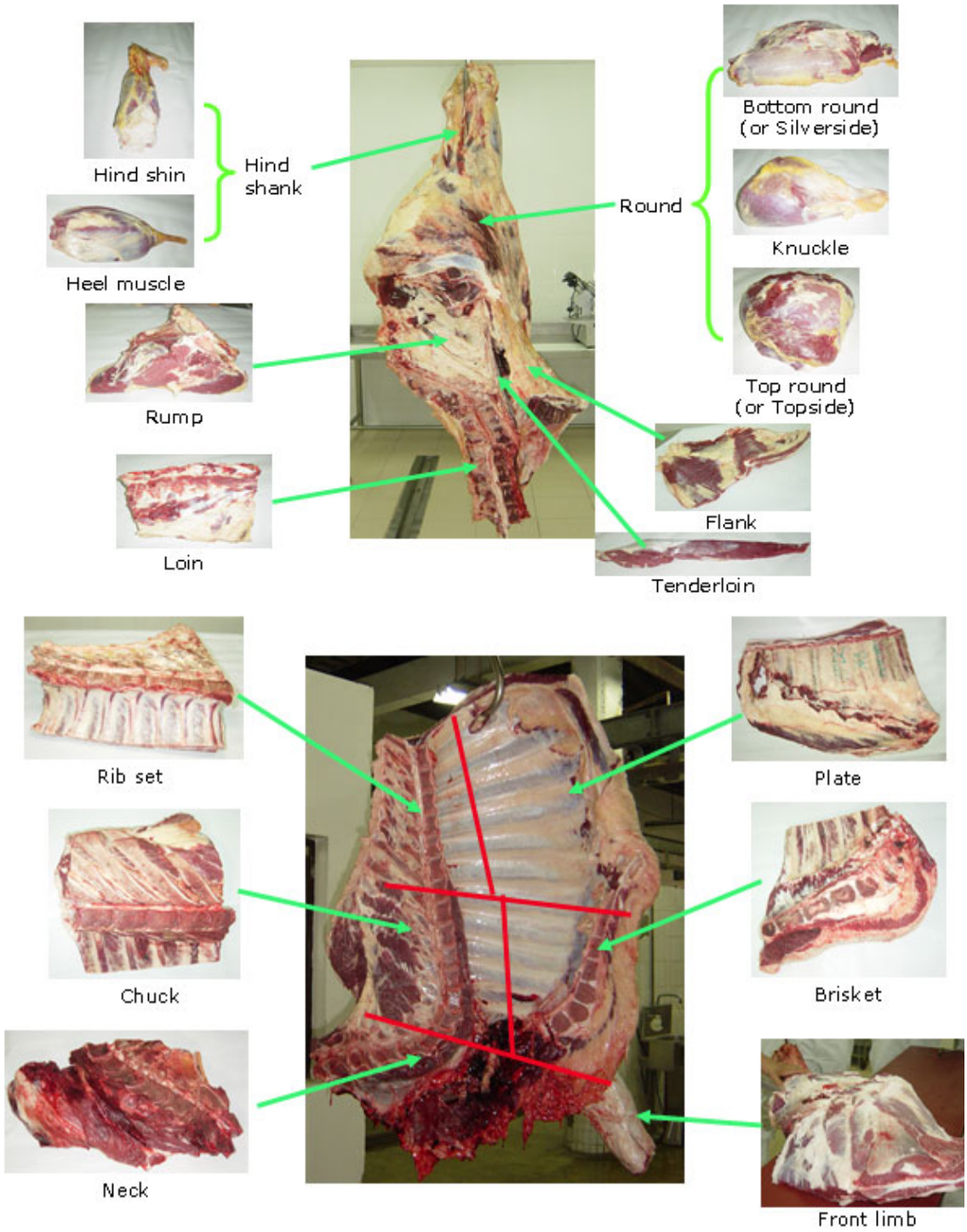


Fig. 75: Beef carcass and its cuts

The **functional properties** of beef are influenced to a large extend by the age of the animal. Meat from younger animals has a much higher water binding capacity than meat derived from a carcass of an older animal. For this reason meat from younger animals should be used for products requiring high binding and water holding capacity (see page 7) and meat from older animals is more suited for products undergoing a drying and fermentation process.

Similar to the grading scheme for pig meat, a simple scheme is proposed for the **selection and grading of beef**, which is considered suitable for small and medium operations. For beef, three grades of manufacturing meat (Fig. 76) are sufficient to cater for the needs of small to medium-size manufacturing. Beef fat and skin are usually not a raw material for meat processing.

Fig. 76: Grading scheme for manufacturing-meat from cattle / buffaloes

Grade Beef 1 (B1)
Lean beef without visible fat and connective tissue

Grade Buffalo 1
Lean buffalo meat without visible fat and connective tissue

Grade Beef 2 (B2)
Beef with less than 10 % (visible) connective tissue and less than 10 % fat

Grade Beef 3 (B3)
Beef trimmings with up to 20 % (visible) connective tissue and 20 % fat

The following grading scheme for beef is proposed:

GRADE Beef 1 (B1) **Lean muscle meat with all visible fat and connective tissue removed**

The meat is derived from the major muscles of the fore and hindquarter with the exception of shanks and belly muscles.

GRADE Beef 2 (B2) **Muscle meat trimmings with small quantities of connective tissue (<10%) and body fats (<10%)**

Meat parts used for this grade are mainly obtained as muscle trimmings from the manufacture of primal meat cuts and from smaller lean muscles which are not sold as special cuts.

GRADE Beef 3 (B3) **Muscle meat trimmings with connective tissue (<20%) and body fats (<20%)**

For this grade, small meat trimmings removed from bones during deboning, flanks and shanks are used. As this meat is relatively high in connective tissue and fat, it is only used for the manufacture of finely chopped meat mixes. It is not suitable for use as coarse parts in meat mixes due to its tough texture.

In some regions, in particular in Asia, **buffalo meat** plays a major role in the manufacture of meat products often replacing beef. The proposed grading scheme for manufacturing meat from **buffaloes** is the same as for beef (see Fig. 76).

In the above illustrations only grade 1 buffalo meat is shown. Grade 2 and 3 for buffalo is similar as indicated for Beef 2 and 3. Buffalo meat has excellent properties for further processing, in particular a pronounced red colour, good water binding capacity and typical flavour. Differences in texture compared to beef (buffalo meat may be slightly tougher) play no role in further processing. Buffalo meat differs slightly from beef in terms of:

- Colour: Buffalo meat has slightly darker red colour than beef (see Fig. 76), also processed meat products containing buffalo meat have a darker and more intensive red curing colour.
- Taste: Buffalo meat has a more pronounced meat flavour and taste.
- Texture: Buffalo meat cuts, upon ripening and aging, can be made sufficiently tender but remain with slightly stronger texture as compared to similar beef cuts.
- Fat content: Buffalo meat is usually leaner than beef and the colour of buffalo fat is white as compared to the yellowish fat colour in beef (see page 12).

Selection and grading of manufacturing-meat from poultry

In global meat production poultry meat is taking the second place after pork. Due to its widespread availability and popularity and its mostly very competitive production cost, poultry meat has an increasing share as a raw material in processed meat. Turkey and chicken meat is very suitable for further processing purposes.

Turkey meat, which has darker and brighter muscle components deriving from the same carcass is well suited for processed meat products. In some developed countries there are sizeable turkey meat industries, with outlets for processed turkey meat products, such as bologna/frankfurters/ham sausage type sausages, and cooked turkey hams. Such products are similar to the equivalent ones fabricated with beef and pork, but they are usually leaner.

Fig. 77: (Scheme): Turkey carcass and its cuts a / b leg (a = thigh, b = drumstick), c1 / c2

A widely practiced approach is to classify turkey carcasses in two grades. Grade A is top quality with no defects on the meat surface and general appearance. Entire frozen carcasses as retail goods belong to this category. Grade B is the lower category and this meat is usually taken for further processing. When producing turkey cuts (Fig. 77), those cuts not needed or suitable for fresh meat sales, can also go into further processing.

In developing countries, the production of **chicken meat** is by far more important than the production of turkey meat. Chicken meat can be produced industrially around population centres and it is in high demand, particularly where pork is not consumed for socio-cultural or religious reasons.

The most popular processed products from chicken meat are *chicken frankfurters*, *hotdogs*, *chicken hams* and the various breaded and fried products of the *chicken nugget type* (see Chapter: Processed products made from chicken meat, page 187).

For the production of meat from chicken for processing, the same principles apply as in the beef and pork sector. Either the entire carcass meat is used for further processing, or some of the cuts go in fresh meat sales and the remaining into the manufacture. Chicken carcasses are usually cut in **wings**, **legs** and **breast** (Fig. 78). Legs can be further subdivided into *thighs* and *drumsticks***.** The breast consists of the larger *superficial breast muscle* and the smaller profound breast muscle, the latter is also called "*filet*" (see Fig. 80, 84).

Fig. 78: Muscle meat of chicken carcass a / b leg (a = thigh, b = drumstick); c1 / c2 breast meat (c1 = breast, c2 = filet); d = wing

Examples for chicken cutting

Industrial method

In large industrial operations, chicken are usually cut in the hanging position. Carcasses are suspended by the neck on a conveyor and pass though working stations. At each station a specific cut is made and a certain part removed, until finally only the bone-carcass structure remains.

The following is a widely practiced industrial cutting method: First the skin is incised around the body above the legs (Fig. 79). Then the wings are loosened, by cutting between wings and carcass through the wing joint. Following minor incisions using a knife, the wings are pulled-off together with the breast meat. The legs are then pulled off the carcass and finally the fillets are removed (Fig. 80). Only the bone-carcass structure with neck remains.

Fig. 79: Cut-up in vertical position (industrial cutting)

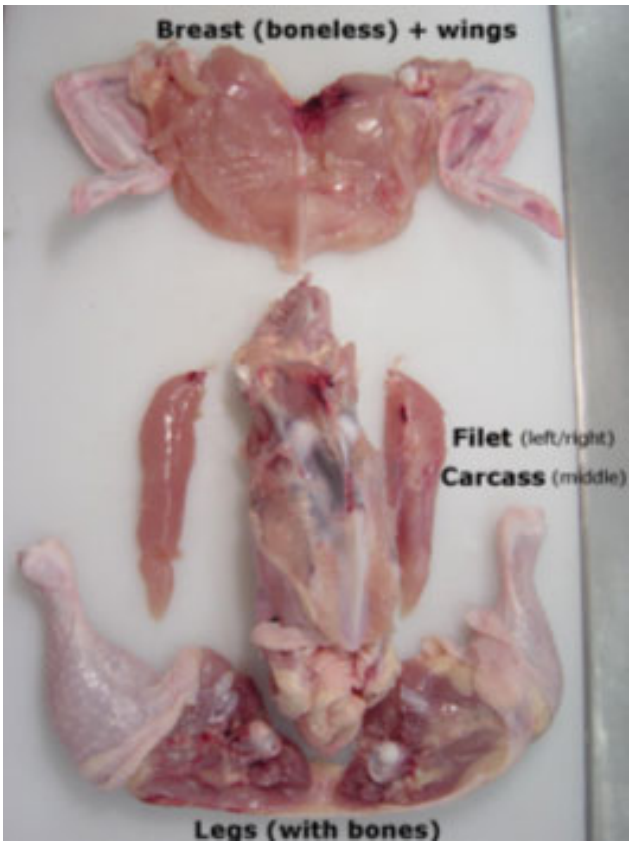


Fig. 80: Chicken parts in industrial cutting

Small-scale method

In small-scale operations more attention is usually paid to obtaining intact parts for individual sales. Conveyor systems are in most cases not available and therefore chicken carcasses are usually cut-up on a cutting board or table. Many different cutting styles have been developed. The following is one example.

First the chicken carcass is positioned on the cutting board with the breast muscle facing downwards. Then a deep cut is made just above the legs following the leg line (Fig. 81). The two carcass parts are pulled apart and the legs are separated with a knife by splitting the backbone. Next the wings are cut off through the lower wing joint (Fig. 82). If the breast and filets muscles are wanted separately, they are now removed from the upper carcass part and trimmed (Fig. 84).

Lean meat can now be trimmed off the carcass parts for further processing; skin and fat are also obtained.

Fig. 81: Cut-up in horizontal position (small-scale cutting)

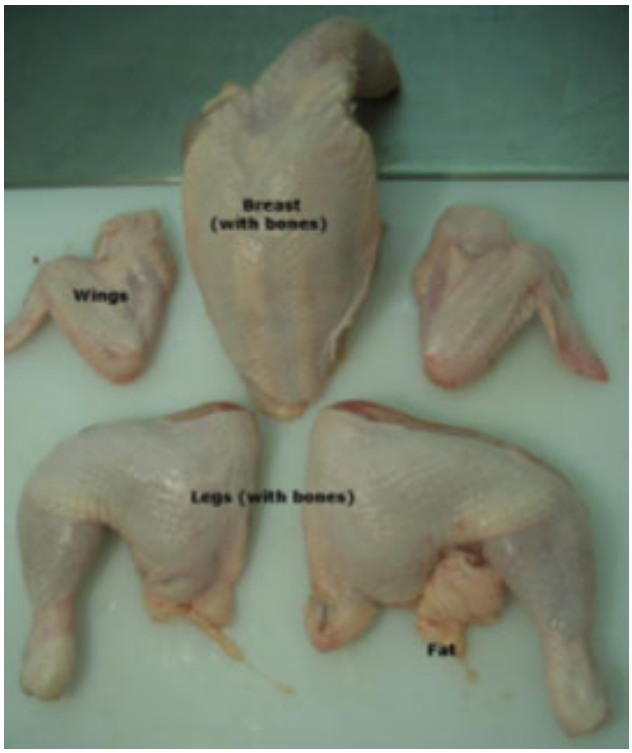


Fig. 82: Chicken parts in small-scale cutting

Grading of chicken meat for large operations

Chicken manufacturing-meat for larger processing operations is usually categorized in **four** different grades. The four grades of chicken meat are either used for **pure** chicken meat products or for **mixed** products. In **Halal** products made from red meat (beef, mutton), the fat portion may partially or fully be chicken skin.

Also in customary **mixed red meat products** (like frankfurter, bologna, breakfast sausages, luncheon meat, etc.) normally made of lean pork and beef or lean pork only, and pork fat, part of the lean pork may be substituted by lean chicken meat. This is usually done for cost-cutting reasons i.e. when cheaper chicken meat is available), but also to satisfy the growing demand for lower fat meat products.

The four grades are described below (Fig. 83):

GRADE Chicken 1 (CH1) **Chicken white muscle meat with visible fat, connective tissue and skin removed**

For this grade mainly breast and filet meat is used. As meat of this grade is used for reconstituted chicken hams and chicken sausages with visible coarse meat parts, all fat and skin must be removed from the lean meat.

GRADE Chicken 2 (CH2) **Chicken muscle meat with adhering subcutaneous and intermuscular fat**

Deboned and skinless meat from all chicken cuts (breast, legs, wings) can be used. This meat is usually ground or chopped during further processing. Smaller quantities of subcutaneous and intermuscular fat are usually not removed and incorporated in the final product.

GRADE Chicken 3 (CH3) **Chicken skin / fat**

Chicken skin is removed from the carcass or individual cuts and collected separately. Chicken skin has a high fat content and is ground prior to being added to processed meat products. Chicken fat serves as the fat portion in all-chicken processed meat products such as chicken frankfurters or chicken bologna. It can also be used as fat in lean beef or mutton products, such as Halal frankfurters etc. Chicken skin is added to meat products for the same purpose as pork fat in pork/beef products, namely to contribute to product flavour and softer product texture.

GRADE Chicken 4 (CH4) **Mechanically deboned chicken meat** (MDM)

This grade is manufactured in industrial chicken plants by mechanically separating remaining muscle tissue from the chicken carcasses after removing legs and wings and the breast muscles including skin. Chicken necks are also used for MDM. MDM contains muscle meat, connective tissue and some fat remaining on the bones after removing the meat cuts. MDM is a typical industrial product and not produced in small operations. However, it is available on the meat market and can be purchased by smaller producers as frozen blocks for further processing.

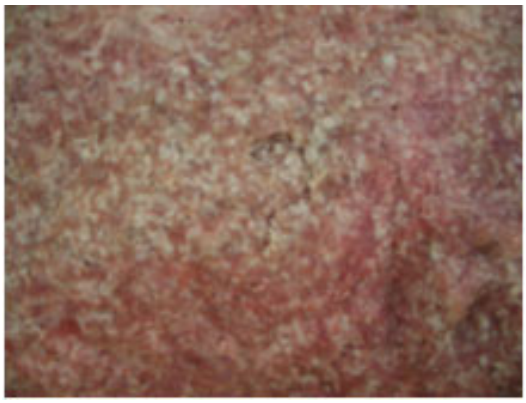
Chicken MDM is an ingredient for lower-cost meat products for partial substitution of the lean meat. However, MDM addition is limited as high amounts of chicken-MDM will affect the quality of products (deficiencies in texture and taste) and may in some countries result in products which are not in line with national food regulations.

Fig. 83: Grading scheme for chicken meat (industrial scale)

Grade Chicken 1 (CH1)
Breast meat

Grade Chicken 2 (CH2)
Chicken muscle meat with adhering subcutaneous and intermuscular fat

Grade Chicken 3 (CH3)
Chicken skin, ground
(below: from close range)



Grade Chicken 4 (CH4)
Frozen chicken MDM in plastic bags (below: from close range)

Grading of chicken meat for small operations

In small-scale operations, more emphasis is given to sales of fresh chicken parts. Therefore usually only three grades of processing meat are obtained (Fig. 84):

GRADE 1: Trimmed lean breast and filet muscle meat (light colour)

GRADE 2: Leg meat (darker colour) and trimmings from carcass

GRADE 3: Skin/fat

Fig. 84: Grading scheme for chicken meat (small-scale)

Grade Chicken 1 (small-scale)
(Breast and filet muscle)

Grade Chicken 2 (small-scale)
(Leg meat and trimmings)

Grade Chicken 3 (small-scale)
(Skin / fat)