

Agricultural processing brochure

Brochure content:

- Introduction
- Process description
- Other processing options
- Energy Advisory Services
- References

Processed meat groups:

- **Whole** meat products
- **Minced** meat products
- **Emulsified** meat products

Yield:
0.907kg of lean meat will yield approximately 1kg of salami

South African farmers facing current economic realities are searching for new options to maintain or expand their businesses. One of the many opportunities to grow markets, turnover and profits is by adding value to farm produce. Options need to be selected carefully based on sound information and knowledge of the opportunities presenting themselves, taking into account the strengths and weaknesses of individual farms.

Introduction

Product group: Meat products

The deregulation of the meat industry has provided opportunities for livestock farmers to slaughter, process and market their own animals. Abattoirs on farms are quite common these days.

Alternatively, approved meat can be brought in for processing. Meat is a very versatile food substance with a wide variety of processed product possibilities.

Processed meat products are classified into three broad groups, based on the size of the meat particle used:

Whole meat products – muscle tissue is still clearly recognisable and defined in the end product (e.g. ham, bacon, pressed pork or beef);

Minced meat products – the meat structure has undergone a degree of breaking up, for example in a mincer, and the meat is no longer in a fibre form, but particle form (e.g. salami, fresh sausage, hamburger patties, meat balls, etc.); and

Emulsified meat products – the muscle tissues have been finely minced and are not recognisable any more in the fibrous or particle form (e.g. frankfurters, viennas, polonies and meatloaves).

Product description: Salami

Salami is categorised as a minced meat product. It is prepared by chopping meat and fat, stuffing it in a casing that is then smoked, fermented and dried to produce a product with an extended shelf life. Fermentation reduces the pH to below 5.3 and drying removes about 20% of the moisture. During the fermentation process, lactic acid is produced and this produces the characteristic "tangy" salami flavor.

The production of fermented meat products such as Salami is based on the fact that meat can be modified by

micro-organisms during prolonged storage. Desirable modifications include improvements in flavour, aroma, palatability, appearance and storage life. Uncontrolled fermentation can lead to the formation of off-flavours, strange tastes, health threatening metabolites as well as colour deterioration, loss of consistency and the growth of pathogenic micro-organisms.

A wide variety of Salami variations is available due to their various origins such as Italian, Hungarian and German Salami, each with their own cultural flair.

The production methods are basically the same but small variations are responsible for significant differences in the end products. The long shelf-life quality of fermented sausages such as Salami is due to a combination of low pH, low moisture, high salt and spice content.

Process description: Ingredients

Meat: Although any type of meat, even chicken, can be used, a mixture of lean pork and beef is most often used. If the meat is too lean, fat can be added, but pork fat should be avoided as this can develop off-tastes and off-flavours. Originally, less valuable cuts were used for the production of Salami, but today it is a well-known fact that the quality of the meat has a direct influence on the end product. Good quality meat, free of blemishes, is therefore recommended and no mechanically recovered meat may be used. Dark, firm, dry pork is not suitable, but pale, soft meat can be included at levels of up to 20%. Good microbiological quality is important to reduce bacterial competition with the starter culture.

Lard: If extra fat is necessary, lard can be used. It should not be older than 3 days and be of high quality with no off-flavours (rancidity).

Ice and water: Ice or water is included into the formula to control the temperature during mincing. The quality of the water used both as an ingredient in any meat product as well as a cooling agent, is of major importance. Potable water must be used and is defined as water with no suspended matter and no substances that could be deleterious to the products or harmful to health. In addition, the water should be treated (by flocculation, filtration, chlorination or other acceptable process) to ensure compliance with the following microbiological requirements:

- Total count should not exceed 100 per ml
- Coliform organisms should not exceed five organisms per 100ml, and
- Faecal coliform should not be detectable in 100ml of the water

Edible offal (where permitted) such as heart, liver and kidney may be included up to 5% of the mass of the product and must be declared in the ingredient list on the label when used.

Casings: Both natural and synthetic casings can be used. Natural casings are produced from the cleaned intestines of sheep, pigs and cattle. Pig and sheep intestines are sold in bundles of about 100m packaged in dry salt. These intestines are stored at 4°C and should be rinsed in cold water before use. The casings are allowed to soak for 45 minutes at room temperature. Natural casings are delicate and easily broken during stuffing and linking and could therefore be substituted with edible collagen casings. Natural casings are permeable to moisture and smoke, and therefore shrink during processing, thereby remaining in close contact with the surface of the sausage.

Other manufactured (synthetic) casings can also be used and include the following:

- Cellulose - close to natural casings, but must be removed before consumption
- Inedible collagen - very strong

Soft pork
meat can be
included at
levels of
up to
20%

The casings
are allowed to
soak for
45 minutes
at room
temperature

Salami

- **Salt:** Salt is added at a concentration of 0.5 – 0.75% to help lower the water activity, preserve the product and to enhance taste.
- **Curing mix:** The curing mix may contain nitrite (up to 150mg/kg) for colour development and also helps to retard lipid oxidation.
- **Glucono delta lactone:** This is added to ensure rapid reduction of pH in the early stages of fermentation.
- **Dextrose:** **Dextrose** (sugar) acts as a fermentable substrate for the lactic acid bacteria.
- **Flavourings:** Various flavourings including red wine may be added. Herbs and spices are also added.
- **Food additives:** Only those permitted under Act 54/1972 and regulations may be added.
- **Meat extenders:** A limited quantity of textured soy protein may be used to improve the body and reduce cooking losses.
- **Starter culture:** It has become common practice to add a commercial starter culture instead of relying on the natural flora in meat for fermentation. Freeze-dried or frozen lactic acid producing organisms provide more dependable results. The starter culture may comprise of a single organism or a section of organisms that convert dextrose into lactic acid. The culture activity is at an optimum between 26 and 38°C.

Process

Chopping of ingredients for Salami

The semi-frozen lean meat is chopped in a bowl cutter for a few rounds before the glucono-delta lactone is added and chopped for a further 20 – 30 seconds. The semi-frozen fat and remaining ingredients are added gradually during continued, but slow chopping. The mixture is then chopped at high speed until the desired particle size is reached (5 - 6mm). This must be reached before the temperature exceeds 4°C. The frozen state of the meat and fat ensure clean, neat cut particles with minimum smearing and prevents strong binding of meat proteins with water. The extraction of salt soluble proteins during chopping is not desirable in fermented sausages.

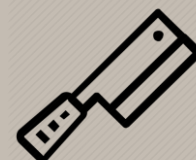
Curing of meat for Salami

Curing starts as soon as the curing ingredients are added to the meat during chopping and continues until the full colour development has taken place. It is usually completed during tempering of the Salami.

Stuffing of Salami

The chopped mixture is immediately stuffed in a suitable casing, usually made from synthetic materials with small holes in the surface to allow trapped air and moisture to escape.

It is very important to remove as much air as possible from the Salami mixture prior to and during stuffing. Air pockets (oxygen) are detrimental to fermentation. This can be done using a vacuum mixer or vacuum filler. In the absence of such sophisticated equipment, small-scale operators compress the meat mixture into the stuffing machine by hand. It is equally important that the temperature of the mixture remains under 4°C (preferably at 1°C) during stuffing to avoid fat smearing on the inside of the casing.



Salami

Fermentation of Salami

The Salami is held for 24 - 48 hours in a room or cabinet (incubator) where the temperature is controlled at 20 - 22°C and the relative humidity is kept above 86%. These conditions initiate the fermentation process and cause surface drying while the curing process is completed.

Smoking of Salami

The Salami is smoked for 2 -3 days at 18 - 22°C and a relative humidity of 80 - 85%. Cold smoking is used in combination with other preservation techniques such as fermentation and drying. Conditions favour the growth of bacteria that transform nitrate to nitrite, and this is followed by the growth of lactic acid producing bacteria. Smoking therefore favours both colour development (curing) and taste development (fermentation). Smoking also enhances the flavour but does not cook the product.

Smoking takes place in a cabinet (box) or room where smoke can be generated by controlled combustion of moist sawdust or a rapidly moving steel plate against a log. Smoke is carried into the smoke chamber by fans. Smoke can also be given an electric charge and electro-statically deposited on the meat surface.

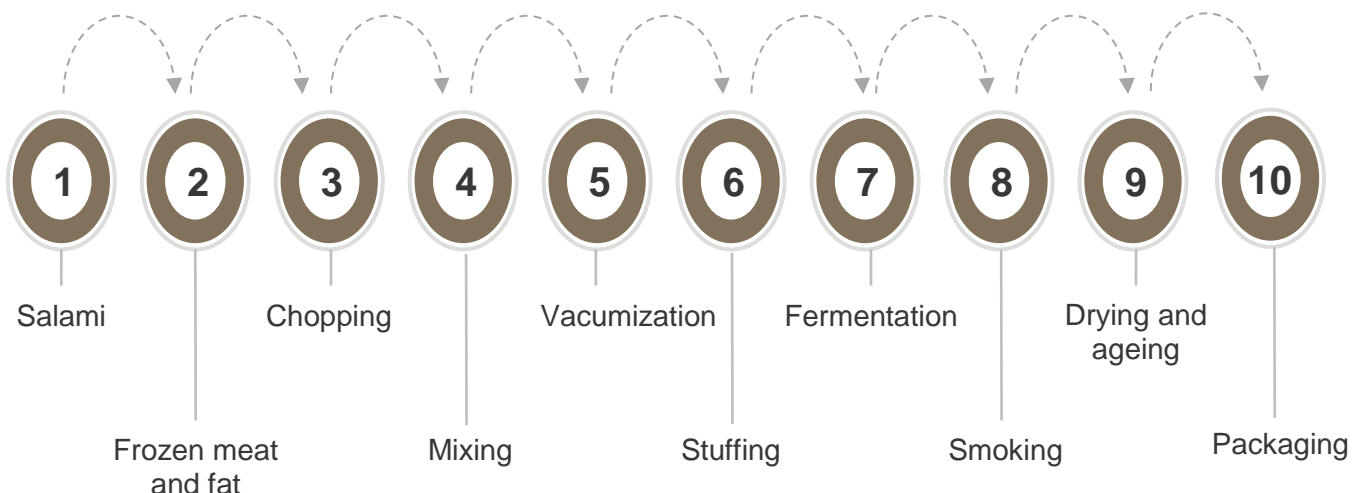
Oxygen is one of the factors which needs careful control during smoking since it has a definite effect on the amount of smoke generated and thus the colour and flavour of the meat. Other important process parameters are the temperature of smoke and the humidity inside the smoke cabinet. Air circulation is also critical since it influences oxygen supply, temperature and humidity.

Drying of Salami

The smoked Salami is transferred to another controlled atmosphere chamber where it is kept until the product has lost 20% of its weight. The temperature in the chamber is controlled at 14 - 18°C and the relative humidity at 75 - 80% with the minimum air circulation. These conditions favour slow drying. It is very important that the drying rate is controlled to prevent both case hardening and spoilage of the product. The drying time varies from 10 to 120 days, depending on the size of the sausage and drying conditions.

During the drying process, fermentation continues to take place, but at a slower rate. Ideally the moisture content and the pH should reach optimum levels simultaneously.

Process overview



Packaging of Salami

Fermented sausages such as Salami require the minimum packaging, since the casing already serves as a primary packaging material. Sausages may be placed in cardboard boxes for transport and storage. Salami can be sliced and pre-packed for retail sale in vacuumed plastic films. Vacuum packaging is the best option for retaining the colour of the Salami and to minimise fat oxidation.

Labelling of meat products

The products are labelled/printed with the necessary information. Labelling in South Africa is controlled by legislation. Anyone who wants to use the information provided in this document must familiarise him/herself with all the applicable laws that apply to the producing, processing, manufacturing and storage of the products referred to in this document.

Other process option

Below is a list of *minced meat products* not covered in this report, but available from Eskom.

- **“Droë wors”** is minced and seasoned meat (beef or venison) and fat that is stuffed in a thin, natural casing and left to dry naturally.
- **Fresh sausage** is prepared from minced meat that is uncured, seasoned with salt and spices, and stuffed into casings without smoking or cooking. Examples include “*boerewors*”, beef sausage, pork bangers and mutton sausages.
- **Frozen hamburger patties** are shaped, minced meat products containing added ingredients and seasoning that may be crumbed and flash-fried prior to freezing.
- **Russians** are smoked sausages made of minced pork, beef and fat, embedded in a meat emulsion. It is flavoured with paprika and stuffed in pork casings.
- **Smoked sausages** can be cured or uncured, seasoned, stuffed into casings and smoked but not cooked prior to sale.
- **Hamburger patties** are minced meat products which are pressed into a round, flat shape and they contain added ingredients and seasoning. Variations include bacon burgers and lamb burgers made from pre-cured pork and lamb respectively. Other variations include cheese patties and microwave patties.



Photo source: www.google.com



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Eskom's role is to aid the client with basic information in the decision-making process. Thereafter the Eskom Advisor will fulfil the role of energy advisor part of the team that the selects

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Alternative funding

Five alternative funding product offerings are available to help reduce your investment costs for new agro-processing or agro-beneficiation businesses or to expand/improve an existing agro-processing or agro-beneficiation business.

Literature sources:

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