

Agricultural processing brochure

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Processed meat groups:

- **Whole** meat products
- **Minced** meat products
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Yield:
0.562 kg lean meat will yield approximately 1 kg of French polony.

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** – 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: French polony

French polony is a typical *emulsified sausage* product and the most basic type of luncheon meat. The basic polony mixture and processing method can be used as the basis for the manufacture of most other types of luncheon meats and loaves. These include olive loaves, egg loaves, pepper loaves, etc.

All of these products are good examples of "value-added" processing, where relatively ordinary meat cuts and trimmings are tenderised by grinding or chopping and may have salt, spice and other ingredients added before cooking, smoking, drying or other finishing processes.

The result is a product with a unique texture, aroma and flavour. Each step in the process can be achieved in a number of ways (different chopping/mincing methods, spice blending, smoking and cooking processes, etc.) with the result that there are hundreds of varieties of luncheon meats available.

Process description:

Ingredients for polony:

Meat: Any type of meat can be used, including beef, pork, poultry or mutton. A mixture of lean and fatty pork and beef is, however, used most often. When the meat is too lean, fat can be added.

Fat: When additional fat is required, lard can be added provided that it is not older than 3 days and contains no skin.

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, which is defined as water free from suspended matter and from substances that could be harmful to the products or to human

health, must be used. In addition, the water should be treated (by flocculation, filtration, chlorination or other acceptable processes) to ensure compliance with the following microbiological requirements:

- Total count shall not exceed 100 per ml;
- Coliform organisms shall not exceed five organisms per 100 ml, and

- Faecal coliform shall not be detectable in 100 ml of the water

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

Casings: Polony is normally stuffed in plastic casings.

Other ingredients:

Ingredient	Reason for inclusion	Inclusion levels
Salt	Taste, preservative, solution of salt soluble meat proteins, texture and adhesion	0 - 5%*
Nitrate/Nitrite	Colour development, taste development, preservative	100 - 160 ppm**
Polyphosphate	Water binding, buffer systems	0.2 - 0,5 %**, *
Sodium ascorbate	Reduction of curing time, colour stabiliser - only in minced/chopped products	500 ppm**
Citrates	Water binding, buffer systems	0.006 - 0,1%**
Non-meat proteins	Water binding, texture improvement	2.0 - 3,5 %**, *
Gums and starches	Water binding	2.0 - 3,5 %**
Flavourings	Taste improvement	
Sweeteners	Improve water retention and taste	0.5 - 1,0%**
Natural binders	Improve water retention, water binding and texture improvement	8%*

* Requirements of the South African Standards specification must be adhered to.

** Requirements of the regulations published under the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972 must be adhered to.



3 mm
die

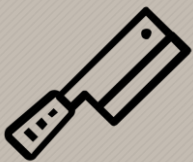
Mincing of meat for polony

The lean meat (containing a maximum of 20% fat) and the rest of the fat is separated before mincing. The lean meat is passed through a 3 mm die (aperture size of final sieve plate in mincer).

The temperature of the meat should be kept below 5 °C for mincing to ensure a clean, neat cut without smearing. The meat should be free from bone chips; gristle, cartilage and excessive amounts of connective tissue since

these would damage and block the sieve plate.

The rest of the fat is minced separately and also passed through a 3 mm die.



Chopping is halted when the mixture reaches a temperature of
8.5 °C

Chopping of ingredients for polony

The finely minced meat is transferred to a bowl cutter for the next processing step. The fat is not added at this stage. Half of the ice water together with the salt is added and chopping commences. The water dissolves the salt to form brine with a concentration of 7 - 8%. The salt soluble proteins are

extracted while the mixture is chopped at high speed.

Chopping is halted as soon as the mixture reaches a temperature of 8.5 °C. At this point the mixture should be a uniform, sticky mass. Temperature, rather than time, is used as a guide for chopping.

Ice water is necessary to keep the temperature down for protein extraction since chopping creates mechanical energy that is converted into heat. High temperatures would prevent protein extraction and even cause protein coagulation and emulsion destabilisation.



vacuum mixer
removes trapped
air

De-aeration of the polony mixture (optional)

De-aeration is the removal of trapped air or gasses present in a product due to processing or natural causes.

The polony mixture is transferred to a vacuum chamber or vacuum mixer to remove trapped air and thus prevent fat oxidation. The air

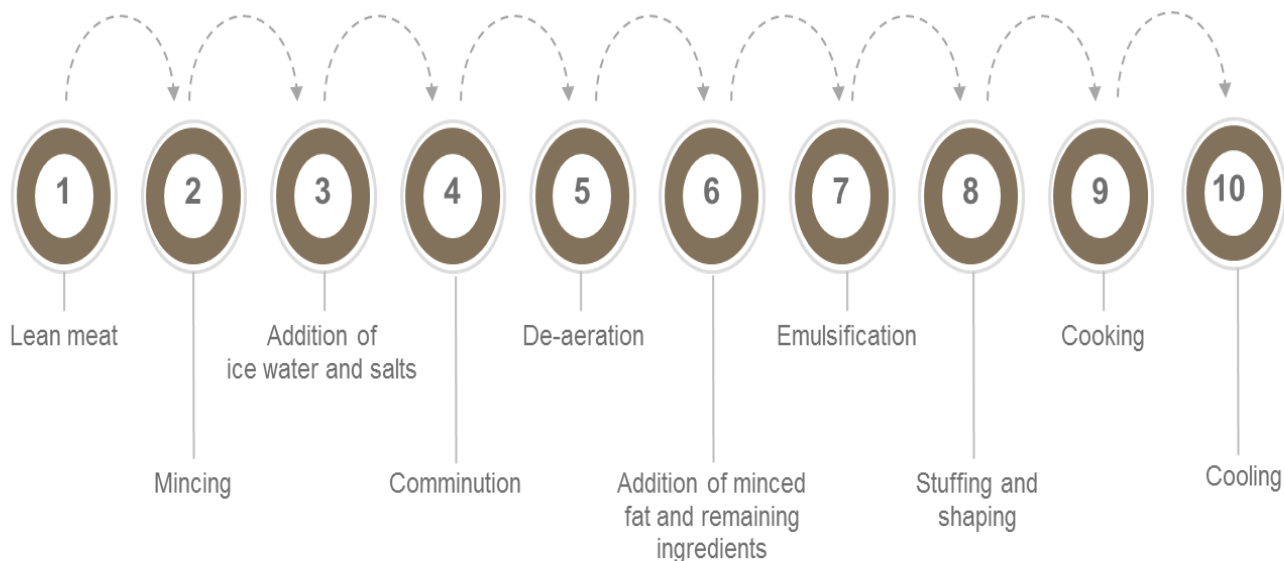
bubbles may also contain impurities and be a possible source of micro-organisms that may cause spoilage of the product. De-aeration also ensures a firm, uniformly stuffed product.

Although this is an optional process for small-scale operations

due to extra costs involved, it is considered necessary for large-scale operations which have access to such equipment.

Some of the larger bowl cutters are equipped with a vacuum facility, which is very useful since it eliminates the need to transfer the mixture after emulsification.

Process overview



Emulsification of polony mixture

Emulsification involves stabilising a mixture of two liquids by adding an emulsifying agent that reduces the interfacial tension and creates a barrier to droplet coalescence.

An emulsion is created when the minced fat is added to the lean meat mixture in the bowl chopper and chopped until a homogenous mixture is formed (around 12 - 16 °C).

It is particularly important that the meat extenders and starches should be added after protein extraction has taken place, since they are hygroscopic and will absorb a lot of moisture, making it less suitable for the solubility of proteins.

Emulsification involves stabilising a mixture of two liquids

Stuffing and shaping of polony

The meat emulsion is transferred from the bowl chopper or vacuum mixer to the sausage filler. A great variety of sausage fillers are available, varying considerably in capacity. Hand driven models generally offer from 5 to 15 liter capacities, while fully automated hydraulic stuffers can accommodate from 50 to 500 liters.

Continuous fillers are also available and although very expensive, they are the best option for large-scale operations because of their versatility. Continuous fillers can be equipped with additional equipment such as portioners, link twisters or casing clipping units.

Pre-printed plastic

casings of different diameters and lengths can be used for polony.

The casing is placed over the stuffing nozzle. As the casings fill with meat, they are supported and allowed to slide off the nozzle at a pace that ensures maximum filling while eliminating air pockets.

The casings are sealed with metal clips or strings.

The mixture stuffed in plastic casings takes on the shape of the casing, unless it is placed in aluminum or stainless steel moulds with spring lids that force the product to take on the shape of the mould during cooking.

Cooking of polony

The Polony is usually cooked in a steam cabinet or in hot water. The simplest procedure is to set the temperature of the

steam cabinet at 78 - 82 °C and then to cook the product to an internal temperature of 72 °C. Cooking time depends on the weight

and dimension of the product. Humidity is once again a crucial factor in the quality of the cooked product.

Cooling of polony

The cooked polony should be cooled immediately after it is removed from the cookers to prevent overcooking and bursting. The product is cooled with cold, potable running water until the internal

temperature is reduced to 30°C. The polony is then placed in cold room storage for further cooling. The product should be handled carefully during and after cooling.

After one day of cold storage, the polony can be dipped in boiling water for 5 seconds to shrink the casing and ensure a neat surface appearance. It is then returned to the cold storage rooms.

Labelling of meat products

The casings 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 processing options

Below is a list of other emulsified products not covered in this report, but available from Eskom.

- **Frankfurters** are cooked, smoked sausages prepared from emulsified meat. Frankfurters are also cured,

seasoned and skinned. It can be sold as a convenience product or a canned product.

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.

For more info visit:
<http://www.eskom.co.za/sites/idm/Business/Pages/Alternativefunding.aspx>



Energy Advisory Services

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 as part of the team that the farmer selects.

Optimise your energy use

Eskom's Energy Advisors, in regions across South Africa, offer advice to business customers on how to optimise their energy use by:

- Understanding their energy needs
- Understanding their electrical systems and processes

- Investigating the latest technology and process developments, including electric infrared heating and drying systems
- Analysing how to reduce energy investment costs
- Optimising energy use patterns in order to grow businesses and industries

Call 08600 37566, leave your name and number and request that an Energy Advisor in your region contacts you.

Alternatively, e-mail an enquiry to advisoryservice@eskom.co.za.

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