

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:
0.84 kg
of lean
meat will
yield
approximately
1 kg
patties

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: Hamburger patties

Patties are minced meat products containing added ingredients and seasoning which is pressed into a round, flat shape. Variations include bacon burgers and lamb burgers made from pre-cured pork and lamb respectively. Other variations include cheese patties and microwave patties.

According to the Standards for meat patties (SABS 1675:1997), the actual total meat content of ingoing units should be at least 70% and not more than 6% starchy material.

Yield: 0.848kg of lean meat will yield approximately 1kg patties. This is based on the assumption that patties contain 84% meat and 16% water and other ingredients.



Photo source: www.google.com

Process description

Ingredients for patties

Meat: Patties can be made from beef, pork, mutton or poultry, but generally beef is the most popular choice for hamburger patties in South Africa. The freshness of the meat trimmings is a key factor in the shelf-life and flavour of patties. Trimmings should be used within 24 hours of slaughter to ensure preservation of the original colour in the finished product and the prevention of rancid flavours. Bruised and oily trimmings and the seedy parts of pork bellies should not be used. Trimmings should be well chilled (around 0°C) to improve handling characteristics. Another important criterion is the absence of gristle, bone, cartilage and large amounts of connective tissue in meat trimmings intended for patties. Although frozen meat can be used, fresh meat is preferred. Frozen meat should be used without defrosting. Mechanically recovered meat may not be used for products complying to South African Standard Specifications (SABS 1675:1997).

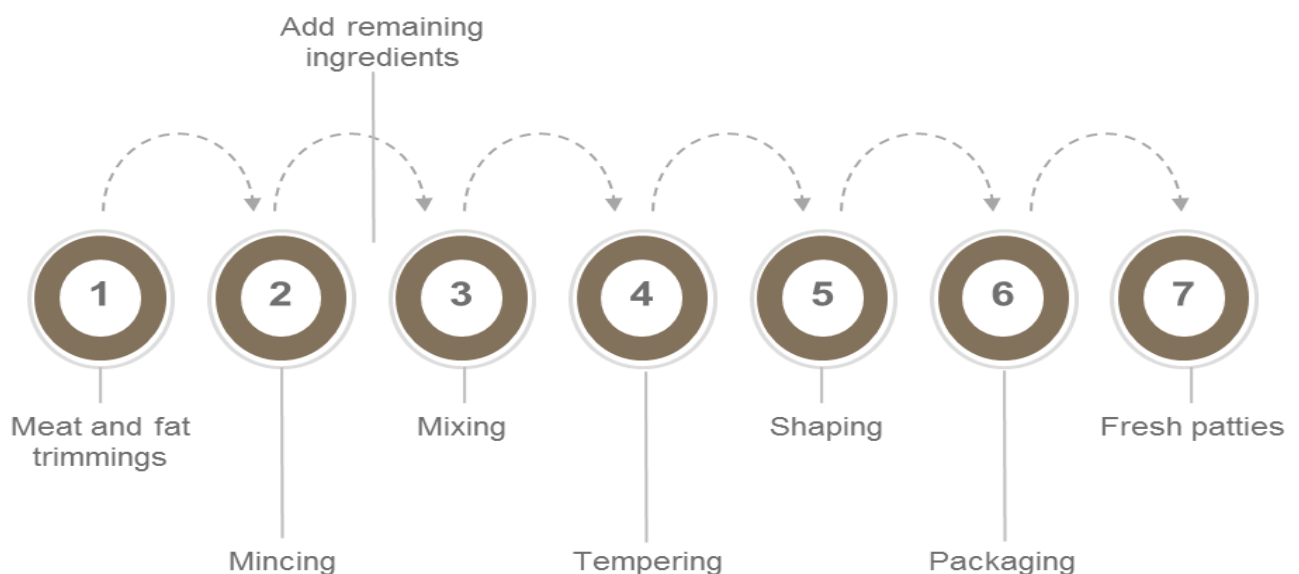
Fat: If the meat is too lean, fat can be added. Pork fat (lard) should be avoided as this can develop rancid off-flavours during storage. Hard beef fat can be added, and mutton fat should be used sparingly, since it imparts a very distinct flavour to the product.

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 that does not contain suspended matter and 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 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 100ml
- Faecal coliform shall not be detectable in 100ml of the water

Starch or cereal products: Crumbs are added to absorb any free moisture and to contribute to the mouth-feel and texture of the patties. Crumbs are classified on the basis of their particle size. The level of inclusion in patties is usually between 5 and 10%. Crumbs or batter used to wrap the product is quite different from those included in the mixture. These contain binding agents to ensure the adhesion of the layer of crumbs to the patty.

Process overview



Salt: Salt is added to impart taste but also acts as a preservative and functional ingredient. The functional property of salt is to extract and solubilise the meat proteins and consequently to increase the water-holding capacity. Patties usually contain between 0.5 and 0.75% salt.

Spices and herbs: This includes natural dried components or mixtures of spices and aromatic plants in whole, broken or ground form. Spices are used in foodstuffs for flavouring, seasoning and to impart aroma. Herbs and spices add zest to patties and are added to the liking of the manufacturer. Seasoning can be obtained from spice dealers in premixed, ready-to-use form. This is of great convenience to the small-scale processor, since it eliminates mistakes made during weighing of very small amounts of ingredients and ensures uniform product quality.

Food additives: Various additives, including colorants, flavours and preservatives are available to the meat processor. Only those permitted under Act 54/1972 and regulations may be used in the specified amounts.

Meat extenders: Meat extenders such as textured soy protein products are widely used to improve the body and reduce cooking losses. Added advantages are the added nutritional value and functional properties. Textured soy absorbs meat juices, seasonings and fat and releases them again during chewing. They also act as stabilisers and coagulate with heating to give structure to the product. The amount included should however be limited to prevent the detection of a bean-like flavour.

Other speciality ingredients: Cheese, mushrooms, onion and peppers may be added

Mincing of meat for patties:

Mincing is the first step in the manufacturing of patties. The meat trimmings and fat are prepared for easy mixing with the remaining ingredients. Mincing takes place in a mincer with various screen plate sizes, each with its own blade plate. The lean meat and fat usually need to be relatively coarse for patties (4½mm or larger aperture size of final sieve plate in mincer).

The temperature of the meat during mincing is important. The ideal temperature is well chilled, but defrosted, generally below 5°C to ensure a good, clean cut. The meat should be thoroughly deboned, since bone chips can damage the mincer. Excessive amounts of connective tissue also cause mincing problems due to blocking of the sieve openings.



4 ½mm
or larger



Mixing of ingredients for patties

The remaining ingredients are mixed with the minced fat and lean meat in a special mixer such as a Z-blade mixer or alternatively in the meat mincer. The latter method involves mincing the meat and fat in a two-stage mincing process. The first time involves passing the meat and fat through a slightly larger screen plate (e.g. 8mm) than required for the end product. The remaining ingredients are weighed and added to the minced meat and fat and roughly mixed by hand before being reintroduced to the mincer, this time using the required screen plate (4½mm).

This method is popular because it saves on the required apparatus. Mixing and mincing can also take place in a bowl cutter but runs the risk of being over-mixed or over-chopped. Typical signs of excessive mixing are fat smearing and a tough, rubbery end product.



Tempering of ingredients for patties

Tempering involves allowing a semi-processed product to stand for a specific period of time before processing is resumed. This allows certain reactions to take place in the product that would facilitate or aid subsequent processing procedures.

After mixing, the mixture is kept at 4°C for an hour to allow for complete hydration of the crumbs and other dry ingredients, as well as flavour development.



Shaping of patties

The tempered patty mixture can be shaped in any desired shape. Shaping can be done with a hand press, which shapes and presses one patty at a time. This is a very slow method and is only suited for small-scale operations. It is important to ensure that the weight of the manually pressed patties is kept uniform (for instance 100g; ±5g).

Large meat processing plants use either extrusion moulding or an extrusion and slicing method to shape patties. Extrusion moulding involves pumping the mixture through a narrow tube into a moulding chamber that shapes the patties. A simpler method involves extruding the mixture through a large pipe and slicing the shaped mixture as it exits with a rotating knife.



Packaging and storage of patties

Fresh patties are normally packed in a polystyrene tray and over-wrapped with an air-permeable polymer film. The products are then visible to the consumer. Fresh patties are naturally very susceptible to bacterial decay and have a shelf life of about 5 - 7 days under refrigerated conditions (± 4°C).



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.

Legal requirements for meat products

The meat processor must be familiar with the legislation and regulations involved with meat processing, the products and the premises.

Other processing options:

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 dried.

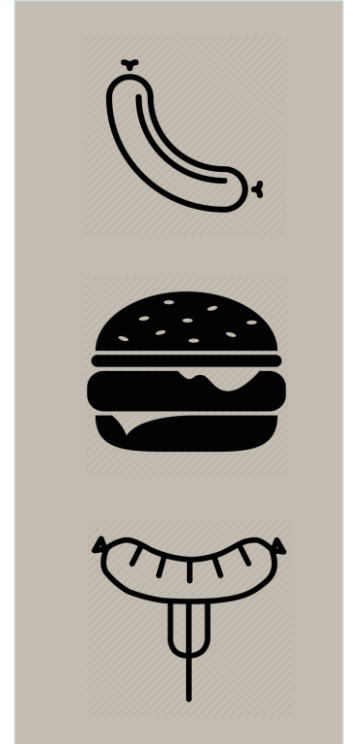
Fresh sausage is made of minced meat that is uncured, seasoned with salt and spices, and stuffed into casings without smoking or cooking. Examples include “boerewors”, beef sausage, pork bangers and mutton sausages.

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.

Salami is a fermented chopped meat product. Fermentation reduces the pH to below 5.3. The product is also dried to remove at least 20% of the moisture.

Uncooked smoked sausages can be cured or uncured, seasoned, stuffed into casings and smoked but not cooked prior to sale.



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 part of the team that the 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 by:

- Understanding their energy needs.
- Understanding their electrical systems and process.
- 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



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](http://www.eskom.co.za/sites/idm/Business/Pages/Alternativefunding.aspx).

Literature sources:

- Forrest, J.C et al. 1975. Principles of Meat Science. San Francisco: W.H. Freeman Nickerson, J.T.R & Ronsivalli, L.J. 1982. Elementary Food Science. 2nd ed. Westport: AVI Potter, N.N. & Hotchkiss, J.H. 1995 Food Science. 5th ed. New York: Chapman & Hall.
- Price, J.F. & Schweigert, B.S. 1987. The Science of Meat and Meat Products. 3rd ed. Westport: Food & Nutrition Press.
- Rust, R.E. 1976. Sausage and Processed Meat Manufacturing. American Meat Institute Center for Continuing Education.
- South African - Foodstuffs, Cosmetics and Disinfectant Act (no 54 of 1972) and regulations. Johannesburg: Lex Patria
- South African Standard Specification: Packaged meat products (processed or manufactured) SABS 885:1974. Pretoria: South African Bureau of Standards
- Varnam, A.H. & Sutherland, J.P. 1995. Meat and Meat Products: Technology, Chemistry and Microbiology. London: Chapman & Hall.
- Google free images: Product and other photos were sourced from Google images using a filter: Free to share and use commercial

Disclaimer

The reader's attention is drawn to this notice which contains a limitation of risk or liability of Eskom, and constitutes an assumption of risk or liability by the reader or an indemnification of Eskom. The reader acknowledges that he/she has made she/he aware of this disclaimer and is aware that the disclaimer limits the liability of Eskom.

The aim of this document is solely to provide the reader with some basic information on agro processing in order to understand the extent of the operations involved. The reader should familiarise him/herself with all applicable laws that apply to the product growing, storage, processing and manufacturing. This information concentrates on the sequence and steps involved in the processing of the selected product, and explains the reason and necessity of each step. It is not a complete reference document on which calculation and design shall be based, nor was it ever intended to be.

While Eskom has made every attempt to ensure that the information contained in this brochure has been obtained from reliable sources, Eskom does not accept any responsibility or liability for the accuracy, content, completeness, legality, or reliability of the information contained in this brochure, and the readers or users are required to also make their own independent enquiry, before relying upon same.

All information in this brochure is provided "as is" with no warranties, promises and/or representations of any kind, expressed or implied, as to the nature, standard, accuracy or otherwise of the information provided in this brochure nor to the suitability or otherwise of the information for a purpose. Computer generated images, walkthroughs and rendered images used in this brochure are the artist's impression and are indicative of the actual designs. The imagery used in the brochure may not represent actuals. Eskom shall not be liable to the reader for any loss or damage of whatever nature (direct, indirect, consequential, or other) incurred by the reader as a result of any action or omission related to the information provided in this brochure. The reader shall indemnify Eskom against any claim or action instituted by a third party as a consequence of the actions taken in relation to the contents of the brochure, emanating from any area of law.