

Preservative use in processed meats

Licensee guidance

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Introduction

Preservatives are used in processed meats for food safety, shelf life and food technology reasons. Sodium nitrite or potassium nitrite play a key role in the safety of processed meats. Nitrites, or in slow cured meats sodium or potassium nitrates which are gradually converted to nitrites, are the key ingredients in meat cures. They provide excellent protection against botulism in processed meats. At the same time their use results in the characteristic colour and flavour of cured meats.

Other preservatives inhibit the growth of microorganisms. The sulphites, sources of sulphur dioxide, also inhibit the growth of microorganisms while retaining the bloom (fresh colour and appearance) of red meat.

Preservative use is regulated for a number of very good reasons. Some preservatives can have adverse affects on health. The levels of nitrates and nitrites in meat are restricted because they can be converted in the stomach or during high temperature frying to chemicals understood to cause cancer. Sulphur dioxide exposure causes breathing difficulties in some people. Other preservatives can have adverse affects if consumption limits are exceeded. Preservatives can also be regulated to prevent use which is incompatible with other manufacturing processes.

Overview of the relevant standards

The approvals for use of preservatives in meat products are contained in *Standard 1.3.1 – Food Additives* of the Australia New Zealand Food Standards Code. This standard categorises food according to a system devised in the European Union. Processed meats are first categorised as being ‘in whole cuts or pieces’ or as ‘comminuted’. Subcategories depend on the production methods used. Preservative approvals are linked to particular sub-categories.

The [flow chart](#) (page 4) summarises the information relating to processed meat categories and the permitted preservatives contained in FS 1.3.1.

A number of food standards are relevant to processed meats. These notes refer to the following standards:

- FS 1.3.1 Food Additives. A user guide has been prepared for this standard.
- FS 1.6.2 Processing Requirements. This standard defines dried meat and heat treatment and cooking times for fermented comminuted processed meat.
- FS 2.2.1 Meat and Meat Products. A user guide has been prepared for this standard.
- FS 4.2.3 Production and Processing Standard for Meat. This standard includes processing requirement for the production of uncooked comminuted fermented meats.

[Table 1](#) (page 5) expands on the categories used in FS 1.3.1 and helps in determining where certain products fit into the system. Common products names are shown in the flow chart and the table. These names might assist with selection of the correct category but caution is needed; companies sometimes use product names for marketing purposes and the products might not be true to type.

In some cases products are defined by what they are not! For example lup cheong is not processed according to the requirements for uncooked fermented meat and is not fresh sausage and—as it is made from comminuted meat—it is a processed comminuted meat product. Table 1 also lists other applicable standards.

Preservatives permitted in meat products

Schedule 1 of FS 1.3.1 permits the use of the following preservatives in certain meats and meat products. The ingredient number is shown in brackets and a group name is included where relevant.

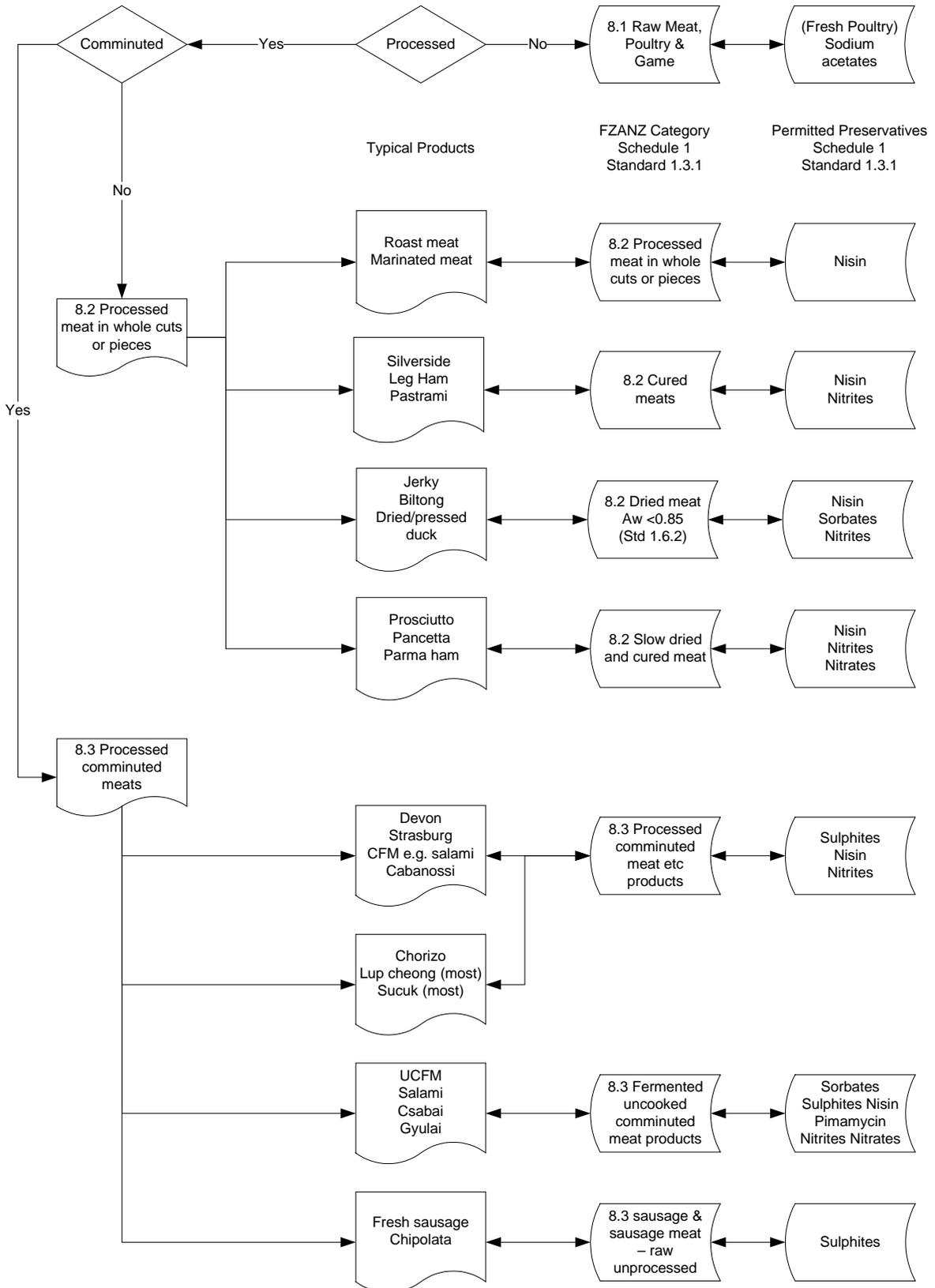
- Sodium acetates (262)
- Natamycin or Pimaricin (235)
- Nisin (234)
- Nitrites – potassium nitrite (249) and sodium nitrite (250)
- Nitrates – sodium nitrate (251) and potassium nitrate (252)
- Sorbates – Sorbic acid (200), sodium sorbate (201), potassium sorbate (202) and calcium sorbate (203)
- Sulphites – Sulphur dioxide (220), sodium sulphite (221), sodium bisulphite (222), sodium metabisulphite (223), potassium metabisulphite (224), potassium sulphite (225) and potassium bisulphite (228)

Key issues

- Processed meat products must be properly categorised and only preservatives permitted for that category may be added. For example sorbates are permitted additives to dried meat but they are not to be added to slow dried and cured meat.
- Carry over of preservatives from ingredients is limited to the maximum permitted level in the ingredient multiplied by the usage rate of the ingredient in the processed meat product (an example of this calculation is provided in Table 2 below).
- Nitrate-based cures may only be used in a few specialty products such as dry cured hams and dry fermented sausage. The long, slow curing processes rely on a long-term reservoir of nitrate that is slowly converted to nitrite over the course of the process.
- Sausage premixes and sulphite preservatives should be used according to the manufacturer's instructions. Sausage premixes usually include excess sulphites to allow for production and storage losses. Overuse of premixes or addition of a 'spike' of preservative can result in illegal levels of sulphites.

[Table 2](#) provides some examples of preservative use in processed meats that does not comply with the Food Standards Code.

Processed meat (smallgoods) preservative use



30 June 2009

Table 1: Matching products with the processed meat categories in Food Standard 1.3.1

Category	Examples	Required characteristics	Clues to identity
8.2 Processed meat in whole cuts or pieces			Whole muscle or meat portions but not processed by mincer or cutter.
Processed meat in whole cuts or pieces	Roast or marinated meats		No cured meat colour. May be sold cooked, sliced or raw for subsequent cooking.
Cured meats	Silverside, leg ham, pastrami	Meat flesh including any attached bone containing no less than 160 g/kg meat protein on a fat free basis. (This requirement also applies to meats and slow dried and cured meats).	As smallgoods these are typically cooked products, with cured meat colour. Corned beef or pastrami may be sold raw for subsequent cooking. The relatively high protein level limits excessive water addition.
Dried meats	Jerky, biltong	Complies with Food Standard (FS) 1.6.2 – meat has been dried to a water activity of no more than 0.85 but does not include slow dried cured meat.	Low moisture, air dried products. Typically brined cold over 4 days or salt is packed around meat strips. Meat is dried in a hot air oven at temperatures around 55-65°C. Drying is quick ~ 5 hours. The final water content is 30-35% and salt 11-12%. (MLA 2003 ¹)
Slow dried and cured meat	Prosciutto, pancetta, Parma ham		Slow-cured meats are typically dry salted in a chill room for 12–24 days. Salted meat is dried for many months under controlled temperature and humidity (eg 15 °C and 75% RH). The final product is usually stored bone-in at room temperature or bone out, vacuum packed in chilled storage. (MLA 2003)

Category	Examples	Required characteristics	Clues to identity
8.3 Processed comminuted meat products			Comminuted—divided into small parts—typically by use of a mincer (grinder) or cutter. Comminution can be coarse to produce non-emulsified sausage like salami, or fine to produce emulsified sausage like frankfurts or Devon.
Processed comminuted meat products	Devon, Strasburg, cooked fermented meats including some salami	Compositional requirements (FS 2.2.1) apply with processed meat containing no less than 300g/kg meat and manufactured meat containing no less than 660 g/kg meat. Labelling requirements (FS 2.2.1) apply to cooked fermented comminuted meat.	Products can be sold cooked or raw for subsequent cooking. The meat must have undergone a process other than boning, slicing, dicing, mincing or freezing.
Fermented uncooked comminuted meat products	UCFM, salami, csabai, Mettwurst	<p>Compliance with processing requirements of FS 4.2.3 including the use of a suitable process, the use of a starter culture, <i>E. coli</i> testing, monitoring and recording pH, times and temperatures of fermentation, and maturation and weight loss or a_w.</p> <p>Labelling requirements (FS 2.2.1) apply to UCFM. Some products are heat treated as per FS 1.6.2. These products are still classified as UCFM but have different labelling requirements (FS 2.2.1).</p>	<p>There are four basic categories of UCFM products.</p> <p>Moist sausage: these products typically have a short fermentation and maturing times and rely on low pH (<4.5) for shelf-stability.</p> <p>Semi-dry sausage: longer maturation periods result in a product which is shelf stable when pH is <5.2 and a_w is <0.95.</p> <p>Dry mould ripened salami: after fermentation, salamis are not smoked, but are inoculated with surface mould and ripened at low temperature (around 10-12°C) for up to 2 months to give a_w of <0.90 and a pH 5.6 – 6.0.</p>

Category	Examples	Required characteristics	Clues to identity
			Very dry, high pH Italian salamis: these sausages are matured for long periods (> 2 months) at low temperatures (around 12°C), which provides shelf-stability due to low a_w (<0.91) (MLA 2003).
Sausage and sausage meat containing raw unprocessed meat	Fresh sausage, chipolata	FS 2.2.1 includes a definition of sausage and details compositional requirements	Minced or emulsified meat in a casing or formed into discrete units, but not reformed to resemble a cut of meat. Products are not cured.

1. Reference: MLA (2003), *Guidelines for the safe manufacture of smallgoods*, Meat and Livestock Australia Ltd.

Table 2: Examples of processed meats that do not comply with Food Standard 1.3.1

Issue	Discussion
Coppa and Pancetta with sorbic acid/sorbates	Coppa and Pancetta are slow dried cured meats. Sorbic acid is not a permitted additive for slow dried and cured meats. The use of sorbic acid in these products might result from confusion with dried meat where sorbic acid is permitted. It is possible that sorbates are deliberately misused to control mould growth which can occur on the surface of products during drying. Mould growth is traditionally removed from dried cured meat by washing and brushing.
Mortadella with elevated levels of nitrite and nitrate. Mortadella that contained only nitrate and the elevated levels suggested that the product was formulated with a nitrate based cure.	Mortadella is a processed comminuted meat product. Nitrate is not a permitted additive and nitrite based cures must be used. The nitrite and/or nitrate found in the products exceed permitted limits and it is likely that input was too high. Nitrite is often included in a formulation at levels exceeding the regulatory limit to allow for processing and storage losses. However, nitrite is poisonous and it must be used cautiously. The product formulation must be correct and nitrite levels in finished batches should be checked regularly.
Lup cheong with elevated levels of nitrate.	<p>Lup cheong is a processed comminuted meat product. Nitrate is not a permitted additive and nitrite based cures must be used. Lup cheong is traditionally a quick-dried unfermented sausage intended to be eaten cooked. Variations in production methods might be found in some Sydney suburbs, but lup cheong is not made using a long, slow curing process and the use of nitrate based cures is not technically sound.</p> <p>The change to nitrite based cures must be made with great caution. Nitrite is toxic if overdosed. The amount of nitrite used in a formulation is limited to about 25% of the amount of nitrate that would have been included. The nitrite should be added in a premix with salt to guard against the risk of causing nitrite poisoning. The nitrite/salt premix should be formulated so that dangerous overuse would result in excessive salt levels and unpalatable product.</p> <p>Note: Similar conclusions can be reached about Middle eastern sausages such as Sucuk. The products may undergo initial fermentation but they do not meet regulatory requirements (FS 4.2.3) for UCFM and they are intended to be cooked prior to consumption. They are properly classified as processed comminuted meat and nitrite based cures are to be used.</p>

Issue	Discussion
Ham, black pudding and lup cheong containing benzoic acid.	Benzoic acid is not a permitted additive for use in meat and meat products. However, benzoic might be found in a meat product due to a permitted use in food additives or ingredients such as fruit pulp, chilli paste or apple cider. Formulations or batch records could justify the presence of benzoic acid in meat products. Benzoic acid must not be added directly to the meat product but 'carry over' is permitted. For example, a chorizo sausage is formulated with 5% chilli paste, which includes benzoic acid at 3000 mg/kg (the maximum permitted level). The carry over of benzoic acid to chorizo is limited to 5% of that maximum—150 mg/kg.
Fresh sausage with excessive sulphite levels.	This is a familiar problem. The use of a commercial sausage premix often results in a sulphite input slightly above the 500 mg/kg maximum permitted level to allow for processing and storage losses. At the point of sale, sausages prepared using commercial premixes occasionally exceed the maximum permitted of sulphites level by a small margin. Substantially non-compliant levels of sulphites are more likely to result from an added spike of preservative ('preso').

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