



Chapter 21

Salpicão and Paio

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Abstract

Salpicão and Paio are traditionally cured meat products made preferentially from pork loin. Still, it can use meat from the leg, in a single piece, or from grossly cut meat. Salpicão is produced mainly in the North of Portugal, while Paio is in the South, with its most significant expression in Alentejo. The meat is salted and seasoned, according to the regional or even producer's recipes. In the production of salpicão, the wine is frequently, but not always, used to season the meat, while in paio, it is the red pepper paste and garlic paste that impart the *sui generis* aroma and color to the product. The seasoned meats are filled into casings and dried. Smoking is always used in salpicão, while paio might or might not be smoked. The drying process combined with the salt contributes to a sliceable texture and reduced water activity that ensures its preservation.

Key words Traditional meat products, Dry-cured products, Dry-fermented sausages, Cured loins, Mediterranean sausages, Manufacture process

1 Introduction

The loin is a noble pork cut that can be preserved by curing. Different meat products are prepared from pork loin in Portugal according to regional specificities on meat preparation and seasoning. Salpicão and Paio are cured meat products from the north and the south region, respectively. These products have a long tradition of manufacturing and are highly valued by the consumers due to their exquisite sensory characteristics and attractive nutritional value due to the relatively low-fat level [1, 2].

Salpicão might be manufactured with a whole piece of loin, cut transversally to the muscle fibers orientation, or with the loin cut in pieces around 3–6 cm. Besides the salt that is always present, the seasoning is variable and linked to the production location. In wine-making regions, red wine combined with salt, garlic, and lauryl is used to marinate a whole piece of loin for several days. In the other areas, manufacturers still use wine, red or white, but with more discrete importance. In these recipes, sweet and spicy paprika is

always present, combined with garlic, laurel, and other seasonings that each producer might use to impart their particular sensory notes to their recipes [3]. From the nineties of the XX century, an effort was made to recover a pork breed at risk of disappearance—Bísaro. The aptitude of that pork to transform into cured meat products is excellent due to its intramuscular fat that results in juicy and flavor-rich salpicão. Meat from that breed, pure or with at least 50% of Bísaro blood, is used for protected geographic indication (PDI) products [4]. Due to the specific environmental conditions, as well to preserve the cultural heritage of the traditional manufacturing processes, there are three types of salpicão with a PDI: *Salpicão de Vinhais*, *Salpicão de Barroso-Montalegre* and *Salpicão de Melgaço* [5].

Paio is a cured sausage from the Alentejo region, and the loin used is from the Alentejano swine breed, a variant of the Iberian breed [6, 7]. The meat from these animals has outstanding properties to transform into cured paio. The amount and composition of the fat result in a controlled oxidation process resulting in a characteristic-rich odor. Paio is made from a single piece of loin, cut in the direction of the muscle fibers, or local variants that might be prepared with meat grossly cut into pieces [1].

In both salpicão and paio, the extensive maturation that might be from 4 weeks to more extended periods, depending on the sizes of the product, results in a slow drying process. As a result, the products acquire a sliceable texture and reduce the water activity to ensure their microbiological safety. The aroma formation is a complex interaction between enzymatic, chemical, and microbial modifications of the fat and protein and fat, combined with the aroma of the seasonings and the smoke when that operation is used [2].

The traditional recipes have been adapted to industrial production, using nitrite, combined or not with nitrate, to increase microbial safety. In some industries, the products are subjected to a mild heat treatment (55–60 °C), viewing the elimination of low-infective-doses pathogens [3]. That operation might occur concomitantly with the smoking or at the beginning of the drying process. As expected, heat treatment modifies the product considerably, resulting in more flawed aroma products, characterized mainly by seasonings and smoke notes [8].

The main objective of this chapter is to make a detailed description of the formulations of Salpicão and Paio and the different stages of their manufacturing processes.

2 Materials

1. Main ingredients: Pork loin and tenderloin (*see Note 1*).
2. Common salt, sweet and spicy paprika, garlic, red or white wine, red pepper, laurel, water, optionally nitrite salt can be used (Table 1).
3. Casings: the casings used are from large swine intestine.
4. Final products characteristics (Table 2):
 - (a) Salpicão (Fig. 1).
 - Shape and external appearance: It has a dark brown exterior color, eventually reddish when paprika is used.
 - Weight: given that the casing in which it is stuffed is natural, the weight will be variable, ranging from a minimum of 0.2 kg to a maximum of 0.5 kg.
 - Diameter: 5–8 cm.
 - Internal appearance: The lean part of salpicão is the characteristic bright red of cured meat. It can have an orange tone from the paprika or a purplish one due to meat marination in red wine. The fat is white or pale beige. It has a *sui generis* cured flavor, smoky notes, and discrete aromas from the seasons used, namely the wine, garlic, and red pepper paste.
 - Sensory characteristics: It has a *sui generis* cured flavor, smoky notes, and discrete aromas from the seasons used namely the wine, garlic, and red pepper paste. The texture is firm and juicy.
 - (b) Paio (Fig. 1)

Other common designations: *Paio do lombo, paio, painho, paiola*.

 - Shape and external appearance: broad sausage, cylindrical in section and straight with a length between 12 and 20 cm. Appearance: shiny, slightly rough. Stuffed on natural salted pork casings twisted and tied with cotton thread at both ends. Reddish and white color with semi-hard to hard consistency.
 - Weight: 300–500 g.
 - Diameter: 6–15 cm.
 - Internal appearance: meat Reddish pink color, with some white streaks. Perfectly connected mass, homogeneous in appearance. The fat is pearly white and shiny,
 - Sensory characteristics: Flavor and aroma: Pleasant, smooth and delicate flavor, slightly salty, and

Table 1
Example of recipes of Salpicão and Paio ingredients (curing ingredients and condiments per kg of meat)

	Salpicão	Paio
Refined salt	15 g	15 g
Nitrite salt (optional)	0.10 g	0.10 g
Sweet paprika	10 g	
Spicy paprika	5 g	
Garlic pasta (<i>Allium sativum L.</i>)	10 g	10 g
Red pepper paste (<i>Capsicum annuum L.</i>)		25 g
Powder laurel	0.05 g	
Red wine	0.5 dl	
White wine	–	0.3 dl
Water	–	0.2 dl

Table 2
Chemical composition of Salpicão and Paio

Parameter	Salpicão	Paio
Energy [kcal]/100 g	319	436
Lipids: [g]/100 g	20.4 ± 9.7	40.1 ± 4.6
Saturated fatty acids	8.0	16.1
Monounsaturated fatty acids	9.3	18.5
Polyunsaturated fatty acids	2.7	5.4
Protein [g]/100 g	33.7 ± 6.4	18.7 ± 1.6
Moisture%	39.2 ± 9.5	31.5 ± 3.9
Salt%	4.1 ± 2.1	5.0 ± 0.4
Ash%	5.3 ± 2.0	6.0 ± 0.8
pH	5.4 ± 0.3	5.5 ± 0.4

Data obtained from [9–11]

sometimes aftertaste slightly spicy. The pleasant flavor developed from the non-protein fraction and the limited oxidation of fat. When meat from acorns' finished pork is used, the products develop an exquisite aroma thanks to the compounds formed from the oxidation of polyunsaturated fatty acids. When smoked, discrete notes are perceived.



Fig. 1 Salpicão at a curing house and sliced product appearance (a) and Paio final product and slices appearance (b)

3 Methods

The different steps of the manufacturing process (Fig. 2) are carried out in accordance with the traditional knowledge.

The loins (or eventually meat from the leg) are mixed with condiments and macerated for several days at low temperature, afterward are stuffed in large pork natural casings.

- Preparation of loins. For Salpicão, entire loins can be used or cut on large pieces.

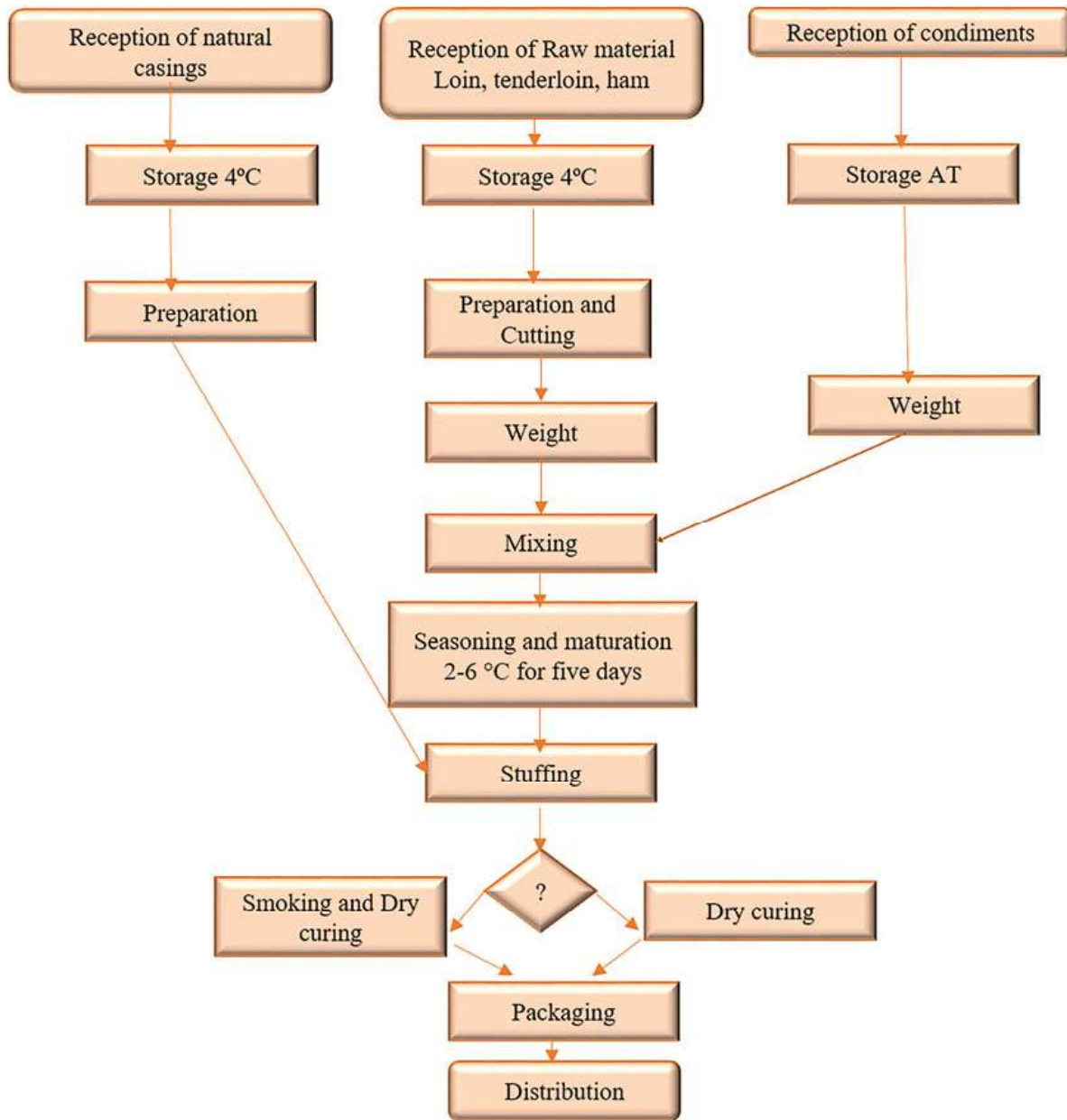


Fig. 2 Flow diagram of salpicão and paio manufacture

For Paio will be used pork loin, tenderloin, but also could be use leg and shoulder and fat obtained from the cutting of carcasses of Alentejano swine breed (*Sus ibericus*), the fragments of meat and fat (70–90% thin and 30–10% fat) can be obtained mechanically or manually.

- Weigh all ingredients according to formulations (Table 1) (*see Note 2*).
- Mix the ingredients and condiments with the meats.
- Leave to mature at 2–6 °C for 2–5 days (*see Note 3*).
- Fill the meat in natural large pork casings (*see Note 4*).

- Smoking in the traditional smokehouse at low temperature with oak or chestnut wood (*see* **Note 5**).
- Curing period in the traditional smokehouse or drier: The cure will be done for approximately 1 month, and the weight break will be 30% on average. The sausages are considered cured when the weight breaks are in the order of 30%.

4 Notes

1. The meat must be of high hygienic Quality; meat with abnormal quality traits, as PSE (pale, soft, and exudative) or DFD (dry, firm, and dark) should be avoided to produce salpicão or paio, due to the abnormal drying kinetic and preservation.
2. When nitrite and nitrate is used, this additive should be used mixed in common salt, as it is commonly sold in the meat industry. The amount of this additive must be carefully monitored to reduce the potential adverse effects it represents.
3. During this phase at low temperature, there are the growth of lactic acid bacteria and coagulase-negative gram-positive cocci that contributes to the preservation and sensory characteristics of the product.
4. When natural casings are used, they must be adequately disinfected. Ancient traditional procedures included, after a thorough washing, salting for several days, marinating the casing in water with lemon and or spirit.
5. Smoking is done with slow-burning of hardwood, like *Quercus ilex*, *Q. faginea* L., *Castanea sativa* M., *Olea europaeae* L. The burning must be done without a live flame (<500 °C) to avoid the accumulation of harmful polycyclic aromatic hydrocarbons. There is a trend to reduce the extension of smoking to the strictly necessary period to the minimum coloring and flavoring of the sausages.

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