

# Evaluation of structural and functional conditions of regional Portuguese kitchens, their legal framing and influence on the quality of the final product

A.L. Magalhães<sup>1</sup>, E. L. Pereira<sup>1,2</sup> and E. Ramalhosa<sup>1,2</sup>

<sup>1</sup>School of Agriculture, Polytechnic Institute of Bragança, Campus Sta. Apolónia, Apartado 1172, 5301-855 Bragança, Portugal

<sup>2</sup>Mountain Research Center (CIMO), Polytechnic Institute of Bragança, School of Agriculture, Campus Sta. Apolónia, Apartado 1172, 5301-855 Bragança, Portugal  
elsa@ipb.pt

## Introduction

Trás-os-Montes is a Portuguese region known for the production of traditional, smoked, naturally-fermented meat products. *Alheira* (Figure 1) is one of the most important, being frequently described as a traditional, smoked, naturally-fermented meat sausage, prepared from pork meat or its mixture with poultry, bread and olive oil, spiced with salt, garlic and paprika.

Generally, this kind of products is produced in “Regional kitchens” that include small scale producers (Figure 2). Nowadays these individual producers have to fulfill European regulations, such as EC Regulation n.º 852/2004, EC Regulation n.º 853/2004 and EC Regulation n.º 2074/2005, as well as Portuguese normatives, such as the Normative-Dispatch n.º 38/2008 and Law-Decree n.º 209/2008 which approves the “State of Practice of the Industrial Activity”, called REAI.

The main aim of REAI is to prevent the risks associated with the exploration of these industrial establishments, in order to guarantee public health, security of persons and their belongings, hygiene and safety of the work places and quality of the environment, in addition to other points.

## Objective

- Evaluation of the structural and functional conditions of three “Regional kitchens” and discussion on how these points are included in REAI;
- Determination of the quality of the final product.

## Results and Discussion

In general terms, the structural and functional conditions of the studied regional kitchens were quite satisfactory.

### I) Localization

All kitchens were located in rural areas and had business licenses.

### II) Business plan

- (i) **Industrial activity:** N.º.10130 – “Production of meat products”;
- (ii) **Final products:** Several meat products, including “*alheiras*”;
- (iii) **Machines and Equipment:** all the kitchens were quite well equipped;
- (iv) **Food workers:** Their number was quite low ( $\leq 3$ ), with more than 45 years old and basic education;
- (v) **Social accommodations:** Nearby the kitchen entrance with easy and proper access, without direct communication with the production areas. Sanitary rooms with cold and hot water, as well as with drying hygienic systems (small paper towels) and waste bins with foot-lever. No first aid equipment was found;
- (vi) **Water:** potable;
- (vii) **Energy:** Electric;
- (viii) **Noise and residues:** Not significant.

### III) Attribution of the veterinary control number

- (i) **General drawing of the establishment + Production line:** The places were designed to prevent the occurrence of contamination (Figure 3).

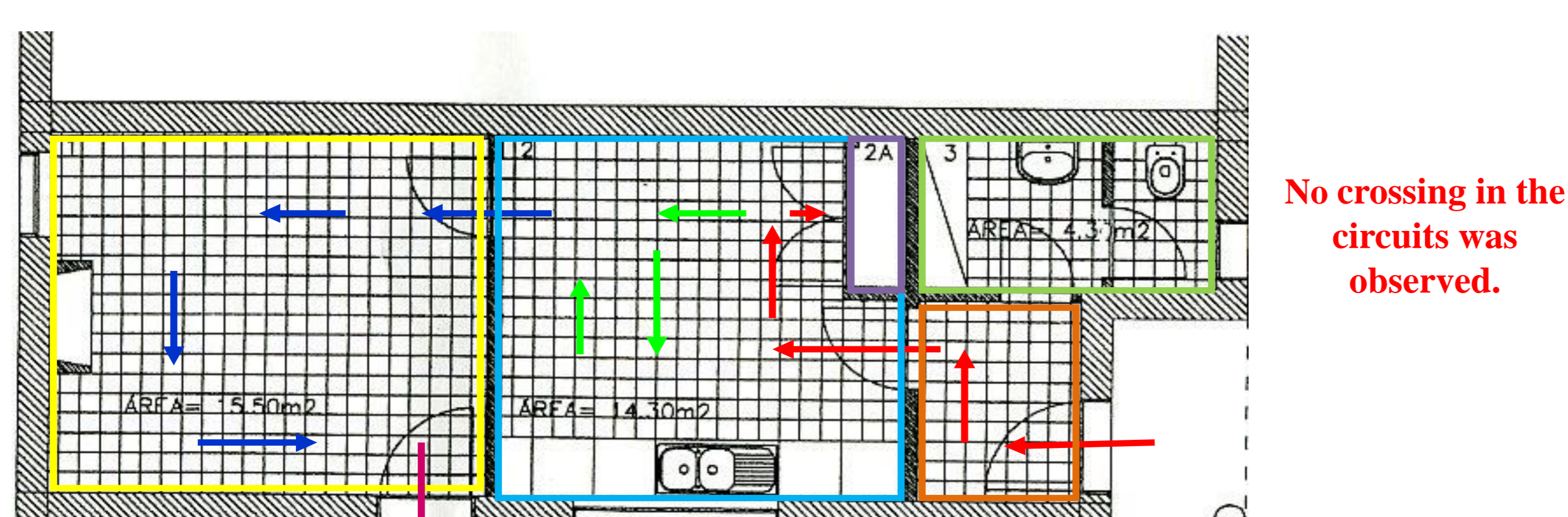


Figure 3 – General drawing of one of the kitchens (functional areas and flows included)  
Legend:

Functional areas	Circuits
<span style="color: yellow;">■</span> Drying area	<span style="color: red;">↑</span> Reception and storing of raw-materials
<span style="color: blue;">■</span> Production area	<span style="color: green;">↑</span> Processing
<span style="color: green;">■</span> Sanitary room	<span style="color: blue;">↑</span> Drying/Storing
<span style="color: orange;">■</span> Access area	<span style="color: red;">↑</span> Expedition
<span style="color: grey;">■</span> Refrigeration chamber	



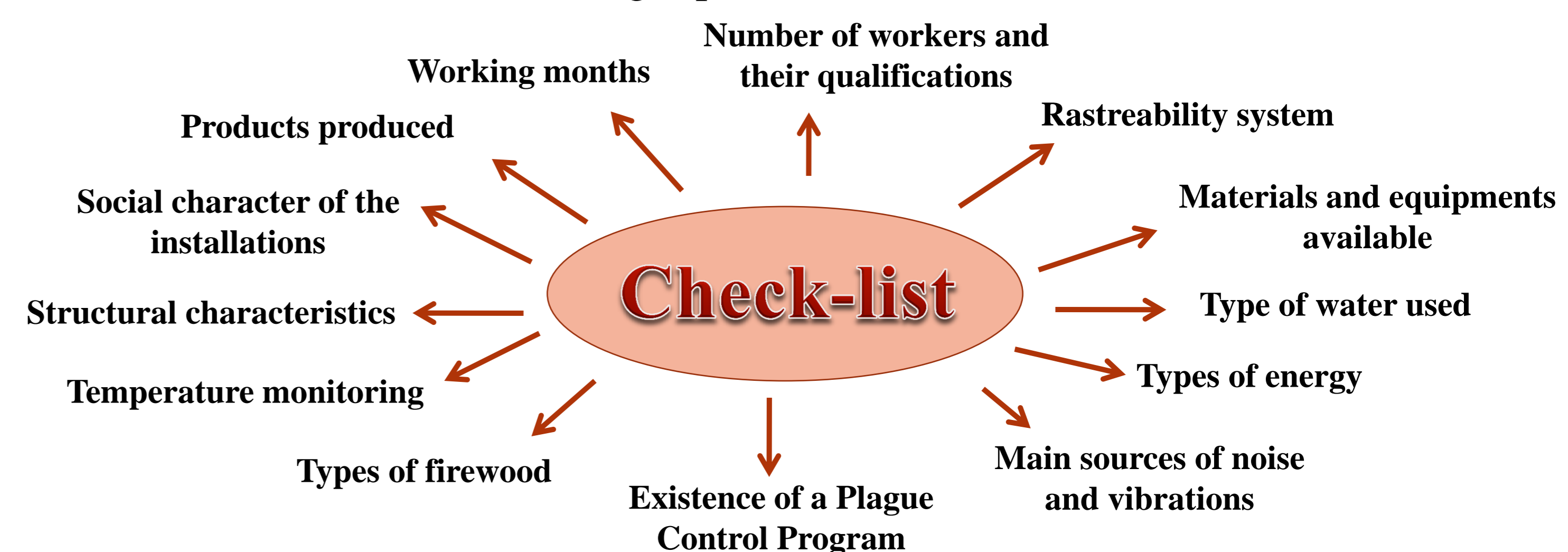
Figure 1 – *Alheiras*.



Figure 2 – Regional kitchens.

## Materials and Methods

- Three Regional kitchens were studied: A, B and C;
- Check-list that included the following topics:



- Microbiological characterization of *alheiras* subjected to a dry period of five days.

### III) Attribution of the veterinary control number (cont.)

- (ii) **Description of the structural conditions of the establishments:** In agreement with Points 1 and 2 of Chapter I of Annex B of the Law-Decree n.º 342/98. Most of the time, the materials used were easy to clean and disinfect.
- (iii) **Flowchart:** Each kitchen follows a recipe. In general terms, the meat is boiled until it separates easily from the bone. Then it is shredded manually and the pigskin is chopped in a mincing machine. The boiled water is strained and used to soften slices of bread. The filling up is made in dehydrated hog’s casings. Afterwards, *alheiras* are dried, being suspended on sticks near the fireplace (Figure 4), during one week. The majority is immediately sold, while the other portion is vacuum packed.
- (iv) **Existence of a Plague Control Program:** Topic not considered in REAI. Some kitchens had insect traps and nets. Nevertheless, none had implemented a Plague Control Program, probably due to its high cost.
- (v) **Microbiological quality of the final product:** The microbiological quality of *alheiras* produced in the three kitchens is represented in Table 1.



Figure 4 – Smoking phase.

Table 1 – Average values of log cfu/g ( $\pm$  standard deviation) of mesophiles, molds and yeasts, coliforms and *E. coli* determined in *alheiras* of the three kitchens

Kitchens	Mesophiles	Molds and yeasts	Coliforms	<i>E. coli</i>
A	4.8 $\pm$ 3.1	7.6 $\pm$ 1.4	2.1 $\pm$ 1.5	1.1 $\pm$ 0.2
B	7.0 $\pm$ 1.1	8.4 $\pm$ 1.0	1.1 $\pm$ 0.1	<1.0
C	8.5 $\pm$ 0.6	8.1 $\pm$ 0.3	2.9 $\pm$ 0.5	<1.0

High values ↩ ↪ < 2 log cfu/g **Satisfactory!**

No foodborne microorganisms, such as *Salmonella*, *Listeria monocytogenes* and *S. aureus*, were detected.

## Conclusions / Recommendations

- The Portuguese regional kitchens fulfill the obligatory requisites for the preparation of sausages in a hygienic and safe way;
- *Alheiras* did not represent any danger to public health;
- The points referred in REAI assure the minimal conditions for the safe production of this kind of products.