MICROBIOLOGICAL SURVEY OR RAW PRODUCTS FROM ANIMAL ORIGIN SOLD AT RETAIL LEVEL ON EXPIRATION DATE IN PORTUGAL

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INTRODUCTION

In the European Union, food labels must mention the date of minimum durability or the 'use by' as defined by law Regulation 1169/2011. Food companies are responsible for determining the shelf-life and they always make sure to set the date at least several days before the product is no longer safe. Thus, each manufacturer determines the own margin of safety and ensure that food product is consumed much before it is not edible. In recent years, food sustainability becomes a current concern and this is one of the main lines of the sustainable development goals of the FAO. To reduce the food waste levels at retail sector, some retailers' brands implement a expiration date decrease pricing practice. However, the consumers´ perception about the likelihood of choice and thus acceptance of the practice is still unclear. Since the sale of foods close or at the end of the expiration date may involve some health risks since date of minimum durability may vary due to conditions. The objective of this study was to determine the microbiological quality of raw beef, pork, chicken and fish sold at retail level on expiration date in Portugal

MAT & MET

To evaluate the microbiological quality of foodstuffs at the expiration day, a total of 25 raw foods from animal origin were purchased in two supermarkets in north Portugal between 1 March 2019 and 1 May, 2019. Samples were analyzed for total microbial count (TMC), Enterobacteriaceae (ENT), lactic acid bacteria (LAB), *E. coli* (EC), Moulds and yeast (M&Y), *Listeria monocytogenes* (LM), *Bacillus cereus* (BC), *Salmonella* spp. and *Staphylococcus aureus* (SA). To assess the microbiological quality of foods, Samples were classified as satisfactory or unsatisfactory according to microbiological criteria defined in Regulation (CE) 1441/2007 and literature The quality classification of the samples according to the microbiological counts considered the worst result obtained in one of the spoilage/foodborne pathogen tested for each sample.

RESULTS

Raw products from animal origin displayed the following microbiological counts (Fig.1) (CFU/g) on average: Total microbial counts: 6.26±1.82, Enterobacteriaceae: 3.42±2.18, Lactic acid bacteria 4.72±2.01, *E. coli*: 0.52±1.11, Moulds & Yeast: 3.48±1.81. Regarding foodborne pathogens, all samples not presented counts for *Salmonella* spp., *B. cereus* and *S. aureus*. Only 1 sample accounted 4.45 Log CFU/g for *L. monocytogenes*. Results by raw products from animal origin showed that beef displayed the highest microbial counts for total microbial counts, enterobacteriaceae and mould and yeast. Fish and meat products not presented count for *E. coli*. and pork displayed the highest counts for mould and yeast. According to the microbial criteria, 56% of samples were unsatisfactory for TMC (>10^6 CFU/g) and M&Y (>10^5 CFU/g); 76% of them for ENT (>10^2 CFU/g) and also 20% for EC (>10 CFU/g). In overall, only 2 (8%) samples accounted satisfactory levels for all the microbial criteria.

DISCUSSION

The study of raw foods from animal origin sold on expiration date showed concern results. The safety of raw foods analysed did not represent a public health concern due to the absence of *Salmonella* spp., *B. cereus*, *S. aureus* and *L. monocytogenes.* However, the *fact that 68%* of samples analysed displayed microbiological counts above the recommended limit for total microbial counts and moulds & yeast as well as 80% of them were unsatisfactory for the hygienic criteria (enterobacteriaceae and *E. coli*), indicates that the potential sale of these expired products, as a measure to reduce food waste, would not be recommended. Results suggests that i) the expiration date is not optimized by manufacturer or ii) storage conditions along the food chain (i.e. temperature) may not be correctly achieved.

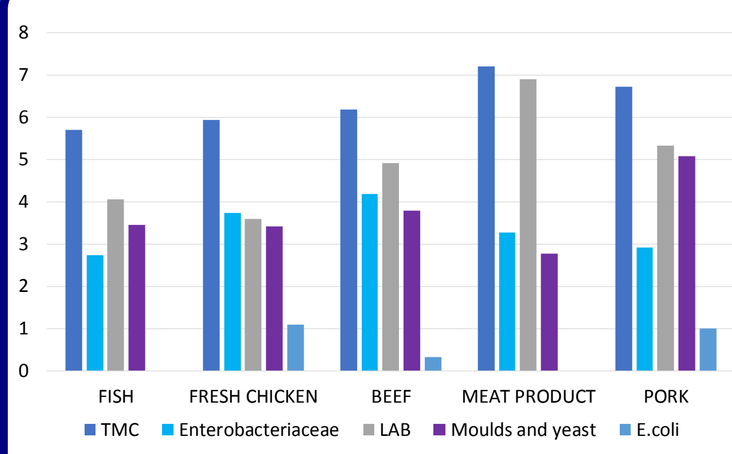
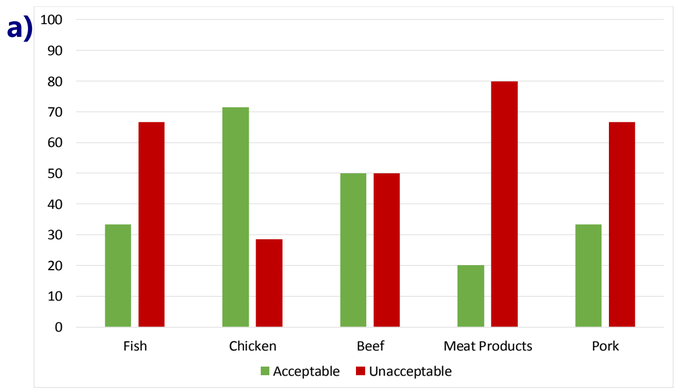
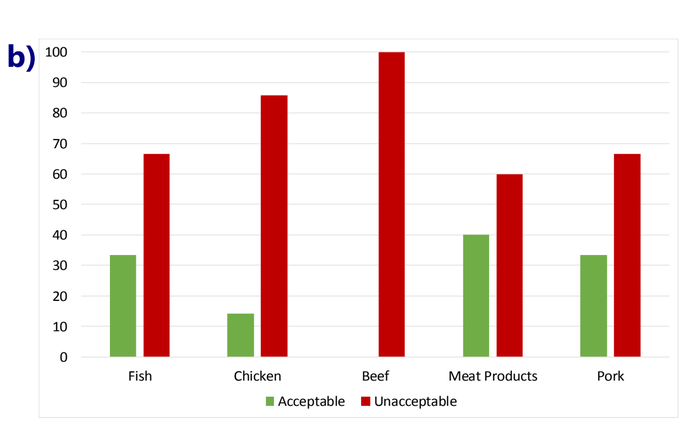
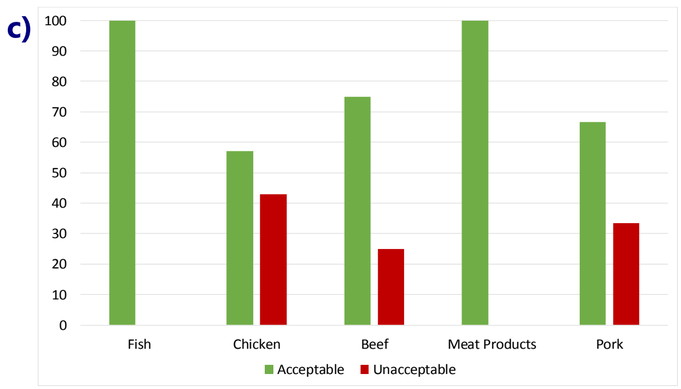


Figure 1. Microbial counts by food group







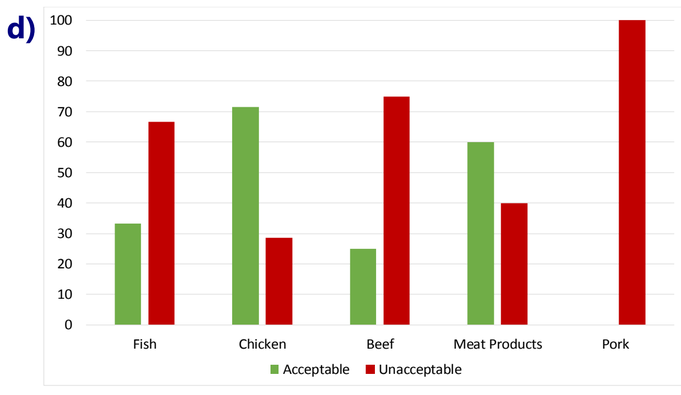


Figure 2. Comparison of microbial quality by food group. a) Total microbial count; b) Enterobacteriaceae; c) *E. coli*; d) Moulds & yeast