MICROBIAL EVALUATION OF SLICED TURKEY MEAT WITH DIFFERENT COLOUR QUALITY

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Background

Poultry meat is spoiled by bacteria (*Pseudomonas, Achromobacter, Flavobacterium, Acinetobacter/Moraxella, Alcaligenes, Aeromonas, Brochotrix, Lactobacillus*) and some yeast which induced changes on its organoleptic characteristics with slime and putrid odours (Cox *et al.*, 1998). The meat microbial contamination level depends on the hygienic conditions of slaughtering and deboning but intrinsic and extrinsic factors as pH and temperature respectively, influence the growth and development of microorganisms (Lucke *et al.*, 1995).
According to Fraqueza *et al.* (2000) almost 23% of turkey carcasses evaluated in a slaughterhouse presented breast muscles too dark or too light compared to the consumer standard of colour acceptability. Between those about 9% of the meat have PSE characteristics, with low pH and the other 14% were very dark with a higher pH. These reality could be different in others slaughter conditions but the importance of this picture is also related with the retail of these different qualities of turkey meat. These are characteristics that could influence consumer appetence and shelf life.

Objectives

The aim of this study was to do a microbial evaluation of sliced turkey meat with different colour quality collected in a slaughterhouse from selected carcasses classified as Lighter (PSE like), Intermediate and Darker like condition. The evolution of the principal spoilage flora groups was assessed in the sliced meat packed in aerobiose along a storage period time at 0ºC clarifying the relation between colour quality and respective shelf life.

Methods

The sampling of breast muscles with different colour was performed on different days from turkey carcasses (BUT 9 and BIG 6) slaughtered and deboned under plant conditions. Colour (Minolta Colorimeter CR-300, Minolta, Osaka, Japan; using the L, a, b, co-ordinates, CIELAB colour system), and pH 24h post-mortem (pH_{24h}, Sentix Sp, WTW, A991409014) were measured on the *Pectoralis* muscles after carcasses deboning. The selected breast muscles according the colour parameter L≥51 (Lighter condition), 43<L>51 (Intermediate condition) and L≤43 (Darker condition) were sliced in scallops. Less than one hour after transportation under refrigeration to the laboratory the sliced meat were individually packed on polystyrene trays wrapped in an oxygen permeable polyethylene film, performing an aerobic condition. The meat were immediately stored at 0±1ºC in the dark for 12 days.
On days 0, 5 and 12 the following Microbiological analyses were carried out: total psicrotrophic aerobic counts at 10ºC for 10 days (Plate Count Agar, Merck, Germany), *Enterobactereaceae* counts in Violet Red Bile agar (VRB agar, Merck, Germany) at 37ºC for 2 days, *Pseudomonas spp.* counts (CFC agar base, Oxoid, UK) after incubation at 30ºC for 2 days, lactic acid bacteria counts on Man Rogosa Sharpe Agar (Oxoid, UK) incubated at 30ºC for 3 days and *Brochothrix thermosphacta* count in streptomycin, actidione, thallous acetate agar (STAA, Oxoid, UK) incubated for 2 days at 30ºC. Counts were expressed as log cfu/g.

Results and discussion

The means of L and pH_{24h} values from the turkey breasts selected in slaughter and classified as lighter, intermediate and darker condition are presented on table 1. The samples analysed were significantly different for L value while for pH value there are only differences between the darker (pH=5.99) and the lighter ones (pH=5.71).
The changes of microflora growth on sliced turkey samples, during storage at 0ºC, are presented in figure 1 and 2.
On day 0, the initial contamination with psicrotrofic aerobic microorganisms of the samples with different colour condition was not significantly different (Lighter: 4.83cfu/g; Intermediate: 4.88cfu/g; Darker: 5.19cfu/g) being the predominant spoilage flora the *Pseudomonas spp.*. After 5 days the microbial growth rate has increased generally more 2log exception made for lactic acid flora which development have been very shy. All the samples had acceptable total psicotrophic aerobic counts on the 5th day.
The samples classified with different colour had no significant differences for counts of all the microflora groups analysed on the 5th day, although on the 12th day the darker samples presented higher counts of psicrothrofic aerobic flora than the lighter samples (p<0.05). This tendency is also observed on the *Enterobactereaceae* and *Pseudomonas spp.* counts. It could be explain by the intrinsic characteristics of darker samples with higher pH and with higher glucose levels disposable in an early stage providing substrate to microbial growth (Garcia-Lopez *et al.*, 1998).
The predominant spoilage flora after 12 days refrigeration of turkey slices samples were the Gram negative microflora and the *Brochothrix thermosphacta*.
The count differentiation of the analysed microorganisms on the different quality colour of turkey meat is observed only after the 5th day of storage. This could be explained by a better adaptation of some microbial groups to the substrate (turkey meat) dependent of its intrinsic characteristics with a better growth rate, however sliced turkey meat microbial counts will be over the limit of acceptability.

Table 1: Means of L and pH values from the turkey breasts selected in slaughter and classified as Lighter, Intermediate and Darker colour condition.

Classified colour turkey Breasts	Lighter	Intermediate	Darker
n	14	6	7
L	52.19±1.28[a]	46.70±1.50[b]	40.36±1.10[c]
pH	5.71±0.08[a]	5.81±0.13[ab]	5.99±0.11[b]

[a, b, c] Means in the same row followed by different superscripts are significantly different (p<0.001)
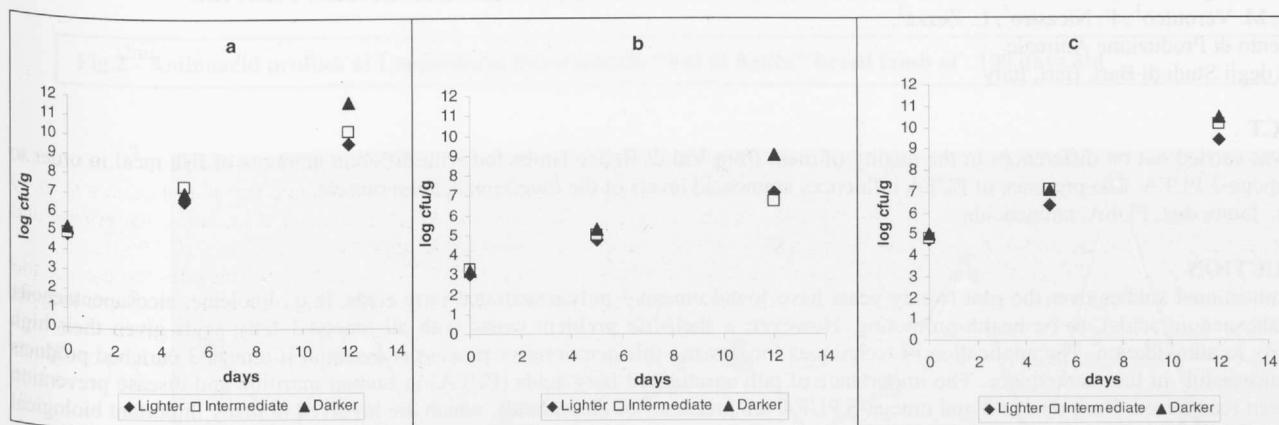
Figure 1: Psicrotrofic aerobic total (a), *Enterobactereaceae* (b) and *Pseudomonas spp.* (c) counts in Lighter, Intermediate and Darker colour sliced turkey meat during storage time.
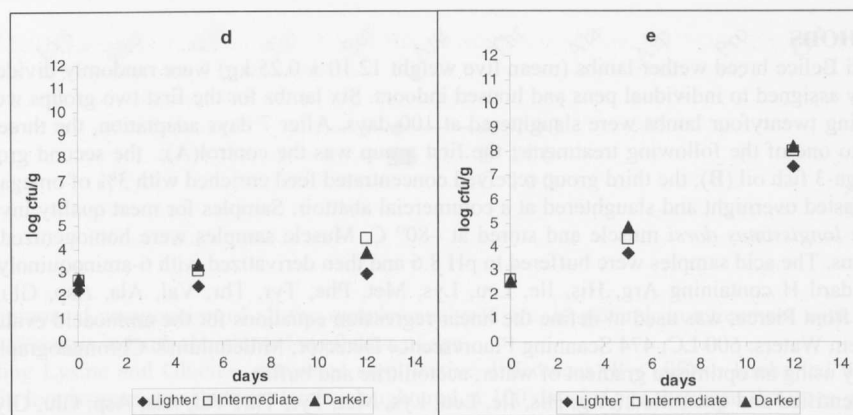

Figure 2: Lactic acid bacteria (d) and *Brochothrix thermosphacta* (e) in Lighter, Intermediate and Darker colour sliced turkey meat during storage time.

Pertinent literature

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