Salt reduction and potassium replacement perception of traditional corned beef in different age (18-85) cohorts

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Abstract – This aim of this study was to investigate the effects of salt reduction and replacement on red processed meat flavour perception in varying age cohorts (18-85). The Na levels varied from 0.2%-1% and K lactate was used as a salt replacer. The study showed varying preferences in young and middle age cohorts for the varying salt and potassium levels. However, for the elderly (65+) no flavour preference was observed. By designing foods especially catered for the elderly we can cater for the specific needs of the elderly and induce some health benefits as a result.
Key Words – Elderly, Potassium, Sensory Science, Salt Reduction Programmes.

I. INTRODUCTION

The topic of sodium consumption and its relationship to cardiovascular health is controversial, especially for our aging population. Meat and fish contribute to 30% of Irish salt intake with cured/processed meats contributing to 18% of the salt in the meat and fish category IUNA [1]. Since 2003, the FSAI (Food Safety Authority of Ireland [2] has coordinated a salt reduction programme whereby salt in sausages, rashers and cooked hams was successfully decreased. Potassium levels of rashers and puddings were successfully increased. Many other countries have also implemented similar salt reduction programmes. The recommended daily allowance for potassium is higher than that of sodium, yet consumers consume less potassium than sodium Yang et al. [3]. It is important that salt reduction programmes do not affect the sensory quality of traditional meats that are often consumed by the elderly. Processed meats are an important protein source. Protein is an important nutrient for preventing age related sarcopenia. This paper sets about developing an age profile of the sensory acceptable level of salt reductions in corned beef.

II. MATERIALS AND METHODS

Semitendinous muscles within the pH range from 5.5 ± 0.1 were hand injected with the brine solution. The brine was mixed for 3 minutes with 3500 rpm. A one needle hand injector was used. The homogenized brine solution was injected into the beef samples at an injection rate of 20 %. The samples were then placed in an OPA/PP (Poly Amide/Polypropylene) bag and vacuum packed. The samples were the stored in the chill store at 4 ° C for 24 hrs. The injected samples were cooked in the convection oven with 100 % steam at 85 ° C for 3 hours. The temperature was monitored using a temperature probe. After cooking, the samples were transferred to the chill at 4° C.
Sensory analysis was carried out on untrained assessors (n=256). The ages ranged from 18-85 years old. The sample size of the age cohorts were as follows; 18-24 (n=33), 25-34 (n=43), 35-44 (n=40), 45-54 (n=51), 65-74 (n=45), 75+ (n=44). Each panellist rated the sensory qualities of the samples in duplicate on triplicate batches, according to the methods of Amsa [3]. The experiment was conducted in panel booths. The samples were served cold and they were cut into 3 mm thickness slices. Physical analysis; texture, colour, cooking loss, along with proximate compositional analysis; protein, salt, ash, potassium, moisture and fat was carried out on each sample. The data obtained was analysed using ANOVA – Partial Least Squares Regression (APLSR). Data was processed using Unscrambler software version 10.3. (CAMO ASA, Trondheim, Norway).

III. RESULTS AND DISCUSSION

The results of the sensory evaluation comparing the various samples in the different age cohorts is presented in figure 1. Sample B1 contained K (lactate) and 1% sodium. This sample was significantly ($p \leq 0.001$) positively correlated to flavour liking with the 35-44 age cohort. Sample B2 (1% Na in the final product) was significantly ($p \leq 0.001$) ($p \leq 0.01$) positively correlated with the 18-24 and the 35-44 age cohorts respectively. Sample B3 (0.8 % of Na) was significantly ($p \leq 0.01$) positively correlated to flavour liking with the 35-44 age cohort and was significantly negatively correlated

($p \leq 0.001$), ($p \leq 0.001$), for the 18-24 and the 25-34 age cohorts respectively. Sample B4 (0.6 % Na) was significantly ($p \leq 0.01$) and ($p \leq 0.05$) positively correlated for flavour in the 35-44 and the 65-74) age cohorts respectively. Sample B5 (0.4 % Na) was significantly ($p \leq 0.05$) positively correlated to flavour liking for all the following age cohorts: 18-24, 25-34 and 45-64. Sample B6 (0.2 % Na) contained the least amount of Na and was significantly ($p \leq 0.001$) positively correlated to flavour liking in the 35-44 age cohort. No significant preferences for an individual sample were observed in the 65+ age cohorts; 65-74 and 75+.

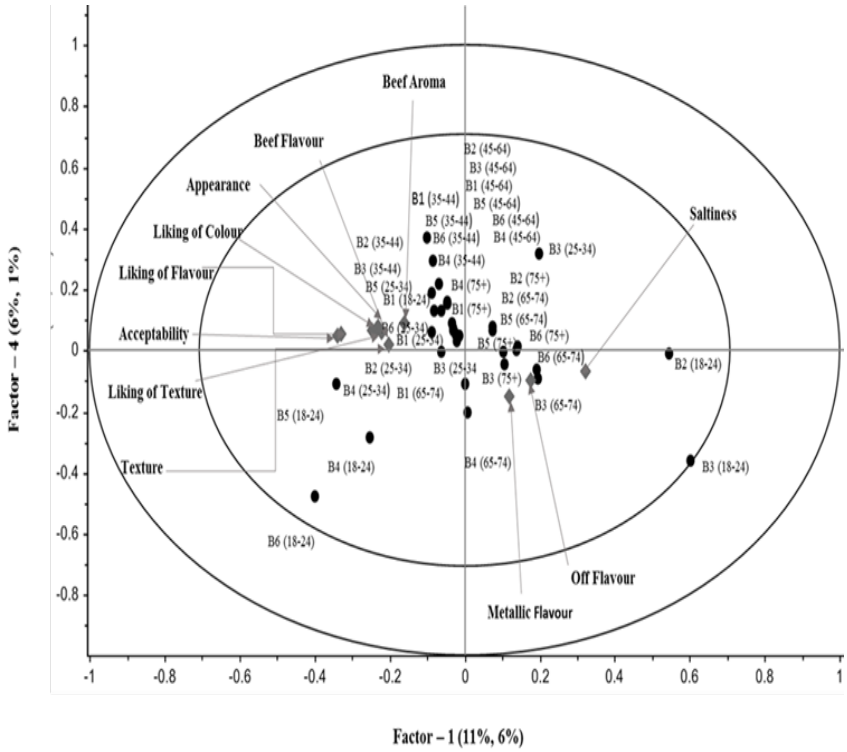

Figure 1. APLSR plot correlating the sensory attributes with the varying age cohorts and samples

IV. CONCLUSION

Flavour preferences were noted in the young to middle aged categories (18-64). However, there were significant differences observed in the elderly (65+) age groups. These age groups did not observe any difference in the samples with lower salt for sample B1 where K lactate was used as a salt replacer. This information may be used in processing and food formulating to manipulate meat products that are lower in sodium and higher in potassium, that may benefit the elderly. Elderly do not require the levels or sodium that is added to corned beef currently to satisfy their flavour expectations. Thus these levels can be reduced. This paper also provides evidence that potassium can be added to red processed meats as a salt replacer without having an impact on elderly taste (65+) perception. The elderly avoid fresh meat principally due to dentition and processed meat due to salt levels. Salt reduced processed meats which are healthier may be used to counteract the detrimental effects of sarcopeania, while also providing familiar and highly accepted traditional elements to the elderly diet that are more likely to be consumed than unfamiliar and unappealing dairy protein based nutritional supplements

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