

Conception of meat product adapted to chewing deficiency of Elderly (#579)

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Introduction

Meat is considered a high-quality and widely consumed protein source. The amino acids derived by diet serve as the main building blocks for *de novo* muscle protein synthesis, preventing sarcopenia in the elderly population. This population often suffers of impairment of chewing efficiency, leading to less intake and even avoidance of meat products. For the elderly who are unable to swallow due to dysphagia, declining sensory perception and saliva production, a decrease in meat intake can result in various malnutrition forms, and unhealthy ageing. Therefore conceiving meat products with a texture meeting the masticatory capacity of elderly for delivering required nutrients is of importance from a public health perspective and for meat industry. The bioaccessibility of peptides and amino acids was evaluated after mimicking deficient mastication and digestion under elderly physiological conditions.

Methods

Deboned poultry tight meat were cut in 2x2x2 cm cubes, then injected with brine (13%). After 24h rest at 4°C, meat was cooked under vacuum at 80°C for 8h before manually shredded and flash pasteurization. The meat texture was assessed using measurement of 20 and 80% compression (Instron). Four combinations of oral and digestive conditions were simulated. Normal and deficient mastication were programmed on the masticator apparatus AM² for production of meat boluses. Boluses were characterized with granulometry and physical measurement. Rheology traits (hardness, cohesiveness) and granulometry of boluses were evaluated using TPA and sieves. D50 represents the median size of the bolus particles. Each boluses were digested in a dynamic digester (DIDGI®) mimicking adult or elderly digestive conditions. Proteins, peptides and free NH₂ were determined in the 3 compartment digesta (at 40', 80', 120' for gastric; at 40', 80', 120', 160' for Duodenum/Jejunum; at 120', 160', 200' for ileum) using Bradford, Direct detect and fluorescamine determinations. A two way Anova was performed (mastication and digestion as factors) with repeated measurements.

Results

The shredded poultry meat had a 20 and 80 % compression values of 1.2+/-0.3 and 11+/-3 N/cm², respectively. For the textural properties of the boluses, we observed no difference between a deficient vs normal mastication in hardness (fig 1) or cohesiveness, elasticity and adhesiveness. However the deficient mastication lead to a significant higher median size of bolus particles (d50) (4+/- 0.7 mm for normal mastication vs 5.3 +/- 0.7 mm for

deficient mastication. In other words, meat bolus arriving in the stomach after deficient mastication contained a greater proportion of large particles.

Fig 1: Hardness (N) of bolus after normal and deficient mastication

In the digestive process, the protein released from the meat matrix differed significantly in adult compared to elderly conditions. The fig 2 showed that in elderly digestive condition, less proteins were released especially in the gastric compartment, while the difference was less marked in the 2 other compartments. Deficient mastication combined with the elderly digestive conditions delayed proteins and peptides appearance in the gastric compartment which did not reach the level observed in adult gastric digestion.

Fig 2: Protein release during meat digestion after normal/deficient mastication and under adult or elderly physiological digestive conditions in the 3 compartments.

Interestingly, the level free amine function at the end of the digestion did not differ whatever the chewing ability (fig 3). However, the elderly digestive conditions lead to a reduction of 25% of the level free amine function.

Fig 3 : Free NH₂ content at the end of digestion for adult/elderly digestion and normal and deficient mastication

Conclusion

Ageing is associated with decreased chewing efficiency, which leads to a lower disruption of swallowed meat pieces, as we observed with bolus with higher particles size. However, in the meat product developed, the physical traits of the bolus did not differ whatever the chewing efficiency. The conception of adapted meat product for specific population need to integrate the food oral processing in the overall digestive process, since meat intake decreased with an increase in age, while the requirements in proteins, minerals, are rising with age. Further work should be carried out with interventional study for the determination of plasma amino acid availability, and subsequent postprandial protein retention.

Notes

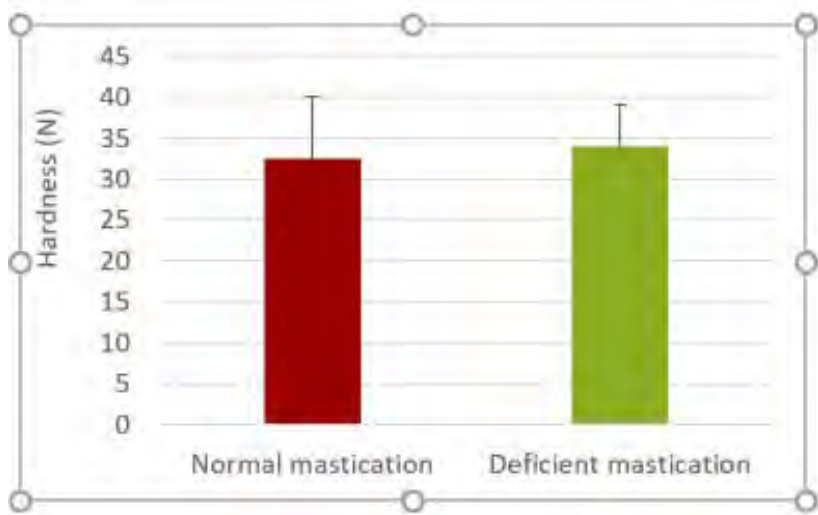


Fig 1

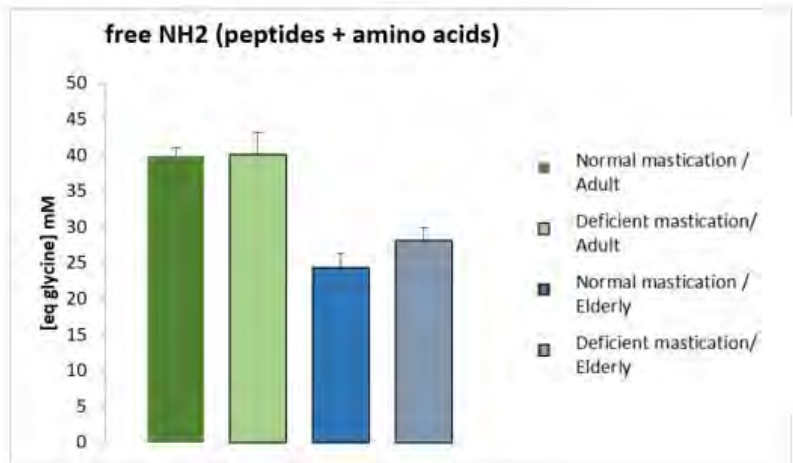


Fig 3

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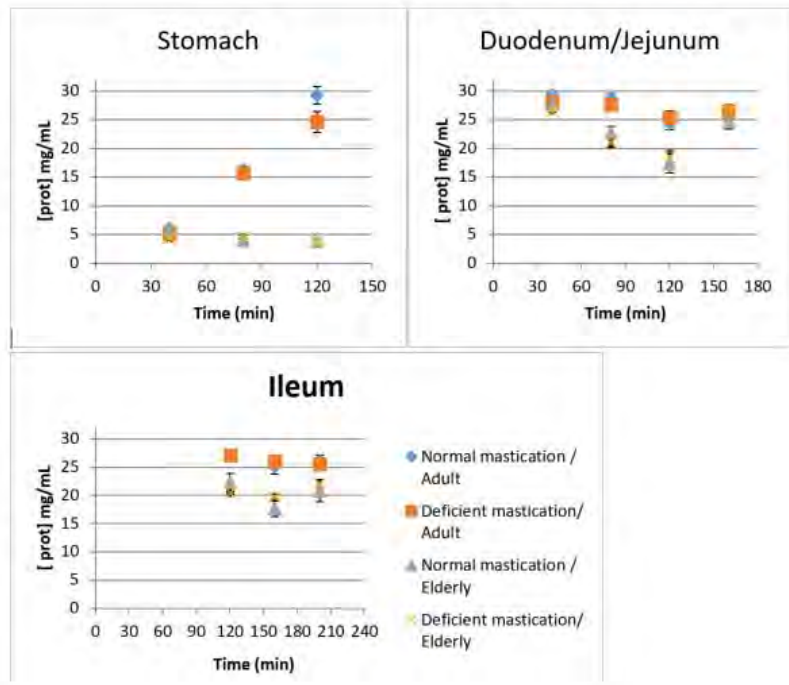


Fig 2

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