## Dry-cured ham stuffing using radio frequency and its effect on texture

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**Introduction:** Conventional dry-cured ham stuffing is used at the industry to improve the internal texture, but processing time is long. An innovative approach is the use of Radiofrequency (RF) heating that increases heating rates, improves energy efficiency, allows heating of thicker products and a better distribution of temperature within the product (Singh &Ramaswamy, 2015). The objective of this study was to evaluate the usefulness of RF to heat evenly dry-cured ham and the effect of RF heating on defective dry-cured ham texture as an alternative method to long mild thermal treatments.

**Material and methods:** Samples: Twelve dry-cured hams with defective texture (soft or pastiness defects) formatted in block were used to study the effect of RF on texture. Equipment: The RF heating was carried out in a 15 kW STALAM Radio Frequency system (RF 15 KW, STALAM S.p.A., Italy). Conventional heating of dry-cured samples was simulated using a conventional stove. Experimental design: Hams were divided in four pieces in which Biceps femoris (BF) muscle was always present. Hams were reconstructed using one fourth from four different hams. Hams were vacuum packaged and subjected to the following treatments: Control (C): Samples not treated. RF2600 and RF2700: Samples were processed with RF in two steps: processing at 5,500V for 1.25 h and additional 3 h at 2,600V or 2,700V, respectively. RF+S: RF processing at 5,500V for 1.25 h and 3 h in a stove at 42° C. Temperature increase was monitored. Physicochemical analysis: Relaxation test (maximum force (F0) and force decay at 2 seconds (Y2) and 90 seconds (Y90) in BF muscle was performed using a Universal Texture Analyser (Morales, Guerrero, Serra, & Gou, 2007). A colorimeter Minolta Chroma Meter CR-400 was used to measure colour in the CIE-LAb space. Statistical analysis: Effect of RF heating treatment was evaluated using a one-way ANOVA procedure including RF treatment as fixed effects and differences were tested by means of Tukey's test ($p \leq 0.05$).

**Results and discussion:** Temperature increases faster in fat than in lean areas because of the lower specific heat of fat Even though fat areas absorb less energy. RF processing was able to heat evenly the dry-cured ham up to 40°C. As expected, temperatures inside the ham were slightly lower (35-37°C) than near the surface (39-47°C), as the energy of the electromagnetic waves decreases with the penetration depth. Only RF2700 produced a significant increase of F0 and Y90 demonstrating its usefulness to perform an accelerated stuffing of dry-cured ham ($p<0.05$). Although RF treatments produced a slight increase of L* value, no significant changes were observed on a* or b* values, causing no problems on the appearance of the product.

**Conclusions:** Radio frequency can produce a homogeneous heating of dry-cured ham and might be used industrially to correct defective textures. More experimental work is needed to study the effect of salt content and weigh loss on the increase of temperature and texture.

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**Literature:**

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