Specific Fluid Content: an instrumental parameter to estimate juiciness in meat and plant-based burgers

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Objectives: Water holding capacity, the ability to retain moisture is one of the most important properties in meat and in plant-based burgers. Distribution of fluid is also responsible for sensory differences between meat and plant-based burger, so an instrumental parameter to correlate with sensorial results could be useful to reduce analysis cost and improve eating quality. This communication describes the first results for a new parameter "Cooked Specific Fluid Content" (CSFC) to estimate water/fluid content in cooked burgers.

Materials and Methods: Two commercial (CB, CE) and oneself produced plant-based (OP) and one meat (MT) types of burgers, for a total of 40 samples were used. The plant-based burgers were based on pea protein. Regarding the water holding capacity's parameters, were retained: the total moisture content (TMC), the cooking loss (CL), the meat cooking shrinkage (MCS) according to the MCS protocol developed by Barbera and Tassone [1], and the fluid to the mouth (FTM). Samples were cooked in the oven at 165°C until 72°C to the core. The fluid to the mouth in the cooked burger (FTM) is the amount of water lost after drying the cooked sample in an oven at 120°C for 4h. All the measured parameters were percentage values referred to raw sample weight except MCS that was referred to the raw surface indicating the lost area due to the shrinkage. Cooked specific fluid content (CSFC) was obtained as the amount of water lost after drying divided by the volume of cooked product and expressed as mg/mm^3. The vol- ume was obtained multiplying the cooked surface area (measured by the MCS method) by the cooked height. To estimate the cooked height, the raw height was reduced by the shrinkage (MCS).

Results and Discussion: TMC ranged from 62.3% (OP) to 55.2% (CE) and for meat 60.8% while CL ranged from 18.6% (MT) to 9.1% (CE). The FTM was significantly lower in the meat burger (42.2%) suggesting lower fluid availability at the consumer's mouth. However, meat had a significantly larger MCS (24.3%) while CE had the smallest one (7.1%). Normally meat, also considering the different types of fat, has better juiciness [2] which, at first glance, is not evidenced by the two parameters (CL and FTM). CSFC considers how cooking can concentrate fluid in relation to different shrinkage and thus could explain how much sensory experience highlights. The meat had a CSFC of 0.79 mg/mm^3 significantly higher than plantbased burgers, which had an average value of 0.55 mg/mm^3. This indicated a greater efficiency of the meat to retain water when cooked contributing to the juicy sensation perceived by the consumer. CSFC was significantly correlated with the other measured parameters as well as with fat and protein content (not reported). In contrast, it did not correlate with TMC indicating that the absolute amount of water was not critical in determining juiciness. What matters is that the water retained by the cooked product is actually available to the consumer's mouth.

Conclusions: The CSFC instrumental parameter could help researchers and the food industry to better estimate juiciness in improving the quality of meat and plant-based products. These latter are currently in high demand in the market and are not yet able to emulate meat products. The obtained results are very promising, and studies are underway to correlate directly with sensory parameters.

References:

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Key words: Plant-based burgers, Meat burgers, Specific fluid content, Juiciness