

# Relationship between texture profile analysis on homogenized burgers (TPAH) and fatty acid composition of meat and plant-based burgers

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## Abstract

Texture profile analysis (TPA) is largely used to characterize semisolid foods. However, a recent study has verified that it cannot be recognized as a coherent method. So different alternatives were proposed.

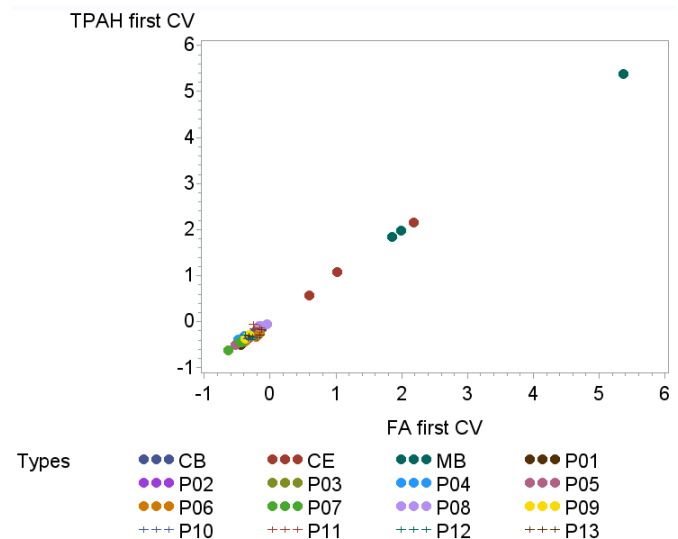
The objective of this study was to use the TPA on cooked burgers after homogenization (TPAH) and verify its relationship with fatty acid content (FA). Sixteen different types (48 samples: a meat and 15 plant-based burgers) were cooked at 165°C until 72°C to the core, homogenized in a grinder at 600rpm for 20s and placed in a 16 mL container. The compression extrudes the product up by a double compression cycle test, performed with a cylinder probe of 11.2mm diameter. Textural properties, including hardness, gumminess, chewiness, springiness, and adhesiveness were measured with an Instron 5543.

On the same samples FA profile was analysed with a GC-2010Plus (Shimadzu) after freeze-drying to maintain the nutritional characteristics.

Statistical analysis applied the procedures GLM, simple and Canonical Correlation to describe the relationships between TPAH and FA of meat and plant-based burgers.

Results showed that unsaturated FAs significantly affected the texture of burgers. Higher values of polyunsaturated FAs significantly reduced the hardness, gumminess, and chewiness. In addition, effect of monounsaturated FAs significantly reduced adhesiveness. Significant negative correlations were found between: oleic acid and adhesiveness ( $r=-0.43$ ); linoleic acid and gumminess ( $r=-0.37$ ) and chewiness ( $r=-0.35$ ). Saturated FAs did not significantly affect the texture; however, some significant negative correlations were observed between lauric and miristic acids with hardness, gumminess, chewiness and positive with adhesiveness. Palmitic and stearic acids had a similar influence on hardness, gumminess, chewiness (positive correlation) and adhesiveness (negative correlation).

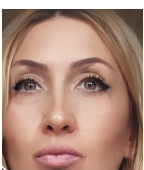
It can be concluded that TPAH is correlated with FA composition (Figure 1) and polyunsaturated FAs can improve the burgers texture.



**Figure 1.** Correlation between the TPAH and FA first canonical variable (CV) of cooked meat and plant-based burgers (MB = meat burger; the others all plant-based burgers)

## Recent Publications

1. Barbera S., Tassone S. (2006). Meat cooking shrinkage: Measurement of a new meat quality parameter. *Meat Science* 73(3):467-474.
2. Boukid F., Castellari M. (2021). Veggie burgers in the EU market: a nutritional challenge? *European Food Research and Technology* 247:2445-2453.
3. Mabrouki S., Glorio Patrucco S., Tassone S., Barbera S. (2022). Texture profile analysis on raw homogenized meat and plant-based burgers. *Japanese Journal of Meat Science and Technology* 63:344.
4. Peleg M. (2019). The instrumental texture profile analysis revisited. *Journal of Texture Studies* 50(5):362-368.
5. SAS System for Windows (2021). Release 9.4; SAS Institute Inc.: Cary, NC, USA.



## Biography



Researcher since 2006 at the department of Agriculture, Forestry and Food (DISAFA) at the University of Turin; PhD in the Department of Animal Science (2001) at the University of Turin on meat quality; Degree in Agronomy Science and Technologies (1997) at the Agronomy Faculty of Turin with a thesis on characteristics of meat. She works on feed analysis, use of by-products in animal nutrition for a sustainable and ethical production, conservation of local breeds.

She has been coordinator of local projects and "World Wide Style" (WWS) projects. Tutor of PhD student and trainees. Author and co-author of more than 80 papers on meat quality, *in vitro* digestibility, alternative feeds and by products in animal nutrition, feed composition and characteristics of animal products. Her teaching activity included the course of "Quality of animal products" at the DISAFA and "Feed digestibility and environmental impact" in the Master Course of Agriculture BeiJing University of Agriculture (Cina).

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