

## Effect of Transglutaminase on the Textural and Sensory Attributes of Pea Pod Protein Concentrate-Based Patty: A Sustainable Protein Alternative for Sports Nutrition

Seema Singh <sup>1</sup>, Anil Kumar <sup>2</sup>

Research Scholar, Department of Food Science and Technology, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand- India, 263145 <sup>1</sup>  
Associate Professor, Department of Food Science and Technology, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand- India, 263145 <sup>2</sup>

### INTRODUCTION & AIM

Livestock farming consumes vast amounts of natural resources while contributing significantly to environmental degradation. Despite using 77% of global farming land, meat production remains highly inefficient compared to plant-based alternatives.

Plant-protein based diet are recently in demand due to ethical, environmental and health related issues raised in the recent past that made food industry to explore the development of plant-based products as an alternative to animal-protein based diets.

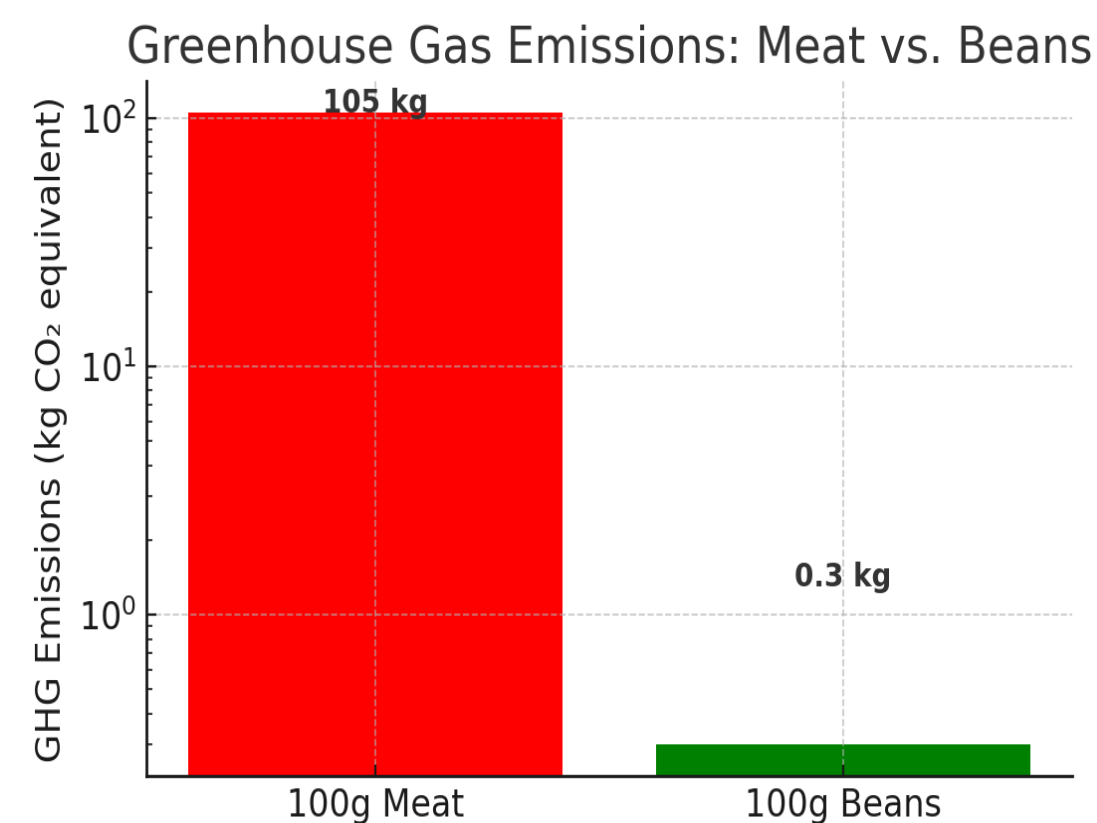
#### Water Consumption:



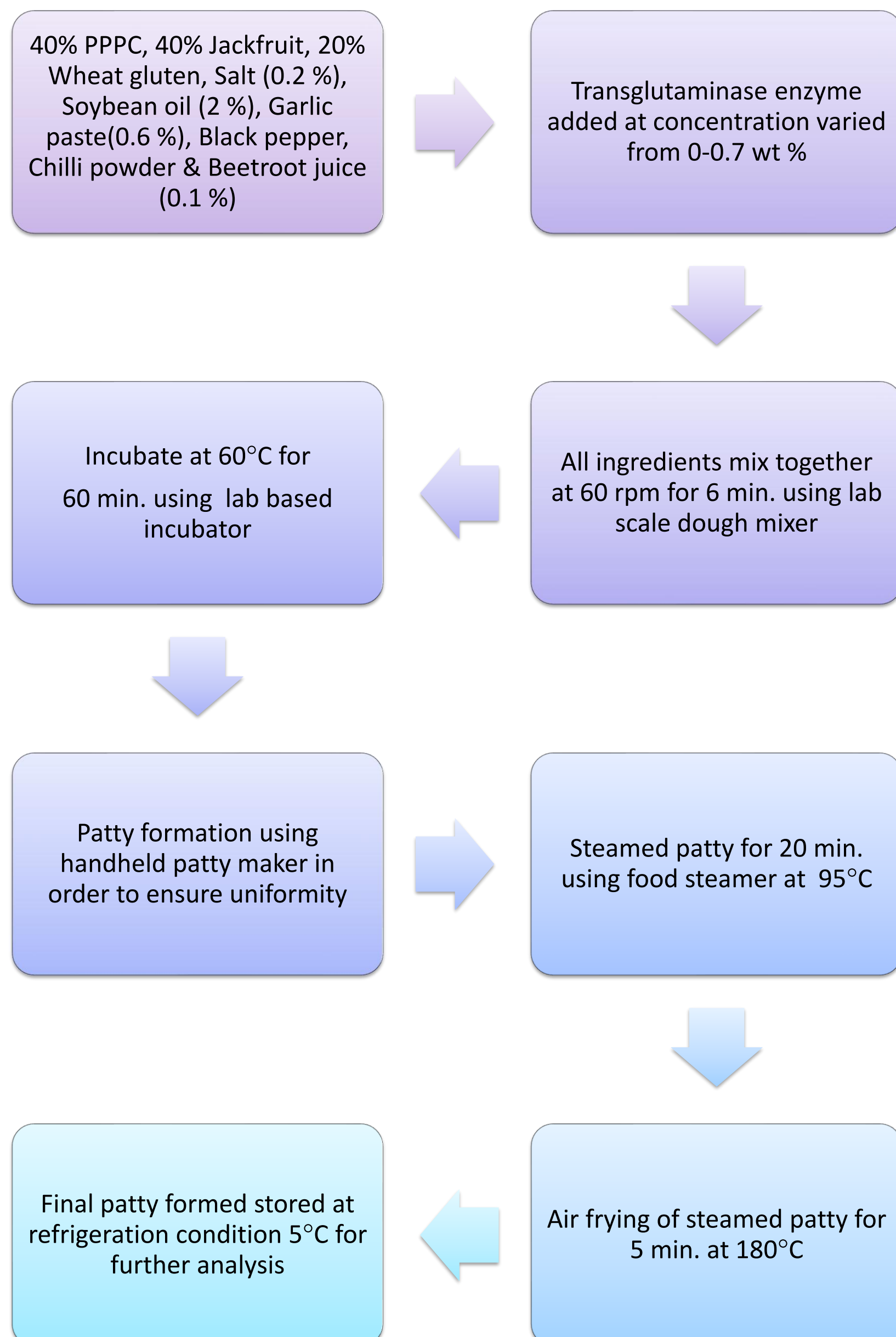
Meat: 235 trillion gallons

Soy: 5 trillion gallons

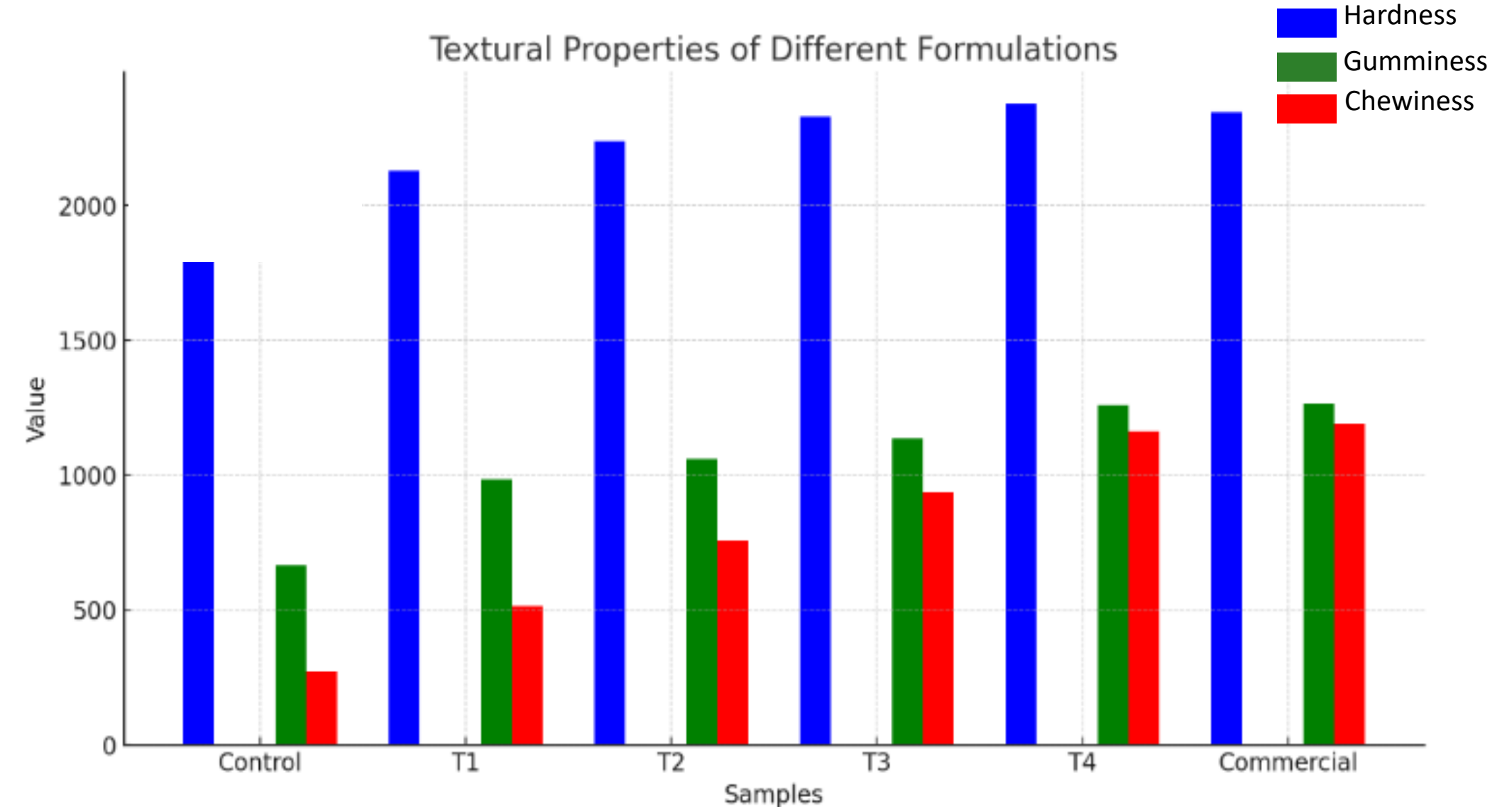
Wheat: 155 gallons



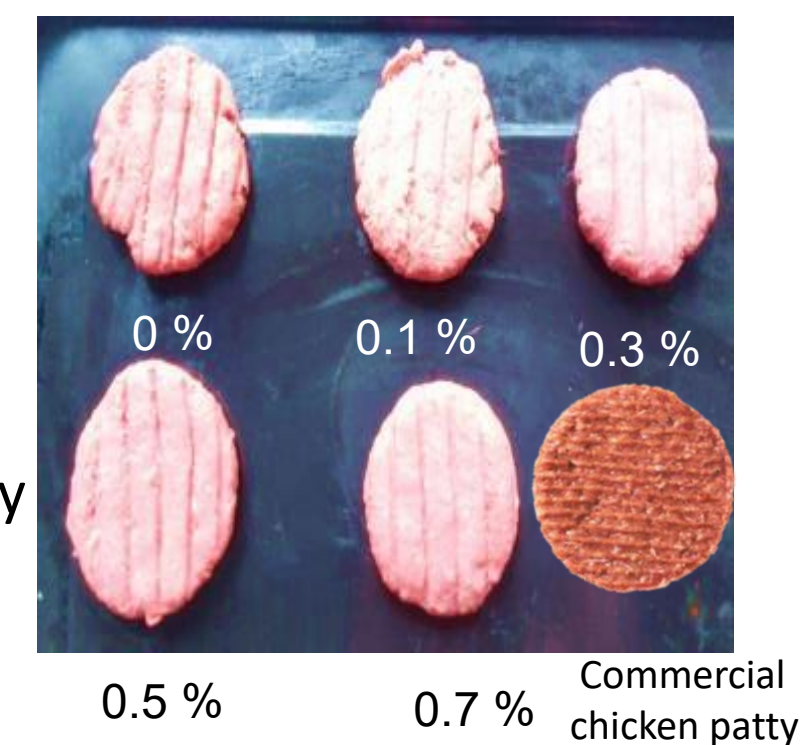
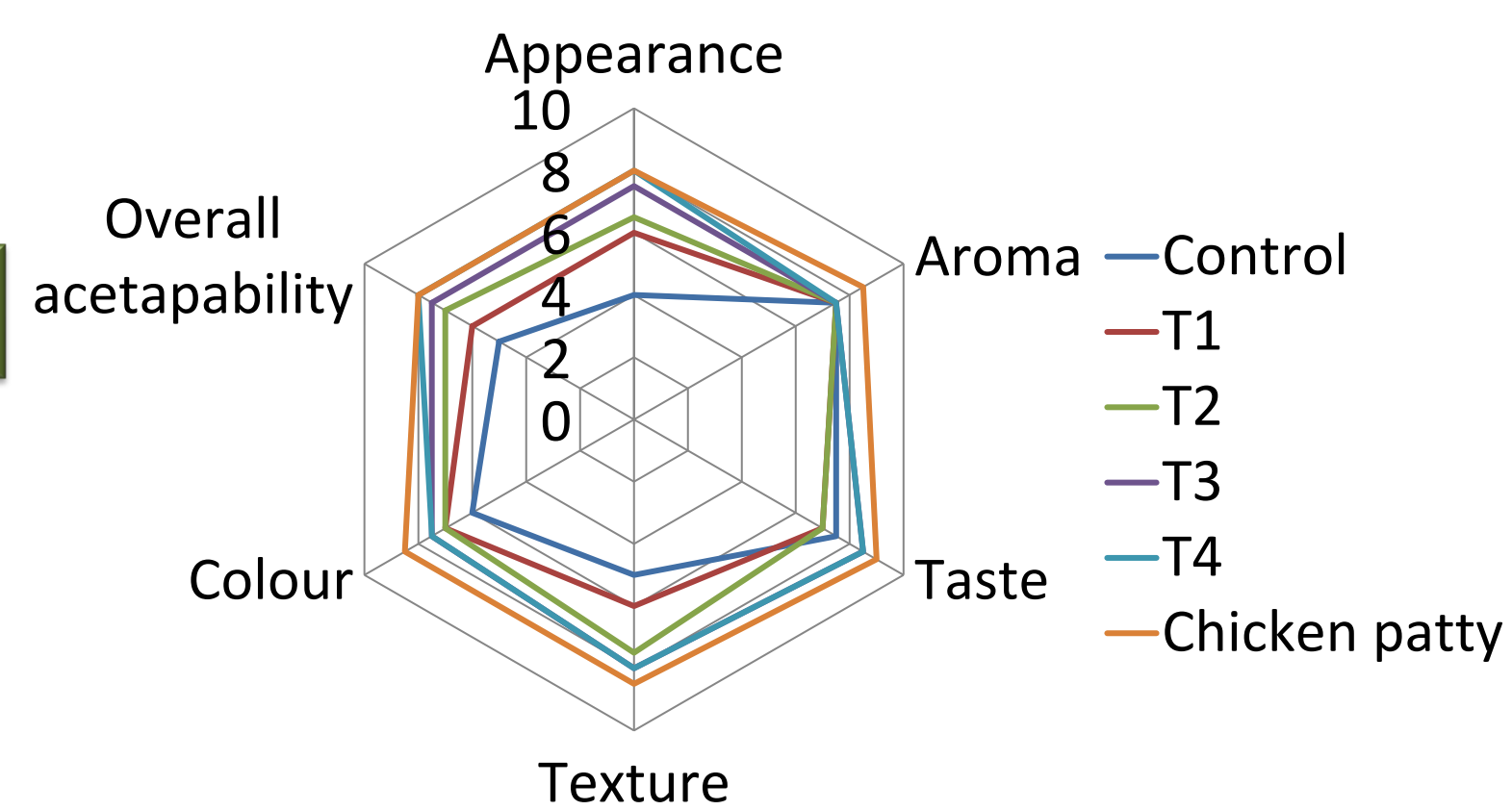
### METHOD



### RESULTS & DISCUSSION



Different levels of transglutaminase **Control** = 0% **T<sub>1</sub>** = 0.1% **T<sub>2</sub>** = 0.3% **T<sub>3</sub>** = 0.5% **T<sub>4</sub>** = 0.7%



#### Effect of different levels of transglutaminase enzyme

- ❖ **Appearance:** The commercial sample scores (8) highest, with T<sub>3</sub> (7) and T<sub>4</sub> (7.5) showing better visual appeal than the control (4).
- ❖ **Texture:** Improves with enzyme addition, with T<sub>3</sub> and T<sub>4</sub> (Hardness 2375.69 g) performing best, though T<sub>4</sub> may be slightly too firm.
- ❖ **Flavor & Taste:** T<sub>2</sub> (7) and T<sub>3</sub> (7) score better than the control (6), but T<sub>4</sub> (5) shows a slight drop, likely due to excessive binding affecting flavor release.
- ❖ The PPPC-based patty contained 47% protein, which is more than twice the protein content of the commercial chicken patty (20%)

\*Sensory evaluation was conducted using a 9-point hedonic scale.

### CONCLUSION

The 0.7% enzyme-treated sample (T<sub>4</sub>) exhibited high hardness, gumminess, and chewiness (2375.69 g, 1260.4 g, 1160.4 g) and a protein content of 47%, serving as a rich protein source for plant-based sports nutrition.

A plant-based patty formulated with 40% PPPC, 20% wheat gluten, 40% jackfruit, and 0.7% enzyme closely mimics the texture and protein profile of a commercial patty, showing promising potential as a high-protein, plant-based alternative for sports nutrition

### FUTURE WORK / REFERENCES

More research is needed to understand the enzyme's impact on various protein sources and improve the overall palatability of the plant-based food product

- Cheng, Z., Qiu, Y., Ahmad, I., Pang, Y., Yue, A., Chen, Z., and Lyu, F. 2025. Enhancement of structural properties of 3D-printed plant-based meat analogs by TGase/laccase. *J. Food Eng.*, 387: 112352.
- Yu, X., Li, T., Yue, M., Zhang, S., Zhang, Y., Wang, X., ... and Ma, C. 2025. Impact of transglutaminase on structural and rheological properties of pea protein-cornmeal-wheat gluten blends for meat analogue production. *J. Food Eng.*, 390: