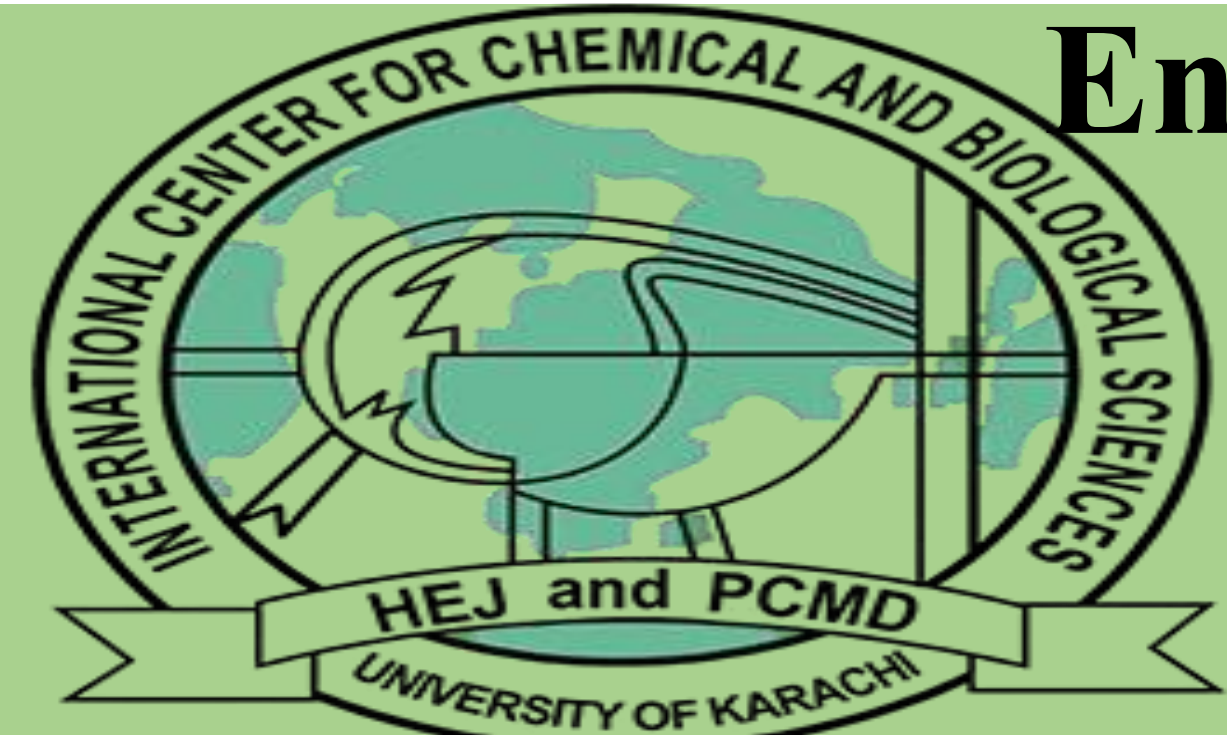




Ensuring Food Safety and Religious Compliance: Amino Acid-Based Authentication of Gelatin Sources Using Advanced Mass Spectrometry Tools

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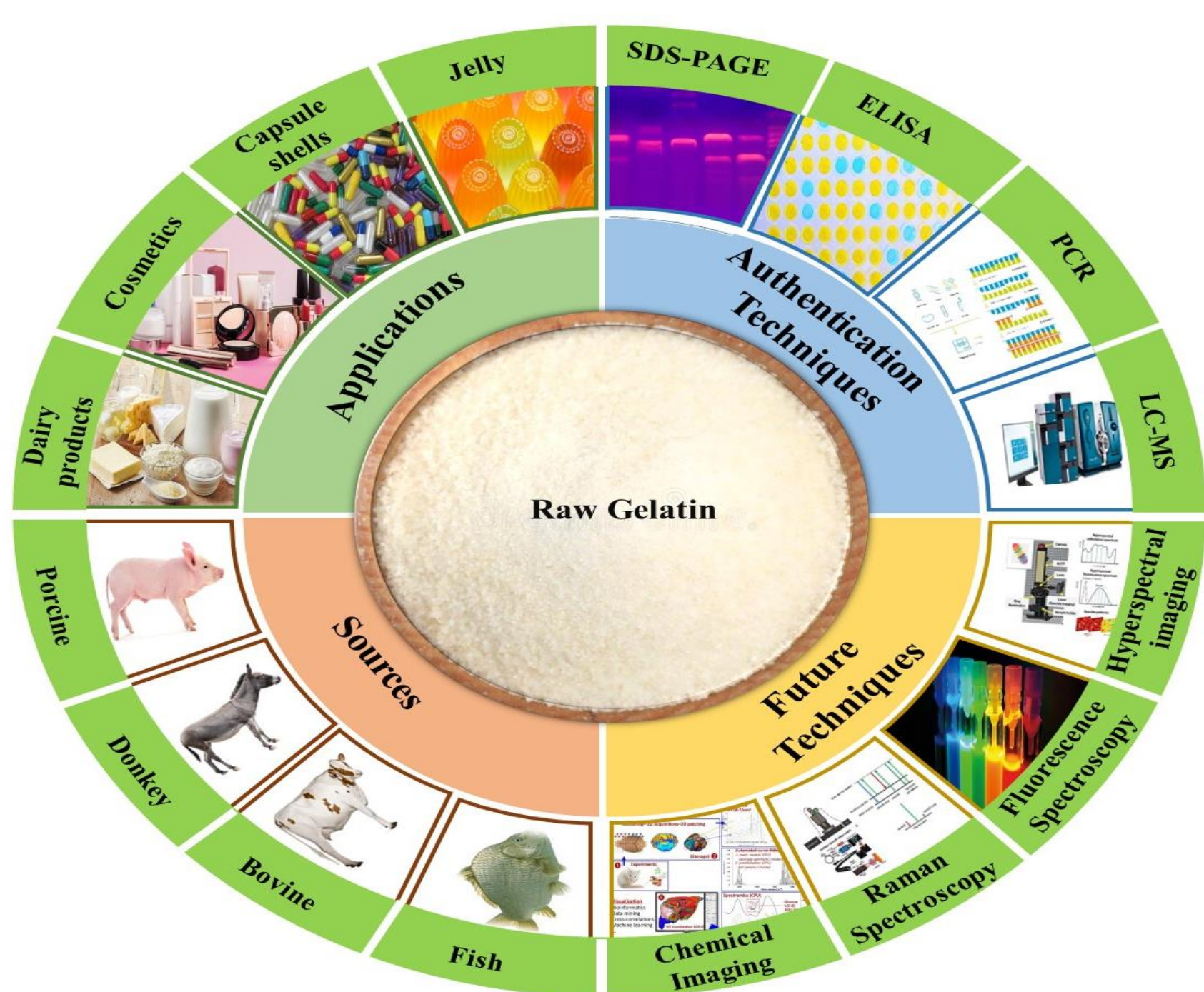
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Background

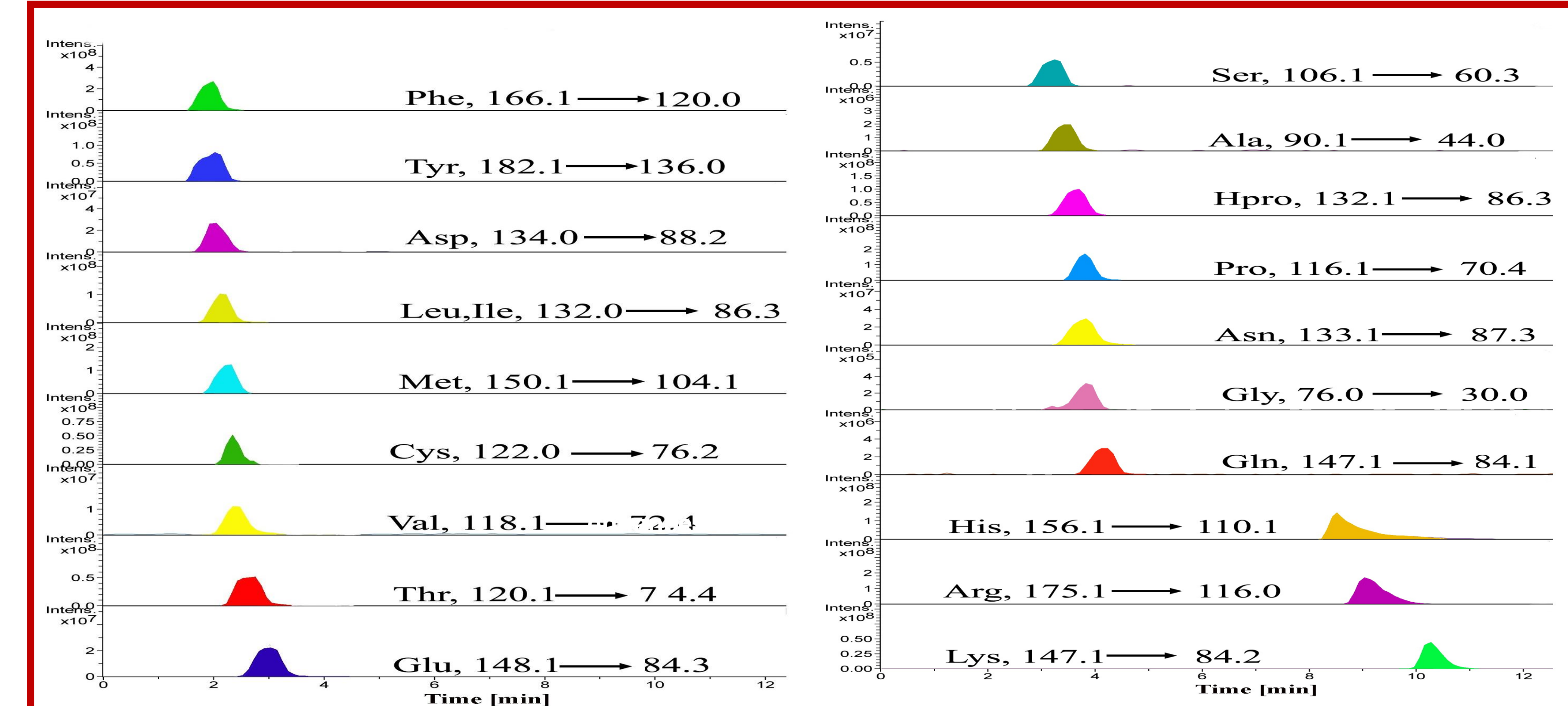
- ❖ Gelatin is a protein obtained by partial hydrolysis of different animal collagenous tissues, including porcine, donkey, bovine, fish, etc.
- ❖ Gelatin is widely used in the food and pharmaceutical industries, where it plays a crucial role in dairy products, jelly, and capsule shells.
- ❖ Adulteration and false labeling of gelatin products raise health, ethical, and economic concerns.
- ❖ Reliable detection methods are essential to prevent fraud.
- ❖ Authentication techniques such as SDS-PAGE, ELISA, PCR, and LC-MS are essential for verifying the origin and purity of gelatin.
- ❖ Emerging technologies are improving gelatin authentication and ensuring compliance with religious, ethical, and quality standards.



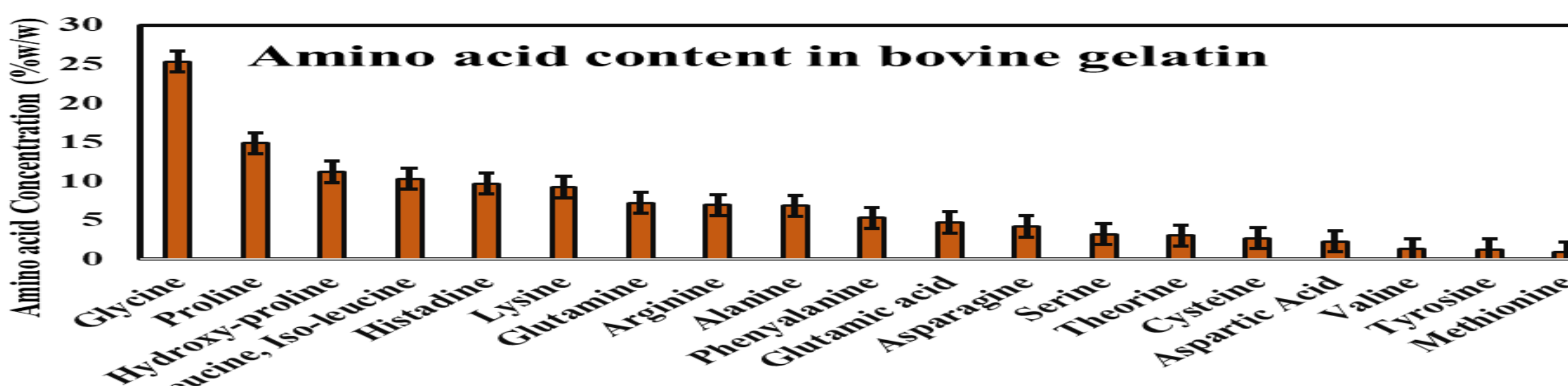
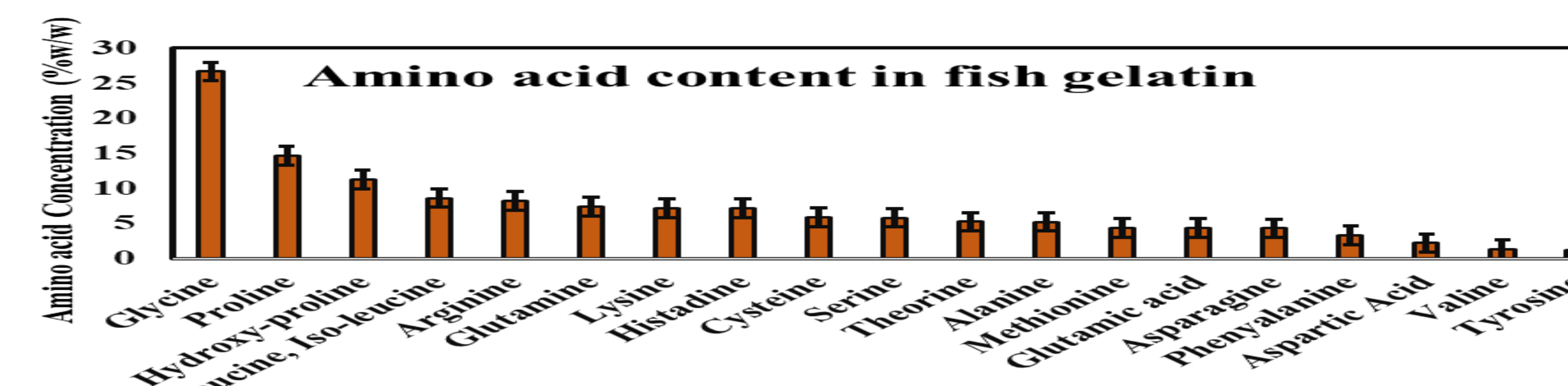
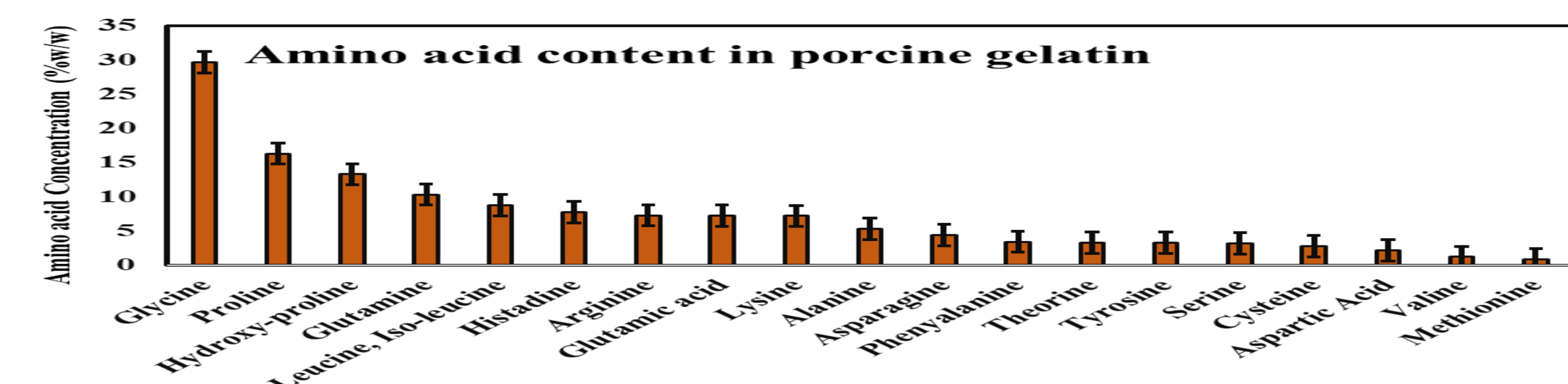
Experimental



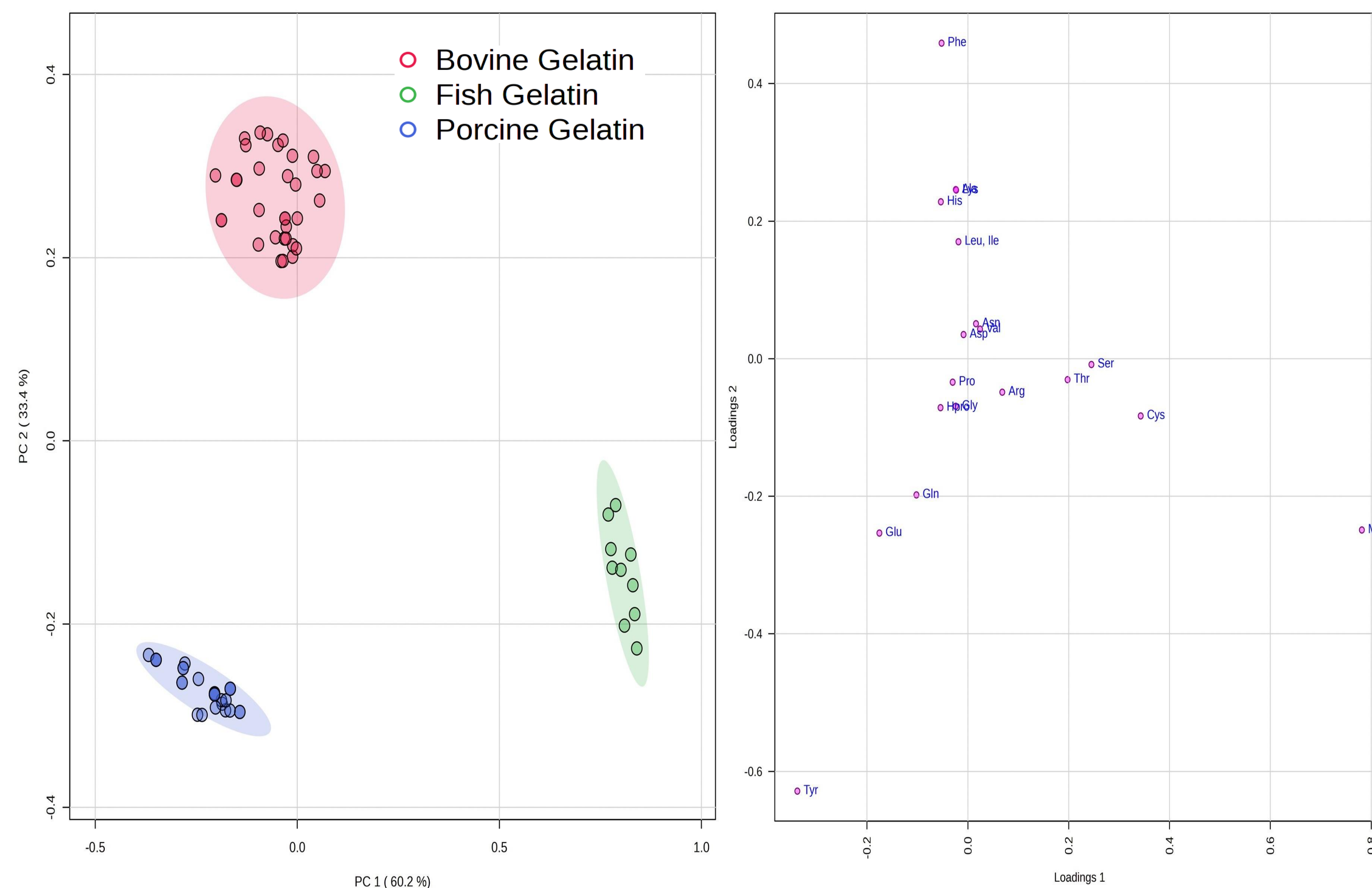
Chromatographic Separation



Amino Acids Content



Score and Loading Plots



Important Outcomes

- ❖ 20 amino acids were identified and quantified in different gelatin sources.
- ❖ Porcine gelatin correlated with glycine, proline, hydroxyproline, tyrosine, glutamine, and glutamic acid.
- ❖ Bovine gelatin was correlated with lysine, leucine, isoleucine, histidine, phenylalanine, and alanine.
- ❖ Fish gelatin correlated with methionine, threonine, serine, arginine, and cysteine.
- ❖ The application of this method was extended to the analysis of 18 real samples, each containing a different gelatin source.

Future Perspectives

- ❖ To develop a nanomaterial-coated lateral-flow immunoassay (nano-ELISA) for on-site detection of gelatin sources.
- ❖ Evaluation of recombinase polymerase amplification (RPA) potential as a more sensitive method.
- ❖ Double gene targeting can commercially be a new pathway for identifying the origin of gelatin.

References

- ❖ Hassan, M., et al (2024). Methods for detection and quantification of gelatin from different sources. *Food Chemistry*.
- ❖ Hassan, M., (2025). Authentication of porcine, bovine, and fish gelatins based on quantitative profile of amino acid and chemometric analysis. *Food Control*.