

Name of Solution:

Technology for gelatin extraction and gelatin derived products from food animal hide/skins and poultry processing waste

Submitter: ICAR

Solution Overview: *What is it, and what problem does it solve? Brief 2–3 sentence description.*

Complete here: This is a sustainable, enzymatic/ultrasound-assisted method for extracting high-quality gelatin from water buffalo hide, sheep and goat skin and poultry processing waste (chicken skin, head, and feet). It addresses the dual challenge of underutilized food animal hide/skin, poultry by-products and environmental waste by converting them into a valuable, non-porcine gelatin source suitable for food, pharmaceutical, and biomaterial applications

Key Features & Benefits: *Main components and why it is useful? Bullet points summarizing methods, tools, and value added.*

Complete here:

Components:

- **Raw materials:** Water buffalo hide, sheep and goat skins, Chicken skin, head, and feet (SHF blend)
- **Acids used:** Food-grade acetic and citric acids
- **Technology:** With or without Ultrasound-assisted extraction (UAE) and use of enzymes.

Methods and Tools:

- Replaces time-consuming alkali hydrolysis and usage of acids
- Enzymes/Ultrasonic cavitation can be used for enhanced extraction
- Characterization tools: FTIR, SDS-PAGE, rheometer, texture analyzer

Value Added:

- Economical usage of water buffalo hide, sheep and goat skins
- Converts poultry waste (13–14% of live weight) into high-value gelatin

- Improved yield (up to 8.9%), Gel strength (up to 601.22 g Bloom strength), Viscosity and functional properties of gelatin
- Avoids religious concerns associated to porcine/beef gelatin

Where It Works and Where It Can Work: *Existing and potential target regions, agroecologies, or farming systems. Include examples if available*

Complete here:

Existing:

- Slaughter units producing large number of hides/skins
- Gelatin manufacturers
- Poultry processing sectors in India
- Regions generating large poultry by-products (urban or peri-urban poultry hubs)

Potential:

- South and Southeast Asia: Major poultry-producing regions
- Middle East and Muslim-majority countries: Halal gelatin demand

Farming Systems:

- Integrated poultry farming units
- Small-medium poultry processors with access to poultry processing by-products

Evidence & Impact: *What results has it shown? Stats, pilot outcomes, or testimonials*

Key Outcomes:

- Gelatin of superior or equivalent quality can be produced from water buffalo hide, sheep and goat skins relative to commercially available porcine/beef gelatin
- **Yield:** 6-10% depending on drying and other treatment methods



- **Hydroxyproline content:** Up to 17.75 mg/g (indicative of collagen quality)
- **Gel strength:** 472.88 to 601.22 g (outperforms commercial gelatin)
- Solubility: 74.17%–91.74% across pH 4–6
- Viscosity: Up to 43.12 mPa.s (higher than commercial standards)
- Color & Clarity: Significantly improved by ultrasound treatment
- Functional properties: Enhanced emulsifying, foaming, and water-holding capacities

Scientific Validation:

- Proteomic analysis confirmed presence of collagen $\alpha 1$, $\alpha 2$, $\alpha 3$ chains
- FTIR indicated better structural integrity with increased α -helical content
- More than 5 high impact research publications

Scalability & Adoption Support: *Why it can be scaled and what's needed to adopt it? Low-cost, adaptable, partner-ready, etc.*

Complete here:

Scalability Factors:

- Low-cost and eco-friendly: Less reliance on harsh solvents (acid and alkali) and long processes
- Adaptable: Can be integrated into existing meat processing and poultry waste processing systems

- Partner-ready: Applicable to both small and industrial-scale processors

Requirements for Adoption:

Access to:

- Food-grade acetic/citric acid
- Ultrasonic equipment (e.g., ultrasonic bath is also sufficient) and enzymes

Basic infrastructure for:

- Hides/skin cleaning, handling and storage
- Waste collection, preprocessing (cleaning, mincing)
- Controlled drying and grinding
- Training on industrial gelatin production and ultrasound-based protocols
- Policy support or public-private partnerships for valorizing hide/skins and poultry waste

Partners & Contact Info: *Who's involved and how to connect? List of key contact and partners + email / phone.*

Contact Info:

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