

Keywords: Gelatin, ultrasound-assisted extraction, poultry waste, functional properties, rheology

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## BACKGROUND

Globally around 73.79 millions of chicken are being slaughtered annually for meat production (FAOSTAT, 2021), resulting in generation of a massive number of by-products (skin, feet, feathers, bones, viscera etc.). Exploring methods to treat or repurpose these valuable resources in production of gelatin has the potential to not only bolster the economy but also address waste management issues.



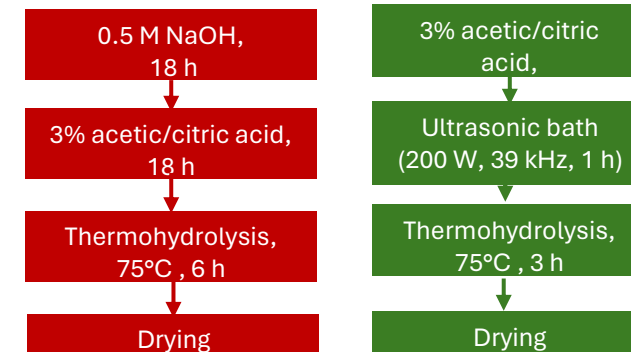
## OBJECTIVE

To extract and characterize gelatin from chicken by-product blend (skin-head-feet) using food grade acid (3% acetic acid/citric acid)

## GREEN AND SUSTAINABLE APPROACH

A process intervention for ultrasound assisted green extraction was attempted by reducing the processing time and eliminating the alkali hydrolysis process

## CONVENTIONAL PROCESS INTERVENTION



## RESULTS

Table 1. Physico-chemical properties of gelatin derived from poultry waste

Treatment	Yield (%)	Gel clarity (%)	Gel strength (g)	Viscosity (mPa.s)
CA	7.25 ± 0.09 <sup>c</sup>	4.5±0.14 <sup>b</sup>	600.4±1.38 <sup>a</sup>	38.92±0.36 <sup>b</sup>
CC	7.27 ± 0.02 <sup>c</sup>	3.73±0.04 <sup>c</sup>	464.26±0.74 <sup>c</sup>	29.4±0.53 <sup>c</sup>
UA	8.9 ± 0.07 <sup>a</sup>	5.47±0.13 <sup>a</sup>	601.22±3.9 <sup>a</sup>	43.12±0.14 <sup>a</sup>
UC	8.03 ± 0.06 <sup>b</sup>	5.34±0.18 <sup>a</sup>	472.88±1.22 <sup>b</sup>	38.15±0.51 <sup>b</sup>

CA = gelatin extraction using alkali + acetic acid

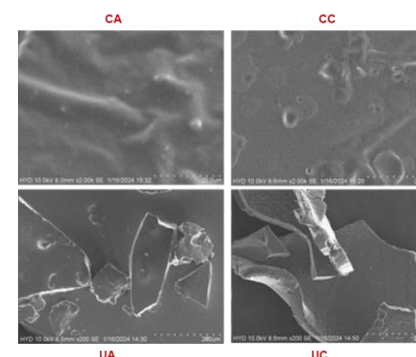
CC = gelatin extraction using alkali + citric acid

UA = gelatin extraction using only acetic acid (without alkali) + ultrasonic bath

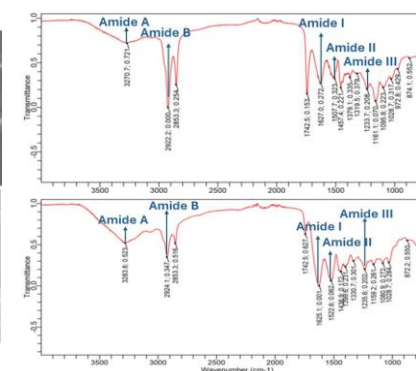
UC = gelatin extraction using only citric acid (without alkali) + ultrasonic bath

Table 2. Functional properties of gelatin derived from poultry waste

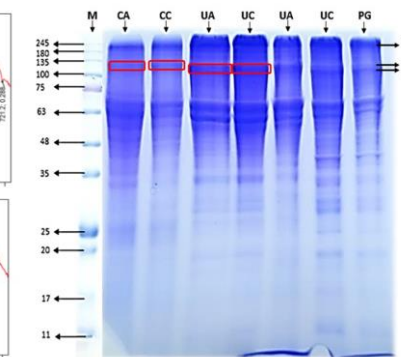
Treatment	EAI (m <sup>2</sup> /g)	ESI (%)	WHC (g water/g gelatin)	OHC (g water/g gelatin)	Foam expansion (%)
CA	76.6±0.95 <sup>b</sup>	81.57±0.78 <sup>b</sup>	7.46±0.03 <sup>b</sup>	3.87±0.3	110.67±0.76 <sup>b</sup>
CC	72.5±0.32 <sup>c</sup>	80.23±0.59 <sup>b</sup>	6.8±0.18 <sup>c</sup>	3.36±0.28	107±2.28 <sup>b</sup>
UA	84.2±1.19 <sup>a</sup>	88.39±1.68 <sup>a</sup>	7.78±0.01 <sup>a</sup>	3.71±0.29	124.67±2.43 <sup>a</sup>
UC	77.66±0.61 <sup>b</sup>	88.6±0.31 <sup>a</sup>	6.79±0.11 <sup>c</sup>	3.82±0.31	111.33±1.17 <sup>b</sup>



Scanning electron microscopy of gelatin powder



FTIR spectra of acetic acid treated gelatin and ultrasonically treated gelatin



SDS-PAGE pattern of gelatin extracted from chicken skin-head-feet blend

## CONCLUSION

Ultrasound-assisted extraction with acid pretreatment aims to shorten processing time and reduce solvent usage during extraction, thus addressing issues related to long operational times, pollution and waste management. Ultrasound treated gelatin exhibited better yield, functional properties and higher gel strength, rendering it suitable for applications in the food products.