

## NC-213 Progress Report for 2024

### Title

Integrated approaches for profitable shea nut value chain enhancement: A case study in rural Ghana

### Investigators

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### Outputs/Research Updates

Shea trees are a cash crop predominantly grown in the wild of the shea region spanning from Senegal to Ethiopia on the African continent. Shea nuts are harvested from shea trees and are used in the production of shea butter. As of 2010, USAID estimated that the shea industry generates between USD 90 and 200 million per year in sales of shea nuts and shea butter exports. There has been considerable research and information on the socio-economic potential of the shea industry in rural communities where shea nuts are produced, the engineering properties and processing of shea nuts into shea butter, and the nutritional capabilities of the commodity. However, information regarding the post-harvest handling and preservation of shea nuts has yet to be given much attention. At the rural level where shea nuts are produced, a substantial amount of shea nuts are lost due to poor post-harvest handling practices, making the nutritional and economical utilization of shea nuts a challenge. This research's primary goal is to reduce post-harvest loss in the shea value chain of rural Ghana, and the specific objectives include the following:

1. Assessment of post-harvest loss of shea nuts in the value chain at a rural production level.
2. Assessment of the viability of hermetic bag storage of shea nuts to mitigate post-harvest loss and maintain the quality of shea nuts.
3. Evaluation of moisture sorption isotherm for shea nuts.
4. Assess the profitability of shea butter production for women groups and shea butter processing centers for investors

### Outcomes/Impacts/Deliverables and updates of studies continued in 2024

#### Study 4: Assessing the profitability of four shea butter processing methods

Shea butter processing is vital for rural livelihoods in Sub-Saharan Africa, particularly Ghana. However, traditional processing methods are labor-intensive and inefficient, limiting financial returns. This study assessed the financial profitability of four shea butter processing methods—manual, semi-mechanized with outsourcing, semi-mechanized with group-owned equipment, and mechanized—in the Ullo Traditional Area of the Upper West Region of Ghana. The analysis employed non-discounting (Payback Period (PBP) and Benefit-Cost Ratio (BCR)) and discounting (Net Present Value (NPV) and Internal Rate of Return (IRR)) methods and sensitivity analyses on key economic variables. Results indicated that mechanized processing

(S3) offers the highest profitability, with an NPV of GHC 50,175 over 10 years and an IRR of 85%, suited for investors aiming at larger-scale shea nut processing and shea butter production. In comparison, the semi-mechanized approach with group-owned equipment (S2B) proved to be a viable option when grant funds were available to purchase equipment, resulting in an NPV of GHC 4,175 and positive cumulative cash flow in the first year. Manual processing (S1) was unprofitable when accounting for the value of time and labor at minimum wage due to low production capacity. In that scenario, selling raw shea nuts at harvest would generate sufficient profit (GHC 918) to meet a household's annual shea butter consumption needs (35 kg, GHC 875). This study recommends the need for scalable, mechanized systems for rural shea processors to maximize revenue and access premium markets, highlighting the importance of controlling operational costs, ensuring reliable end product demand, and grant-based investment in scalable mechanization.

## **Publications**

### ***Research***

- Ph.D. Final Oral Defense. November 20<sup>th</sup> 2024. Integrated approaches for profitable shea nut value chain enhancement: A case study in rural Ghana

### ***Oral/Poster Presentations:***

- Feed Manufacturing Training Program, International Grain and Feed Industry Academy, Iowa State University, U.S. Grains Council Sub-Saharan Africa DDGS Team, May 7-8, 2024 (Obeng-Akrofi: 2 lectures)
- Advanced Grain Elevator Operations Management Short Course, Grain & Feed Association of Illinois (GFAI), Bloomington, Illinois, June 17-21, 2024. (Obeng-Akrofi: 4 lectures; 3 hands-on sessions)
- Advanced Grain Elevator Operations Management Short Course, Agribusiness Association of Iowa (AAI), Ames, Iowa, August 5-9, 2024. (Obeng-Akrofi: 4 lectures; 3 hands-on sessions)

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