BINDERLESS MOMBASA GRASS (*Panicum maximum*) PELLET FEED FOR SMALL RUMINANTS

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An Undergraduate Thesis Submitted to the Faculty of the Department of Agricultural And Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines in Partial Fulfillment of the Requirements for the Degree of

BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB PROCESS ENGINEERING)

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ACCEPTANCE SHEET

This undergraduate thesis manuscript entitled "**BINDERLESS PELLETED MOMBASA (*Panicum maximum*) GRASS FOR SMALL RUMINANTS**" prepared and submitted by **JAMIE ANN M. CHIOCO**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB PROCESS ENGINEERING)**, is hereby accepted:

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BIOGRAPHICAL SKETCH

Jamie Ann M. Chioco is presently a 22-year-old college student from La Torre, Talavera, Nueva Ecija. She was born on the 10th of April in the year of our Lord 2001. She is the youngest child among the three children raised by Mrs. Estrella M. Chioco and Mr. Chito S. Chioco.

She started her elementary education at the age of six at San Pascual Integrated School and finished in March 2012 as Class Valedictorian.

She continued her junior secondary education at the Information and Communication Technology Curriculum (ICT) of Talavera National High School (TNHS) and achieved her diploma in April 2016 with honors.

With the hope of getting into college to pursue Agricultural and Biosystems Engineering, she continued her senior secondary education by taking Science, Technology, Engineering, and Mathematics (STEM) Academic Strand at Talavera Senior High School. She finished her senior secondary education in June 2018 with honors.

Through the motivation and insights given by successful agricultural engineers in the family, she chose to take the Bachelor of Science in Agricultural and Biosystems Engineering for her tertiary education at Central Luzon State University.

Despite many hardships, she continues to push through her tertiary education and has spent all four years of her college life fulfilling her hopes, dreams, and duties as a daughter, a sister, and a student.

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ABSTRACT

CHIOCO, JAMIE ANN M. Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, **FEBRUARY 2024**. **BINDERLESS MOMBASA GRASS (*Panicum maximum*) PELLET FEED FOR SMALL RUMINANTS.**

Adviser: **RUEL G. PENEYRA, M.Sc.**

One of the challenges during each harvest season of forage grasses are the storage and surplus. Freshly harvested grass will be fed to ruminants, and the surplus will be stored on the farm; however, the seasons affect the nutritional value of Mombasa grass. With this, the study aimed to produced binderless pellet feed to efficiently handle and store the surplus forages, specifically the Mombasa Grass, using only moisture conditioning coupled with proper machine operational parameters. The specific controlled variables are the moisture content of the Mombasa Grass, and the die diameter and roller-to-die clearance of single-die pelletizer machine.

The ANOVA indicates that within the parameters investigated, there is no significant difference ($p > 0.05$) in binderless pellet physical properties as affected by variations in moisture content (A), roller-to-die clearance(B), die diameter (C) and its combinations. However, the die diameter (C) does exert a significant influence on the palatability score of produced pellets ($p < 0.05$).

The optimal operational parameters for producing binderless Mombasa grass pellet feed are identified as 25%, moisture content, 2.5 mm roller-to-die clearance of, and a pellet die with a diameter of 6mm. In terms of palatability, the optimal combination of

factors for achieving high palatability was found to be a moisture content of 15% and a 4-mm die diameter, with a roller-to-die clearance ranging between 2.5 mm and 3.5 mm.

Within the limit of the factors considered, the pelletization process demonstrated a strength in maintaining consistent hardness, impact resistance, moisture content and density of the produced binderless pellet. This stability in pellet formation across varying range of factors proved the effectiveness of the proposed production process for binderless pellet from Mombasa grass. This study lays the groundwork for a thorough understanding of the pelletization process and contributes valuable insights to the broader field of biomass utilization and sustainable manufacturing practices.

Keywords: Pellet production; Binderless Pellet; Mombasa grass; Moisture conditioning

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