DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF AUTOMATED RABBIT FEEDER

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(AB Machinery and Power Engineering)

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ABSTRACT

ISIDRO, RONALD JR G., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, **JULY 2024, DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF AUTOMATED RABBIT FEEDER**

Adviser: MARVIN M. CINENSE, Ph.D.

This study presents the development, fabrication, and testing of an Automated Rabbit Feeder (ARF) designed to enhance efficiency in rabbit farming by automating the feeding process. The engineering and planning type of research was utilized to devise a working prototype, emphasizing design specifications, construction layouts, and functional analysis. The ARF integrates an Arduino Uno microcontroller with linear actuators to automate feed dispensing, ensuring precise feed delivery and reducing labor. The system's performance was evaluated through a series of experimental setups comparing automated and manual feeding methods.

The design considerations included the use of galvanized iron sheets for the feeder compartment, and a backup battery to ensure continuous operation. The feeder was designed to discharge 23-27 grams of feed per activation, controlled by push-button switches operated by the rabbits. The study employed exploratory descriptive qualitative research to investigate the ARF's components, effectiveness, and durability.

Data collection involved measuring feed consumption, waste, and machine feed discharge efficiency. Statistical analysis using the t-Test: Two-Sample Assuming Equal Variances demonstrated significant differences in feed consumption but not in feed waste between the two feeding methods. The machine feed discharge efficiency averaged 85.82%, and the feed discharge capacity were averaging around 25 grams.

The automated rabbit feeder has an investment cost of Php 30,836.00, including purchase and installation expenses, with a salvage value of Php 3,083.60. The depreciation is Php 2,774.94, interest on investment is Php 2,035.18, and shelter, taxes, and insurance total Php 1,519.20. The total fixed cost is Php 6,352.24. The variable costs include annual electricity consumption of Php 3,600.00, feed consumption costs of Php 5,200.00 for starter feeds, Php 13,200.00 for grower feeds, and Php 11,200.00 for the rabbits, plus repair and maintenance costs of Php 15.42. The total variable cost is Php 57,516.37. The annual operating cost is Php 63,868.61, covering repairs, maintenance, and recurring fees, with an hourly operating cost of Php 15.60. The expected payback period is 1.61 years, with a breakeven point of 1,357.32 kg of rabbit feed. These figures highlight the financial feasibility, profitability, and minimum production required to cover costs and generate profits.

Manual feeding in rabbit farming incurs annual costs totaling Php 67,150.00, with labor being the highest expense at Php 36,000.00 per year. Other significant costs include water (Php 1,550.00), starter feed (Php 5,200.00), grower feed (Php 13,200.00), and rabbit kits (Php 11,200.00). Income from selling rabbit meat at Php 450.00 per kilogram, with each rabbit having an average dressed weight of 1.7 kilograms and yielding Php 765.00, totals Php 85,680.00 annually, assuming the sale of 112 rabbits. This results in a net income of Php 18,530.00 and a return on investment (ROI) of 51.47%.

Automated rabbit feeders offer significant advantages for starting a rabbitry business. They reduce the time and effort required for feeding, making them ideal for busy individuals or frequent travelers. Automated dispensing prevents overeating, promotes healthier rabbits, and reduces the risk of obesity. These feeders maintain cleanliness by dispensing food in a controlled manner, minimizing mess and potential contamination. Overall, they streamline operations, improve feeding consistency, and enhance rabbit health, making them a valuable asset for efficient and successful rabbit farming ventures.

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