BUSITEMA UNIVERSITY
Pursuing Excellence

P.O. Box 236, Tororo, Uganda
Gen: +256 - 45 444 8838
Fax: +256 - 45 4436517
Email: info@adm.busitema.ac.ug

www.busitema.ac.ug

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANISATION AND IRRIGATION ENGINEERING

DESIGN AND FABRICATION OF AN IMPROVED FORAGE CHOPPER

BYADONG DIANA

BU/UG/2016/3

EMAIL:adongdiana256@gmail.com

CONTACT: 0786962721/0751063818

SUPERVISOR: MR. OBETI GRISM LAWRENCE

A final year project report submitted in partial fulfilment of the requirements for the award of the BSc. In Agricultural Mechanisation and Irrigation Engineering, December 2020.

ABSTRACT

Uganda is an agricultural country and its livestock sector contributes about 30% of the national Agriculture Gross Domestic Product (GDP) in the form of milk and meat and is a source of livelihood to about 4.5 million people living in the country (UIA, 2009).

Animal feeding is a very important factor regarding animal husbandry and natural forage or pasture provides over 90% of the feed requirements for ruminant livestock (Sarwatt and Mollel, 2013). Forage is plant material (mainly plant leaves and stems) eaten by livestock. In most areas forage is fed to animals by providing it in form of whole crop. By doing this, a lot of forage is wasted and it also affects the digestion system of animals therefore for the complete utilization of forage, we need to cut the forage into small pieces with the help of a forage cutter.(Mustafa, 2016). Also through chopping, different grass varieties can be mixed together which increases on the palatability of the feeds. But most importantly, excess pasture grown during the rainy season has to be chopped and preserved in form of hay or silage which is the conserved green fodder having moisture content in the range of 65 to 70% (Anand, 2017) to await scarcity like during the dry seasons and this can be achieved using a mechanical device known as a forage chopper.

Conceptualization of the machine involved two inter-related units; the feeding unit and the cutting unit. Different components of the machine were designed basing on the physical, mechanical and chemical properties of the forage, the components include; the feed hopper, feed rollers, blade shaft and roller shafts, main frame, driving mechanism and analyzing forces acting on the components to prevent failure. From the designs, cutting unit operates at a speed of 1050rpm and the feeding unit at a speed of 350rpm with a total maximum transmitted power requirement of 4HP after fabrication, the performance and economic analysis of the machine were performed in terms of chopping efficiency of 78.4%. .Machine's total cost; Ugx.1.125M, and its Net present value is 4,232282, and since its greater than 0, the project is viable, Owing to the performance and economic analysis of the machine, it achieves all its design purposes hence it is recommended for commercialization and adoption by the target groups.

DECLARATION

I, ADONG DIANA, hereby declare to the best of my knowledge that this report is an outcome of my own work and has not been presented for any academic award in my university, college or higher institution of learning. Throughout the work I have acknowledged all other sources in its compilation.

Signature.....

ADONG DIANA.

APPROVAL

This project is submitted to the Faculty of Engineering for examination with approval of my supervisors and the contents are satisfactory for the award of the degree

Supervisor

MR. OBETI GRISM LAWRENCE

Signature…….

Date…….

ACKNOWLEDGMENT

Sincere thanks go to the Almighty God for the wisdom, knowledge, grace, mercy, and protection He has given me and also to my parents, brothers, sisters, relatives, classmates and friends who have assisted me through guidance and support.

I also extend my gratitude to all my lecturers at Busitema University who have equipped me with academic knowledge that has enabled me to succeed in my studies.

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DEDICATION

I dedicate this report to my grandmother Rose Otuko, my uncles Akona Jolly Joe and Bala Moses who have raised me up, given me financial assistance, parental guidance, cancelling and encouragement in all my academic endeavors.

I also dedicate this report to my sponsors of Lindner Foundation Uganda who helped me financially during my early stages of education.

TABLE OF CONTENTS

TABLE OF FIGURES