BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANISATION AND IRRIGATION ENGINEERING

DESIGN AND CONSTRUCTION OF AN IMPROVED FORAGE CHOPPER

BY

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DEDICATION

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DECLARATION

I MULINDWA STEVEN, declare that this project report is my original work and has never been published or submitted before to any University or Institution of high learning for the award of Bachelors in Science of Agricultural Mechanization and Irrigation Engineering.

Signature .....

Date 26th May 2016.....

APPROVAL

This report has been submitted for examination with approval from the following supervisors:

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ABSTRACT

Forage has been the main source of feed for livestock. A forage chopper is a machine that is meant to chop forage into the required uniform size. Forage grows well in areas of Mpigi district because of the fertile soils and favorable climate. Despite the involvement of many farmers in livestock farming, many people have underutilized forage consumption by livestock.

The problem of unequal size of forage has been due to traditional methods of chopping forage i.e using machete. More still, the existing forage choppers are expensive to be afforded in developing countries like Uganda. Also hand machete increase the level of exposure to injuries.

The purpose of this study was to design and construct a low cost improved motorized forage chopper machine that creates a quick, safe and easy way to chop forage with increased productivity and equal size. The chopper consists of feed hopper, chopping blades, power transmission unit, base support and frame and it was designed and developed basing on the mechanical, physical and chemical properties of common forage. The chopper was made using the cheap available materials in Uganda.

The chopper uses a motor of 4 hp with two blades operating at 850 rpm speed in order overcome drawbacks of existing hand or power operated choppers and to meet the demand of livestock farmers. This chopper has a chopping efficiency of 90% with effective capacity of 252 kg/hr. The mean length of cut is about 4 ± 0.5cm. The cost of the prototype was 500,000UGX excluding the cost of the electric motor. It is recommended that the forage chopper be integrated into any livestock farm because of its low cost and both a high capacity and chopping efficiency

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Se-Selenium

DM- Dry Matter

Kg- Kilo gram

GDP-Gross Domestic Product

T-Ton

Hp- Horse power

Ha-Hectare

CHAPTER ONE: INTRODUCTION

1.1 Background

Forage is plant material (mainly plant leaves and stems) eaten by grazing livestock (Drew, 2015). Almost all the forages have sufficient levels of Potassium (K), Calcium (Ca), Magnesium (Mg), Manganese (Mn), and Zinc (Zn) to meet requirements of ruminant animals (Ababa, 2013).

According to the 2004 Population Census, the livestock population in Uganda comprised of 6,100,000 cattle, 1,150,000 sheep, 6,852,000 goats, 1,719,000 million pigs, 33,000,000 chickens and all these feed on forage.(Kabirizi et al. 2007.)

Varieties of forage grown in Uganda include; Chloris gayana (Rhodes grass), setaria, Cynodon plectostachyus, guinea grass, Pennisetum purpureum (elephant grass), coach grass among others(Kabirizi et al. 2007.). Pennisetum purpureum (elephant grass) is the most desired by livestock because of its palatability and high nutrient values.(Dorozvnski 2013.)

Animal agriculture is one of the most important economic sub-sectors of Uganda's agriculture and is currently among the most rapidly developing countries. The livestock sub-sector in Uganda contributes about 30% of the national Agriculture Gross Domestic Product(GDP) in the form of milk and meat(Kabirizi et al. 2007.). In order to improve household nutrition, income and food security among resource-poor households in Uganda, a number of livestock development projects have introduced intensive or stall feeding for cattle production based on improved breeds.

Chopping forage is the fundamental step in forage processing and it is divided into hand chopping (using machete) and machine chopping. Most of all these early choppers were turned with a hand crank aided by a heavy flywheel to maintain motion while the blade bit through the forage. The forage chopper is particularly designed for livestock keepers to facilitate in chopping the huge volumes of forage delivered to the farm to feed the zero grazed animals.(Agricultural 2011)

The new livestock farming methods adopted in Uganda like zero grazing gives no room for animals to graze in the fields. However, chopping is still done rudimentarily which is associated with un-equal size of the forage hence digestion problems to the animals.

This calls upon the need to design and construct an improved forage chopper that will achieve equal size of forage and at a lowest cost.

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