

A design of Multipurpose Feeding System Used in Agriculture

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Abstract

In modern world, there is increase in demand of more agricultural equipment and machineries, to save time. At the same time there are some restrictions to availability of space and storage facility. The main objective of designing the multipurpose feeding system is to achieve flexibility, ease of handling and compatibility. This multipurpose feeding system will meet all these requirements and achieves flexibility. It mainly includes chaffing, cutting, mixing and final feeding. It can be adjusted according to various needs without carrying separate equipment's of cutting, mixing and feeding. All three features are provided within single setup. There are three basic key elements of system which are mainly cutter, auger and conveyor that are used for cutting, mixing and feeding purpose respectively. End result is to save time, avoid handling of extra machineries and optimum milk yield.

Keywords— auger, cutter, multipurpose feeding system.

I. INTRODUCTION

This is a time of automation in many fields where most of manual effort is replaced by mechanical power in all degree of automation. Agriculture is now one of the most important sectors it plays a vital role in Indian economy. In order to further develop this sector technology has become one of the main bases. While dealing with the agriculture sector it entails difficulties relating to a number of factors. A recent survey conducted among farmers and labors working in cow-barn, poultry house, sheep house shows that they are need to use different type of machinery for cutting and mixing purpose, which relatively takes more separate time for cutting and mixing. At the same time for distribution purpose also it requires separate rail guided wagons or small trolleys. To overcome a machine is need which will full fill the above problem. A semi-automatic multipurpose feeding system was design and constructed to provide predetermined amounts of food. It is combined effect of every aspect which will lead to cutting, chaffing, mixing and finally feeding. In this power supplying is given by the motor that have basic role in cutting and mixing. This system more efficient, compact in size and avoid unnecessary handling of machinery or accessories for feeding purpose.

II. LITERATURE REVIEW

Every dairy farmer would like to feed his animals better and more efficiently. Many research results support that more frequent feeding result in higher production. This will ultimately increase the milk yield and higher economy.

Anne Grothmann, Franz Nydegger [1] present the result from the survey showed that an automatic feeding system can be installed not only on farms with a big herd or a high milk yield but also on small ones. He suggested that the increase of the feeding frequency by using an automatic feeding system could have an influence on the performance of the animals. By using an automatic feeding

system significant reduction in working time by comparison with the conventional feeder mixer wagon has been observed Fig. 1.

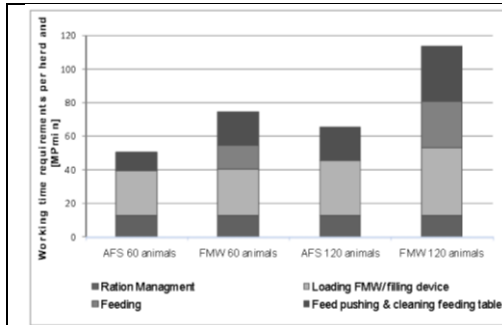


Fig. 1 Comparison of daily working time required between automatic feeding system (AFS) and feeder mixer wagon (FMW)

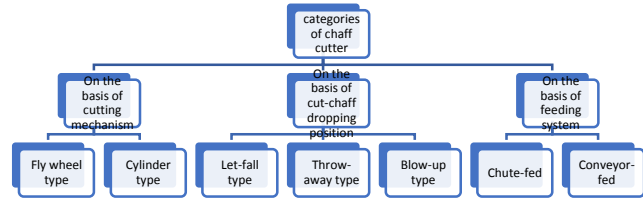


Fig. 2 types of chaff cutter

Anand Kumar Telang [2] stated that Implementation of technology in the field of agriculture has brought a very wide changes in manual procedures are replaced by advanced technical procedures. Here before we used to cut the chaff, grass manually to feed the animals. When it was in a very large scale it is difficult to cut and it consumes more time. Due to chaff cutting machine, chaff can be easily cut in a very least time and helps avoiding injuries as it occurs in manual method. It also increases the overall productivity of the system. So technology has brought a wide change in the field of agriculture. After surveying it is observed that there are various types of chaff cutter which is categories as follows Fig. 2.

III. WORKING PROCEDURE

A multipurpose feeding system mainly consists of cutter, augar (mixer) and conveyor. The cutter is driven with the help of single phase 2 H.P., 230V, 12A motor at 1425 rpm and it includes chaff blades and chunk blades, which are mounted at outer periphery of cutter and along internally welded three parallel shafts respectively. The hopper mounted at top most side of cage, the chunk blades cut the fodder (e.g. corn seeds, soya bean etc) from Hooper. A different size net is provided below the cutter to control the size of the cutting material. The chaff blades cut the input material (e.g. corn stalk, wheat stalk etc) which is feed from tray. Then both the cutting material dropped into the collector or mixing chamber. The power transmission is done via V belt drive and pulleys to the cutter and augar. The augar has mainly continuous helical strips along its length. The process of mixing is completely accomplished by the augar. The final mixed fodder will be pass over the conveyor, which distribute the fodder to respective cows station by manual push, as the setup has provided with wheels at the bottom of trolley. “Fig. 3” shows the schematic representation of the working model.

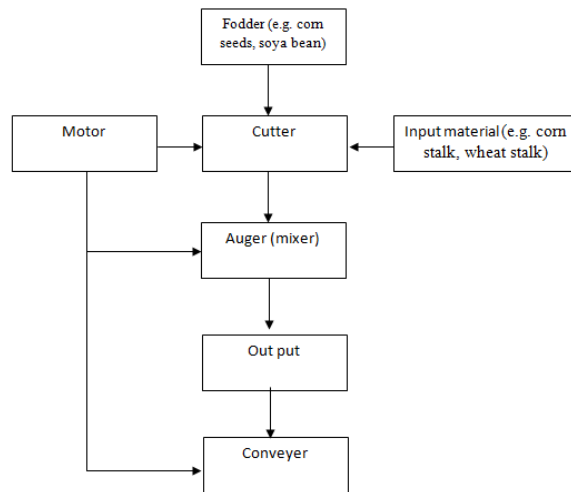


Fig. 3 Schematic representation of model

IV. MATERIAL SELECTION

One of the important considerations in system design is the choice of the component material. Cutter is usually made from of M.S or H.C.S. After doing literature and market survey we have finalized the components and its material which is enlisted in Table I.

Table- I

List of components and material

List of components	Material
Hopper	Sheet metal
Cutter	M.S.
Mixer(Auger)	M.S
Main shaft	M.S.
Pulley	C.I.
Conveyer belt	PVC
Conveyer frame/roller	Al, M.S
Frame	M.S.

V. CAD MODELLING OF DESIGN ELEMENT AND FABRICATED ASSEMBLY MODEL

After completing the design calculations of chaff cutting system, we prepared CAD models of components which are going too used in our system by using CAD software Fig 4–9, and successfully fabricate the system is shown in “Fig. 10”.

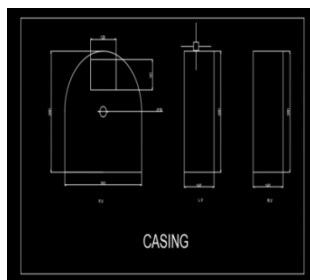


Fig. 4 2D model of casing

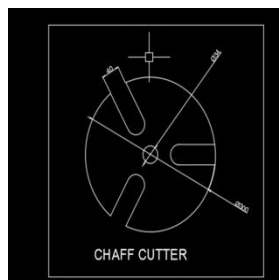


Fig. 5 2D model of cutter

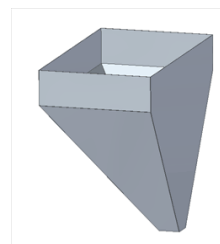


Fig. 6 3D model of Hooper



Fig. 7 3D model of auger

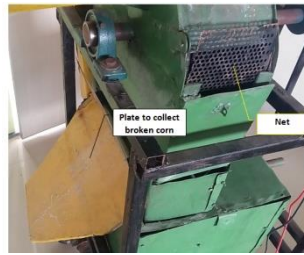


Fig. 8 Flat plate and Trey

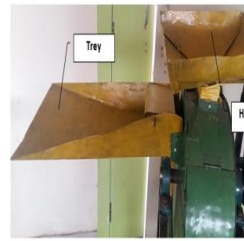


Fig. 9 Trey and Hooper



Fig. 10 Actual Feeding system

VI. WORKED DEVELOPED

- A. Designed system is single phase powered, compact, aesthetically pleasant, easily movable and less noisy.
- B. In this system we get desired cutting outputs of chunk, chaff, corn etc and mixed product of it.

VII. CONCLUSION

Multipurpose feeding system is manual push type semi-automatic feeding system useful for user to use for multiple applications. It provides use of different operating mode i.e., single processing chaff cutting, chunk cutting and double processing uniform feeding. It supports various sizes of nets for cutting purpose according to need. We can also add medicine in the fodder which gets uniformly mixed in chamber. This will maintain the health of animals and hence increase the productivity of farm. It is user friendly, safe to use and can be easily adjusted by changing the output. It is compact in size hence reduces manufacturing cost, only one man can operate whole setup by supplying the fodder from both the input (Hooper and tray) and pushing the trolley. Thus saves time and reduce the labor cost. The whole system setup can be move by wheels provided at the bottom of trolley.

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