International Journal of Engineering Sciences &Research Technology

(A Peer Reviewed Online Journal)
Impact Factor: 5.164

IJESRT

RESEARCHERID
THOMSON REUTERS
[Ramat 2020]
IC™ Value: 3.00
ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

IJESRT
INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF GLUME MIXTURE

Abhishek Mishra[*1], Ajay Kumar[2], Thalesh Kumar Vedvyas[3] & Manish Kumar[4]
[*1,2,3&4]Sagar Institute of Science Technology and Research, India

ABSTRACT

Animal welfare means how an animal is coping with the conditions in which it lives; it is based on 'five freedoms' and 'four principles' of animal welfare. Dairy cattle are considered as sentient beings due to which husbandry should be provided as per their needs. As cattle and human beings are intrinsically connected to each other, protection of cattle from diseases and unnecessary suffering should become prime responsibility of human. Welfare of dairy cattle cannot be measured directly, as is multidimensional in nature and can be measured by various indicators which are either direct or indirect. In this review we try to analyze dairy cattle welfare, their indicators and their assessment. In this study glume mixer design is considered for mixing of glume, water, straw as cattle food. The machine operation includes crushing and mixing of glume. A DC-Motor of 24V 350W is recommended for effective working. The design of shaft is on the basis of strength, rigidity and stiffness to overcome the distributed weight of glume. The machine requires a shaft of 22mm diameter and 15inch length to drive the blades. Two batteries of 24v 4Ah each, a blower of 300rpm and 2 solar panel of 12v each is required to charge the batteries. An attempt is carried out to increase the economic value of cattle feeding by machine. The present paper deals with the research work carried out related to cattle feeding by glume mixer.

KEYWORDS: Glume, straw, motor, solar panel.

1. INTRODUCTION

According to the European Food Safety Authority (EFSA), the fact that dairy cows are bred selectively to continue increasing the milk production is an important cause of their suffering. The main problem occurs when the farmers prepare food for the cattle. The best meal for cattle isto feed them the mix glumes with other protein items but it takes a lot of time to prepare as well as to feed. So sometimes farmers doesn't mix or prepare the glume which can cause health issue to the cattle which can lead to decrease in milk production as well as in the field of agriculture. So to avoid health kind of issues we have prepared the glume mixing machine which is easier to use and mixes glume properly. The method of mix design consists of selection of optimum proportion of ingredients, i.e., water, glume, straw. The blades of glume mixing machine rotates in one direction only which creates a particular flow pattern in the fodder hence the particles tend to mix properly. Mixture Shaft rotates about it's own axis which helps it to reach all parts of the container. This ensures that turbulence required for thorough mixing is provided all over the container. This machine involves a rotating blades that revolves about the fixed container axis. Machine has speed regulator feature to stir the mixture for proper mixing.

2. LITRATURE REVIEW AND REFERENCES

[1]Kumar Chandan. et al; Animal welfare issues have grown in importance n recent years not only in developed countries but also in developing countries where improvement of animal welfare practices can lead to not only improved production and health of the animals but also increased trade opportunities. Such countries, where land and labour are cheaper than in developed countries, are likely to have a natural commercial advantage by producing farm products more cheaply. The Indian dairy farming system comprises traditional smallholder production system and commercial dairy farming which is relatively of recent origin and is growing. The animal welfare issues and problems in these two production systems may be different due to

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

different farming practices and use of modem production technology. So for little effort has been made in India to understand dairy animal welfare or to identify the indicators of welfare or to assess the level of welfare. Therefore the status of dairy animal welfare under our different dairy farming systems needs to be studied so that the animal welfare areas or management practices which jeopardize animal welfare could be identified and a strategy could be developed for enhancing the animal welfare.

[2] Yehia Fahmy et al;An extensive background overview on the use of agricultural residues (wastes) for production of paper, board, binder less board, energy, different types of fuels by pyrolysis (solid, liquid and gaseous fuel), many petrochemicals substitutes, charcoal (active carbon), dissolving pulps and rayon. It includes scientific and industrial data, case studies, current status, and sustainability of paper and sugar industries, green nanotechnology, and future prospects.

[3] Ajila C.M.et al; Agricultural and food-industry residues constitute a major proportion (almost 30%) of worldwide agricultural production. These wastes mainly comprise lignocellulosic materials, fruit and vegetable wastes, sugar-industry wastes as well as animal and fisheries refuse and by products. Agro-residues are rich in many bioactive and nutraceutical compounds, such as polyphenolics, carotenoids and dietary fiber among others. Agro residues are a major valuable biomass and present potential solutions to problems of animal nutrition and the worldwide supply of protein and calories, if appropriate technologies can be used for their valorization by nutrient enrichment. Technologies available for protein enrichment of these wastes include solid substrate fermentation, ensiling, and high solid or slurry processes. Technologies to be developed for the reprocessing of these wastes need to take account of the peculiarities of individual wastes and the environment in which they are generated, reprocessed, and used. In particular, such technologies need to deliver products that are safe, not just for animal feed use, but also from the perspective of human feeding. This review focuses on the major current applications of solid-state fermentation in relation to the feed sector.

[4] Pardeep Kumar Sadh1 et al; Agricultural residues are rich in bioactive compounds. These residues can be used as an alternate source for the production of different products like biogas, biofuel, mushroom, and tempeh as the raw material in various researches and industries. The use of agro-industrial wastes as raw materials can help to reduce the production cost and also reduce the pollution load from the environment. Agro-industrial wastes are used for manufacturing of biofuels, enzymes, vitamins, antioxidants, animal feed, antibiotics, and other chemicals through solid state fermentation (SSF). A variety of microorganisms are used for the production of these valuable products through SSF processes. Therefore, SSF and their effect on the formation of value-added products are reviewed and discussed.

[5] ShyamPrakash Koganti[1] et al; Cement concrete paving blocks are precast hard products complete out of cement concrete. The product is made in various sizes and shapes like square, round and rectangular blocks of different dimensions with designs for interlocking of adjacent tiles blocks. Several Research Works have been carried out in the past to study the possibility of utilizing waste materials and industrial byproducts in the manufacturing of paver blocks. Various industrial waste materials like quarry dust, glass powder, ceramic dust and coal dust are used as partial replacement of fine aggregate and assessed the strength parameters and compared the profit percentages after replacement with waste materials. Quarry dust can be replaced by 20% and beyond that the difference in strength is not much higher but considering cost we can replace upto 40% so that we can get a profit of almost 10%. Similarly we can replace glass powder and ceramic dust by 20% only beyond that there is decrement in strength and even with 20% replacement we can get 1.34 % and 2.42% of profit. Coal dust is not suitable for alternative material as fine aggregate as it reduces the strength.

[6]Rajeev Ravindran 1 et al; Agro-industrial waste is highly nutritious in nature and facilitates microbial growth. Most agricultural wastes are lignocellulosic in nature; a large fraction of it is composed of carbohydrates. Agricultural residues can thus be used for the production of various value-added products, such as industrially important enzymes. Agro-industrial wastes, such as sugar canebagasse, corn cob and rice bran, have been widely investigated via different fermentation strategies for the production of enzymes. Solid-state fermentation holds much potential compared with submerged fermentationmethodsfortheutilizationofagro-basedwastesforenzymeproduction. This is because the physical–chemical nature of many lignocellulosic substrates naturally lends itself to solid phase culture, and thereby represents a means to reap the acknowledged

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

potential of this fermentation method. Recent studies have shown that pretreatment technologies can greatly enhance enzyme yields by several fold. This article gives an overview of how agricultural waste can be productively harnessed as a raw material for fermentation. Furthermore, a detailed analysis of studies conducted in the production of different commercially important enzymes using lignocellulosic food waste has been provided.

3. MATERIALS AND METHODS

(1) BLOWER:-Blower is equipment or a device which increases the velocity of air or gas when it is passed through equipped impellers. They are mainly used for flow of air/gas required for exhausting, aspirating, cooling, ventilating, conveying etc. we used blower of 300rpm to transfer glume to the container.

(2) CONTAINER:- A container is any receptacle or enclosure for holding a product used in storage, packaging, and shipping . Things kept inside of a container are protected bybeing inside of its structure. The term is most frequently applied to devices made from materials that are durable and are usually at least partly rigid. We used tubas a container to contains the mixture.(Diameter 15''Base diameter 14'' volume 5 kg/m^3)

(3) SOLAR PANEL: Solar panels are those devices which are used to absorb the sun's rays and convert them into electricity or heat. The process of converting sunlight to electrical energy is one that has improved dramatically over the last few decades, and is now more efficient than ever.(12V 2 Pieces)

Figure 1 Solar Pannel

Figure 2 Battery

Figure 3 D C motor

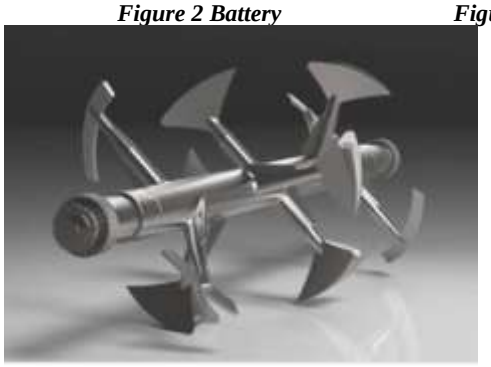

Figure 4 Driver Shaft

(4) BATTERY 24V 4Ah:-A battery is a device that produces electrons through electrochemical reaction and generates emf (Electro Motive Force). In this model battery produces emf and transfers it in DC-motor. (2piece)

(5) ANGLE and IRON PLATE:- An angle plate is a work holding device used as a fixture in metalworking. The angle plate is made from high quality material (cast iron) that has been stabilized to prevent further movement or distortion. (Thickness 5mm, Length, 25mmHeight 18")

(6) DC-MOTOR:- DC-Motor is a device which transforms the electrical energy into mechanical energy. We are using 24V 350W DC-Motor of speed 300rpm. The function of DC-Motor in this model is to rotate the driver shaft.

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

(7) DRIVER SHAFT:-A shaft is a rotating machine element, usually circularin cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power. We used shaft of diameter 22 mm length15''to drive the blades for mixing.

Hence the power required to convey the grass can be derived thus;

$$P = \frac{QLWF}{4560}$$

Q, is the conveyor capacity; L is the projected length of the screw conveyor; F is the material factor and W is the bulk density. This equation shows that the force required for rotation of shaft is the product of pressure and the surface area of contact. The surface area of the circular disc plate is given by;

$$A = \pi r^2$$

Again, power can be represented as the product of force and the velocity, where velocity;

$$V = \omega R$$

Where ω is the angular velocity which is equal to that of the shaft,

$$\omega = \frac{2 \pi N}{60}$$

The power required to overcome frictional losses can be computed assuming 10% losses due to frictional forces. Essentially, the shaft is designed on the basis of strength, rigidity and stiffness. Where N, is the speed of the shaft in rev/min.

The equivalent dynamic load (Fe) can be represented as;

$$Fe = (xCrFr + CtFt)S$$

C_r is the radial factor, x is the rotational factor, Fr is the radial load, Ct is the thrust factor, Ft is the thrust or axial load and S is the safety factor.

Essentially, the screw power shaft operates both as conveyor and a power element. The screw is welded to the shaft with incremental screw height which provides the compressive force required for briquetting. Design considerations for screw press entails the power to overcome the inertia of the shaft and the screw, the power to convey the pulverized dried grass stock along the entire length of the press and the power to effectively compact the feedstock with little or no binder added.

Working:-The working principle of the machine is based on concrete mixing machine. To run this system, we will first give the DC-current to DC-motor (24V, 350W, 300RPM) after that DC-motor will run shaft by the help of rotation drive. Then blower blows amount of glume with nutrients inside the container filled with water. Then the rotating shaft connected with blades properly mixed all the materials contains inside the container. Then we will manually empty the container.

Table 1: Operating Parameters

1. Capacity of Container	5Kg
2. Ratio of Water with Glume	1 : 5
3. Power Supply	24W
4. Speed of Shaft	300 rpm
5. Battery Running Time	8 hr
6. Mixing Time	5 min/mix

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

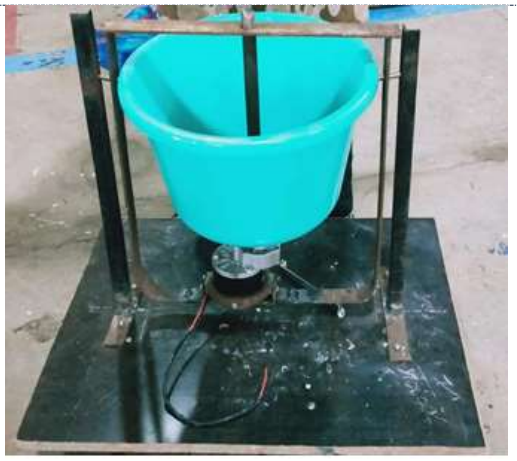

Figure: Glume Mixture

4. RESULTS AND DISCUSSION

Glume mixer machine as shown in figure is designed for mixing cattle food. The machine parameters are given in table 2:

Table2. Machine parameters and specifications

Design Parameters	Specifications
Blower	300rpm
Motor	24V 350W
Shaft	Diameter 22mm, length 15”
Solar panel	12V
Battery	24V 4Ah
Container	Outer diameter15”Base diameter 14”Volume 5kg/m^3

5. CONCLUSION

As seen from the research literature related to glume mixer nee development in technology is necessary to increase the economic value of cattle feeding.

6. ACKNOWLEDGEMENTS

The authors are sincerely thankful to the International Journal of Engineering Sciences and Research Technology. The views or opinion expressed in this article are those of the authors in the guidance of Prof. sanjeev gupta, anil shetty, Mahesh sir

REFERENCES

[1] Chandan Kumar. et al Dairy cattle welfare in India: A review; Asian J. Dairy & Food Res, 36(2) 2017: 85-92
[2] Yehia Fahmy et al; Agricultural Residues (Wastes) for Manufacture of Paper, Board, and Miscellaneous Products: Background Overview and Future Prospects; International Journal of ChemTech Research CODEN(USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555 Vol.10 No.2, pp 424-448, 2017.
[3] Ajila C.M.et al
[4] Pardeep Kumar Sadh1,Agro-industrial wastes and their utilization using solid state fermentation: a review

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

[5] Shyam Prakash Koganti1, Kommineni Hemanthraja2 and Satish Sajja3Published under licence by IOP Publishing Ltd
[6] Rajeev Ravindran 1,2, Shady S. Hassan 1,2 , Gwilym A. Williams 2 and Amit K. Jaiswal 1, A Review on Bioconversion of Agro-Industrial Wastes to Industrially Important Enzymes
[7] School of Food Science and Environmental Health, College of Sciences and Health, Dublin Institute of Technology, Cathal Brugha Street, D01 HV58 Dublin, Ireland; rajeev.ravindran@mydit.ie (R.R.); shady.hassan@mydit.ie (S.S.H.)
[8] School of Biological Sciences, College of Sciences and Health, Dublin Institute of Technology, Kevin Street, D08 NF82 Dublin, Ireland;
[9] Baird, B.A., et al. (2016). Program animal welfare: Using behavioral and physiological measures to assess the well-being of animals used for education programs in zoos. Applied animal behavior science, http://dx.doi.org/10.1016/j.applanim.2015.12.004.
[10] Bertoni, G., Calamari, L. and Trevisi, E., (2007). How to define and evaluate welfare in modern dairy farms, 13 th Int. Conf. on Production Diseases in Farm Animals ,Leipzig, Germany, pp. 590-606