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Advanced Design for Generation of Electricity in Rotary Mode Operation Using Animal Power

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A B S T R A C T

Keywords

Animal power, Electricity, Rotary mode operation, Dynamo.

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Livestock have been used in agriculture for thousands of years supplying energy for crop production in terms of draught power and organic manure. But due to mechanization in agriculture, the role of animals in crop production became less relevant. But in a country like India where 78% of farmers have less than 2 ha of area for cultivation, the question whether the use of tractors and tillers are economical put forward the importance of draught animals in agriculture. It is assumed that one pair of draught animals develop approximately 750 watts of power. If the million animals can be used, say, for about 250 days of a year at the rate of 6 hrs per day, then the total energy available will be 45 million mw hr. It has been estimated that average use of animal power in a year is only 100 year days. In this research a modified machine design and developed for the generation of the electricity with the help of draught animal in rotary mode operation and The average speed, draft force and power requirement of a pair of bullocks were 2.5 km/h, 730 N and 0.18 kW to operate the animal driven electricity generator for electricity generation and battery charging.

Introduction

Energy crisis in the world will be one of the factors to impede the economic growth of both developing and developed countries. Agriculture sector plays a key role in the agricultural purposes. The farmers have to be educated in the area of energy conservation and proper utilization of available resources in the country. The Electric Power Survey of India that is done regularly helps forecast



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Original Research Article

Testing of Animal Powered Electricity Generation Unit for Linear Mode of Operation

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A B S T R A C T

Keywords

Animal Powered Electricity Generation Unit for Linear Mode of Operation

Farm mechanization and the utilization of the draught animals, is very important the current time, and they should not burden to the farmers. In this dissertation a machine is tested for utilization of animal power in linear mode of operation of electricity and the main objectives of this dissertation are to generate electricity with the help of animal power in linear mode of operation and store it in the battery for the house hole purpose. Electricity generation by animal power is a novel technology. It has unique future of using animal power as transportation for electric generation. It was feasible to generate the electricity by using draught animal power in linear mode of operation. The system was tested for three times and it was recognized that the speed in the ratio of 1:640 at the input of alternator. The output power to input power ratio i.e. efficiency of the system was found to be 55%.

Introduction

Energy is a basic requirement of human life, just like in agriculture, industry, transportation, communication. There are two types of energy available which could be use in the form of electricity. First one is the natural energy which is also called renewable energy such as solar, wind, ocean, wave and biomass etc. and the is unlimited but increasing the problem of unemployment in our country the use of man & animal power is very necessary. Agricultural operations, transportation, wars, marriages, etc. were dependent on animal husbandry sector mainly on quality bullocks, which are produced by indigenous animals besides milk. Draught animals have been

Study and Analysis of Animal and Human Muscle Power for Electricity Generation

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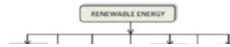
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Abstract— The main objective of this paper to utilize the muscle power of human and animal for powered battery charging system. It consists of a mechanical gear reduction device driving an alternator and operates at variable speed. The alternator is connected to a battery bank via rectifier. The characteristic of the system depends on the gear reduction system, the car alternator, and the system configuration. The electricity generation by animal and human power is a novel technology. The electricity generated is stored in the batteries of different capacity and used for lighting, cooking and minor irrigation. This equipment needs less maintenance. Also this equipment is emission free, low cost and has long life.

Keywords- Animal power, human power, speed increaser, lead acid battery.

I. INTRODUCTION

The technologies of renewable energy are known to be less competitive than conventional electric energy conversion systems, mainly because of their intermittency and the relatively high maintenance cost. The several advantages renewable energy sources such as the reduction in dependence on fossil fuel resources and the reduction in carbon emissions to the atmosphere. Renewable energies avoid the safety problems derived from power of atomic. It has become more desirable to adopt renewable energy power plants.



mechanization, there has been the population of draught animal decrease but still animal power plays an important role to perform various agricultural operations. Table 1 shows the sustainable power of individual animals in good condition [4].

Table 1: Sustainable power of individual animals in good condition

Animal	Typical weight kN (kg)	Typical Pull weight bit ratio	Typical pull N (kg)	Typical working speed m/s	Power output W	Working hours per day	Energy output MJ/day
Ox (Bullock)	4.5 (450)	0.11	500 (50)	0.9	450	6	10
Buffalo	5.5(550)	0.12	650 (65)	0.8	520	5	9.5
Horse	4.0 (400)	0.13	500 (50)	1.0	500	10	18
Donkey	1.5 (150)	0.13	200 (20)	1.0	200	4	3
Male	3.0 (300)	0.13	400 (40)	1.0	400	6	8.5
Camel	5.0 (500)	0.13	650 (65)	1.0	650	6	14

II. EXPERIMENTAL SETUP DETAILS

The experimental setup block diagram as shown in fig. 2. In this setup firstly the animal and human power connected to wooden belan to transmit the muscle power to gear reduction through mechanical link. The gear reduction drives by muscle power and its increases the speed of system and to produce mechanical energy. The production of mechanical energy converts into electrical energy with the help of alternator and its store in storage system.



Performance Evaluation of Animal Driven Rotary Mode Power Transmission System to Operate Flour Mill

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ABSTRACT. The Performance evaluation of Animal Driven Rotary Mode Power transmission system for operating flour mill was undertaken at the site of the CAET, MKV, Parbhani. The work rest schedule of 1 hour work – ½ hour rest - 1 hour work – ½ hour rest - 1 hour work – ½ hr rest – 1 hour work was followed. The speed (kmph), draft (kg), output (kg/hour), power developed (W), physiological responses and fatigue score of experimental bullocks in operations of flour milling were recorded. Flour Mill was also evaluated for performances in developed rotary transmission system. The Power generated by the bullock pair in a developed rotary transmission system and Output of flour milling operation were varies significantly with speed of local bullock pair during all operations. The draft exerted by bullocks, speed of bullocks, power generated and output of flour Mill during work rest cycle were varied from 18.31 to 36.18 kg, 2.97 to 2.37 kmph, 0.301 to 0.234 kW and 5.45 to 5.20 kg/hr respectively. The output of flour mill by using developed animal driven rotary power transmission system was lower than that of in electrical operation. The total cost of operation of bullock operated flour mill were Rs. 62.46 per hour. Due to fluctuation of speed in rotary mode, the performance of the flour milling was lower in a rotary power transmission system than that of in the electrical operation.

KEYWORDS: Power transmission, Flour Mill, Dynamometer, Draft, Fatigue Score.

I. INTRODUCTION

The animals are isoperative for approximately 150 to 200 days in a year. This idle time can be resourcefully utilized by establishing an animal operated agro processing unit. The bullocks can be used in rotary mode power transmission system, post harvest operations like flour milling, chaff cutting, dal milling, groundnut decorticators, oil extraction, threshing and other stationary operations. Development of matching agro processing machines to be used in rotary mode power transmission system is helpful to the farmers to use their animals in idle time and save electricity and other fuels and may earn more by leasing this facility to others.

II. MATERIAL AND METHODS

Experiment was conducted at College of Agricultural Engineering and Technology, Parbhani site. The developed animal driven rotary transmission system was evaluated for its performance for flour milling operation. During the test, bullocks were hitched at a distance of 4.24 m from the centre of vertical input shaft. The bullocks walked in circular motion that resulted on an average 0.0 RPM at vertical input shaft 77% RPM at pulley of Flour Mill. Flour mill is a machine of 1 hp capacity which is operated by developed Animal driven Rotary Power Transmission system. The developed animal driven rotary transmission system was designed for 1 hp power output. The work rest schedule of 1 hour work – ½ hour rest - 1 hour work – ½ hour rest - 1 hour work – ½ hour rest - 1 hour work was

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Evaluation of rotary mode of application of ponies/horses for generation of electricity in Imphal, Manipur

R. K. TIWARI

Abstract

The animal driven rotary mode system was evaluated to generate electricity for battery charging. The cost economics of electricity generation and storage was worked out. The ponies energy in rotary unit to generate the electricity for battery charging was best utilized with proper work-rest cycle and nutritive feed. The main objective of the establishment of rotary power transmission system was to utilize power of pony during idle period. Fatigue score was found to be increased with duration of work. The physiological responses of the pony viz., pulse rate, respiration rate and rectal temperature increased with duration of work whereas speed of operation decreased. The battery (12 V, 35 Amp-h) could be fully charged (specific gravity = 1.265) after 6 hours of pony operation following work-rest cycle of half an hour: 1 hour rest. The CFL (8 W, DC) were used for test trial which were glowing brightly. The average speed of pony at no load and loads were 4 and 3 revolutions/min, respectively. The overall body length and girth of pony were 1150 and 1450 mm, respectively. Time of charging was depended on the size of the battery as 35Ah battery required 6 hour for full charging. The alternator started emitting current at 1265 rpm and at this stage the battery started drawing current. Voltage increased and current drawn decreased with the state of charging. The power output reduced with reduction in current drawn. Battery charging was recommended at 50 per cent discharge level. At specific gravity of 1.200 the battery is charged at 50 per cent level and the draught requirement was observed to be 53 kgf which was well within the draught capacity of animals. Thus, it is recommended that battery should be put on charge at 50 per cent discharge level. Below this the draught requirement was observed high. The cost of pony and labour was therefore may be excluded from cost estimation. After excluding the cost of animal and labour the cost of battery charging was worked out as Rs. 9.62 and total cost for charging a battery of 35 Ah was found to be Rs. 57.72.

Keywords

Rotary mode, Battery fatigue work-rest, Rectal

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Description

A new method is proposed for electric generation with negligible running cost. In this method a compressors is used to store mechanical energy in the form of compressed air by using rotary animal power. This compress air is further used to produce rotary motion for electric generation when and as desired. This method has negligible running cost because in case of traditional metoda, mechanical energy is stored in the form of electric energy in the battery. The life of a battery is 3-4 years and cost of battery varies from Rs. 12000-15000. So the running cost of traditional method is minimum i.e. Rs. 4000-5000 per year. This is the major cause of unutilization of animal draught for generation of electricity. By using new method of electric generation by draught animal, above problem can be solved.

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[https://www.researchgate.net/publication/316434962 Physiological Responses of Bullocks in Rotary Transmission System for Briquette Production](https://www.researchgate.net/publication/316434962_Physiological_Responses_of_Bullocks_in_Rotary_Transmission_System_for_Briquette_Production)

The screenshot shows the ResearchGate interface for the article "Physiological Responses of Bullocks in Rotary Transmission System for Briquette Production". The article is published in the "Journal of Animal Research" (Volume 7, Issue 1, 2017) and has a DOI of 10.5958/2277-940X.2017.00003.1. The authors listed are Swapnil Choudhary, Parmanand Sahu, Viren Manish Victor, and Prabhakar Shukla. The article has 38 reads, 0 recommendations, 0 followers, and 1 citation. The page includes a search bar, navigation links (Home, Questions, Jobs), and a sidebar with "Abstract and figures" and "Ad you may be interested in". The abstract text describes draught animals as a source of energy for agriculture in Chhattisgarh, India, and details the physiological responses of bullocks during briquette production. A small image of a bullock is shown below the abstract. The sidebar also features a "Deliver fast & reliable Code" advertisement for Parallel Studio XE and a "Seleziona tutto" button.

Physiological Responses of Bullocks in Rotary Transmission System for Briquette Production

January 2017 - Journal of Animal Research 7(1):15
DOI: 10.5958/2277-940X.2017.00003.1

Swapnil Choudhary · Parmanand Sahu · Viren Manish Victor · Prabhakar Shukla

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Abstract and figures

Draught animals such as bullocks and he buffaloes are the important source of energy for agricultural operations on small and marginal farms of Chhattisgarh, which constitute three fourth (75.77%) portion of total land holding. Draught animals used in this region are small sized. In this paper physiological response of non-descriptive breed of bullocks of Chhattisgarh region in rotary power transmission system for briquette production are described. The physiological responses of Bullock in terms of pulse rate, respiration rate and body temperature were recorded during the briquette production after every one hour workout. The average speed of bullock during briquette production and power output was recorded 0.84 m/s and 0.43 kW respectively. The power output reduced with passage of time. The operating speed of bullock varied with the working hour and the bullocks were not fatigue after 6 hours of work as they scored 16 points against the fatigue level score of 20 points.

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Experimental Study on Animal Powered Mechanical Device for Home Lighting System

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Abstract

In this paper authors experimentally studied the animal powered electric generation system for home lighting. Although animals have been using for domestic works at rural and remote areas, but the electricity generation by Animal power is a novel technology. This invention provides animal powered mechanical device for home lighting system. It has unique features of using animal power as prime mover for electric generator. Animal energy in form of high-torque low-speed can be converted into low-torque high-speed through speed increaser to energize the electric generator. The electricity generated is stored in the battery and used when lighting is required either for DC light or AC light using inverter. This equipment is emission free, low cost and has long life. Also this equipment needs less maintenance and any person can run either skilled or unskilled.

Keywords: Animal power, speed increaser, electric generation.

<https://www.seea.org.in/irjee/upload/v12430.pdf>

Generation of Electricity by Utilization of Power of Draught Animal

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ABSTRACT

A new method is proposed for electric generation with negligible running cost. In this method a compressor is used to store mechanical energy in the form of compressed air by using rotary animal power. This compressed air is further used to produce rotary motion for electric generation when and as desired. This method has negligible running cost because in case of traditional method, mechanical energy is stored in the form of electric energy in the battery. The life of a battery is 3-4 years and cost of battery varies from Rs. 12000-15000. So the running cost of traditional method is minimum i.e. Rs. 4000-5000 per year. This is the major cause of un-utilization of animal draught for generation of electricity. By using new method of electric generation by draught animal, above problem can be solved.

Key words: Electric generation, Compressors, Mechanical energy, Animal draught.

There is an increasing interest and urgency to develop and exploit any possible source of renewable energy which may be applied to the benefit of communities, particularly in remote areas where grid electricity is not available. Systems which generate such electrical energy are particularly attractive, because of the flexibility of application, cleanliness and storage capability of generated electricity.

The use of animals for draught purpose is probably the most important application of livestock to farming in developing countries. Traditionally, draught animal's power has been the main source of farm power. With

Draught animals power (DAP) play a dominant role in our rural economy. Although an increasing mechanization is replacing the animal power in the villages, reducing the total DAP, yet India has to depend on animal operations for many years to come from agricultural operations transport of farm product. The draught animal power has not been found adequate and, thus this is being supplemented by mechanical power, especially for tillage, irrigation and threshing [1]. Ninety percentage of land holdings are distributed in marginal to semi-medium farm holdings. It covers about 50 per cent of total cultivated land. This area has been