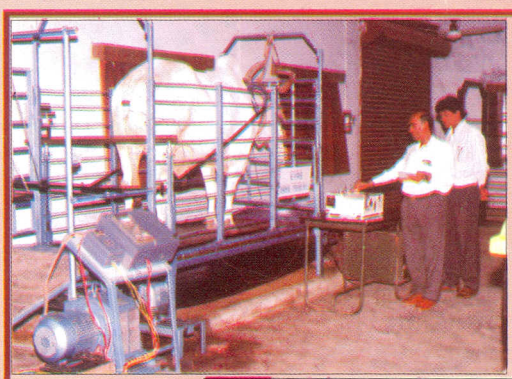
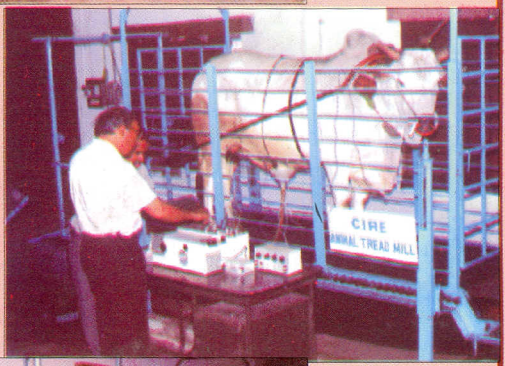
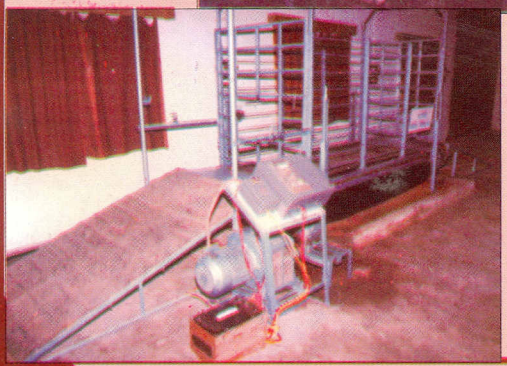
CIAE ANIMAL TREAD MILL

A SUCCESS STORY







CO-ORDINATING CELL

ALL INDIA CO-ORDINATED RESEARCH PROJECT ON
INCREASED UTILIZATION OF ANIMAL ENERGY
WITH ENHANCED SYSTEM EFFICIENCY

CENTRAL INSTITUTE OF AGRICULTURAL ENGINEERING
Nabi Bagh, Berasia Road, Bhopal - 462 038, India

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Extension Bulletin No. CIAE/UAE/2002/30

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Year	2002
Published by	CO-ORDINATING CELL ALL INDIA CO-ORDINATED RESEARCH PROJECT ON INCREASED UTILIZATION OF ANIMAL ENERGY WITH ENHANCED SYSTEM EFFICIENCY CENTRAL INSTITUTE OF AGRICULTURAL ENGINEERING, NABI BAGH, BERASIA ROAD, BHOPAL - 462 038, INDIA
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INTRODUCTION

Presently, we are not able to make optimum use of available draft power of animals due to lack of proper understanding and measurement technique for quantifying fatigue. In absence of this the animal neither properly loaded nor proper scheduling of their work and rest is done. Also indigenous scientific instruments were not available to assess work performance of animals in laboratory. As a result no authentic information was available for harnessing optimum power from working animals. Their work capacity and work rest schedule can be now scientifically worked out using CIAE animal tread mill under laboratory condition. To evolve standard techniques for quantifying degree of fatigue of draught animals based on their physiological and visual symptoms and to standardize measurement of fatigue symptoms using appropriate instrumentation, Central Institute of Agricultural Engineering, (CIAE) Bhopal has designed, developed and evaluated animal tread mill. With the help of animal tread mill, studies were conducted at CIAE, Bhopal on work output of draught animals under varying load and climatic conditions and scheduling work rest cycle for getting the optimum and maximum energy outputs from bullocks.

CIAE ANIMAL TREAD MILL

The treadmill basically consists of a portable frame, a conveyor belt, railings, transmission drive system, transport wheels inclination device for changing the work angle wheel and a loading device for the animals with suitable harnessing system and inclined platforms for loading and unloading the test animal in and out from the tread mill (Fig. 1).

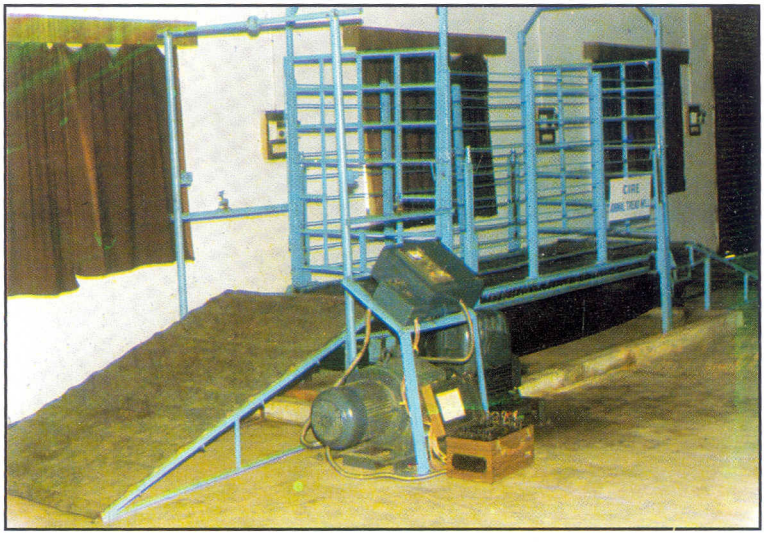


Fig. 1 : A view of CIAE animal tead mill

The speed of the treadmill can be adjusted in the range of 0-3.0 kmph and the draft load on the animals can be exerted from 0-15% of their body weight. In the extensive trials with treadmill, established that it was working very satisfactorily and maintenance of speed and load was very reliable. It is very useful and reliable equipment for laboratory studies.

SALIENT FEATURES OF TREAD MILL

It is an instrument to study the draftability and fatigue of animals at different loads and speeds in the laboratory.

It is run by a 5 kW variable speed motor through speed reduction unit. Speed of working of the animals on the treadmill can be adjusted between 0-3.0 kmph.

The loading on the animals is done using appropriate harnessing system and desired hanging weights.

The slope of the treadmill can be adjusted between 0-10° with respect to ground level.

Constructional details of animal treadmill

The CIAE animal treadmill basically consists of

i. A frame

ii. An endless conveyor belt supported on rollers and arrangements for tightening the belt

iii. Railings

iv. Transport cum inclination changing wheels

v. Mounting platform

vi. Harnessing and loading device

vii. Drive system

i. Frame

The main frame is made out of M.S. channel of 125 x62.5x10 mm size. Channels are fitted at both the ends upto a length of 130 mm to give proper support to two 300 mm dia rollers. Fifty three rollers of 35 mm inside dia and made of heavy duty M.S. pipe are mounted on this frame to give proper support to the conveyor belt. At both the ends of these rollers gun metal bushes are provided. Three tie rods are provided to keep the position of both channels at proper spacings.

At one end of the channel, an arrangement has been made to slide the bearing block of the driving rollers in and out. This arrangement helps in tightening the endless belt.

ii. Conveyor belt and roller support

The conveyor belt is of 3 ply endless rubber belt of 7.5 m length and 1.0 m width. It is supported on 53 rollers made of heavy duty 35 mm dia pipe. At both the ends of the pipe end plugs are provided which move in gun metal bushings.

Two 300 mm dia rollers are provided at both the ends of the frame. They are so fixed that top of all the rollers (small and big) are in the same plane to enable the conveyor belt to remain flat during use.

iii. Railings

To keep the animal on the conveyor belt, railings are provided on the main frame. The side railings are fixed to the frame, while front and rear railings are hinged and are openable to allow the animal to walk in or out from the conveyor belt. The height of the railings is kept as 1200 mm.

iv. Transport wheel device

To enable the treadmill to be shifted from one place to another, four transport wheels, two in the front and two in the rear are provided. Inclination changing transport wheels are fixed on a telescopic box section frame. The height of the conveyor belt with respect to ground level can be adjusted upto about 500 mm by moving the screw of the telescopic box section of transport wheel in or out. With the help of these screws the inclination of platform can be adjusted.

v. Mounting platform

On both the entries, the treadmill has a slanting removable platform to help the animal to comfortably climb up and down the treadmill (Fig. 2 & 3).

Fig. 2 : Bullock climbing on the tread mill

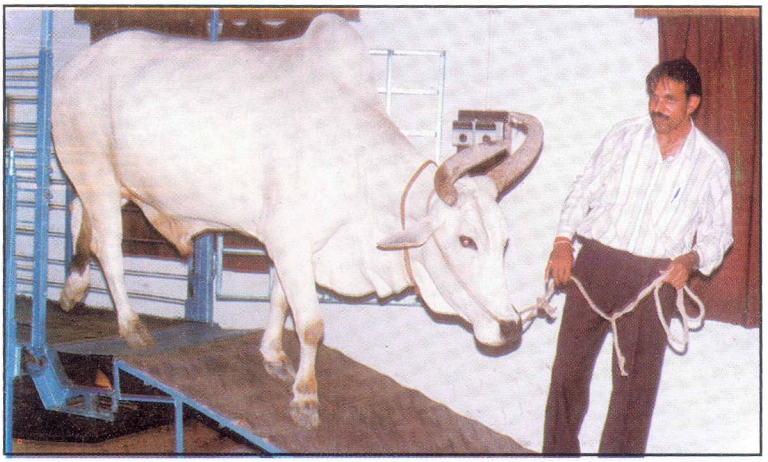


Fig. 3 : Bullock coming down from the tread mill

vi. Harnessing and loading device

Single animal harness with padded collar is provided for harnessing the animal (Fig. 4).

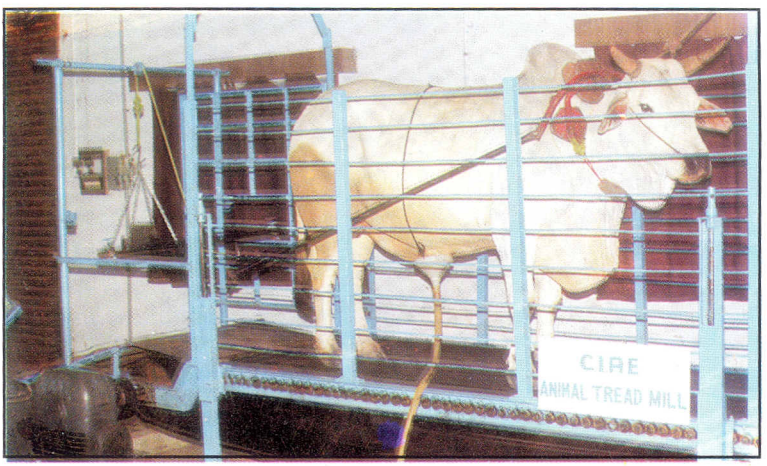


Fig. 4 : Bullock on the tread mill with single harnessing system

The harness is connected to the hanging weight type loading device with a U-shaped piped frame where loads could be placed.

For loading the animals, known weights are kept in a hanging pan hanged through a rope and pulley arrangement.

vii. Drive system

The drive to the treadmill is provided by a 5 kW variable speed motor with reduction unit (Fig. 5).

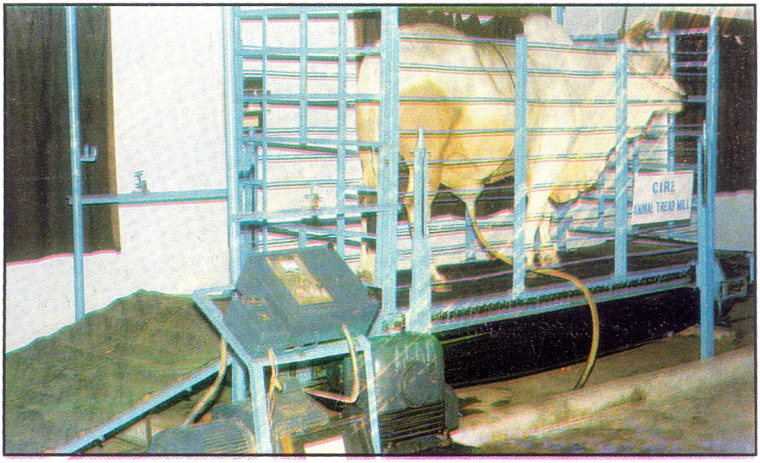


Fig. 5 : View of variable speed motor and reduction unit connected with the tread mill

PERFORMANCE AND TESTING

Testing of animal tread mill was done for its performance and trouble free working with load and no load conditions. No load power requirement was 1.75 kW and on load it was 2-2.2 kW. The animal was first allowed to climb on the tread mill and then the speed was regulated by the variable speed motor and the desired speed was maintained starting from zero. Four bullocks, two of Malvi breed and two of non-descript local breed were trained to walk on the treadmill. Later on, studies were conducted on whole day basis on these bullocks with and without load. The tread mill was calibrated before starting the experiment. A load cell of 500 kgf capacity and matching indicator was mounted between the hanging pan and rope connected to the

beam of the loading device. Draft load was varied from 0 to 6% of the body weight of animal by adding the known weights in the pan and pull values were recorded through load cell indicator (Fig. 6).

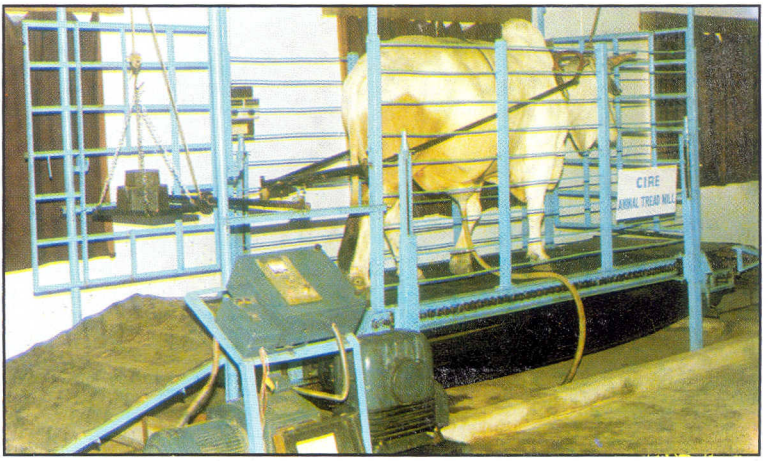


Fig. 6: Bullock loaded with known weights

The angle of the pull was measured by using abney level. A curve was plotted between weights and draft force.

Physiological parameters and visual distress symptoms were recorded at hourly intervals. Pulse rate was measured using a stethoscope, rectal temperature by using a clinical thermometer and respiration rate was measured by putting palm on the flank of the animal and counting breaths / min. Other fatigue parameters were observed visually. Upadhyay's fatigue score card was used for assessing the fatigue of the animals. Later on a 2-channel recorder named as "Student Physiograph" Data logger was used with sensors for recording the pulse rate, respiration rate and rectal temperature (Fig. 7 & 8).

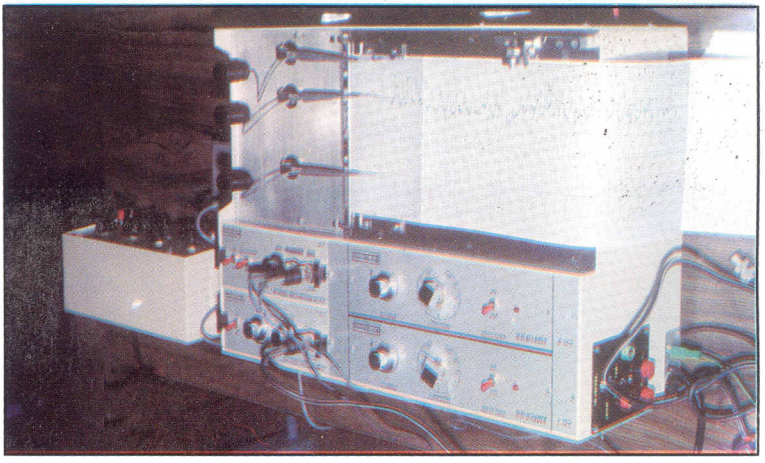


Fig. 7 : View of student physiograph

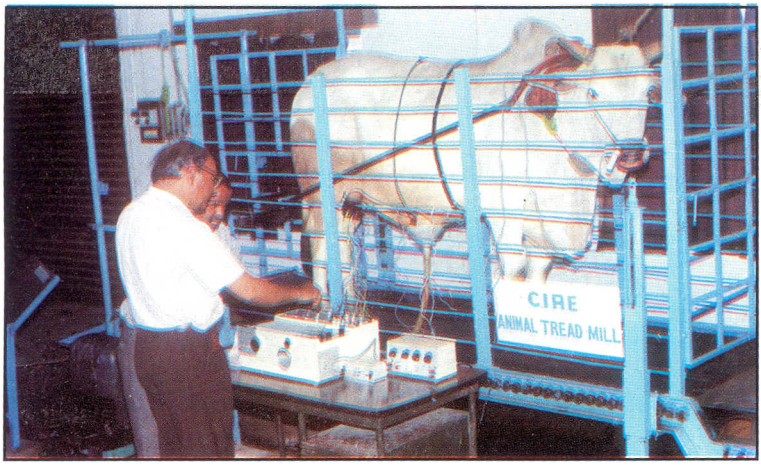
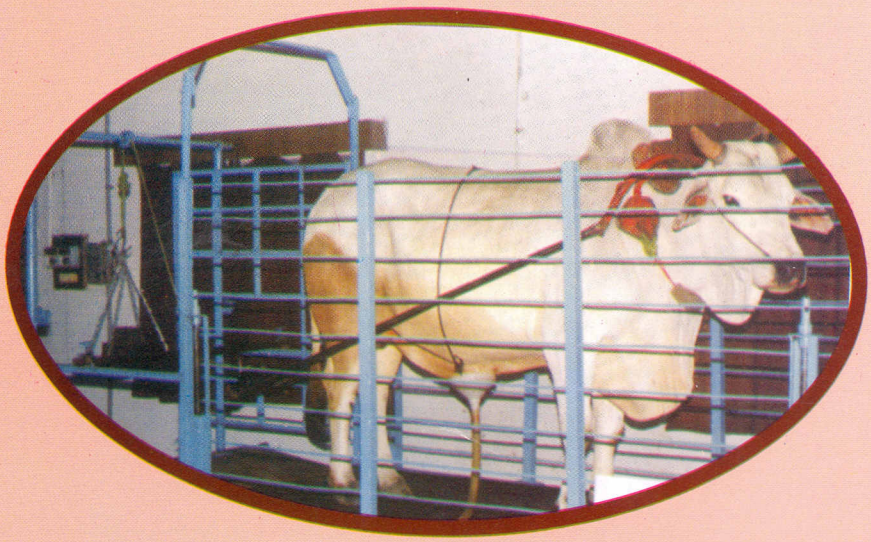


Fig. 8 : Recording by student physiograph

The complete system was tested and evaluated for its satisfactory performance and recording fatigue symptoms of animals at load and no load conditions. Tread mill harnessing and loading system was found very satisfactory.



Printed : Neo Printers : Ph. : 551558, 273558