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A study on bullock energy utilization through rotary mode power transmission system in operating potato peeler and slicer for chips making as value added product of potato

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ABSTRACT : Use of bullocks for agricultural work is limited to tillage, sowing and transportation. The total annual use of bullocks in the state of Odisha is less than 300 hours even though the annual potential use is nearly 800 hours. To enhance the utilization of bullocks, there is a need of using bullock power operated stationary machines requiring about 1 hp (0.8 kW) power for doing various post harvest operations in rotary mode like paddy threshing, paddy winnowing, chaff cutting, sugarcane crushing, groundnut decortications, oil expelling, pulse milling and dehusking etc. This would ultimately reduce the economic burden of maintaining bullocks. With this aim, a study was conducted during the year 2012 for operating a potato peeler and slicer with the help of the rotary gear complex, installed in the premises of College of Agricultural Engineering and Technology, OUAT, Bhubaneswar, Odisha. The experiments were conducted continuously for 3 hours (8 am-11 am) with the work rest cycle of 1hour work + 20 minutes rest + 1 hour work +30 minutes rest + 1 hour work. The measurement of physiological responses like respiration rate, heart rate, body temperature etc. of the small sized non-descript breed of bullocks (pair body weight of 450 kg) of Odisha were done at half an hour interval and calculation of the corresponding fatigue scores to know their comfortable working without inflicting any health hazards. The mean draft requirement of the potato peeler and slicer was found to be 7.70 % and 6.40 %, respectively in terms of percentage of body weight of the small size bullocks which were within their draftability. The highest fatigue scores during the operation of peeler and slicer were 18 and 17, respectively which were below the threshold fatigue score of 20. The output of potato peeler and slicer in rotary mode was observed to be 160 kg/h and 73 kg/h, respectively as against their corresponding values 200 kg/h and 100 kg/h in electrically operated motor and only 7 kg/h in manual peeling and slicing with the help of a knife. The operation of potato peeler and slicer through rotary mode was not found to be economical as compared to when operated with electric motor. Nevertheless, it was a meaningful utilization of animal power during the idle period in farm operations and to compensate the maintenance cost of the bullocks.

KEY WORDS : Bullock power, Potato peeler and slicer, Physiological responses of bullock, Fatigue score, Mechanical gear system, Rotary mode of operation

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