

DESIGN AND SUCCESSFUL DEMONSTRATION OF A PORTABLE CATTLE-CRUSH FOR ROUTINE HOOF TRIMMING

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ABSTRACT

Lameness associated with hoof diseases has a great economic impact on the dairy sector. Functional claw trimming is a scientific, repeatable method for maintaining physiological and biomechanical function of the bovine digit which can avoid the onset of lameness in cattle. This when carried out once or twice a year, is now regarded as an integral part of lameness management and control as well as claw health prophylaxis program. Modern claw trimming requires proper restraint systems for cattle. In India, till date there is no portable cattle crush designed for functional claw trimming of cattle. The present study demonstrates the successful designing and demonstration of a portable cattle-crush for routine hoof trimming in dairy cattle.

Key words: Hoof trimming, Cattle, Crush

INTRODUCTION

Bovine lameness has a great economic impact on the dairy industry, it is ranked as the third most important disease

after mastitis and reproduction disorders (Green *et al.*, 2002). The incidence of claw horn lesions associated with lameness is a major concern in managing modern intensive dairy herds. The resulting discomfort and pain were identified as an important animal welfare issue (Whay *et al.*, 2003). Webster *et al.* (2004) defined animal welfare as "Fit and feeling good", implying a capacity to sustain health and vigour throughout an animal's effective working life. The responsibility for animal welfare should imply more than simply a desire to minimise suffering but incorporate a concern for elements of positive welfare such as comfort, companionship and security (FAWC, 1993).

Functional claw trimming is a scientific, repeatable method for maintaining physiological and biomechanical function of the bovine digit which can avoid the onset of lameness in cattle, preventing claw horn lesions from evolving from a subclinical to the clinical stage (Toussaint-raven, 1989) and part of any lameness management and control as well as claw health prophylaxis

(Tol *et al.*, 2004). Functional claw trimming, carried out once or better twice a year according to the Dutch standard (Toussaint-raven, 1989), is now regarded as an integral program (Green *et al.*, 2002). Modern claw trimming requires proper restraint systems for cattle such as walk-in crush or tilt tables (Fiedler *et al.*, 2004). That is particularly important when grinding discs are applied, which are preferred by many veterinarians and professional claw trimmers as they work fast and effectively (Fiedler *et al.*, 2004). In India, till date there is no portable cattle crush designed for functional claw trimming of cattle. The traditional methods of restraining the cows without chutes did more damage to the cow and the operating personals.

MATERIALS AND METHODS

Measurement of the forelimb from hoof to the knee joint, height at withers, length from point of shoulder to pin bone, chest girth and width of the cow at the level of thirteenth thoracic vertebrae were taken and expressed in centimeters from six cross-breed cows to access the length and width of the cattle crush. A computerized model of the chute was designed using AutoCAD 2010 with the measurements taken from the cows. The cattle crush was designed using stainless steel square pipes of 306 L grade, with two gear systems to lift the forelimb and hind limbs. An abdominal belt was designed for the support of the animal

while inside the cattle crush and gear system was attached to the belt for the abdominal support. Separate facility was designed for restraining the front hooves and rear hooves and a trolley with a capacity to lift 500 kg was used for lifting the rear foot. Two wheels with hard rubber tyres were attached to the rear part of the crush in order to move it from one place to another place. The cattle trevis was used for performing functional claw trimming by two professional hoof trimmers with standard devices and techniques and the average time for the procedure in minutes and any complications noticed during the usage for the cows and any of the operating personal were studied.

RESULTS AND DISCUSSION

The mean \pm SE values of the measurement of forelimb from hoof to the knee joint was 32 ± 2.30 cm, height at withers was 124.33 ± 2.18 cm, length from point of shoulder to pin bone was 140.00 ± 2.12 cm, chest girth was 176.00 ± 4.87 cm and width of the cow at the level of thirteenth thoracic vertebrae was 62.00 ± 2.10 cm respectively. The portable cattle trevis weighed 210 kg, with an overall measurement of length 185 cm, width 80 cm and height 225 cm. It was designed with a facility to restrain the head of the cow and mechanism to free the cow once the procedure is over (Fig. 1). Separate mechanism was designed to restrain the forelimb of the cow and examine the front hooves of the cow. Abdominal belt with attached gear system was made for



Fig. 1 The portable cattle-crush



Fig. 2 The animal restrained in the cattle-crush and the entire weight of the animal was supported by the abdominal belt



Fig. 3 The hind limb of the animal lifted and fixed for functional claw trimming



Fig. 4 Functional claw trimming performed on the animal

transferring the entire weight of the cow on to the belt so that the cow can stand without weight bearing on its limbs and the limbs can be lifted and examined (Fig. 2). Separate mechanism was made for lifting the hind limbs with a facility to fix the hoofs and to avoid the backward kick of the animal during the procedure (Fig. 3). Functional claw trimming was performed on cows on both the hind limbs and forelimbs of the cows without any casualties to the cow and the trimmers (Fig. 4).

A study on the effects of disease on milk production, reported a milk loss in cows with foot disorders, which varied between 1.5 and 2.8 kg per day during the first two weeks after lameness was diagnosed (Rajala-Schultz *et al.*, 1999). Hernandez *et al.* (2002) found approximately 10 % decrease in mean milk production in 167 lame cows from a total of 531 lactating cows during the 305 day period. The significant impact on milk yield reduction of clinically lame cows was estimated at 357 kg per 305 day lactation and

in these lame cows milk yield was reduced from up to 4 months before lameness was diagnosed (Green *et al.*, 2002).

Functional claw trimming normally is a safe and preventive procedure for hoof associated lameness in cattle, but injuries can be caused during this procedure by claw trimmers, due to evasive movements of the animals and injury to muscles, when too much time is needed for paring off the claws. Furthermore, animals can potentially sustain injuries on the way to the trimming chute, especially when improper restraining techniques are used and on the way from the chute to the barn (Kofler, 2001). The claw trimming procedure itself contains many possibilities to induce stress reactions in cows: an interruption of the daily routine, the handling of the cattle in the immediate pre-trimming phase, the restraint procedure and the claw trimming itself with optical, acoustical, tactile and mechanical disturbances (Stanek *et al.*, 1998).

Higher proportion of veterinary surgeons considered both preventive foot trimming and treating claw lesions to be potentially painful and stressful to the animals and cause physical stress to themselves. This perception might have been conceived due to the fact that the veterinary surgeons relied on field level facilities only and probably the use of local anaesthesia and casting techniques to restrain the cattle while

attending to their feet. Many farms in India however, lack the special facilities designed to restrain lame cows for claw trimming. On the other hand, professional claw trimmers used their own specifically designed equipment to restrain cattle effectively during claw care (O'callaghan Lowe *et al.*, 2004). In the present study a new walk - in type crush was successfully designed and its farm level utility was assessed and the cows experienced minimum struggling and there were no physical injuries to the veterinarians. Well-designed restraining devices had the potential to reduce stress experienced by the cow (Grandin, 1998). The animal must be held tightly enough to provide a feeling of restraint, while avoiding pain caused by excessive restraining. Restraint can be a very strong source of stress. In this study, the time needed for the complete claw trimming procedure was 20 ± 1.40 min. Therefore, functional claw trimming, performed 2 times a year should be strongly recommended to the farmers as an integral part of any dairy herd management and control program. In order to minimize stress reactions, claw trimming must be done carefully and quickly, and in a suitable environment with proper and safe restraining.

SUMMARY

Cows have to be restrained safely and correctly using specifically designed and certified cattle crushes for stress free and safe hoof trimming.

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