



LRST model movable trevis: A novel method to restrain cattle in barns

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Adequate restraining of animals is essential to perform any type of examination, viz. various management operations, artificial insemination, administration of drugs, surgical interventions and application of modern diagnostic equipment like ultrasound scanner (Grandin 1995a). Various restraining techniques are in use depending upon the species, the temperament of the animal, duration and purpose of restraining and management situation (Grandin 1998a, Troxel and Gadberry 2014). Restraining of large animals in standing position is usually carried out in metallic cages called chute/trevis and are usually seen as an essential facility constructed in farms and hospitals wherein a large number of animals are routinely being handled (Grandin 1997). Various modifications of the trevis are made depending upon the purpose and number of animals to be handled at a time (Grandin 1998 a).

Trevis (chutes) of different sizes are usually constructed for animal handling, as fixed structures at convenient locations and mostly outside the barns (Grandin 1995b, Smith 2002). However, procedures involving repeated handling of more number of animals make it difficult and stressful to take away the animals into restraining facilities (Grandin 1998b, Price 1987). Routine activities like dressing of wounds, gynaecological examination, insemination and advanced operations like ultrasound scanning for reproductive management and research purposes necessitate frequent restraining and controlling animals *in situ* at the standing space within the barns (Grandin 1998a, Kasimanickam *et al.* 2014).

As a part of an ongoing research project on impact of thermal stress on fertility of cows, involving weekly scanning, blood collection and other observations on numerous cows extended over a period of one year, necessitated almost daily restraining of animals *in situ* within the barns. Reducing handling stress has been found to improve the efficiency of interventions and welfare of the animals (Grandin 1998b, Lima *et al.* 2018). Hence the

idea of fabricating a suitable device was initiated and the efforts were organized with the objective of developing a movable trevis for convenience of restraining operations inside the barns.

The study was carried out at the dairy farm of Livestock Research Station, Thiruvazhamkunnu under Kerala Veterinary and Animal Sciences University. As per the objective, a preliminary structure of movable trevis was constructed by modifying and fitting wheels for the conventional stationary trevis and was put to operational trials. The final device developed through step by step improvements was designated by name of the research station as “LRST model movable trevis” and is being used routinely for restraining cows.

The trevis was made of GI (galvanized Iron) pipes (Fig. 1.) having dimensions (10 G × 2 inch diameter) for adequate weight and strength. The pipes were fixed together by welding into a rectangular frame of sufficient space for enclosing a crossbred cow (120 × 70 × 100 × 80 cm as length, width, front side height and rear side height respectively). The GI pipe pieces intended for the rear side were joined together in the shape of a ladder and those forming sides of the trevis were fixed on to the ladder at 90 degree angle. The front side was left open to appear ‘U’ shape upon viewing from the top. Corners of both the rear side GI pipes were reinforced by fixing additional pipe pieces at a suitable angle as shown in Fig.1.

The trevis was fitted on two pairs of strong wheels with diameters of 8 inches and 4 inches for front and rear wheels respectively. The rear wheels were revolving type and provided with brake facility. The anterior top portion of the trevis was provided with metal chains of 80 cm each on either side and backward directed hooks were also provided on the sides. These chains were intended for fastening the trevis onto neck rail of the manger after positioning around the animal. Provisions were also made for inserting a metal pipe across the anterior portion of the trevis through rings/ loops to prevent forward movement of smaller sized cows and heifers

The trevis was provided with a removable platform/tray having a flat surface of 40 × 45 cm and side ridges of 5 cm all around for keeping the ultrasound scanner. The platform was arranged by cutting the floor of a wheel barrow and

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Fig. 1. LRST model movable trevis.

was fixed at one end of a metal pipe (1.5 inch diameter and 80 cm length) working as a handle for the platform (Fig. 2). The handle pipe was bent downwards from its middle so that the free end was at an angle of around 60 degree with the platform. The free end of the platform handle was intended for inserting into either of the vertical pipes forming rear corners of the trevis. An additional tray was also provided below the main tray for keeping various accessories during the operations. The trevis was used for routine restraining operations.

The preliminary structure of the movable trevis was subjected to step by step improvisation and the final device "LRST model movable trevis" was found to be very convenient for routine restraining of cows at their respective standing space within the barns. Total weight of the trevis was 45 kg excluding the detachable platform. Requisite weight of the trevis is essential for stability especially while mounting the scanner platform as well as the costly equipments kept on it. The scanner platform and the ultrasound machine in use weighed 7 and 8 kg respectively. Thus putting 15 kg additional weight on one corner of the trevis necessitate sufficient weight of the trevis and firm fixation for better stability and safety of the equipments, personnel and the animals. Trevis weighing 45 kg fixed with the neck rail using securing chains had desired strength for restraining of cattle and smooth functioning alongside of the trevis.



Fig. 2. Platform for the scanner.

Rolling on wheels and possibility of changing the direction of movement facilitated by revolving type rear wheels made routine handling and operation of the trevis very convenient for workers including woman. Positioning of the scanner platform in front of the examiner at the eye level and easily rotatable mounting of the same makes scanning operation very convenient and efficient. Direction and position of the scanner could be adjusted and fixed at the required place tightening the screw provided for ensuring better vision onto the monitor. The height of the platform was fixed at a level above the height of cows for safety and to keep the scanner at a convenient position for handling and better vision

Operation: After ensuring desirable direction of the animal to be restrained in standing position, the trevis on wheels was pushed from behind to enclose the animal (Fig. 3). The securing metal chains were taken around the neck rail and hooked to restrict the movement of the trevis. Pressing the brakes on the rear wheels also helped to restrict movements of the trevis. Fixation on to the manger helped to prevent forward movement of the cows. But, whenever required, insertion of the metal pipe through either of the two sets of loops provided on the anterior part of the trevis can provide additional barrier to restrict the length of the trevis for smaller sized animals.

The scanner platform was attached to the trevis by inserting the nearly L shaped pipe into one of the vertical pipes at the rear corner and the direction of the platform was fixed by tightening the screw. Ultrasound scanner was then placed onto the platform and put to operation (Fig. 4). The direction of the scanner and angle of the monitor were adjusted as and when required to regulate the vision and convenience of operation. The tray provided beneath the platform could be used for keeping the probe and other accessories. After completion of scanning, the scanner was removed and even the scanner platform was detached for easier removal of the trevis and better stability while moving and placing on to another animal.

Advantages

- Movable trevis on wheels can be conveniently placed



Fig. 3. Cow restrained inside the trevis.



Fig. 4. Scanning operation in the trevis.

anywhere and brought for use wherever required within the barn.

- Easier restraining of the animal is made possible by bringing the trevis to the standing space of the animal for minimizing the disturbances.
- Avoids stress and resistance of the animal caused by taking into a conventional fixed trevis, which is often constructed outside the barn (Grandin 1998 b).
- Minimum number of helpers and less efforts are required especially when more number of animals in the same barn are to be restrained.
- Permits prolonged examination since the animal is retained in its original position and less disturbed than taking away to outside chutes (Grandin 1995a).
- Very convenient for the examiner since the scanner is located at eye level of the examiner and facilitates better vision since the monitor is placed in front.
- Facilitate more efficient scanning since positioning of the scanner is very convenient and even permits prolonged examination.
- Ensures better cleanliness of the machine avoiding chances for spillage of dung, urine or dirty water on to the scanner.
- Ensures better safety for the costly equipment from the movement around the same or nearby animals and less chance of falling down.
- Highly useful for research requiring frequent scanning with infliction of minimum stress during the examination.

Points for better use

- Need to make the movable trevis incorporate changes as per local requirements.
- Careful handling and routine maintenance required than stationary trevis.
- First one or two instances of placing the movable trevis may cause excitement of some animals necessitating more attention for placing the scanner.
- Scanning platform and scanner need to be removed during replacement of trevis from one place to another

for better stability, safety of the machine and convenience of replacing.

- The positioning of the scanner at a height above the animal makes it difficult to operate by some operators.

Movable trevis was found to have remarkable benefits against minor disadvantage as it is very useful for scanning and other operations with minimum stress to the animal, comfortable for the examiner, trouble-free for the helpers, ensures better safety and cleanliness of the machine, time-saving and facilitates more effective diagnostic intervention. Hence the LRST model movable trevis can be adopted with minor modifications to suit the nature and requirements of individual farms, for convenient handling, time-consuming treatments and trans-rectal ultrasound scanning of large ruminants.

SUMMARY

Appropriate and humane method of restraining the animals is essential to perform any type of clinical examination especially during the use of modern diagnostic equipments like ultrasound scanner. Procedures involving repeated screening of more number of animals make it difficult to move them for restraining in fixed facilities like chute/trevis outside the barn. The ongoing research project on impact of thermal stress on fertility of cows involve ultrasound scanning, blood collection and other observations on many cows almost every day over a period of one year and necessitate repeated restraining. Hence, the idea of fabricating a convenient movable trevis to restrain cows within the barns was initiated and the final device developed through step by step improvisation was named as LRST model trevis. The trevis could be rolled within the barn to enclose the animal in its standing space and was fixed *in situ* using the facilities provided. The removable metal tray was used for placing the ultrasound scanner/other equipments in a safe and convenient position. The trevis on wheels was found to be very useful for trans-rectal ultrasound scanning and other procedures as it causes minimum stress to the animal, comfortable for the examiner, trouble free for the helpers, ensures safety and cleanliness of the machine, time saving and facilitates more effective diagnostic intervention. Hence, the LRST model movable trevis can be adopted with minor changes to suit individual farms for convenient handling and clinical examination especially ultrasound scanning of large ruminants within the barns.

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