

## Technical Note: A total urine collection apparatus for female bison and cattle

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### Abstract

A urinary collection device is described for use in metabolism studies on female bison (*Bison bison*) and cattle. Separating urine from feces, and collecting all urine produced by female animals in metabolism stalls present difficulties. Catheters are usually used on animals in confinement, but often with varying degrees of success. Thus, an external device designed to divert urine into collection receptacles was developed. The urine collection apparatus was used successfully in six 8-day metabolism trials conducted during 1991 and 1992.

**Key Words:** *Bison bison*, *Bos taurus*, metabolism studies

Metabolism studies with ruminants are an important method for determining physiological responses of animals to changes in a variety of environmental stimuli such as, ambient temperature, energy and nutrient levels, and water availability. These studies usually require the measurement of feed offered, and the separation and quantification of urine and feces produced by individual animals. However, total collections of urine and feces are difficult to achieve from females; the proximity of the meatus urinatus and ischio-rectal region causes cross-contamination of samples. Consequently, metabolism studies often use male subjects because of the obvious ease of separating and collecting urine and feces.

If total urine collections from female ruminants are required, the technique most often employed is bladder catheterization. However, catheters present unique problems such as their difficulty of insertion, secondary bacterial infections, and often substantial urine loss.

An apparatus for separating urine and feces from female cattle

and bison was developed. This urine collection apparatus was modeled after the urine deflector flap developed for fecal collection bags by Kartchner and Rittenhouse (1979). Unlike the urine deflector flap, however, this apparatus was also designed to collect urine.

### Materials and Methods

Urine collection devices were used on 3 Hereford cattle and 3 American bison in six 8-day metabolism trials. The urine collection apparatus was constructed of a 2,000 ml center entry, closed system urinary drainage bag<sup>1</sup>, a 500-mm x 250-m strip of burlap, and a 1.2 m length of 7.6 mm inside diameter plastic tubing. The top of the bag was cut open, and the edges around the opening were sewn to the burlap strip using cotton thread in a zigzag pattern. The bag was oriented perpendicular to the burlap, and centered horizontally on the long axis of the burlap (Fig. 1). The edge along the opening of the bag was sewn about 25 mm from the edge of the burlap. An opening to the bag was cut through the burlap in roughly the size and shape of the vulva.

The apparatus was attached to an animal in a squeeze chute. A hypoallergenic biological adhesive<sup>2</sup> was applied to the burlap strip and to the animal; care was taken when applying glue in the area around the vulva, especially below the anus. The apparatus was first attached to the animal around the vulva, and then out around the tuber ischiadica (e.g., the pins).

After 2 to 3 minutes the apparatus was securely bonded, and the animal was placed in a metabolism crate. Once confined, the plastic tubing was connected to the drainage valve at the base of the bag and secured with a number 1-size hose clamp. The end of the tube was placed in a collection bucket outside the crate (Fig. 2). The length and position of this tube were modified for each animal to minimize the possibility of the tube becoming entangled in the animal's legs.

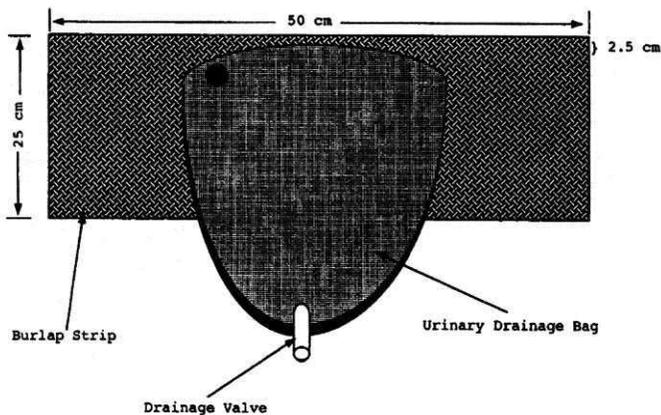
After the first 8-day trial was completed, only the drainage bag

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<sup>1</sup>Order #153504, C.R. Bard, Inc., Bard Urinological Div., 8195 Industrial Blvd., Covington, Ga. 30209.

<sup>2</sup>K-mar Inc., Box 773838, Steamboat Springs, Colo. 80477.



**Fig. 1.** Urinary collection bag developed for use on female bison and cattle.

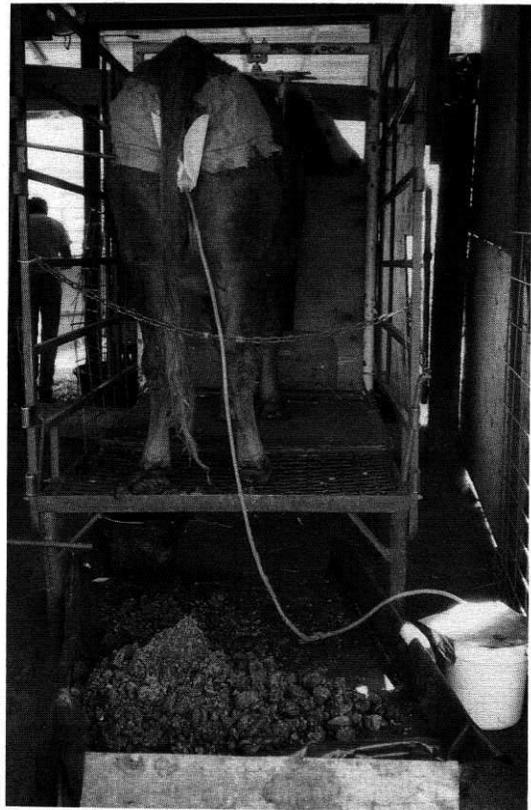
portion of the apparatus was removed, while the strips of burlap were left attached to the animal. This was accomplished by cutting the polypropylene drainage bag with scissors where it was sewn to the burlap. Any free edges of burlap were then trimmed back to the point where it was securely bound to the animal. This allowed animals to urinate freely during the 14-day adaptation periods that preceded each of the subsequent 8-day trials.

Attachment of apparatuses during the second and third trials was similar to the first. However, because the burlap strips of previous apparatuses were still attached over the tuber ischiadica, the next apparatus was glued directly to this burlap. On completion of the last trial, the drainage bag portion of the apparatus was once again removed, and the burlap strips were left in place until they fell off the animals unassisted.

### Discussion

Careful application of the urine apparatus resulted in little or no sample loss during the 8-day trials. The most important stage during application was placement of the apparatus around the vulva. The adhesive was developed to bond materials to animal hair; subsequently, the burlap bound tightly to the hair of the hind quarters. However, little hair exists in the area around the anus and vulva. Thus, it was necessary to adequately work the adhesive into the burlap, and the fine hair around the vulva for a sufficient bond to occur. Also, care was needed to prevent the adhesive from getting on the vulva itself, or inside the bag. This sometimes interfered with the normal discharge of urine, and ultimately caused malfunction of the apparatus.

We did experience a problem with using the apparatus on cattle that we did not have with bison. The protruding tuber ischiadica of cattle resulted in a concave surface in the area between these 2 skeletal projections. Thus, if the burlap was stretched out around the tuber ischiadica, it would cause the apparatus to lift away from the animal in the region of the vulva. We prevented this from occurring by following the contour of the body when gluing the burlap, rather than stretching it out over the tuber ischiadica. However, sometimes the bags did loosen in the region of the vulva towards the end of the 8-day trial. Usually, bags could easily be repaired by carefully gluing the loosened area. On 2 occasions, though, enough of the burlap had become detached that we



**Fig. 2.** Complete urinary collection apparatus used on female bison and cattle during metabolism studies.

chose to remove the drainage bag portion of the apparatus and attach another. The docile behavior of cattle and their confinement allowed us to easily accomplish this task in the metabolism crates.

Removal of only the drainage bag portion of the apparatus between trials, allowed the animals to urinate freely without causing stress by attempting to remove burlap that was bound intimately with hair. Animals did not exhibit any distress beyond that expected during routine handling, and the apparatus did not appear to adversely influence their behavior once in place.

### Conclusions

We found the urine collection apparatus to be an effective means for collecting total urine samples from female bison and cattle during metabolism studies. Additionally, the simple construction and application of the apparatus made it easy to use and did not result in additional stress or infection to our study animals. Therefore, we considered it an improved alternative to catheters in our studies requiring urine collections from female animals.

### Literature Cited

- Kartchner, R. J., and L. R. Rittenhouse. 1979. A feces-urine separator for making total fecal collections from the female bovine. *J. Range. Manage.* 32:404-405.