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Short communication

Nasoruminal endoscopy of the rumen and reticulum in buffaloes (*Bubalus bubalis*) – a preliminary study

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Abstract

Twenty apparently healthy buffaloes were withdrawn of feed and water for 48 hours. Buffaloes were administered with fluids and were subjected to endoscopy every 12 hours. Olympus™ [GIF V70] flexible video endoscope was passed through the ventral nasal meatus, the pharynx, oesophagus and then into the reticulo-rumen in physically restrained buffaloes. The entire reticulum and part of the rumen could be visualized, when the animals were off feed and water for at least 48 hours and evacuations of rumen contents were done even after 48 hours of starvation to visualize the rumen in six buffaloes. The reticulum appeared light brown to pink coloured with honeycomb shape and the rumen appeared smooth, shiny pink, with numerous papillae throughout its surface. The procedure was well tolerated by all the buffaloes and satisfactory reticular and ruminal images could be obtained including biopsy.

Key words: biopsy, buffaloes, endoscopy, reticulum, rumen

Introduction

Endoscopy is a promising tool to directly visualize the mucosal surface of the lumen and orifices in natural and colour-authentic way. Based on the literatures reviewed, endoscopic evaluation of rumen and reticulum in buffaloes has not been reported yet. The objectives of this study were: to standardize the reticuloscopic and ruminoscopic imaging techniques via nasoruminal route, to visualize the interior morphological structures of the rumen and reticulum and to validate the utility of endoscopy for collection of biopsy from the rumen and reticulum in buffaloes.

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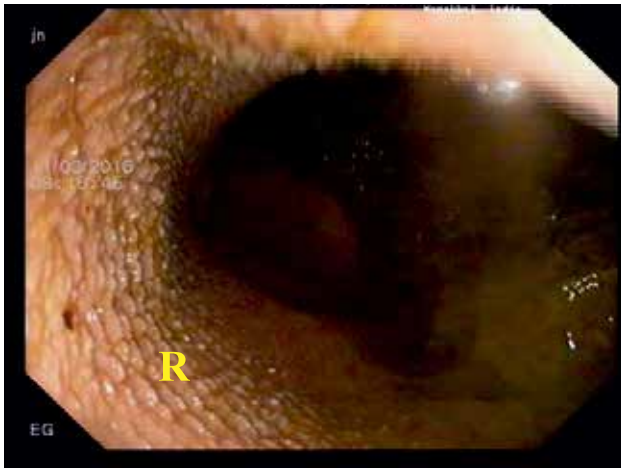

Fig. 1. Endoscopic imaging of reticulum (R)

Fig. 2. Endoscopic imaging of rumen (R)

Materials and Methods

Twenty apparently healthy female Graded Murrah buffaloes brought to Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal, for routine checkup and deworming during 2014-2016 period were subjected for endoscopic evaluation of reticulum and rumen. All the animals were non – pregnant, weighed 250-400 kilograms and were approximately 4 to 4 ½ years old. Buffaloes were reared in the households by farmers and free access to roughage and water was given to all. All the animals were withdrawn of feed and water for 48 hours and in some animals the ingesta were removed by lavage by using extraction pump. During this period, buffaloes were administered with dextrose normal saline and Ringer's lactate (@10 ml/kg IV twice daily) and were subjected to endoscopy every 12 hours. Reticuloscopic and rumenoscopic procedures were performed using flexible video endoscope (Olympus™ GIF V70; Olympus Corporation, Japan) with a usable length of 150 cm and a diameter of 8 mm with working channel diameter of 4 mm for passing the biopsy forceps. The distal tip of the endoscope had two plane deflections (upward 180° and downwards 100°) for successful navigation. The instrument was equipped with a halogen light source, an irrigation system, an insufflation system and recording devices. By using physical methods all the animals were restrained in a chute without any sedation. The endoscope was passed into the reticulo-rumen as described by Sasikala et al. (2019). Through the working channel of the video endoscope single-use biopsy forceps (Olympus Corporation, Japan) were passed and the tissue samples were collected in all the animals and stored in 10% formalin as described by Bancroft and Gamble (2008) for histology.

Results and Discussion

Ororuminal endoscopy using a mouth gag had been infrequently performed because of the risk of damage to the instrument (Constable et al. 2017). In the present study the flexible video endoscope was passed through the ventral nasal meatus up to the pharynx and then into the oesophagus and reticulo-rumen. On day one, both rumen and reticulum were filled with contents and mucosa could not be visualized during endoscopy. After 12 hours of starvation, reticulum near the cardia region was visualized and the rest was filled with feed materials. The entire reticulum and part of the rumen could be visualized clearly only when the animals were off feed and water for a period of 48 hours with maintenance of animals under fluid therapy. Endoscopy of reticulo-rumen via nasal route, followed by starving the animal for 36-48 hours, seemed to be rapid, non-invasive, well tolerated procedure without any complication and required no sedation (Sasikala et al. 2017, Sasikala et al. 2019). Franz et al. (2006) failed to visualize the reticulum during endoscopy in ruminating calves. However, in this study in buffaloes, the reticulum and rumen were visualized following 36 and 48 hours of starvation, respectively and maintenance with fluid therapy was in concurrence with Sasikala et al. (2017) and Sasikala et al. (2019).

The reticular mucosa appeared smooth and shiny with honeycomb shape and light brown to pink in colour (Fig. 1). In six buffaloes visualization of rumen was not possible even after 48 hours of starvation because of abundant rumen contents. Flushing and siphoning of rumen by orally introduced stomach tube emptied the rumen content and enhanced the visualization of rumen in the present study was as suggested by Sasikala et al. (2019). The dorsal sac of rumen had appeared pink, smooth and shiny with numerous papil-

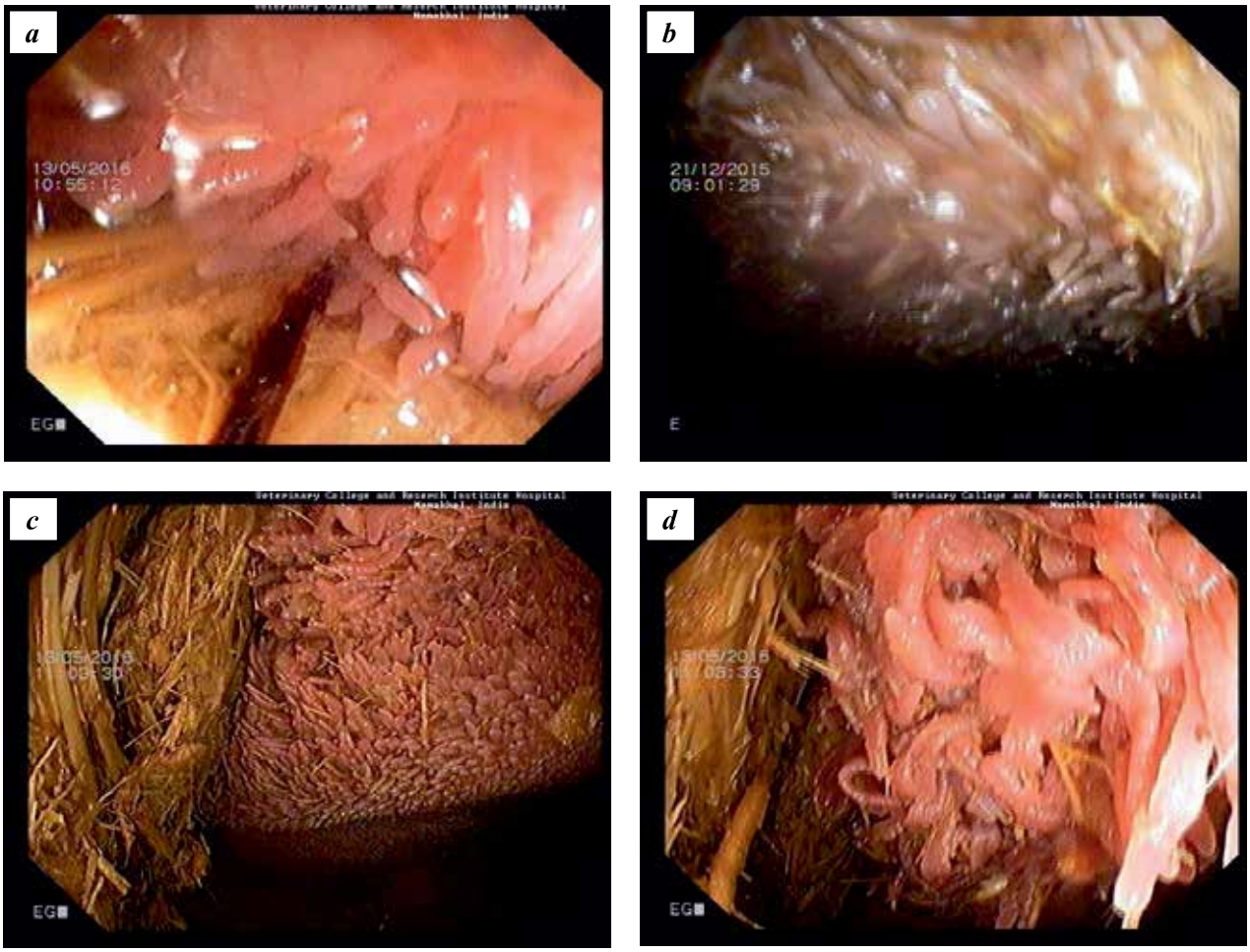

Fig. 3. Endoscopic imaging of various shapes of rumen papillae in buffaloes, a - Pointed smooth papillae, b - tennis bat-shaped papillae, c - leaf-shaped flat papillae, d - thread-like long papillae

lae throughout its surface (Fig. 2). By passing the endoscope tip further caudally, the coronary pillars were visualized only in six animals. Reticular contractions and gushing of fluid with feed content into the rumen were observed in all the animals. Reticulo-omasal orifice could not be visualized in any of the animals through nasoruminal endoscopy in the present study was in concurrence with Franz et al. (2006). The shapes of the rumen papillae varied in different buffaloes during ruminoscopic procedures (Fig. 3). The various shapes of papillae included pointed smooth papillae (Fig. 3a), tennis bat-shaped papillae (Fig. 3b), leaf-shaped flat papillae (Fig. 3c) and thread-like long papillae (Fig. 3d). Various shapes of rumen papillae observed in the present study were in accordance with Sasikala et al. (2019).

On histological examination, endoscopic guided biopsy of reticulum revealed prominent muscularis mucosae in the upper segment of the long fold and the rumen showed complete short papillae without muscularis mucosae which were similar to those described by Bacha and Bacha (2000). Sufficient endoscopic guided biopsy samples collected from reticulum (Sasikala et al. 2017) and rumen (Sasikala et al. 2019) of normal healthy cattle were in contrary to Van Niekerk et al. (2018) where they failed 85% of the time to collect endoscopic biopsies of the rumen with endoscopic biopsy forceps.

Nasoruminal endoscopy was found to be safe, innocuous and well tolerated by all the buffaloes without any special preparation or sedation and satisfactory imaging could be obtained including biopsy in the present study was in concurrence with McRae et al. (2016). In our study, the length of the endoscope used was 150 cm which was not sufficient to examine the entire rumen in adult buffaloes. Abundant rumen contents were also found to be a major setback in complete visualization of rumen in healthy buffaloes.

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