the most consistent results. Mansmann and Knight have described a technique used successfully on over 100 cases of respiratory tract disease in the equine. No serious complications have occurred. Creighton and Wilkins have described a technique in dogs with no untoward reactions.

The identification of the causative agent or agents in respiratory disease allows the clinician to perform antibiotic sensitivity testing and subsequent indicated antimicrobial therapy. More importantly, prognostication is much more acute by knowing the agents involved in the disease process.

My practice tip describes a technique of sampling the lower respiratory tract of the bovine animal, whether it be an adult or neonate.

Materials: Sterile saline, sterile syringe, 12 cc for calves, 35 cc for adults; polypropylene catheter[1] 5 fr. 55 cm in length; indwelling catheter[2], 14 ga., 5 cm in length; sterile B-P scalpel blade.

Site: The ventral cervical area where the trachea is most easily palpated percutaneously is the site of the aspiration. This is most generally in the middle one-third of the neck, slightly lateral to the midline.

Preparation: Routine clipping of the hair and surgical preparation of 10x10 cm area over the site.

Restraint and Anesthesia: Locally infiltrate down to the trachea with 3 to 5 cc of 2% Xylocaine. With the adult bovine, a rope halter or nose tongs with the head pulled to the left places the trachea in close proximity with the skin. In calves, an assistant holding the calf is sufficient.

Procedure: With a B-P blade make a 1 to 2 cm stab incision over the trachea and through the subcutaneous tissue. Thrust the 14 ga. indwelling catheter between two tracheal rings into the lumen of the trachea with the point of the needle down the tracheal lumen towards the thoracic inlet. Withdraw the needle from the catheter and feed the polypropylene catheter down the indwelling catheter into the tracheal lumen. Some of the indwelling catheters have a very narrow tip that may require removal prior to the passing of the catheter. This is eaily done with a scalpel blade or scissors. As soon as the cough reflex is stimulated, attach syringe (with saline) to the catheter. The greatest amount of aspirate is obtained during a cough, so apply suction as the animal coughs. Inject 2 to 5 cc (depending on the size of animal), then aspirate. Air will build up in the syringe and should be disconnected and expelled, then reconnected and the aspiration continued. The total amount of material aspirated will vary from 1/2 to 5 cc. Remove the polypropylene catheter, then the indwelling catheter. I routinely place one horizontal mattress suture in the skin.

[1]Polypropylene catheter, Sovereign®, 5 fr. 55 cm mfd. by Sherwood Medical Industries, St. Louis, Mo.

[2]Indwelling catheter, Sovereign®, large animal 14 ga. catheter with 16 ga. needle, 5 cm long, Sherwood Medical Industries, St. Louis, Mo.

[3]Minimum Essential Medium, Grand Island Biological Company, Oakland, Ca.

Complications: Subcutaneous emphysema may occur in young active animals but this has been a minor problem never requiring treatment.

Culture of Samples: The sample can be directly plated onto blood agar, or frozen for mycoplasma or viral isolation. Viral culture medium[3] has been used in horses with no adverse effects. I have not used this material. Cytological exam can be done by placing mucous strands and cells on a glass slide and doing an impression smear using Wright's stain.

Conclusion: I have utilized other materials, such as 9 ga. bleeding trochars with stiff polyethylene tubing (such as found in the innermost tube of a Teigland swab). However, I have found more swelling and trauma to the trachea using these materials. A 14 ga. hypodermic needle can also be used but there is always the chance of the sharp needle cutting off the plastic catheter, a most drastic complication.

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Correction of Umbilical Hernia in Calves

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Despite questions concerning the genetic implication and herd value, practitioners are often asked to repair umbilical hernias in heifer calves. The calf, having the umbilicus positioned at the most ventral aspect of a pendulous abdomen, is predisposed to umbilical hernia. Instead of the conventional surgical technique, I have been using a porous elastic adhesive bandage (Elastoplast) to facilitate natural closure of the umbilical ring.

The umbilical ring will vary from one to three fingers (2 to 9 cm) in diameter, and the hernia must be completely reducible; otherwise, the conventional surgical method must be used. Ideally, the bandage should be applied at 6 to 12 weeks of age.

The calf is simply tied with a halter and remains in the standing position. The surgeon returns the hernia to the abdominal cavity without difficulty and with the aid of an assistant the bandage is applied snugly to the abdomen. The first wrap of bandage is applied directly over the hernia, with successive overlapping wraps being applied cranial and caudal to the hernia. A safety pin is used to secure the end of the bandage.

The owner is instructed to watch the bandage for bunching. The elastic adhesive bandage is removed three to four weeks after application by cutting it with scissors along the calf's back and stripping it down both sides of the abdomen.

The method has been successfully used for umbilical hernias of numerous calves, one colt, and one

farm pup. The technique is fast, simple and inexpensive. The perils of surgical intervention are avoided. Correction of umbilical hernias in calves using porous elastic adhesive bandage is worth considering as an alternative to more involved and time-consuming conventional surgery.

Elastoplast - No. 1004, 4 inch (10 cm) width, 160-200 inches (4-5 m) length, Smith & Nephew, Ltd., Lachine, Quebec, Canada.

The Roughage Factor in Hay Cubes

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This practice tip, which comes from the West, is to caution you that hay cubes may not provide an adequate roughage factor. Cubing hay instead of baling it has become a common practice. Hay cubes can be completely machine-handled and readily incorporated into complete rations. It has furthermore been claimed that there is less wastage with cubed hay than with baled hay. When baled hay is fed, the lignin stems are often left in the manger. When the same hay is cubed, those stems are consumed by the cow, making their way through the digestive tract but ending up in the gutter in about the same form they went in at the front end.

About four years ago, when Carnation Farms first fed alfalfa hay cubes as the sole source of roughage, the incidence of displaced abomasum increased. Before dietary changes were made there were, in addition, several cases of abomasal ulcers, one of which perforated, resulting in generalized peritonitis. During routine fertility work I observed that the manure felt rough; bowel tracts were easily irritated upon rectal examination.

When baled grass-hay manure is compared to cubed hay manure, many short stems can be seen in the cubed hay but not in the grass-hay manure.

Researchers have shown that providing adequate roughage means the diet must contain 16 to 17% fiber. In addition, that roughage must be in a form of one inch or longer. Hay cubes, in dimension, are over one inch in cross section. Stems, however, break up into pieces shorter than one inch in the cubing process. When hay cubes are soaked apart with water, one can readily see the short lignin stems.

Following my initial observation of increased digestive disorders associated with cubed-hay feeding, I had the opportunity to participate in a study with Washington State University at the Puyallup Experiment Station. Cows fed a complete ration consisting of alfalfa and grain for one year were slaughtered and the viscera examined and compared to control cows fed the same diet but with the hay coming from bales. In that study, cows on the complete cubed diet had gross and microscopic pathological changes in the rumen, abomasum, intestines and liver. The rumen papillae grossly were sparser in number and appeared to be thicker and shorter. Microscopically this change in the rumen papillae was interpreted as hyperkeratosis. In the abomasum of cube-fed cows, erosions and ulcers were observed. The abomasum of one such cow contained partially unbroken cubes, several short pieces of baling wire and a number of small rocks. Microscopically the intestinal mucosa appeared to have undergone hyperplasia. Some cube-fed cows had hepatic degenerative changes with fatty infiltration.

The roughage factor, not adequately provided for in the cube diet, can be supplied with five to ten pounds of baled hay or coarsely chopped green feed or silage. It cannot be supplied by finely chopped corn silage.