

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**

**Erich Studer, D.V.M.**

*Carnation, Washington 98014*

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.