

Disappearance of net wrap after *in situ* incubation in forage-fed steers

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Whether producers remove net wrap or twine prior to grinding or shredding bales is an individual decision that largely is dictated by time, cost of the bale-processing equipment and ability to pull net wrap off frozen bales. We evaluated the dry-matter disappearance of five different types of bale-binding material. After 14 days of incubation in the rumen of Holstein steers, no disappearance was detected in the three types of net wrap or one type of biodegradable twine evaluated. Whether complications occur as a result of the accumulation of consumed net wrap likely is based on the volume of the product consumed and the ability of the plastic particles to move through the digestive tract.

Summary

Five types of bale-binding material and a hay control were evaluated to determine the extent of the disappearance of grass hay, sisal twine, biodegradable twine and three types of net wrap during incubation in the rumen of forage-fed Holstein steers. Each of the binding materials was cut into 2-millimeter (mm) pieces, and 2 grams (g) of each sample was placed in duplicate Dacron bags, whereas the hay was ground through a 2-mm screen, and then 5 g of ground hay was placed in duplicate Dacron bags. Bags were

presoaked in water and placed in the rumen of each of two forage-fed Holstein steers for 0, 6, 12, 24, 48, 96 (four days), 168 (seven days) and 336 (14 days) hours. After incubation, bags were removed from the rumen, rinsed and dried in a forced-air oven for 48 hours. The percent of disappearance was calculated as $(1 - [\text{end sample weight}/\text{beginning sample weight}])$. During the 14-day incubation period, greater than 80 percent of the hay and 70 percent of the sisal twine disappeared from the Dacron bags. However, none of the three types of net wrap evaluated or the biodegradable twine samples disappeared from the Dacron bags

(treatment \times time $P < 0.001$). This indicates the potential for buildup of bale-binding materials through time if they are not removed from the bales prior to feeding.

Introduction

In recent years, a woven plastic material called net wrap has rivaled plastic and sisal twine as the bale binder of choice for many cattlemen in the upper Great Plains. Commercial bale grinding also is popular in the region and, from a feed-handling standpoint, mass-processed bales facilitate proper mixing of dietary components in a total mixed ration (TMR). Additionally, many producers use bale shredders to deliver forages in windrows on the ground for range-feeding situations.

Whether producers remove net wrap or twine prior to grinding or shredding and subsequent delivery is an individual decision that largely is dictated by time, cost of the bale-processing equipment and ability to pull net wrap off frozen bales.

A recent case submitted to the NDSU diagnostic lab was diagnosed as acute tympany (bloat) associated with excessive net wrap ingestion. The goal of the current project was to determine the fate of net wrap

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after *in situ* incubation for up to 14 days in forage-fed steers.

Experimental Procedures

Five types of bale-binding material and a hay control were evaluated to determine the extent of the disappearance of the following during incubation in the rumen of forage-fed Holstein steers:

- Grass hay (Control)
- Sisal twine
- Biodegradable twine (BD Twine)
- Net wrap 1
- Net wrap 2
- Net wrap 3

Each of the binding materials was cut into 2-mm pieces, and 2 g of each sample was placed in duplicate Dacron bags. Hay was ground in a Wiley mill through a 2-mm screen, and then 5 g of ground hay was placed in duplicate Dacron bags. Hay used for the control samples was bromegrass with a nutrient profile of 16.2 percent crude protein (CP), 85.1 percent organic matter (OM), 64.1 percent neutral detergent fiber (NDF) and 35.2 acid detergent fiber (ADF).

Bags were presoaked in water and placed in duplicate in the rumen of each of two forage-fed Holstein steers for 0, 6, 12, 24, 48, 96 (four days), 168 (seven days) and 336 (14 days) hours. The 0 hour bag served as a correction factor.

After incubation, bags were removed from the rumen and rinsed with tap water to remove all large particulate matter. Bags then were rinsed using a top-loading washing machine on the delicate cycle. Bags were agitated for one minute, drained and spun for two minutes. This cycle was repeated until the rinse water was clear (six cycles). Bags then were dried at 131 F (55 C) in a forced-air oven for 48 hours and stored at room temperature until weighing.

The weight of each processed bag was determined and served as the first response variable for our analysis. The percent of *in situ* dry-matter disappearance was calculated as $(1 - [\text{end sample weight}/\text{beginning sample weight}])$ and served as our second response variable for our analysis.

The GLM procedure of SAS was used to evaluate the effect of treatments on sample ending weights and *in situ* disappearance of treatment samples. The model included the effects of steer, sample, time point and their respective interactions. Effects were considered significant at $P < 0.05$.

Results and Discussion

After 14 days of incubation in the rumen of forage-fed steers, none of the three types of net wrap evaluated or the biodegradable twine samples disappeared from the

Dacron bags. As expected, a large proportion of the hay sample (more than 80 percent) disappeared and more than 70 percent of the sisal twine evaluated disappeared during the 14-day period of incubation (Figure 1).

Cattle fed forage that was processed without removal of the types of net wrap or biodegradable twine tested in the current experiment have the potential to retain consumed net wrap for more than 14 days after feeding. Because none of the plastic products disappeared during our study interval, the potential exists for these products to build up in the rumen through time and possibly lead to associated complications. Whether complications occur as a result of net wrap consumed likely is based on the volume of the product consumed and the ability of the plastic particles to move through the digestive tract.

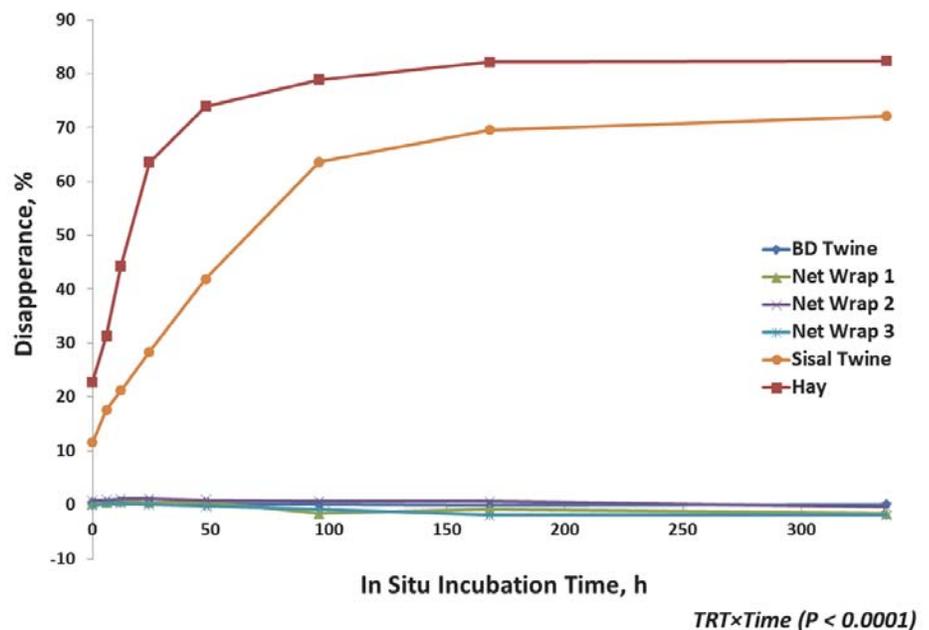


Figure 1. In situ disappearance of bale-binding materials during a 14-day period of incubation.