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Technical Literature

Efficacy of Silage SAVOR[®] Plus_{brand} Silage Preservative in Enhancing the Fermentation of Alfalfa Balage

Introduction

The production of balage is accomplished by baling high-moisture hay, wrapping the bale in plastic, and allowing the bale to ferment. It is commonly accepted that balage and haylage ferment more slowly than corn silage. The slower fermentation process is due to a lower amount of substrate for the bacteria, i.e., sugars, present in balage and haylage. The slower growth of lactic acid producing bacteria in balage and haylage results in a longer period of time needed for the pH to decline and stabilize. The extended time to reach stability allows for more growth of molds and spoilage bacteria, which reduces the quality and quantity of the forage.

Many balage/haylage producers have found that organic acid based forage preservatives assist in fermentation by providing an environment that is optimal for epiphytic lactic acid producing bacteria to grow. As these naturally occurring bacteria grow the result is a drop in pH to provide stable balage/haylage.

The objective of this study was to evaluate the effects of different organic acid based forage preservatives on the fermentation properties and dry matter recovery of alfalfa balage.

Experimental Procedures

High moisture alfalfa hay was mowed, raked, and baled in mid-September in Southwest Wisconsin. At time of baling, the alfalfa hay was treated with two different organic acid based forage preservatives. The treatments were: 1) Untreated Control, 2) Silage SAVOR[®]_{brand} silage preservative, 1 lb/ton, 3) Silage SAVOR[®] Plus_{brand} silage preservative, 1 lb/ton. The Silage SAVOR Plus silage preservative contains 73% total acids, a surfactant system and an antioxidant, to provide a superior environment for epiphytic lactic acid producing bacteria to drop the pH, less time to provide stable balage/haylage, greater reduction in dry matter loss due to plant cell respiration, and improved fermentation characteristics. After baling, each bale was weighed, a core sample taken, and wrapped with a plastic wrap. The wrapped bales were stacked outdoors without further protection and allowed to ferment for 40 days. Forage samples were analyzed for dry matter content.

After a 40-day fermentation period, each bale was weighed and a core sample was collected. Forage samples were sent to an independent laboratory and analyzed for fermentation properties utilizing wet chemistry, including pH, lactic acid, acetic acid, propionic acid, butyric acid, ethanol, ammonia-N, total acids, and lactic acid as a percent of total acids.

Results and Discussion

Dry matter of the balage is presented in Table 1. Initial balage DM was higher for the Silage SAVOR silage preservative treatment than other treatments and this higher DM was maintained through the 40 day ensiling period.

Table 1. Dry matter of alfalfa balage before and after 40 d of ensiling.

Item	Untreated	Silage SAVOR	Silage SAVOR Plus	S.E.
Initial Dry Matter, %	57.7 ^a	60.3 ^b	57.4 ^a	.43
Final Dry Matter, %	56.0 ^a	59.4 ^b	56.9 ^a	.36

^{a,b}Means within row differ (P < .05).

Dry matter recovery tended to be higher for Silage SAVOR silage preservative than untreated, and Silage SAVOR Plus silage preservative tended to have an even a higher dry matter recovery (Table 2). The higher pH in the Silage SAVOR silage preservative treated balage is reflective of the higher level of dry matter. Lactic acid was lowest for the untreated balage and highest for the Silage SAVOR Plus silage preservative, with Silage SAVOR silage preservative being intermediate.

Acetic acid levels were higher for both organic acid treatments. This increase in acetic acid should retard yeast growth and provide a longer period of aerobic stability according to Pelhate (1973) who found that acetic acid was very effective in yeast growth inhibition. Total organic acids were highest for the Silage SAVOR Plus silage preservative treated balage.

Table 2. Fermentation properties of alfalfa balage after 40 d of ensiling.

Item	Untreated	Silage SAVOR	Silage SAVOR Plus	S.E.
DM Recovery, %	98.2	99.3	99.9	.65
pH	5.45 ^a	5.67 ^b	5.43 ^a	.05
Ammonia-N, % CP	3.13 ^b	3.01 ^b	2.82 ^a	.06
Lactic acid, %	.41 ^a	.48 ^{ab}	.56 ^b	.06
Acetic Acid, %	.09 ^a	.22 ^b	.22 ^b	.02
Propionic acid, %	<.01	<.01	<.01	-
Butyric acid, %	<.01	<.01	<.01	-
Total acids, %	.49 ^a	.71 ^b	.78 ^b	.05
Lactic acid, % Total acids	81.7 ^c	68.3 ^a	71.7 ^b	4.26

^{a,b,c}Means within row differ (P < .05).

Conclusions

The use of Silage SAVOR and Silage SAVOR Plus silage preservatives improved the fermentation characteristics of alfalfa balage. In addition, Silage SAVOR Plus silage preservative resulted in the lowest pH values of all treatments. Silage SAVOR silage preservative improved lactic acid and total acid levels over the untreated balage and Silage SAVOR Plus silage preservative performed better than Silage SAVOR silage preservative. Therefore, the use of Silage SAVOR or Silage SAVOR Plus silage preservatives should provide a forage producer with superior fermentation of alfalfa balage.

References

Pelhate. J. 1973. Stabilisation de la mycoflore de maïs-grains humides ensiles. Ann. Tech. Agric. 22:647-66.