

## Effect of the Silostop silo covering system on the ensilage of grass compared to a standard polyethylene covering system.

Report by Yves Gallard, INRA Research Centre Le Pin, L'Ermitte-Borcu, 61310, Exmes, France.

English summary by Professor J M Wilkinson

### Introduction

This report is of a comparison of the Silostop silo covering system, comprising oxygen barrier film with protective net and gravel bags, with a standard silo covering system comprising standard polyethylene film with tyres.

The objective was to test the hypothesis that total loss of dry matter (DM) from silage stored under the Silostop covering system is lower than from silage stored under the standard polyethylene (PE) covering system. The experiment was undertaken with a grass crop ensiled in 120-tonne experimental silos of 20 metres length, 4 metres width, and 2 metres mean height at the Le Pin research centre of INRA, the French National Agricultural Research Institute.

### Material and methods



#### *Silo covering*

**Silo 1** (left hand picture): A single layer of black PE film (150  $\mu\text{m}$  thickness) on top and side walls, the top film overlain with tyres.

**Silo 2** (right hand picture): A single layer of Silostop oxygen barrier film (45  $\mu\text{m}$  thickness) on top and side walls, the top film overlain with anti ultra-violet woven polypropylene netting. Gravel bags were placed around the periphery and laterally at 5 metre intervals.

### *Ensiling and feed-out*

A single crop of primary growth perennial ryegrass was harvested on 12 and 13 June 2014 after a 48-hour period of field wilting and ensiled in both silos simultaneously without additive. All herbage ensiled was weighed at the time of ensiling and on removal from the silos by defacer between 11 January and 20 March 2015, including material discarded as being unfit for use as animal feed.

Silage was removed from the two silos on alternate days. Mean feed-out progression rate was the same for both silos (30 cm/day). Silage samples were taken twice weekly from 15 to 20 cm behind the front of the exposed feed-out face during the 68-day feed-out period for chemical analysis. Density of silage was assessed two weeks after opening the silos by 'Silo scan' at 20 cm depth at 14 points on the exposed feed-out faces of each silo, four near the upper surface, four near the sides, four in the centre and two near the base.

## **Results**

### *Losses during storage*

The average period of storage was 240 days for both silos. Quantities of dry matter ensiled and removed for feeding or discarded, total DM losses and mean silage DM density are in Table 1.

Mean silage density was 178 kg DM/m<sup>3</sup> for Silo 1 and 169 kg DM/m<sup>3</sup> for Silo 2. Total weight of crop DM ensiled was similar for the two silos. However, the amount of silage DM removed for feeding was 17% higher for Silo 2 (Silostop) than for Silo 1 (standard PE). This reflected lower total loss of DM during the storage period for Silo 2 (7% of DM ensiled) compared to Silo 1 (15.2% of DM ensiled), despite evidence of physical damage to the Silostop film that resulted in silage being discarded as unfit for use as feed early in the feed-out period between 19 January and 6 February 2015.

**Table 1.** Dry matter (DM) ensiled, DM removed for feeding and total loss of DM during the storage period.

	<b>Silo 1 – Standard PE</b>	<b>Silo 2 - Silostop</b>
Total DM ensiled (t)	36.3	38.6
Total DM removed for feeding (t)	30.8	35.9
Total DM loss (% of DM ensiled)	15.2	7.0

### *Composition of silage*

Mean values for composition of the silages are in Table 2. Values represent means for the total feed-out period. Butyric acid concentration was higher for silage in Silo 1 (standard PE film) compared to Silo 2 (Silostop), indicating poorer fermentation quality of silage stored under standard PE film than under Silostop. Mean pH value was lower and concentration of acetic

acid was higher for silage under Silostop than for silage stored under standard PE film. Ammonia N levels were similar between silos.

**Table 2.** Composition of silage

	<b>Silo 1 – Standard PE</b>	<b>Silo 2 - Silostop</b>
DM %	42.8	41.5
pH	4.48	4.34
Acetic acid (g/kg DM)	6.26	15.9
Butyric acid (g/kg DM)	17.2	7.35
NH <sub>3</sub> -N (g/kg total N)	1.39	1.43

Although the mean concentration of silage DM during the feed-out period was similar between the two silos, the DM concentration of the silage from Silo 1 (standard PE) decreased progressively from 46.7% at harvest to 41.2% in week 9 of feed-out. The comparable change for Silo 2 (Silostop) was from 43.2% at harvest to 41.2% in week 9 of feed-out, supporting the lower losses of DM due to plant respiration and aerobic spoilage in silage stored under Silostop than under standard PE film.

## **Conclusions**

1. Total loss of DM during storage was lower (7% of crop DM ensiled) for silage stored under Silostop oxygen barrier film than for silage stored under standard 150 µm PE film (15% of crop DM ensiled).
2. Lower butyric acid and lower silage pH indicated superior nutritional value of silage stored under Silostop than in silage stored under standard PE film.
3. The study demonstrated the extent to which total losses can be reduced and silage quality improved by using oxygen barrier film compared to the standard silage covering technique.

11 November 2016