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First estimation and validation of a new model to predict dry matter loss based on temperature changes - III. Validation of model in a crop with low ensilability.

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INTRODUCTION

It was recently demonstrated that a linear regression correlation exists, between dry matter (DM) loss and temperature development during aerobic stability challenge (Pires et al. 2018). The model was validated and proved useful to estimate DM loss in different storage structures (mini silos and big bales) and showed no sensitivity to different treatments (untreated and inoculated with SiloSolve® FC (Witt et al. 2018)).

“ The purpose of this study was to test how the new model could be used for DM loss prediction in alfalfa/grass silages during aerobic spoilage vs. the model described by McDonald et al. (1991), using the difference between recorded temperature in the silo and the ambient temperature. ”

MATERIAL AND METHODS

Alfalfa:Ryegrass
(50:50) (35.1% DM)



SiloSolve® FC (SSFC)
150,000 cfu/g of forage

Untreated control (C)

Lactobacillus buchneri LB1819 DSM22501
Lactococcus lactis O224 DSM11037

n=5

Mini silo
3 l, (1.8-1.9 kg forage)/silo

n=5



Fermented 90 days

Aerobic stability (AS) test after fermentation

0 days

10 days

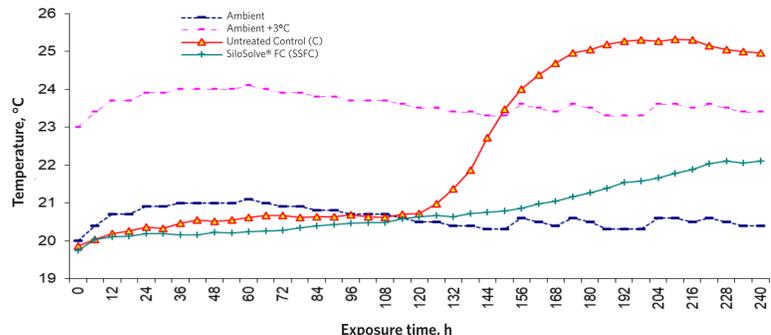


RESULTS

Table 1. DM loss recorded vs. calculated using 2 different models based on temperature in the difficult to ensile alfalfa/grass crop, comparing 2 different treatments (TRT) (untreated (C) and SiloSolve® FC (SSFC)).

Crop	Ambient T at max T during AS test (°C)	Max T (°C) reached after [hours] of AS test		DM loss (%) recorded after AS test (std. dev.)		Calculated DM loss (%) using delta vs. ambient T according to McDonald (1991)		Calculated DM loss (%) using linear regression model according to Pires et al. (2018) (std. dev.)	
		C	SSFC	C	SSFC	C	SSFC	C	SSFC
Alfalfa/grass	20.6	25.3	22.1	3.1	1.9	10	10	2.6	1.0
Mini silos		[204]	[240]	(+/- 0.21)	(+/- 0.21)			(+/- 0.4)	(+/- 0.4)

Figure 1. Continuous temperature recording during aerobic exposure of alfalfa/grass crop, comparing 2 different 2 different treatments (TRT) (untreated [C] and SiloSolve® FC [SSFC]) ** (P<0.01)



Adapting the linear correlation model (Pires et al. 2018) to temperature scores in alfalfa/grass silage demonstrated a vast improvement in the estimation of dry matter loss during aerobic challenge compared to the model described by McDonald et al. (1991), using the difference between recorded temperature in the silo and the ambient temperature (Table 1).

DISCUSSION

Alfalfa/grass mix is a less ensilable crop that normally is not associated with aerobic stability challenges, confirmed by the present study, where untreated alfalfa/grass silage kept aerobically stable for more than 8 days. Nevertheless, inoculation with SiloSolve® FC was effective in extending aerobic stability to a minimum of 10 days (+3°C threshold (EFSA, 2018) above ambient not crossed at time of terminating the aerobic challenge test). The step logic model, the new model and actual DM loss were evaluated, and the new model more accurately (P<0.001) aligned with DM loss recorded in the trial.

CONCLUSION

“ This study confirms that the new linear model is useful for predicting DM loss when subjecting difficult to ferment crops ensiled for 90 days. ”

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