

PSIV-20 The Effect of Silage Additives on Male Sterile Sorghum Fermentation Heat Production and Feed-Out Stability.

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Research

Abstract: The objective was to compare the effect of applying silage additives to male sterile sorghum hybrids on temperature production during ensiling time (30 d) and at feed-out period after 30 or 90 d of ensiling period. Two male-sterile sorghum hybrids; F430 and F465, with and without BMR12 trait, respectively (Richardson Seed Ltd.); were randomly allocated in plots blocked by irrigation section in a dairy farm in West Texas. During harvest, duplicate samples from each plot were obtained, placed on plastic trays, and transported to one of three stations to be treated with chemical silage preservative (SG, SiloGuard), heterofermentative bacteria inoculant with mold inhibitor solution (SM, Silage Maker 250) or distilled water (DW, control). Treatments were applied with spray bottles following a protocol that consisted of two sets of 5 sprays (1.1 mL each and 11 mL total) followed by mixing of the forage. Personnel applying the treatment were blind as to which treatment they were applying and all spray bottles, trays and tables from each station were color coded to prevent cross contamination. After treated, 3.63 kg of forage was packed in three consecutive steps using a manual press on 4.7L buckets (Uline) and a temperature data logger was placed in the center of each of the 30 d mini silos. The amount of material packed was estimated to achieve a 230 kg of DM/m³ compaction at 30% DM of the forage. At opening, the material from each silo was moved to a tray and mixed to be homogenized and exposed to oxygen. Then, the material was added back to its correspondent bucket until it filled up to the border without compressing. Heat production during the feed-out period and air-stability were assessed for both ensiling periods, whereas fermentation heat production during ensiling period was only assessed for 30 d silos. Statistical analysis was performed using mixed

linear regression models (GLIMMIX procedure of SAS) with ensiling period, hybrid, treatment and the interaction of day and treatment included in the model as independent variables. Fourth root and natural log transformation were performed to obtain a normal distribution of residuals, back transformed LSM and 95% CI are reported in Table 1. Treatment effected the silage temperature during the feed-out period ($P < 0.0001$) and air-stability test ($P = 0.02$). Whereas a tendency was observed for daily heat production during the ensiled period ($P = 0.07$). Male-sterile sorghum silage treated with SG had the least temperature during the ensiling period and longer air-stability than SM.

Table 1. The effect of silage additives on heat production during the ensiling and feed-out period and air stability.

Item	SG	SM	DW	P-value
	LSM (95% CI)	LSM (95% CI)	LSM (95% CI)	
Ensiling period temperature, °C	15.5 ^b (15.4; 15.6)	16.2 ^a (16.1; 16.2)	16.1 ^{ab} (16.0; 16.2)	0.07
Feed-out period temperature, °C	8.88 ^b (8.82; 8.93)	8.98 ^a (8.93; 9.04)	8.28 ^c (8.18; 8.28)	<0.0001
Air-Stability, h	32.0 ^a (29.7; 34.5)	27.9 ^b (26.2; 29.8)	31.0 ^{ab} (29.1; 32.9)	0.02

SG – Silage chemical preservative (SiloGuard); SM – Silage heterofermentative bacteria inoculant with mold inhibitor (Silage Maker 250); DW – Distilled water (Control).

Keywords: male sterile sorghum, silage additives, silage temperature