

## SOUTH DAKOTA – Interactions of Silage Variety and Inclusion Level on Beef Growth Performance

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Multiple annual forage research trials took place at the Southeast Research Farm near Beresford, SD, in 2019. Of particular interest was a study investigating interactions of silage variety and inclusion level on beef growth performance, carcass traits, and production per cropland acre in steers.

High-grain-content finishing diets were fed to steers an average of 133 days. A 2x2 (silage variety [Conventional or Enogen Fed Corn] x silage inclusion level [12 or 24% DM basis]) treatment factorial arrangement was used. There were 5 replicate pens of 6-12 steers assigned to each treatment. Two steer populations were used. Cattle were received March 25; processed March 28. Processing included individual body weight (BW) measurement, a unique ID tag, and vaccination against respiratory diseases and clostridial species. Pour-on moxidectin and steroidal implants were administered April 2.

Steers were fed once daily and were stepped up to the final diet over 21 days. Bunks were managed to be empty at 8:00 a.m. most mornings. Feed intake and diet formulations were monitored and summarized weekly. Animals that died or were removed from the study were assumed to have consumed feed equal to the pen mean DMI up to death or removal. Animal diet formulation was based on weekly DM analyses of diet ingredient samples and corresponding feed batch records. BW was recorded for each steer at study initiation, day 28, day 63, and morning of shipment on day 126 or day 140 for the calculation of live growth performance. A 3% pencil shrink was applied to final BW, carcass-adjusted performance was calculated from hot carcass weight (HCW)/0.625.

Cattle were shipped for termination when they visually appraised at 0.50" back fat (BF). Steers were shipped on August 6 after 126 days on feed and August 20 after 140 days on feed, and harvested the following day at Tyson Fresh Meats in Dakota City, NE, where individual steer identity was tracked. Beef production per acre of crop production was calculated from actual intake of corn silage and corn grain for each pen. Cropland required was calculated as sum of pounds consumed/yield calculated for corn and corn silage, using actual corn silage yields; assuming each ton of corn silage contained 8 bu of corn. Beef production per acre was calculated as (carcass adjusted final BW - Initial BW)/acres.

**Animal Growth Performance.** There was no silage x inclusion interaction detected for any live or carcass adjusted growth performance traits. Silage variety did not significantly influence final live or carcass adjusted BW, average daily gain (ADG), DMI, or feed conversion ratio (F:G). Silage variety had no influence on performance adjusted net energy (paNE) values or observed/expected net energy (NE) values. However, steers fed 24% silage had greater final live and carcass adjusted BW, but required an extra 14 days on feed to reach a similar compositional endpoint as the 12% inclusion steers. This ultimately translated into poorer live basis ADG for the high (24%) inclusion steers. Daily DMI did not differ due to silage inclusion level. Steers fed 12% silage had improved live and carcass adjusted F:G compared to the 24% inclusion steers who tended to have lower paNE values. Observed/expected NE values did not significantly differ due to silage inclusion level.

**Carcass trait responses and beef production per cropland acre.** There was no silage x inclusion interaction detected for any carcass traits or beef production per cropland acre. Silage variety did not influence dress, HCW, ribeye area (REA), BF, marbling scores, kidney-pelvic-heart fat (KPH) percentage, estimated empty body fat

**Table 1.** Cattle performance, carcass characteristics, and beef production per acre.

	Silage Hybrid (S)		Inclusion Rate (I)		SEM	P-Values		
	CON	ENO	12%	24%		S	I	S x I
DOF	133	133	126	140	-	-	-	-
Initial BW, lbs	928	926	927	927	1.2	0.24	0.80	0.49
Final BW, lbs	1350	1355	1341	1365	6.4	0.54	0.02	0.24
ADG, lbs	3.17	3.23	3.28	3.13	0.046	0.35	0.04	0.17
DMI, lbs	22.63	22.76	22.67	22.71	0.153	0.54	0.86	0.59
F:G	7.16	7.11	6.96	7.31	0.083	0.65	0.01	0.15
HCW, lbs	873	873	864	882	4.9	0.99	0.03	0.37
YG	3.33	3.33	3.23	3.43	0.044	0.94	0.01	0.06
Marbling Score <sup>1</sup>	532	510	519	522	0.018	0.25	0.85	0.39
Beef/Acre	1892	1765	1791	1866	23	0.01	0.04	0.40

<sup>1</sup>USDA Marbling Score 400=Low Choice, 500=Average Choice

(EBF), final BW at 28% EBF, calculated USDA yield goal (YG), or retail yield. Silage variety did influence beef production per cropland acre, where conventional variety produced greater beef per cropland acre than Enogen (1,892 vs. 1,765  $\pm$  23.0 lbs of beef/acre cropland). No differences were detected for dress, REA, marbling score, KPH percentage, estimated EBF, or final BW at 28% EBF due to silage inclusion level. Silage inclusion level did alter HCW, BF, USDA calculated YG, retail yield, and beef production per cropland acre.

Data indicated silage variety had no influence on animal growth performance or carcass traits, but silage variety did impact beef production per cropland acre, primarily attributable to differing wet silage yield, that in turn, impacted corn yield (bu/ac). Cattle fed a greater inclusion level of silage had greater HCW and beef production per cropland acre compared to the low inclusion of silage. This is an important agronomic concern for forage farmers and feedlots in the Upper Midwest that grow a large portion of their own feed.

For more details on this trial and other forage trials at the Southeast Research Farm in 2019, visit [https://openprairie.sdstate.edu/agexperimentsta\\_rsp/280/](https://openprairie.sdstate.edu/agexperimentsta_rsp/280/).