

Growing and Feeding Sugarbeets to Dairy Cows in the San Joaquin Valley: Part 2 – Silage Quality and Feeding

Peter Robinson*, Gene Aksland, Nick Clark and Stephen Kaffka

Ever more restrictive environmental regulations, including the recent Sustainable Groundwater Management Act (SGMA), have increased the need for dairy producers to find new ways to reduce feed costs and maximize the value of home-grown feeds with less irrigation water. Sugarbeets can be grown as a winter crop, with much higher water use efficiency than comparable summer crops. Winter grown sugarbeet roots were co-ensiled with almond hulls in a large plastic Agbag for 65 days, and then core sampled at several locations. Nutrient assays of the samples suggested little to no silage spoilage with an anticipated, and desirable, nutritional profile. The silage was then fed to lactating dairy cattle as a part of their total ration over a 30 day period, and the cattle ate it with enthusiasm.

The **objective** of the project was to evaluate the nutritional value of a co-ensiled sugarbeet/almond hull silage under southern San Joaquin Valley (SJV) dairy conditions, and evaluate general cattle acceptance of the silage. Growth characteristics and nutrient values of the sugarbeet tubers are in a companion poster (Kaffka et al. 2020).



Row 'A' was 1 foot above grade, Row 'B' was ½ way up the bag and Row 'C' was on top of the bag. The stars represent the core points where outer cores were to 10 inch depth and inner cores were from 10 to 20 inch depth.

Methods: The study was conducted in 2018-19 on the Legacy Dairy near Pixley (California) and 2019-20 on the Rio Blanco Dairy near Tulare. Sugarbeets were harvested in mid- or late June. As sugarbeets have a low dry matter (DM) content (<20-25%), whole roots were co-ensiled immediately with almond hulls (40% by fresh weight; 330 lb/t) with the objective of creating a silage mass with about 37% DM to limit fluid leakage from the Agbag. After 65 days of ensiling, the Agbag was sampled at three locations along the bag and at two depths (0 to 11 inches and 11 to 22 inches) into the bag. Silage was then fed to lactating dairy cattle in their total rations.

Results: Results from the Legacy Dairy are presented. Quality analyses on the Rio Blanco Dairy were similar. The dry matter (DM) of the silage mass attained (~33%) was slightly below the target of 37% due to a lower than expected DM content of the sugarbeet roots. Nevertheless, samples from the surface of the silage (i.e., 0 to 11 inches of depth), had pH values <4.0 and very low mold and yeast counts, all indicative of a lack of spoilage. Analysis of the silage mass (i.e., samples at 11 to 22 inches of depth) had similar pH values with desirably high levels of lactic acid and ethanol, and very low levels of undesirable volatile fatty acids. Proximate nutrients were within expected ranges, although nitrate-N levels were moderately high. The NE_i value, ~0.66 Mcal/lb DM, was similar to that of corn silage. When incorporated in rations for lactating dairy cattle, the cows were observed to readily consume the silage.

Composition of the Sugar Beet/Almond Hull Co-Ensiled Silage ~60 d Post Ensiling

Location	Sample Site on the Ag Bag					
	Lower (A)		Middle (B)		Top (C)	
	(1 ft above grade)		(½ way up the bag)		(Top of bag)	
Core Depth	Outer	Inner	Outer	Inner	Outer	Inner
Temperature (°F)	95.0	92.5	95.0	94.6	97.2	97.5
Density (lbs/ft ³)	47.1	78.5	27.5	53.2	31.0	49.6
Density (lbs DM/ft ³)	11.4	24.5	8.8	17.5	9.2	17.5
Dry matter (%)	24.1	31.2	32.0	32.9	29.6	35.3
Yeast (cfu ,000)	1133	-	282	-	<100	-
Yeast (cfu: ,000)	<100	-	<100	-	<100	-
pH	3.92	3.88	3.95	3.96	3.97	4.01
Acids (% DM)						
Lactic	-	7.1	-	7.1	-	6.0
Acetic	-	2.1	-	1.9	-	1.5
Butyric	-	<0.01	-	<0.01	-	<0.01
Propionic	-	0.03	-	<0.01	-	0.03
Succinic	-	0.07	-	0.07	-	0.07
Formic	-	0.20	-	0.22	-	0.22
Ethanol (% DM)	-	3.4	-	3.0	-	3.1
Ash (% DM)	-	13.3	-	12.3	-	14.0
Crude protein (% DM)	-	7.6	-	7.5	-	7.2
Ammonia N (ppm DM)	-	1300	-	1200	-	900
Nitrate N (ppm DM)	-	955	-	752	-	898
aNDF (% DM)	-	25.4	-	26.7	-	26.9
WSC (% DM)	-	14.5	-	12.5	-	15.8
NFC (% DM)	-	53	-	53	-	51
NE _i (Mcal/lb DM)	-	0.67	-	0.66	-	0.65

Conclusions: Sugar beets co-ensiled with almond hulls created a nutritionally desirable (for dairy cattle) silage with no indications of spoilage through 65 days of ensiling. Enthusiastic consumption of the silage in their rations by the cows support the 2nd study currently underway at a commercial dairy farm near Tulare.

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