

Nutrient composition and management characteristics of California sorghum silage

J. Heguy¹, J. Dahlberg¹, P. Price², J. Martins¹, N. Clark¹, N. Silva-del-Rio^{1,2}, D. Meyer^{1,2}
 University of California Ag & Natural Resources¹ & University of California, Davis²

ADSA 2017, #M158

INTRODUCTION

California's driest three consecutive years were recorded from 2012-2014, and in April 2015, a survey of the Sierra Nevada snowpack showed just five percent of the historical average, the lowest reading since 1950. Water availability has been an issue for dairies in the San Joaquin Valley, and will continue to prevent dairies from producing the quantity and quality of forages (silage) needed in dry years. Feed currently accounts for 65% of the cost of production, and with decreased water allocations, dairies' ability to produce high quality forages to manage feed costs will suffer. Homegrown forages are the most economical feedstuff on California dairies, with a typical corn (summer) and cereal (winter) annual rotation for ensiling.

Little information exists on harvesting and ensiling high quality sorghum for silage, yet there is an increased interest in the crop because of its reported ability to use up to 30% less water while producing silage yields similar to corn. Sorghum has been studied and used in the Texas panhandle, but little to no work has been done related to nutritional value for high producing lactating cows. Questions remain regarding feed quality, starch availability and ensiling characteristics. In future years of water shortages, focus will be placed on alternative forages that require less water and are resilient under drought conditions. Ramifications to dairy cow nutrition need to be studied before broad recommendations to move from corn to sorghum can be made.

OBJECTIVES

1. To obtain information on sorghum management practices, and
2. To determine sorghum silage feed quality in California's San Joaquin Valley.

METHODS

- Producers answered short agronomic and harvest management surveys.
- Silage structure type, delivery rate, and use of a custom chopper were recorded.
- Ten consecutive truckloads of fresh, chopped forage were sampled at the time of delivery to the structure; the ten truckload samples were then composited.
- Composited samples were subsampled and sent to a commercial laboratory for wet chemistry nutrient analysis.
- Effect of sorghum type and sugar-cane aphid on forage quality was analyzed by ANOVA using the GLM procedure of SAS
- A second subsample was analyzed for particle size using the Penn State Particle Separator (PSPS).

University of California
 Agriculture and Natural Resources

RESULTS

Table 1. Penn State Particle Separator results of chopped sorghum (n=16) taken at harvest

	Average	Median	Minimum	Maximum	STD
Upper Sieve	28%	27%	3%	59%	19%
Middle Sieve	51%	52%	17%	70%	15%
Lower Sieve	20%	21%	7%	29%	6%
Bottom Pan	2%	2%	.3%	4%	1%



Table 2. Nutrient composition of chopped sorghum (n=16) taken at harvest
 % of DM

	DM	CP	ADF	NDF	Starch	NFC	Ash	NDFD 30, %NDF
Mean	28.7	9.5	34.6	49.7	10.9	26.3	12.2	48.6
Median	28.4	9.7	34.9	50.4	9.6	27.4	11.8	50.5
Minimum	23.2	5.7	30.4	44.9	1.9	14.4	9.2	35.1
Maximum	34.6	11.7	40.2	55.3	22.5	35.6	21.5	60.3
STD	3.3	1.8	3.1	3.8	6.7	6.0	2.9	7.8



Figure 1. Nutrient composition of BMR & Grain sorghums

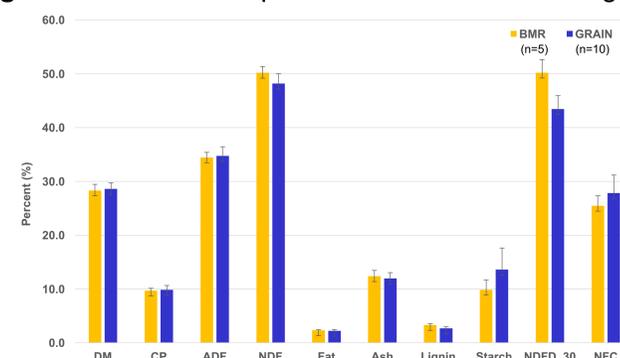
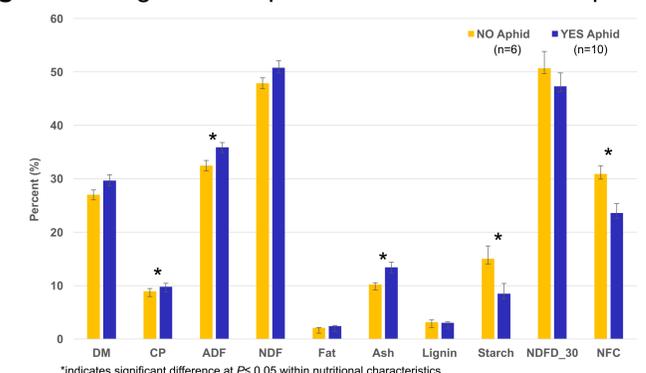


Figure 2. Sugar-cane aphid effect on nutrient composition



RESULTS, DISCUSSION & SUMMARY

- Participant dairy herd size ranged from 320 to 5,550 milking cows (median = 2,025).
- Farmed sorghum ranged from 16.9 to 232.3 hectares (median = 76.1).
- Sorghum was stored in piles (n = 12) and bags (n = 4).
- All dairies utilized custom harvester services.
- Delivery rate of the 10 truckloads of sorghum forage ranged from 12 to 78 minutes (median = 40).
- There were no differences in nutrient composition between grain and BMR types.
- Sugar-cane aphid, a new, invasive pest in 2016, significantly decreased starch and NFC, while increasing CP, ADF and ash. Although small, the current data set indicates that SCA affected starch in the grain type sorghum.
- Penn State Particle Separator results indicate very coarsely chopped, long particles that may be sorted in total mixed rations. Individual results from the PSPS analysis (including pictures): <http://ucanr.edu/casorghum16>
- Sorghum is not corn, with lower levels of starch and NFC and higher fiber content than typical California corn silages. Ash content of chopped sorghum was double that of typical California corn silage.
- Further work will include fermentation analysis of fermented sorghum silage and a feeding study.

