Nutrient Management with Digester Effluent

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Anaerobic Digesters

California Dairy Research Foundation (CDRF) project

- Chemical and physical properties of manure
- Various technologies
- Digesters from 6 freestall dairies in S. SJV
- Summer and winter
- 5 samples over 2.5 days

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Digester effluent being sampled

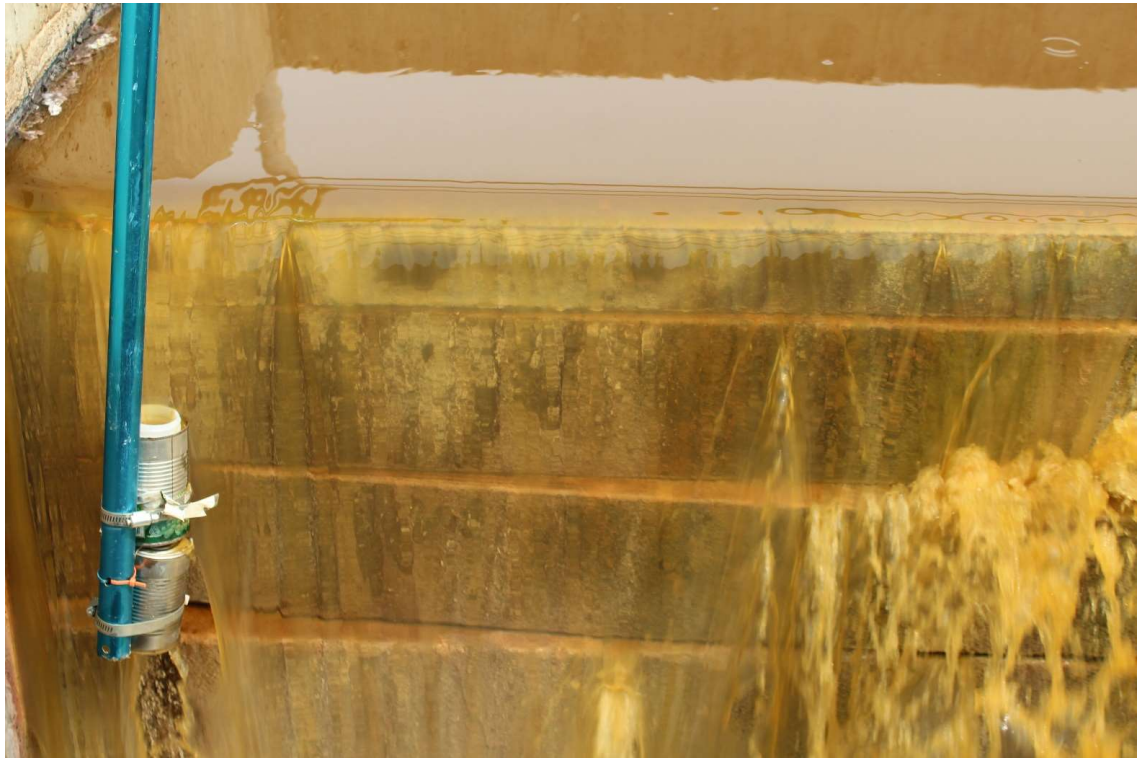

Table 1. Characteristics of manure digestate samples from anaerobic digester systems across six commercial dairies in the San Joaquin Valley of California expressed in pounds per acre-inch of water unless noted otherwise.

Measured	Average		Range (low to high)	
	Summer	Winter	Summer	Winter
Total solids	1,177	4,086	659 – 3,030	2,126 – 7,102
Volatile solids	560	2,675	325 – 1,228	1,193 – 4,707
Carbon	73	185	43 – 103	95 – 292
Organic nitrogen	39	126	5 – 124	63 – 244
Ammonium nitrogen	89	150	33 – 169	85 – 276
Total phosphorus ($P_2O_{5)}$	44	104	23 – 82	71 – 226
Total potassium (K_2O)	164	244	99 – 264	185 – 387
Electrical conductivity $(dS/m)^2$	5.8	7.3	3.4 – 9.8	4.9 – 9.4

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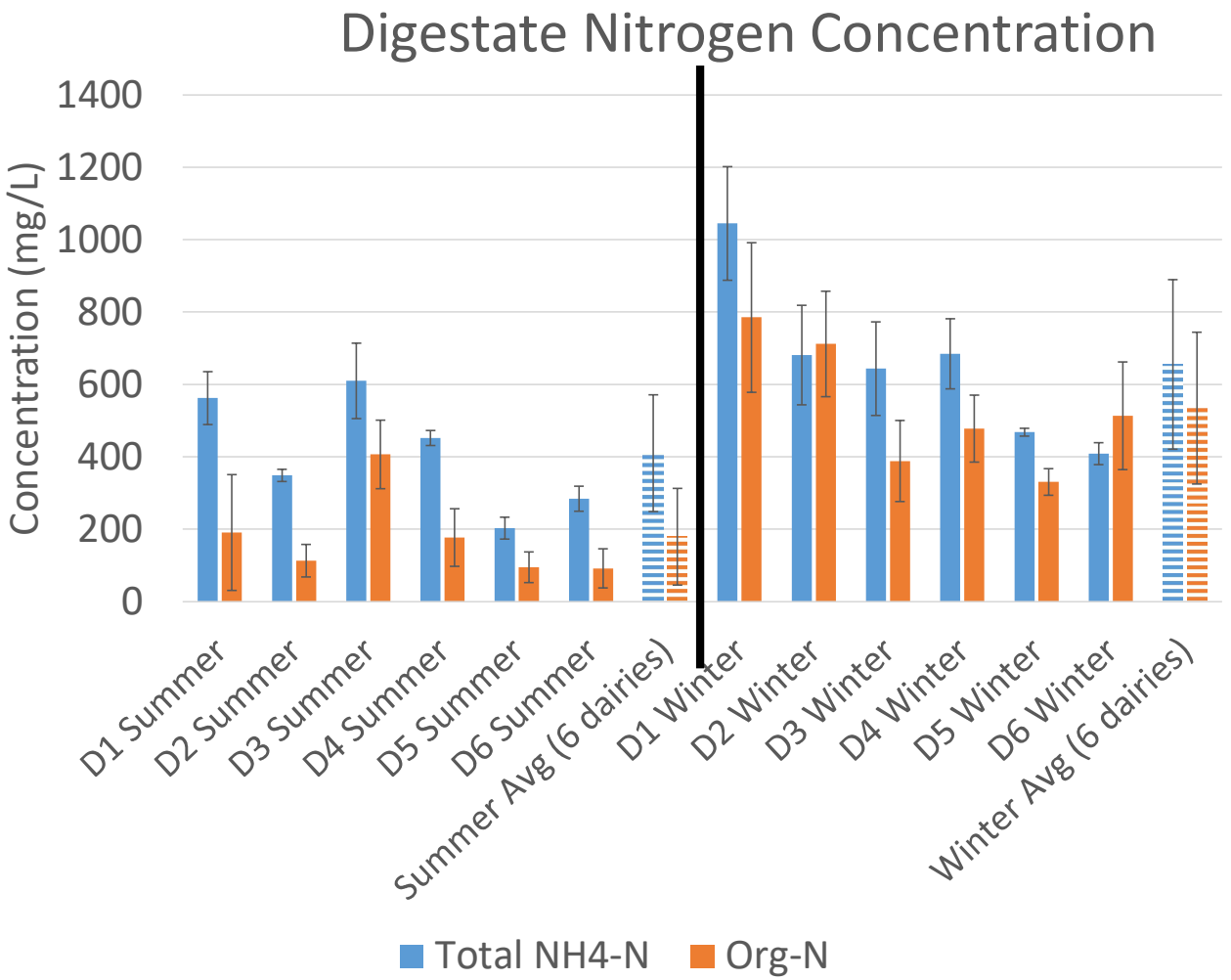

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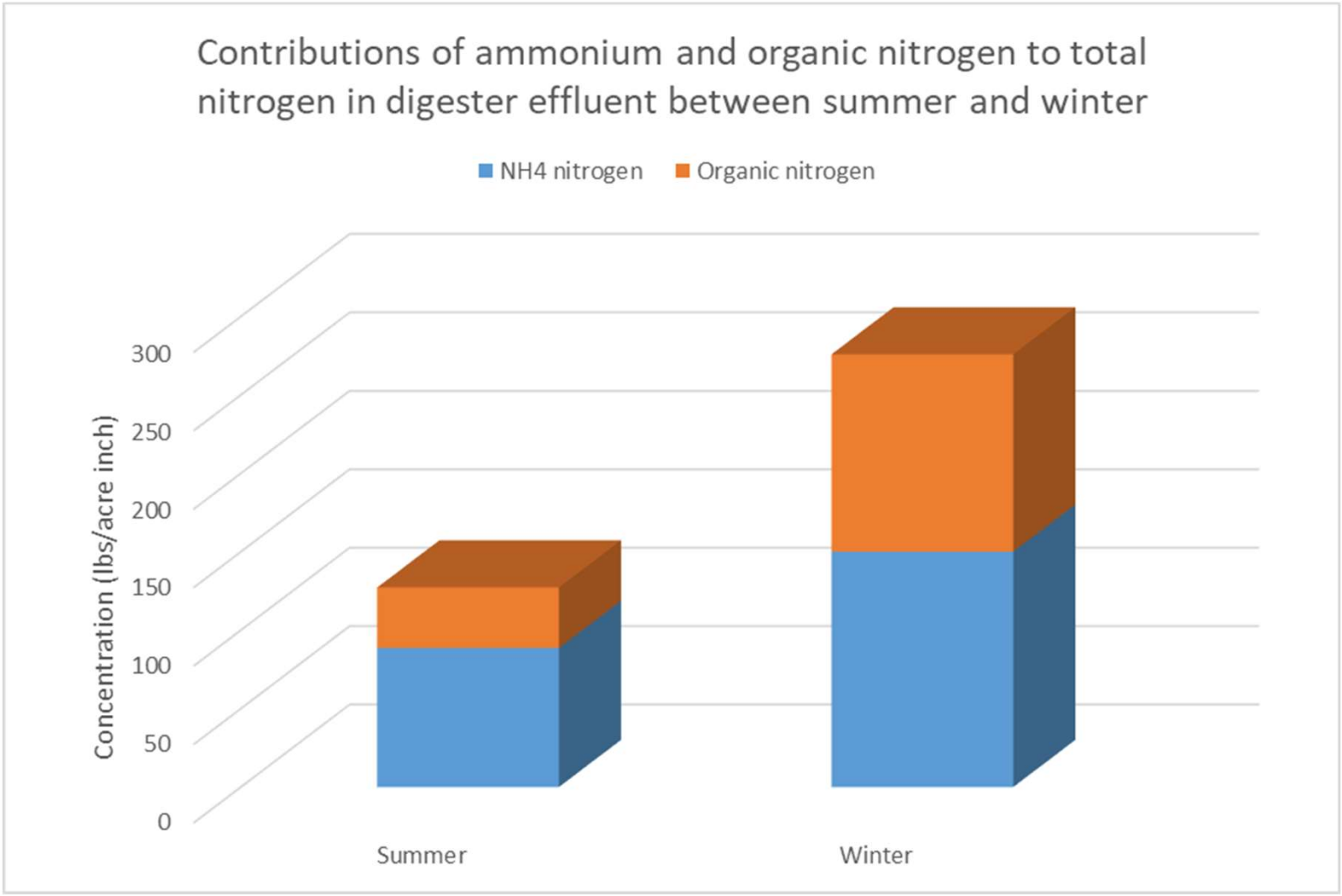

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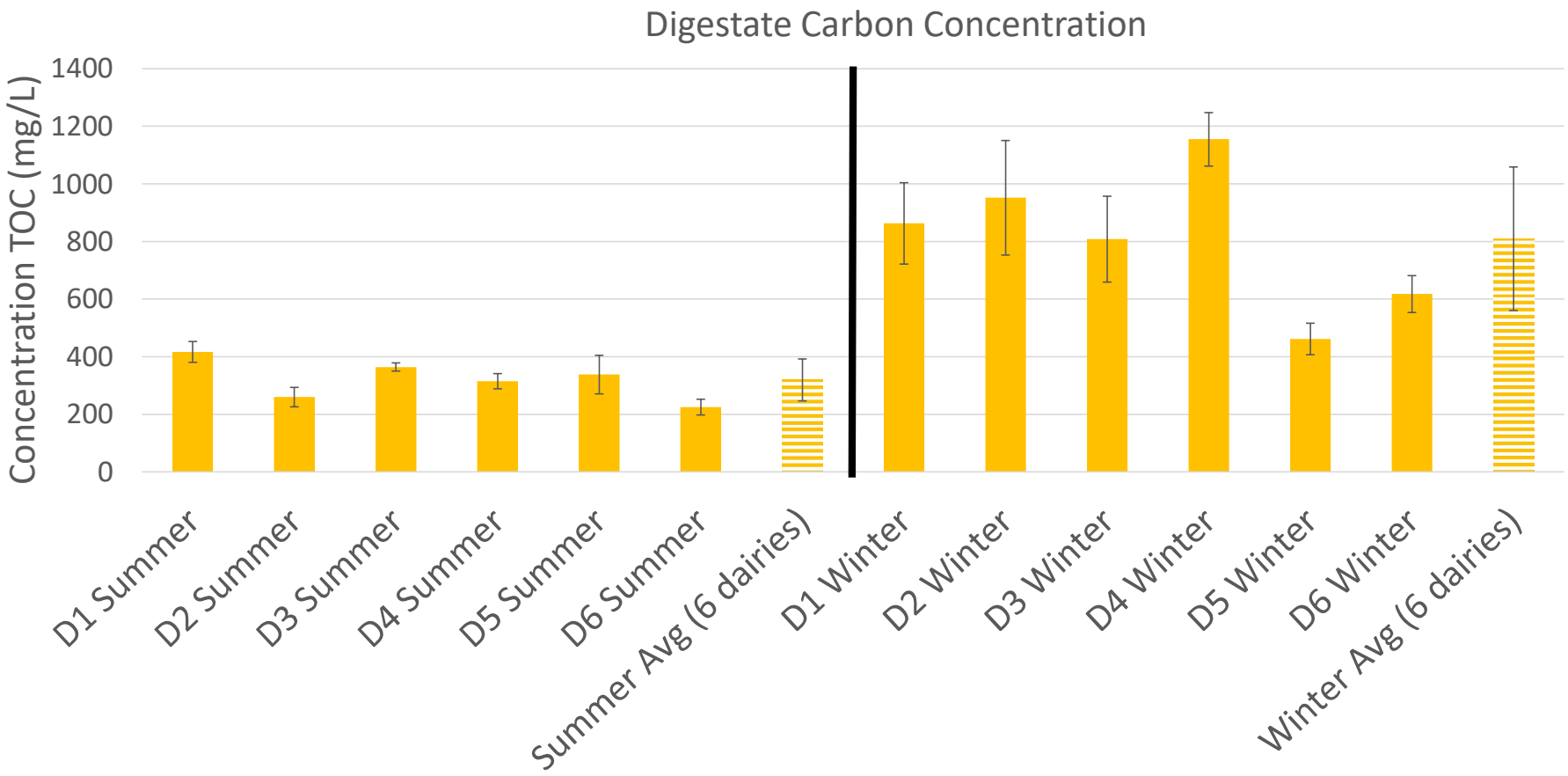

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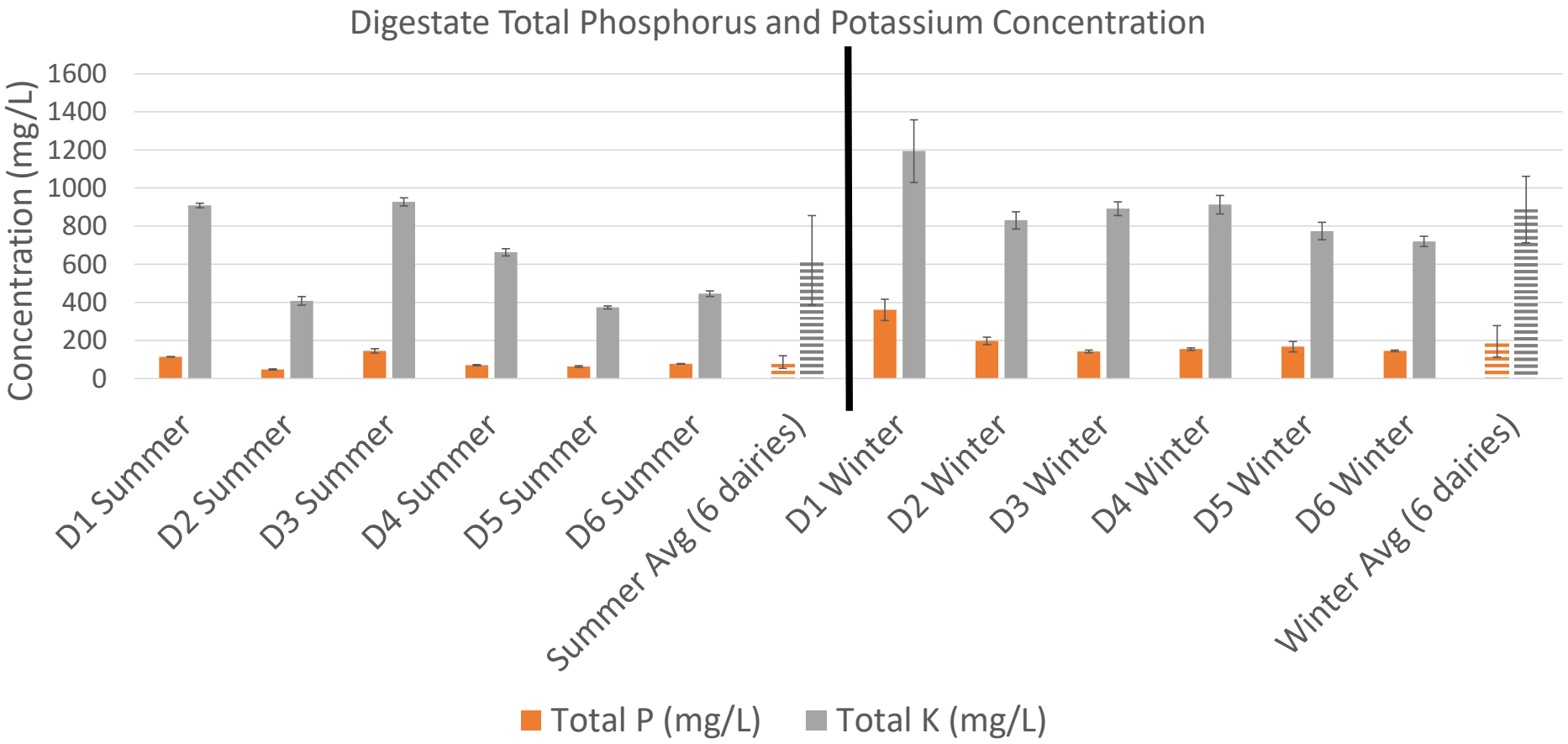
Digestate Total Phosphorus and Potassium Concentration
Concentration (mg/L)
1600
1400
1200
1000
800
600
400
200
0
D1 Summer
D2 Summer
D3 Summer
D4 Summer
D5 Summer
D6 Summer
Summer Avg (6 dairies)
D1 Winter
D2 Winter
D3 Winter
D4 Winter
D5 Winter
D6 Winter
Winter Avg (6 dairies)
Total P (mg/L)
Total K (mg/L)

Table 1. Characteristics of manure digestate samples from anaerobic digester systems across six commercial dairies in the San Joaquin Valley of California expressed in pounds per acre-inch[1] of water unless noted otherwise.		
Measured	Average	
	Summer	Winter
Total solids	1,177	4,086
Volatile solids	560	2,675
Carbon	73	185
Organic nitrogen	39	126
Ammonium nitrogen	89	150
Total phosphorus (P_2O_5)	44	104
Total potassium (K_2O)	164	244
Electrical conductivity (dS/m)[2]	5.8	7.3

3 in. of summer effluent=

132 lbs P_2O_5,

325 lbs available N (267 lbs available N+ 50%*117 lbs org. N),

492 lbs K_2O

40 T/ac corn silage takes up 132 lbs P_2O_5, 304 lbs N, 304 lbs K_2O

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Example: Corn tolerance 1.8 dS/m, yield reduces 7.4% per 1 dS/m above
Consistently using 3.4 dS/m effluent would reduce yields by 11.8%

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Summary

- Winter samples more concentrated than summer samples
- Effluent useful fertilizer, but be mindful of nutrient ratios
- Relatively high salinity-effluent should be blended with fresh water

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Thanks to all who contributed to this project

- Nick Clark, UCCE Agronomy and Nutrient Management Advisor
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- And of course, all the dairies who allowed us to come out and the CDRF for funding this work!

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Questions? joyhollingsworth@ucanr.edu

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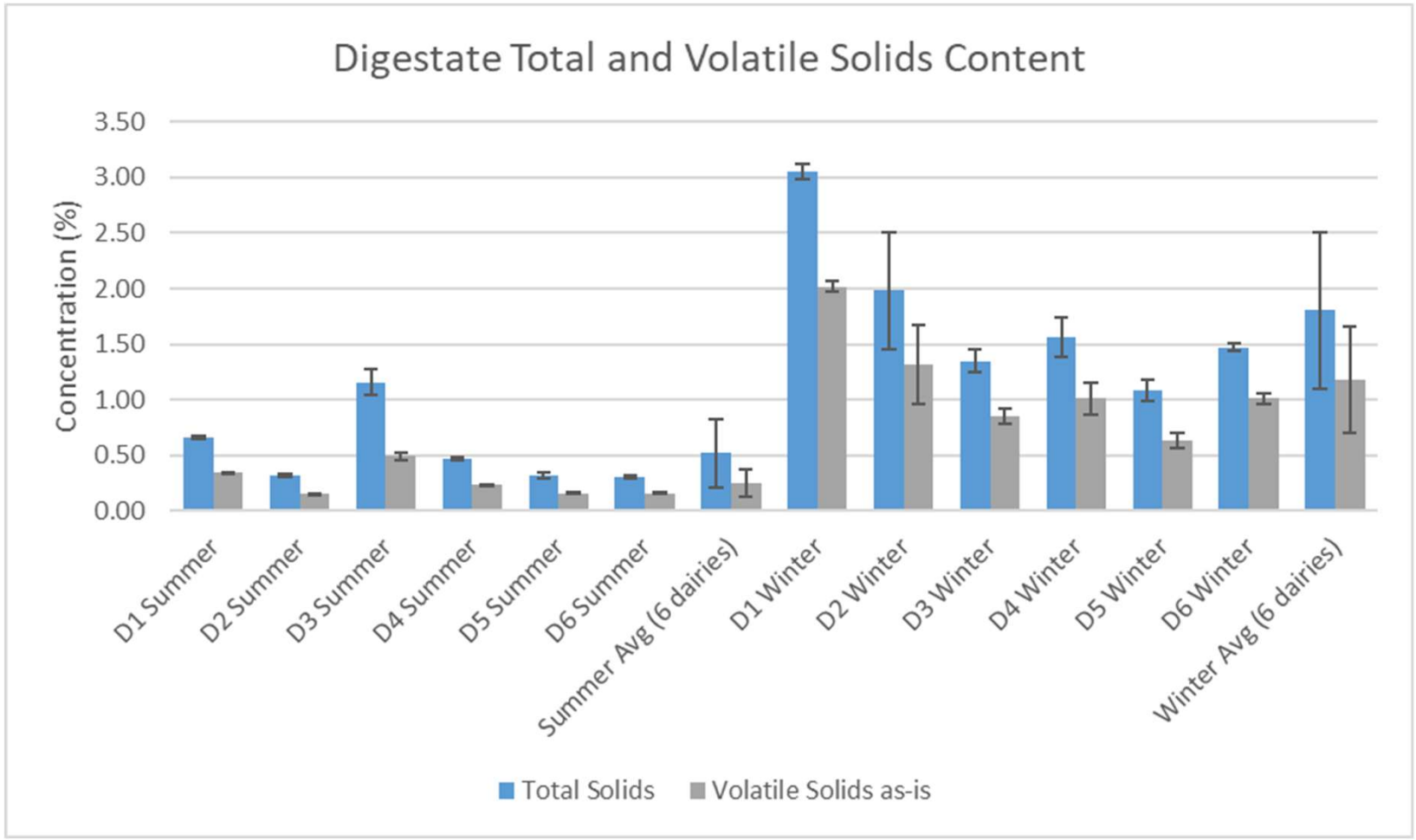

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