

## Research Questions

- Does application of urine or synthetic fertilizer increase second cutting yield in comparison to no fertilizer treatment?
- Is there a difference in second-cut hay yield between plots treated with urine and synthetic fertilizer?



## Raw Data

Treatment	Moisture Percent	Kg Hectare Dry	Kg Hectare Wet
Control	89.61	1452.55	1301.68
Control	92.43	1695.09	1566.84
Control	87.42	1082.00	945.89
Synthetic	87.96	2865.82	2520.84
Synthetic	88.73	3005.27	2666.71
Synthetic	85.61	3116.91	2668.53
Synthetic	85.52	2889.64	2471.26
Urine	86.78	2412.36	2093.37
Urine	87.43	2770.73	2422.31
Urine	86.24	2704.87	2332.55
Urine	85.45	2941.82	2513.88

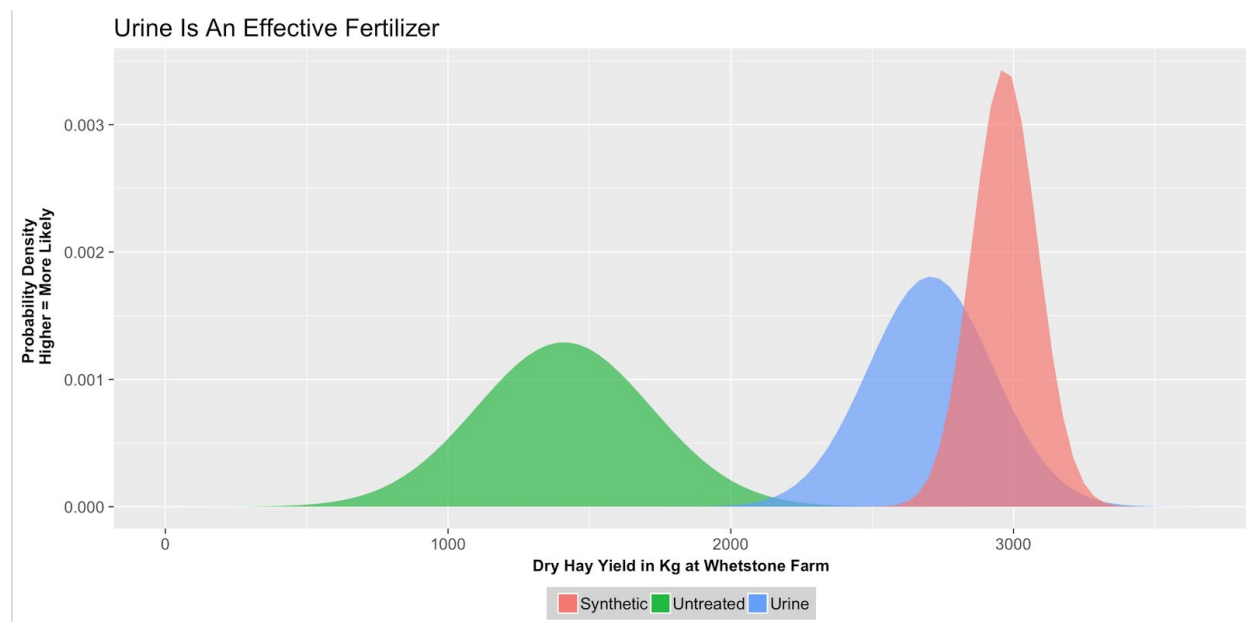
## Pooled Data

Treatment	Sample Size	Dry Mean KG/Hectare	Dry Standard Deviation
Urine	4	2707.44	220.62
Synthetic	4	2969.40	115.67
Control	3	1409.87	308.76

## Exploratory Data Analysis

Assuming that the underlying data is roughly normally distributed and using the means and standard deviations calculated above to draw expected distributions for the treatments for Whetstone Valley Farm, we can visualize expected underlying treatment effect size.

Doing so suggests that both fertilizer types have a marked effect, but that differing fertilizers do not differentiate clearly among one another (i.e. there is significant overlap in their expected yield distributions).



## Data Analysis

For each farm strip two measures were collected, both wet and dry kilograms per hectare of hay yield. An analysis of the correlation between the two showed that they were highly correlated (Pearson's R of .998) so analysis was limited to dry matter.

An analysis of variance was performed, and Tukey's HSD (honest significant difference) test was calculated using the statistical programming language R.

Strong, highly statistically significant differences were found, with both urine and synthetic groups serving as effective fertilizers.

No statistically significant difference was found between the urine and synthetic groups.

These findings are consistent with previous studies by Rich Earth Institute.

Comparison	Mean Difference Between Groups	95% CI Upper Bound For Difference Between Groups	95% CI Lower Bound For Difference Between Groups	P value
Synthetic-Control	1559.5303	1085.8776	2033.183	3.49 * 10E-05
Urine-Control	1297.5667	823.914	1771.2193	1.33E-04
Urine-Synthetic	-261.9636	-700.4808	176.5535	0.26



