

Midfield Pro-Agni Trial

October 2019 to February 2020

by Dr. Theresa Craig with statisticians Dr. Katie Page

Background Information

The trial encompassed 240 cattle (beef steers and Friesian bulls) run October 2019 - January 2020. Starting with 120 animals per treatment group and further divided by beef and Friesian into groups of 60.

Variables considered for the outcomes include:

1. ADG
2. Dressing %
3. Fat mm
4. Mortality and morbidity
5. Liver abscess and adhesions

Feed intake was monitored by total pens, hence statistical analysis could not be run on this data. Feed intake data was used feed/gain and total income.

Treatments

Control; Midfield ration regime for group of beef steers and group of Friesian bulls

Treatment: ProAgni ration regime for group of beef steers and group of Friesian bulls

There were four different paddocks. Pen 64 and 67 were the control and Pen 65 and 68 were on the treatment.

Weights

There were 14 cases where the final weight was zero (animal died before the end of the trial or animal removed due to sickness.) Therefore, these have been selected out of the following analyses.

Treatment vs Control Analyses

Paddocks 64 and 67 are control and paddocks 65 and 68 treatment. (A = ProAgni)

	Frequency	Percent
Control	116	51.3
Treatment	110	48.7
Total	226	100.0

Group Statistics

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
ADG	A	110	2.2089	.27331	.02606
	Control	116	2.2421	.29125	.02704
Fat Cover (mm)	A	110	10.15	4.777	.455
	Control	116	10.02	4.501	.418
Entry Weight (kg)	A	110	354.51	27.651	2.636
	Control	116	353.95	27.194	2.525
Interim Weight (kg)	A	110	440.51	33.425	3.187
	C	116	436.28	28.669	2.662
Final Weight (kg)	A	110	557.60	35.709	3.405
	C	116	560.02	33.243	3.087

Independent sample t-tests showered there was no significant differences in ADG, fat cover (mm) and entry, interim and final weights between the control and treatment conditions.

ADG, Weights and Fat Cover

Independent Samples Test

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
ADG	Equal variances assumed	-.881	224	.379	-.03316	.03762	-.10729	.04097
	Equal variances not assumed	-.883	223.977	.378	-.03316	.03755	-.10716	.04085
Fat Cover (mm)	Equal variances assumed	.208	224	.836	.128	.617	-1.088	1.344
	Equal variances not assumed	.207	221.190	.836	.128	.618	-1.090	1.346
Entry Weight (kg)	Equal variances assumed	.154	224	.878	.561	3.649	-6.630	7.751
	Equal variances not assumed	.154	222.907	.878	.561	3.650	-6.633	7.755
Interim Weight (kg)	Equal variances assumed	1.024	224	.307	4.233	4.136	-3.916	12.383
	Equal variances not assumed	1.019	214.967	.309	4.233	4.152	-3.951	12.418
Final Weight (kg)	Equal variances assumed	-.527	224	.599	-2.417	4.587	-11.456	6.621
	Equal variances not assumed	-.526	220.573	.599	-2.417	4.596	-11.474	6.639

Dress Percentage

The dress percentage was calculated as the carcass weight divided by the final weight expressed as a percentage.

Carcass Weight by treatment group

Descriptive Statistics						
Treatment		N	Minimum	Maximum	Mean	Std. Deviation
A	carcass_weight	110	240.20	344.60	292.2164	19.38294
	Valid N (listwise)	110				
C	carcass_weight	116	243.00	333.20	289.3069	17.74249
	Valid N (listwise)	116				

Group Statistics

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
Dress_%	A	110	52.4227	1.61715	.15419
	C	116	51.6799	1.65569	.15373

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				95% Confidence Interval of the Difference		
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Dress_%	Equal variances assumed	.999	.319	3.410	224	.001	.74282	.21787	.31349	1.17215
	Equal variances not assumed			3.412	223.801	.001	.74282	.21773	.31376	1.17188

There is a **significantly higher dress %** in the ProAgni treatment group (M=54.2%) than the control group (M=51.7%), $t(224) = 3.41, p < .01$.

Friesians vs Bulls

Beef

Group Statistics

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
Entry Weight (kg)	A	60	336.77	14.935	1.928
	C	60	336.27	14.946	1.930
Interim Weight (kg)	A	60	415.67	59.913	7.735
	C	60	423.87	21.502	2.776
Final Weight (kg)	A	60	514.40	122.834	15.858
	C	60	551.37	29.613	3.823
carcass_weight	A	60	272.3367	65.38110	8.44066
	C	60	287.4067	16.78280	2.16665
ADG	A	60	2.1451	.57054	.07366
	C	60	2.3637	.26110	.03371
Dress_percent	A	57	52.9455	1.45207	.19233
	C	60	52.1393	1.69937	.21939

a. Breed = Beef Steer

Independent Samples Test^a

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2- tailed)	Mean Differenc e	Std. Error Differenc e	95% Confidence Interval of the Difference	
									Lower	Upper
Entry Weight (kg)	Equal variances assumed	.004	.953	.183	118	.855	.500	2.728	-4.902	5.902
	Equal variances not assumed			.183	118	.855	.500	2.728	-4.902	5.902
Interim Weight (kg)	Equal variances assumed	2.099	.150	-.998	118	.320	-8.200	8.218	-24.473	8.073
	Equal variances not assumed			-.998	73.95 1	.322	-8.200	8.218	-24.575	8.175
Final Weight (kg)	Equal variances assumed	5.844	.017	-2.266	118	.025	-36.967	16.312	-69.269	-4.664
	Equal variances not assumed			-2.266	65.83 5	.027	-36.967	16.312	-69.536	-4.397
carcass_wai ght	Equal variances assumed	6.345	.013	-1.729	118	.086	-	8.71431 15.07000	-	2.18670 32.32670
	Equal variances not assumed			-1.729	66.74 1	.088	-	8.71431 15.07000	-	2.32507 32.46507
ADG	Equal variances assumed	5.098	.026	-2.699	118	.008	-2.1865	.08100	-.37905	-.05824

	Equal variances not assumed			-2.699	82.674	.008	-.21865	.08100	-.37977	-.05753
Dress_percent	Equal variances assumed	1.700	.195	2.752	115	.007	.80611	.29294	.22586	1.38636
	Equal variances not assumed			2.763	113.750	.007	.80611	.29176	.22813	1.38409

a. Breed = Beef Steer

Conclusion: For beef steers there are significant differences in ADG, dress % and final weight between the treatment and control groups, with the ProAgni treatment group being lighter, having a lower ADG and a higher dress %.

Friesian

Group Statistics^a

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
Entry Weight (kg)	A	60	373.43	24.636	3.180
	C	60	372.53	24.140	3.117
Interim Weight (kg)	A	60	435.87	105.100	13.568
	C	60	419.60	116.638	15.058
Final Weight (kg)	A	60	507.87	188.553	24.342
	C	60	531.33	147.060	18.985
carcass_weight	A	60	263.3933	98.21202	12.67912
	C	60	271.9200	75.46719	9.74277
ADG	A	60	1.9060	.73202	.09450
	C	60	1.9715	.58816	.07593
Dress_percent	A	53	51.8605	1.60917	.22104
	C	56	51.1877	1.46865	.19626

a. Breed = Fries Bull

Independent Samples Test^a

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Entry Weight (kg)	Equal variances assumed	.004	.949	.202	118	.840	.900	4.453	-7.918	9.718
	Equal variances not assumed			.202	117.951	.840	.900	4.453	-7.918	9.718
Interim Weight (kg)	Equal variances assumed	.291	.590	.803	118	.424	16.267	20.269	-23.872	56.405

	Equal variances not assumed			.803	116.7 43	.424	16.267	20.269	-23.876	56.410
Final Weight (kg)	Equal variances assumed	3.014	.085	-.760	118	.449	-23.467	30.870	-84.598	37.665
	Equal variances not assumed			-.760	111.3 93	.449	-23.467	30.870	-84.636	37.703
carcass_wei ght	Equal variances assumed	3.099	.081	-.533	118	.595	-8.52667	15.99005	-	23.13798
	Equal variances not assumed			-.533	110.6 62	.595	-8.52667	15.99005	-	23.15974
ADG	Equal variances assumed	1.514	.221	-.541	118	.590	-.06553	.12123	-.30560	.17453
	Equal variances not assumed			-.541	112.7 69	.590	-.06553	.12123	-.30572	.17465
Dress_perc ent	Equal variances assumed	.298	.586	2.282	107	.024	.67289	.29484	.08840	1.25738
	Equal variances not assumed			2.276	104.7 54	.025	.67289	.29559	.08677	1.25901

a. Breed = Fries Bull

Conclusion: for the Friesian bulls there is a significant difference between the dress % with the ProAgni treatment group being higher. No other outcomes are significantly different in this group of animals.

Mortality and Morbidity

There were 14 animals that got sick or died before the end of the trial. All animals entered the trial on 23 October 2019. The table below shows the number of animals in each of the groups which got sick, died or suffered from liver abscess or adhesions.

			Final head	Morbidity	Mortality	Liver abscess	Liver adhesions
pen 64	Beef	Control	60	0	0	0	0
Pen 65	Beef	ProAgni	57	3		5	1
Pen 67	Freisan	Control	56	3	1	5	
Pen 68	Freisan	ProAgni	53	7			1

Statistics on these numbers can't be run because they are too small a sample size to conclude anything significant.

In control versus treatment for morbidity (3 vs 10) one can see that the ProAgni group are doing worse.

Mortality; There was no significance difference with only one animal dying.

Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	3.985 ^a	1	.046		
Continuity Correction ^b	2.928	1	.087		
Likelihood Ratio	4.192	1	.041		
Fisher's Exact Test				.084	.042
N of Valid Cases	240				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.50.

b. Computed only for a 2x2 table

Animals in the ProAgni treatment groups got sick at a significantly greater rate than those in the control condition, $p = .046$. When the dead animal was added into the calculation the control (raising it to $n=4$) the statistics became less significant $p < .1$

Liver adhesions (control 5 versus treatment 5) there is obviously no difference here so no need to run statistics.

The following table gives data that had single value only so statistics could not be run on this.

			Feed/day	Feed/gain
pen 64	Beef	Control	15.1	6.39
Pen 65	Beef	ProAgni	12.78	5.66
Pen 67	Freisan	Control	17.09	8.09
Pen 68	Freisan	ProAgni	17.63	8.18

Summary and Conclusions

The midfield Pro-Agni trial consisted of 240 animals (steers and bulls) who entered the trial on 23 October 2019 and were in the trial for an average of 92 days. There were four paddocks, two control and two treatments paddocks with 60 animals in each paddock. Fourteen animals died or were removed due to sickness during the trial period, 10 in the treatment condition and 4 on the control condition. Of these 14, 11 were bulls and 3 steers

The key outcomes measures were ADG, fat cover and dress percentage. The ADG for the whole sample was 2.23 (Treatment=2.21; Control=2.24). There were no significant differences between the treatment and control groups in ADG and fat cover (or weights at entry, interim and final measurement times). Animals in the ProAgni treatment groups got sick at a significantly greater rate than those in the control condition There was a significantly higher dress % in the treatment condition than the control condition.

Overall, the conclusion is that the treatment (Pro-Agni) group did not significantly outperform the control (Midfield) group with respect to most of the key outcome measures, except dress percentage where the treatment groups did outperform the control group.

A comparison of the outcomes for each group separately showed that the differences were mainly driven by the beef group with the control beef animals outperforming the others on many of the key outcome measures.