

Applied Microbiology and Biotechnology

Physiology and methane productivity of *Methanobacterium thermaggregans*

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Table S1: ANOVA for Response Surface Reduced Quadratic Model x_{\max}

$x_{\max} = \text{Log}10((-35.24755687 + (0.762155327 * \text{Temperature}) + (3.190981698 * \text{pH}) + (-0.00623276 * \text{Temperature}^2) + (-0.211348003 * \text{pH}^2))$						
Analysis of variance table [Partial sum of squares - Type III]						
Source	Sum of Squares	df	Mean Square	F Value	p-value	
					Prob > F	
Model	0.894493019	4	0.223623255	22.65421373	< 0.0001	significant
A-Temperature	0.087490079	1	0.087490079	8.863205926	0.0089	
B-pH	0.165839363	1	0.165839363	16.8004011	0.0008	
A ²	0.625867049	1	0.625867049	63.40362906	< 0.0001	
B ²	0.037701654	1	0.037701654	3.819376161	0.0684	
Residual	0.15793848	16	0.009871155			
Lack of Fit	0.064093756	5	0.012818751	1.502548646	0.2660	not significant
Pure Error	0.093844724	11	0.008531339			
Cor Total	1.052431498	20				
Std. Dev.	0.099353686		R-Squared	0.84992992		
Mean	-0.149218223		Adj R-Squared	0.812412399		
C.V. %	66.58281013		Pred R-Squared	0.705255087		
PRESS	0.310198831		Adeq Precision	16.83061995		
Factor	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
Intercept	0.024646613	1	0.033546624	-0.046469053	0.095762279	
A-Temperature	0.071120654	1	0.023889129	0.020477962	0.121763346	1.029638993
B-pH	0.092843863	1	0.022651313	0.044825225	0.140862501	1.069259789
A ²	-0.155818999	1	0.019568762	-0.197302922	-0.114335077	1.03079817
B ²	-0.03381568	1	0.01730302	-0.070496445	0.002865084	1.091888669

Table S2: ANOVA for Response Surface Reduced Quadratic Model $r_{(x) \max}$

$r_{(x) \max} = \text{Log}10(-43.55859742 + (0.894196753 * \text{Temperature}) + (4.532229376 * \text{pH}) + (-0.007334806 * \text{Temperature}^2) + (-0.304943494 * \text{pH}^2))$						
Analysis of variance table [Partial sum of squares - Type III]						
Source	Sum of Squares	df	Mean Square	F Value	p-value	
Model	1.21513411	4	0.303783527	15.31034354	< 0.0001	significant
A-Temperature	0.084997108	1	0.084997108	4.283757371	0.0550	
B-pH	0.21295129	1	0.21295129	10.73250231	0.0048	
A ²	0.86675941	1	0.86675941	43.68368639	< 0.0001	
B ²	0.078487926	1	0.078487926	3.955701988	0.0641	
Residual	0.317467497	16	0.019841719			
Lack of Fit	0.069843725	5	0.013968745	0.620522797	0.6876	not significant
Pure Error	0.247623772	11	0.022511252			
Cor Total	1.532601606	20				
Std. Dev.	0.140860635		R-Squared	0.792857129		
Mean	0.256961055		Adj R-Squared	0.741071411		
C.V. %	54.81789264		Pred R-Squared	0.660030587		
PRESS	0.521037668		Adeq Precision	12.93314562		
Factor	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
Intercept	0.471279976	1	0.047561383	0.370454348	0.572105604	
A-Temperature	0.070100064	1	0.033869281	-0.001699605	0.141899732	1.029638993
B-pH	0.105208185	1	0.032114342	0.037128821	0.17328755	1.069259789
A ²	-0.183370154	1	0.027743996	-0.242184798	-0.12455551	1.03079817
B ²	-0.048790959	1	0.024531696	-0.100795831	0.003213913	1.091888669

Table S3: ANOVA for Response Surface Reduced Quadratic Model MER_{max}

$MER_{max} = \text{Log}10(-37.71197957 + (0.651467497 * \text{Temperature}) + (5.199576927 * \text{pH}) + (-0.005140405 * \text{Temperature}^2) + (-0.354136403 * \text{pH}^2))$						
Analysis of variance table [Partial sum of squares - Type III]						
Source	Sum of Squares	df	Mean Square	F Value	p-value	
Model	1.12140412	4	0.28035103	43.40916293	< 0.0001	significant
A-Temperature	0.518242887	1	0.518242887	80.24400674	< 0.0001	
B-pH	0.179778162	1	0.179778162	27.83660023	< 0.0001	
A^2	0.425712088	1	0.425712088	65.91666659	< 0.0001	
B^2	0.105853507	1	0.105853507	16.39020952	0.0009	
Residual	0.103333402	16	0.006458338			
Lack of Fit	0.028823289	5	0.005764658	0.851042014	0.5420	not significant
Pure Error	0.074510113	11	0.006773647			
Cor Total	1.224737522	20				
Std. Dev.	0.080363783		R-Squared	0.915628124		
Mean	1.75082873		Adj R-Squared	0.894535155		
C.V. %	4.590042511		Pred R-Squared	0.850831856		
PRESS	0.182691823		Adeq Precision	24.09421267		
Factor	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
Intercept	1.914966472	1	0.027134711	1.857443453	1.97248949	
A-Temperature	0.173094398	1	0.019323096	0.132131264	0.214057531	1.029638993
B-pH	0.096666915	1	0.018321869	0.057826289	0.135507542	1.069259789
A^2	-0.128510129	1	0.015828499	-0.162065048	-0.094955209	1.03079817
B^2	-0.056661824	1	0.013995818	-0.086331634	-0.026992015	1.091888669

Table S4: ANOVA for Response Surface Reduced Quadratic Model MER_{max} (drum-type gas meter)

MER_{max} (drum-type gas meter) = $\text{Log}10(-34.59247361 + (0.750491255 * \text{Temperature}) + (3.550113117 * \text{pH}) + (-0.00597897 * \text{Temperature}^2) + (-0.241172243 * \text{pH}^2))$						
Analysis of variance table [Partial sum of squares - Type III]						
Source	Sum of Squares	df	Mean Square	F Value	p-value	
Model	1.100703308	4	0.275175827	26.22774156	< 0.0001	significant
A-Temperature	0.471330906	1	0.471330906	44.923805	< 0.0001	
B-pH	0.092877263	1	0.092877263	8.852379516	0.0089	
A^2	0.575935754	1	0.575935754	54.89397194	< 0.0001	
B^2	0.049092907	1	0.049092907	4.679175856	0.0460	
Residual	0.167868561	16	0.010491785			
Lack of Fit	0.088179593	5	0.017635919	2.43440354	0.1016	not significant
Pure Error	0.079688968	11	0.007244452			
Cor Total	1.268571869	20				
Std. Dev.	0.102429415		R-Squared	0.867671225		
Mean	1.785148567		Adj R-Squared	0.834589032		
C.V. %	5.737865011		Pred R-Squared	0.728077663		
PRESS	0.344953027		Adeq Precision	19.49840082		
Factor	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
Intercept	1.946061369	1	0.034585139	1.872744149	2.019378589	
A-Temperature	0.165074236	1	0.024628674	0.11286378	0.217284692	1.029638993
B-pH	0.069480686	1	0.023352538	0.019975517	0.118985854	1.069259789
A^2	-0.149474252	1	0.020174559	-0.192242407	-0.106706096	1.03079817
B^2	-0.038587559	1	0.017838676	-0.076403863	-0.000771255	1.091888669

Table S5: ANOVA for Response Surface Reduced Quadratic Model cum. CH₄ production

$\text{cum. CH}_4 \text{ production} = (-139254.2929 + (2307.001118 * \text{Temperature}) + (19715.7902 * \text{pH}) + (-18.85017552 * \text{Temperature}^2) + (-1370.515378 * \text{pH}^2))$						
Analysis of variance table [Partial sum of squares - Type III]						
Source	Sum of Squares	df	Mean Square	F Value	p-value	
Model	8446243.846	4	2111560.961	8.265314498	0.0008	significant
A-Temperature	874877.6436	1	874877.6436	3.424546581	0.0828	
B-pH	860031.46	1	860031.46	3.366433943	0.0852	
A ²	5724691.389	1	5724691.389	22.4082447	0.0002	
B ²	1585374.735	1	1585374.735	6.205655919	0.0241	
Residual	4087560.781	16	255472.5488			
Lack of Fit	946365.287	5	189273.0574	0.662806131	0.6593	not significant
Pure Error	3141195.494	11	285563.2267			
Cor Total	12533804.63	20				
Std. Dev.	505.4429234		R-Squared	0.673877095		
Mean	1528.420456		Adj R-Squared	0.592346368		
C.V. %	33.06962566		Pred R-Squared	0.397662669		
PRESS	7549578.421		Adeq Precision	9.466851798		
Factor	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
Intercept	2160.420457	1	170.6620487	1798.633076	2522.207839	
A-Temperature	224.9002801	1	121.5313878	-32.7347529	482.5353131	1.029638993
B-pH	211.4299759	1	115.234232	-32.85568309	455.7156349	1.069259789
A ²	-471.254388	1	99.55234348	-682.2959284	-260.2128476	1.03079817
B ²	-219.2824605	1	88.02581397	-405.8888499	-32.67607103	1.091888669