The GLIMMIX Procedure

Model Information	
Data Set	WORK.CROWN
Response Variable	Crown
Response Distribution	Gaussian
Link Function	Identity
Variance Function	Default
Variance Matrix Blocked By	GLB
Estimation Technique	Restricted Maximum Likelihood
Degrees of Freedom Method	Kenward-Roger
Fixed Effects SE Adjustment	Kenward-Roger

Class Level Information		
Class	**Levels**	**Values**
Year	3	Fifth Seventh Sixth
Location	2	Hill Farm LA Tech
Block	4	1 2 3 4
Family	6	AGH2 AGH25 AGHS1 AGHS2 AGHS3 AGHS4
GLB	48	AGH25_Hill Farm_1 AGH25_Hill Farm_2 AGH25_Hill Farm_3 AGH25_Hill Farm_4 AGH25_LA Tech_1 AGH25_LA Tech_2 AGH25_LA Tech_3 AGH25_LA Tech_4 AGH2_Hill Farm_1 AGH2_Hill Farm_2 AGH2_Hill Farm_3 AGH2_Hill Farm_4 AGH2_LA Tech_1 AGH2_LA Tech_2 AGH2_LA Tech_3 AGH2_LA Tech_4 AGHS1_Hill Farm_1 AGHS1_Hill Farm_2 AGHS1_Hill Farm_3 AGHS1_Hill Farm_4 AGHS1_LA Tech_1 AGHS1_LA Tech_2 AGHS1_LA Tech_3 AGHS1_LA Tech_4 AGHS2_Hill Farm_1 AGHS2_Hill Farm_2 AGHS2_Hill Farm_3 AGHS2_Hill Farm_4 AGHS2_LA Tech_1 AGHS2_LA Tech_2 AGHS2_LA Tech_3 AGHS2_LA Tech_4 AGHS3_Hill Farm_1 AGHS3_Hill Farm_2 AGHS3_Hill Farm_3 AGHS3_Hill Farm_4 AGHS3_LA Tech_1 AGHS3_LA Tech_2 AGHS3_LA Tech_3 AGHS3_LA Tech_4 AGHS4_Hill Farm_1 AGHS4_Hill Farm_2 AGHS4_Hill Farm_3 AGHS4_Hill Farm_4 AGHS4_LA Tech_1 AGHS4_LA Tech_2 AGHS4_LA Tech_3 AGHS4_LA Tech_4

Number of Observations Read	144
Number of Observations Used	144

Dimensions	
G-side Cov. Parameters	2
R-side Cov. Parameters	1
Columns in X	84
Columns in Z per Subject	1
Subjects (Blocks in V)	48
Max Obs per Subject	3

The GLIMMIX Procedure

Optimization Information	
Optimization Technique	Dual Quasi-Newton
Parameters in Optimization	2
Lower Boundaries	2
Upper Boundaries	1
Fixed Effects	Profiled
Residual Variance	Profiled
Starting From	Data

Iteration History					
Iteration	**Restarts**	**Evaluations**	**Objective Function**	**Change**	**Max Gradient**
0	**0**	4	327.11392315	.	7.57E-13

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Res Log Likelihood	327.11
AIC (smaller is better)	333.11
AICC (smaller is better)	333.34
BIC (smaller is better)	338.73
CAIC (smaller is better)	341.73
HQIC (smaller is better)	335.24
Generalized Chi-Square	52.75
Gener. Chi-Square / DF	0.49

Covariance Parameter Estimates			
Cov Parm	**Subject**	**Estimate**	**Standard Error**
Variance	GLB	0.4567	0.1485
AR(1)	GLB	0	.
Residual		0.4884	0.08140

The GLIMMIX Procedure

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Year	2	72	177.27	<.0001
Location	1	36	55.25	<.0001
Year*Location	2	72	6.01	0.0039
Family	5	36	12.64	<.0001
Year*Family	10	72	5.39	<.0001
Location*Family	5	36	0.82	0.5439
Year*Location*Family	10	72	0.51	0.8776

F Test for Year*Location Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Year Fifth	1	73.62	15.95	0.0002

Simple Differences of Year*Location Least Squares Means
Adjustment for Multiple Comparisons: Tukey

Slice	Location	_Location	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Year Fifth	Hill Farm	LA Tech	-1.1210	0.2806	73.62	-3.99	0.0002	0.0002

Tukey Grouping for Year*Location Least Squares Means Slice (Alpha=0.05)

LS-means with the same letter are not significantly different.

Slice	Location	Estimate	
Year Fifth	LA Tech	1.7405	A
Year Fifth			
Year Fifth	Hill Farm	0.6196	B

F Test for Year*Location Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Year Seventh	1	73.62	52.00	<.0001

Simple Differences of Year*Location Least Squares Means
Adjustment for Multiple Comparisons: Tukey

Slice	Location	_Location	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Year Seventh	Hill Farm	LA Tech	-2.0238	0.2806	73.62	-7.21	<.0001	<.0001

The GLIMMIX Procedure

Tukey Grouping for Year*Location Least Squares Means Slice (Alpha=0.05)			
LS-means with the same letter are not significantly different.			
Slice	**Location**	**Estimate**	
Year Seventh	LA Tech	4.7953	A
Year Seventh			
Year Seventh	Hill Farm	2.7715	B

F Test for Year*Location Least Squares Means Slice				
Slice	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Year Sixth	1	73.62	46.91	<.0001

Simple Differences of Year*Location Least Squares Means Adjustment for Multiple Comparisons: Tukey								
Slice	**Location**	**_Location**	**Estimate**	**Standard Error**	**DF**	**t Value**	**Pr > |t|**	**Adj P**
Year Sixth	Hill Farm	LA Tech	-1.9221	0.2806	73.62	-6.85	<.0001	<.0001

Tukey Grouping for Year*Location Least Squares Means Slice (Alpha=0.05)			
LS-means with the same letter are not significantly different.			
Slice	**Location**	**Estimate**	
Year Sixth	LA Tech	4.0156	A
Year Sixth			
Year Sixth	Hill Farm	2.0935	B

F Test for Year*Family Least Squares Means Slice				
Slice	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Year Fifth	5	73.62	1.24	0.2982

Simple Differences of Year*Family Least Squares Means Adjustment for Multiple Comparisons: Tukey								
Slice	**Family**	**_Family**	**Estimate**	**Standard Error**	**DF**	**t Value**	**Pr > |t|**	**Adj P**
Year Fifth	AGH2	AGH25	0.06438	0.4861	73.62	0.13	0.8950	1.0000
Year Fifth	AGH2	AGHS1	-0.5890	0.4861	73.62	-1.21	0.2295	0.8297
Year Fifth	AGH2	AGHS2	-0.9529	0.4861	73.62	-1.96	0.0537	0.3750
Year Fifth	AGH2	AGHS3	-0.3868	0.4861	73.62	-0.80	0.4287	0.9674
Year Fifth	AGH2	AGHS4	-0.2169	0.4861	73.62	-0.45	0.6567	0.9977

The GLIMMIX Procedure

Slice	Family	_Family	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Year Fifth	AGH25	AGHS1	-0.6534	0.4861	73.62	-1.34	0.1830	0.7594
Year Fifth	AGH25	AGHS2	-1.0173	0.4861	73.62	-2.09	0.0398	0.3027
Year Fifth	AGH25	AGHS3	-0.4512	0.4861	73.62	-0.93	0.3563	0.9379
Year Fifth	AGH25	AGHS4	-0.2813	0.4861	73.62	-0.58	0.5646	0.9921
Year Fifth	AGHS1	AGHS2	-0.3639	0.4861	73.62	-0.75	0.4565	0.9750
Year Fifth	AGHS1	AGHS3	0.2023	0.4861	73.62	0.42	0.6786	0.9983
Year Fifth	AGHS1	AGHS4	0.3721	0.4861	73.62	0.77	0.4464	0.9724
Year Fifth	AGHS2	AGHS3	0.5661	0.4861	73.62	1.16	0.2479	0.8520
Year Fifth	AGHS2	AGHS4	0.7360	0.4861	73.62	1.51	0.1343	0.6564
Year Fifth	AGHS3	AGHS4	0.1699	0.4861	73.62	0.35	0.7277	0.9993

Table: Simple Differences of Year*Family Least Squares Means Adjustment for Multiple Comparisons: Tukey

Tukey Grouping for Year*Family Least Squares Means Slice (Alpha=0.05)

LS-means with the same letter are not significantly different.

Slice	Family	Estimate	
Year Fifth	AGHS2	1.7861	A
Year Fifth			A
Year Fifth	AGHS1	1.4222	A
Year Fifth			A
Year Fifth	AGHS3	1.2199	A
Year Fifth			A
Year Fifth	AGHS4	1.0501	A
Year Fifth			A
Year Fifth	AGH2	0.8332	A
Year Fifth			A
Year Fifth	AGH25	0.7688	A

F Test for Year*Family Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Year Seventh	5	73.62	15.34	<.0001

The GLIMMIX Procedure

Simple Differences of Year*Family Least Squares Means **Adjustment for Multiple Comparisons: Tukey**								
Slice	**Family**	**_Family**	**Estimate**	**Standard Error**	**DF**	**t Value**	**Pr > |t|**	**Adj P**
Year Seventh	AGH2	AGH25	0.1479	0.4861	73.62	0.30	0.7619	0.9996
Year Seventh	AGH2	AGHS1	-2.6354	0.4861	73.62	-5.42	<.0001	<.0001
Year Seventh	AGH2	AGHS2	-3.0426	0.4861	73.62	-6.26	<.0001	<.0001
Year Seventh	AGH2	AGHS3	-1.7339	0.4861	73.62	-3.57	0.0006	0.0082
Year Seventh	AGH2	AGHS4	-2.1311	0.4861	73.62	-4.38	<.0001	0.0005
Year Seventh	AGH25	AGHS1	-2.7833	0.4861	73.62	-5.73	<.0001	<.0001
Year Seventh	AGH25	AGHS2	-3.1904	0.4861	73.62	-6.56	<.0001	<.0001
Year Seventh	AGH25	AGHS3	-1.8818	0.4861	73.62	-3.87	0.0002	0.0031
Year Seventh	AGH25	AGHS4	-2.2789	0.4861	73.62	-4.69	<.0001	0.0002
Year Seventh	AGHS1	AGHS2	-0.4072	0.4861	73.62	-0.84	0.4049	0.9594
Year Seventh	AGHS1	AGHS3	0.9015	0.4861	73.62	1.85	0.0677	0.4382
Year Seventh	AGHS1	AGHS4	0.5043	0.4861	73.62	1.04	0.3029	0.9036
Year Seventh	AGHS2	AGHS3	1.3087	0.4861	73.62	2.69	0.0088	0.0893
Year Seventh	AGHS2	AGHS4	0.9115	0.4861	73.62	1.88	0.0647	0.4256
Year Seventh	AGHS3	AGHS4	-0.3972	0.4861	73.62	-0.82	0.4165	0.9635

Tukey Grouping for Year*Family Least Squares Means Slice (Alpha=0.05)			
LS-means with the same letter are not significantly different.			
Slice	**Family**	**Estimate**	
Year Seventh	AGHS2	5.2601	A
Year Seventh			A
Year Seventh	AGHS1	4.8530	A
Year Seventh			A
Year Seventh	AGHS4	4.3486	A
Year Seventh			A
Year Seventh	AGHS3	3.9514	A
Year Seventh			
Year Seventh	AGH2	2.2175	B
Year Seventh			B
Year Seventh	AGH25	2.0697	B

The GLIMMIX Procedure

F Test for Year*Family Least Squares Means Slice				
Slice	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Year Sixth	5	73.62	13.84	<.0001

Simple Differences of Year*Family Least Squares Means Adjustment for Multiple Comparisons: Tukey								
Slice	**Family**	**_Family**	**Estimate**	**Standard Error**	**DF**	**t Value**	**Pr > |t|**	**Adj P**
Year Sixth	AGH2	AGH25	-0.4612	0.4861	73.62	-0.95	0.3459	0.9322
Year Sixth	AGH2	AGHS1	-2.7922	0.4861	73.62	-5.74	<.0001	<.0001
Year Sixth	AGH2	AGHS2	-3.1903	0.4861	73.62	-6.56	<.0001	<.0001
Year Sixth	AGH2	AGHS3	-2.1436	0.4861	73.62	-4.41	<.0001	0.0005
Year Sixth	AGH2	AGHS4	-2.1314	0.4861	73.62	-4.38	<.0001	0.0005
Year Sixth	AGH25	AGHS1	-2.3311	0.4861	73.62	-4.80	<.0001	0.0001
Year Sixth	AGH25	AGHS2	-2.7291	0.4861	73.62	-5.61	<.0001	<.0001
Year Sixth	AGH25	AGHS3	-1.6824	0.4861	73.62	-3.46	0.0009	0.0113
Year Sixth	AGH25	AGHS4	-1.6703	0.4861	73.62	-3.44	0.0010	0.0122
Year Sixth	AGHS1	AGHS2	-0.3981	0.4861	73.62	-0.82	0.4155	0.9631
Year Sixth	AGHS1	AGHS3	0.6486	0.4861	73.62	1.33	0.1862	0.7650
Year Sixth	AGHS1	AGHS4	0.6608	0.4861	73.62	1.36	0.1782	0.7507
Year Sixth	AGHS2	AGHS3	1.0467	0.4861	73.62	2.15	0.0346	0.2725
Year Sixth	AGHS2	AGHS4	1.0589	0.4861	73.62	2.18	0.0326	0.2606
Year Sixth	AGHS3	AGHS4	0.01218	0.4861	73.62	0.03	0.9801	1.0000

Tukey Grouping for Year*Family Least Squares Means Slice (Alpha=0.05)			
LS-means with the same letter are not significantly different.			
Slice	**Family**	**Estimate**	
Year Sixth	AGHS2	4.4584	A
Year Sixth			A
Year Sixth	AGHS1	4.0603	A
Year Sixth			A
Year Sixth	AGHS3	3.4117	A
Year Sixth			A
Year Sixth	AGHS4	3.3995	A
Year Sixth			
Year Sixth	AGH25	1.7292	B

The GLIMMIX Procedure

Tukey Grouping for Year*Family Least Squares Means Slice (Alpha=0.05)			
LS-means with the same letter are not significantly different.			
Slice	Family	Estimate	
Year Sixth			B
Year Sixth	AGH2	1.2681	B

Family Least Squares Means					
Family	Estimate	Standard Error	DF	t Value	Pr > |t|
AGH2	1.4396	0.2783	36	5.17	<.0001
AGH25	1.5226	0.2783	36	5.47	<.0001
AGHS1	3.4452	0.2783	36	12.38	<.0001
AGHS2	3.8349	0.2783	36	13.78	<.0001
AGHS3	2.8610	0.2783	36	10.28	<.0001
AGHS4	2.9327	0.2783	36	10.54	<.0001

Differences of Family Least Squares Means Adjustment for Multiple Comparisons: Tukey							
Family	_Family	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
AGH2	AGH25	-0.08298	0.3935	36	-0.21	0.8342	0.9999
AGH2	AGHS1	-2.0056	0.3935	36	-5.10	<.0001	0.0002
AGH2	AGHS2	-2.3953	0.3935	36	-6.09	<.0001	<.0001
AGH2	AGHS3	-1.4214	0.3935	36	-3.61	0.0009	0.0110
AGH2	AGHS4	-1.4931	0.3935	36	-3.79	0.0005	0.0067
AGH25	AGHS1	-1.9226	0.3935	36	-4.89	<.0001	0.0003
AGH25	AGHS2	-2.3123	0.3935	36	-5.88	<.0001	<.0001
AGH25	AGHS3	-1.3385	0.3935	36	-3.40	0.0017	0.0190
AGH25	AGHS4	-1.4102	0.3935	36	-3.58	0.0010	0.0118
AGHS1	AGHS2	-0.3897	0.3935	36	-0.99	0.3287	0.9181
AGHS1	AGHS3	0.5841	0.3935	36	1.48	0.1464	0.6761
AGHS1	AGHS4	0.5124	0.3935	36	1.30	0.2012	0.7819
AGHS2	AGHS3	0.9738	0.3935	36	2.47	0.0182	0.1588
AGHS2	AGHS4	0.9021	0.3935	36	2.29	0.0278	0.2235
AGHS3	AGHS4	-0.07171	0.3935	36	-0.18	0.8564	1.0000

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Tukey Grouping for Family Least Squares Means (Alpha=0.05)		
LS-means with the same letter are not significantly different.		
Family	**Estimate**	
AGHS2	3.8349	A
		A
AGHS1	3.4452	A
		A
AGHS4	2.9327	A
		A
AGHS3	2.8610	A
AGH25	1.5226	B
		B
AGH2	1.4396	B