```
TITLE "BLOCOS AUMENTADOS";OPTIONS PS=64 LS=78 NO DATE PAGENO=1;
DATA BLOCOAU;
INPUT XouC X$ C$ TRAT$ BLOCO$ RESP;
CARDS;
1     0     A     A     1     128
1     0     A     A     2     120
1     0     A     A     3     130
1     0     A     A     4     116
1     0     B     B     1     110
1     0     B     B     2     112
1     0     B     B     3     121
1     0     B     B     4     102
1     0     C     C     1     122
1     0     C     C     2     131
1     0     C     C     3     145
1     0     C     C     4     133
2     D     0     D     1     129
2     E     0     E     1     112
2     F     0     F     1     156
2     G     0     G     2     129
2     H     0     H     2     154
2     I     0     I     2     165
2     J     0     J     3     131
2     K     0     K     3     136
2     L     0     L     3     126
2     M     0     M     4     111
2     N     0     N     4     131
2     P     0     P     4     134
;
PROC PRINT; RUN;
*COM TRAT FIXO;
PROC GLM;CLASS BLOCO TRAT;MODEL RESP= BLOCO TRAT;RANDOM
BLOCO/TEST;LSMEANS TRAT;RUN;

PROC MIXED;CLASS TRAT BLOCO;MODEL RESP=TRAT;RANDOM BLOCO;LSMEANS TRAT;
RUN;
* PROC GLM REALIZA ANALISE INTRABLOCOS;* PROC MIXED INCORPORA INFORMACAO
INTERBLOCOS;

*INCORPORANDO CONTRASTES;

PROC GLM;CLASS BLOCO XouC X C;MODEL RESP = BLOCO XouC C(XouC)
X(XouC);RANDOM BLOCO/TEST;
LSMEANS XouC  C(XouC) X(XouC);RUN;
*XouC = CONTRASTA COMUNS VERSUS DEMAIS;
*C(XouC) = Testa Igualdade dos  COMUNS ;
*X(XouC) = TESTA IGUALDADE DOS DEMAIS;
* Esses programas foram adaptados, com modificações ,  a partir de
"SCOTT, R. A. & MILLIKEN. G. A.A SAS program for analysing augmented
randomized complete block designs.Crop Sci. v.33, p.865-867, 1993";

* Uma tendência atual é considerar  tratamentos X aleatórios e avaliar a
predição,em lugar das médias, conforme a seguir;
PROC MIXED;CLASS BLOCO XouC X C;MODEL RESP = BLOCO XouC C(XouC);RANDOM
X(XouC)/SOLUTION;RUN;
```

Class Level Information

Class	Levels	Values
BLOCO	4	1 2 3 4
XouC	2	1 2
X	13	0 D E F G H I J K L M N P
C	4	0 A B C

Number of Observations Read 24
Number of Observations Used 24

BLOCOS AUMENTADOS
The GLM Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	17	5172.500000	304.264706	9.34	0.0056
Error	6	195.500000	32.583333		
Corrected Total	23	5368.000000			

R-Square	Coeff Var	Root MSE	RESP Mean
0.963580	4.442164	5.708181	128.5000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
BLOCO	3	676.000000	225.333333	6.92	0.0225
XouC	1	864.000000	864.000000	26.52	0.0021
C(XouC)	2	930.500000	465.250000	14.28	0.0052
X(XouC)	11	2702.000000	245.636364	7.54	0.0109

Source	DF	Type III SS	Mean Square	F Value	Pr > F
BLOCO	3	387.000000	129.000000	3.96	0.0715
XouC	1	864.000000	864.000000	26.52	0.0021
C(XouC)	2	930.500000	465.250000	14.28	0.0052
X(XouC)	11	2702.000000	245.636364	7.54	0.0109

BLOCOS AUMENTADOS

The GLM Procedure

Source	Type III Expected Mean Square
BLOCO	Var(Error) + 3 Var(BLOCO)
XouC	Var(Error) + Q(XouC,C(XouC),X(XouC))
C(XouC)	Var(Error) + Q(C(XouC))
X(XouC)	Var(Error) + Q(X(XouC))

BLOCOS AUMENTADOS

The GLM Procedure

Tests of Hypotheses for Mixed Model Analysis of Variance

Dependent Variable: RESP

	Source	DF	Type III SS	Mean Square	F Value	Pr > F
	BLOCO	3	387.000000	129.000000	3.96	0.0715
*	XouC	1	864.000000	864.000000	26.52	0.0021
	C(XouC)	2	930.500000	465.250000	14.28	0.0052
	X(XouC)	11	2702.000000	245.636364	7.54	0.0109
	Error: MS(Error)	6	195.500000	32.583333		

* This test assumes one or more other fixed effects are zero.

BLOCOS AUMENTADOS

Least Squares Means

Xou C	RESP LSMEAN
1	122.500000
2	134.500000

C	Xou C	RESP LSMEAN
A	1	123.500000
B	1	111.250000
C	1	132.750000
0	2	134.500000

X	Xou C	RESP LSMEAN
0	1	122.500000
D	2	131.500000
E	2	114.500000
F	2	158.500000
G	2	130.500000
H	2	155.500000
I	2	166.500000
J	2	121.500000
K	2	126.500000
L	2	116.500000
M	2	116.500000
N	2	136.500000
P	2	139.500000

,

BLOCOS AUMENTADOS

The Mixed Procedure

Model Information

Data Set	WORK.BLOCOAU
Dependent Variable	RESP
Covariance Structure	Variance Components
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information

Class	Levels	Values
BLOCO	4	1 2 3 4
XouC	2	1 2
X	13	0 D E F G H I J K L M N P
C	4	0 A B C

Dimensions

Covariance Parameters	2
Columns in X	11
Columns in Z	13
Subjects	1
Max Obs per Subject	24

Number of Observations

Number of Observations Read	24
Number of Observations Used	24
Number of Observations Not Used	0

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	146.22931784	
1	2	140.61330956	0.00086486
2	1	140.56064365	0.00003358
3	1	140.55875895	0.00000006
4	1	140.55875580	0.00000000

Covariance Parameter Estimates

Cov Parm	Estimate
X(XouC)	257.99
Residual	33.2386

Note que **HERDABILIDADE= 257.99/(257.99 33.2386)**

BLOCOS AUMENTADOS

The Mixed Procedure

Fit Statistics

-2 Res Log Likelihood	140.6
AIC (Smaller is Better)	144.6
AICC (Smaller is Better)	145.4
BIC (Smaller is Better)	145.7

Solution for Random Effects

Effect	X	Xou C	Estimate	Std Err Pred	DF	t Value	Pr > |t|
X(XouC)	0	1	5.5E-14	16.0619	6	0.00	1.0000
X(XouC)	D	2	-2.6878	7.3718	6	-0.36	0.7279
X(XouC)	E	2	-17.7476	7.3718	6	-2.41	0.0528
X(XouC)	F	2	21.2305	7.3718	6	2.88	0.0281
X(XouC)	G	2	-5.0257	7.3718	6	-0.68	0.5208
X(XouC)	H	2	17.1209	7.3718	6	2.32	0.0592
X(XouC)	I	2	26.8655	7.3718	6	3.64	0.0108
X(XouC)	J	2	-10.3365	7.3718	6	-1.40	0.2104
X(XouC)	K	2	-5.9072	7.3718	6	-0.80	0.4535
X(XouC)	L	2	-14.7658	7.3718	6	-2.00	0.0920
X(XouC)	M	2	-15.6128	7.3718	6	-2.12	0.0785
X(XouC)	N	2	2.1045	7.3718	6	0.29	0.7849
X(XouC)	P	2	4.7621	7.3718	6	0.65	0.5422

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
BLOCO	3	6	3.60	0.0852
XouC	1	11	0.51	0.4920
C(XouC)	2	6	14.00	0.0055