```
data example;
input  Amount Fat $ ;
datalines;
264 fat1
272 fat1
268 fat1
277 fat1
290 fat1
276 fat1
278 fat2
291 fat2
297 fat2
282 fat2
285 fat2
277 fat2
275 fat3
286 fat3
278 fat3
271 fat3
263 fat3
276 fat3
255 fat4
266 fat4
249 fat4
264 fat4
270 fat4
268 fat4
;
proc glm;
      class Fat;
      model Amount=Fat;
      means Fat/ bon lsd scheffe tukey cldiff;
   run;
```

The SAS System

The GLM Procedure

Class Level Information		
Class	Levels	Values
Fat	4	fat1 fat2 fat3 fat4

Number of Observations Read	24
Number of Observations Used	24

The SAS System

The GLM Procedure

Dependent Variable: Amount

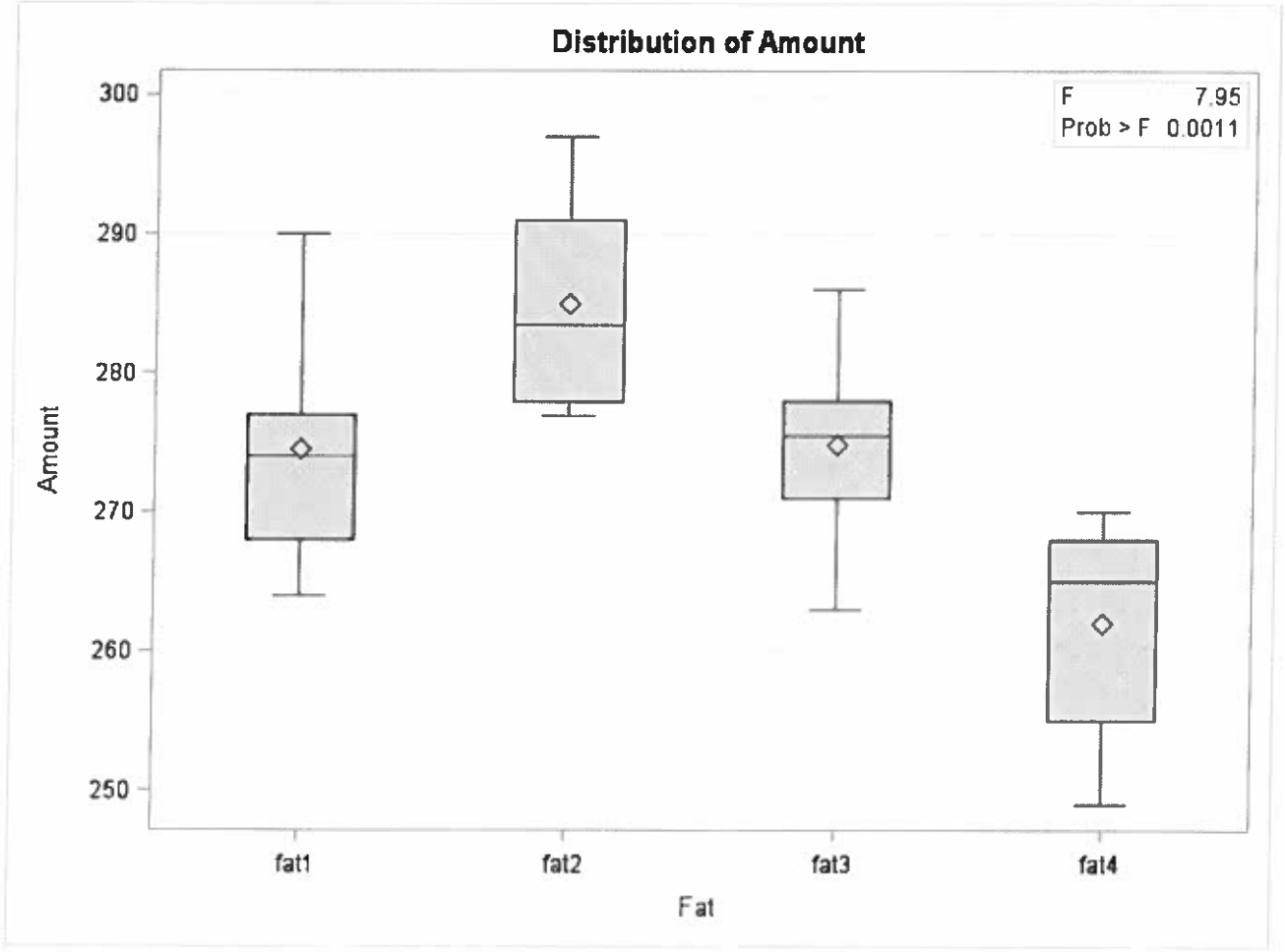
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1595.500000	531.833333	7.95	0.0011
Error	20	1338.333333	66.916667		
Corrected Total	23	2933.833333			

R-Square	Coeff Var	Root MSE	Amount Mean
0.543828	2.984589	8.180261	274.0833

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Fat	3	1595.500000	531.833333	7.95	0.0011

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Fat	3	1595.500000	531.833333	7.95	0.0011

Contrast	DF	Contrast SS	Mean Square	F Value	Pr > F
fat1 vs fat2	1	330.7500000	330.7500000	4.94	0.0379
fat1 vs fat2, fat3 and fat4	1	1.3888889	1.3888889	0.02	0.8869
fat1 and fat2 vs fat3 and fat4	1	770.6666667	770.6666667	11.52	0.0029


Distribution of Amount
F 7.95
Prob > F 0.0011
300
290
280
270
260
250
Amount
fat1
fat2
fat3
fat4
Fat

```
input Amount Fat $ ;
datalines;
264 fat1
272 fat1
268 fat1
277 fat1
290 fat1
276 fat1
278 fat2
291 fat2
297 fat2
282 fat2
285 fat2
277 fat2
275 fat3
286 fat3
278 fat3
271 fat3
263 fat3
276 fat3
255 fat4
266 fat4
249 fat4
264 fat4
270 fat4
268 fat4
;
proc glm;
      class Fat;
      model Amount=Fat;
contrast 'fat1 vs fat2' Fat 1 -1 0 0;
contrast 'fat1 vs fat2, fat3 and fat4' Fat 3 -1 -1 -1;
contrast 'fat1 and fat2 vs fat3 and fat4' Fat 1 1 -1 -1;
   run;
```

The SAS System

The GLM Procedure

Class Level Information		
Class	Levels	Values
Fat	4	fat1 fat2 fat3 fat4

Number of Observations Read	24
Number of Observations Used	24

The SAS System

The GLM Procedure

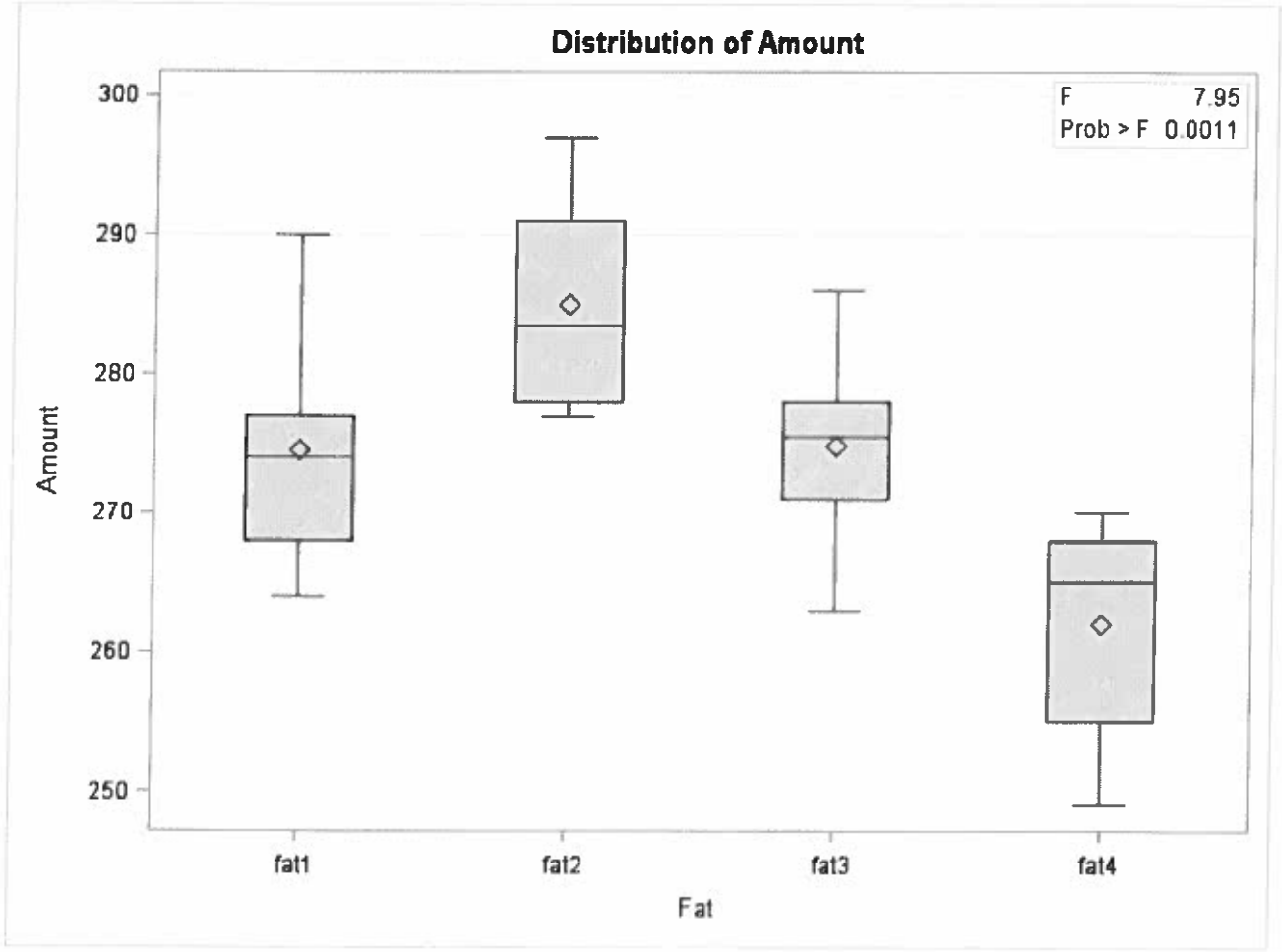
Dependent Variable: Amount

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1595.500000	531.833333	7.95	0.0011
Error	20	1338.333333	66.916667		
Corrected Total	23	2933.833333			

R-Square	Coeff Var	Root MSE	Amount Mean
0.543828	2.984589	8.180261	274.0833

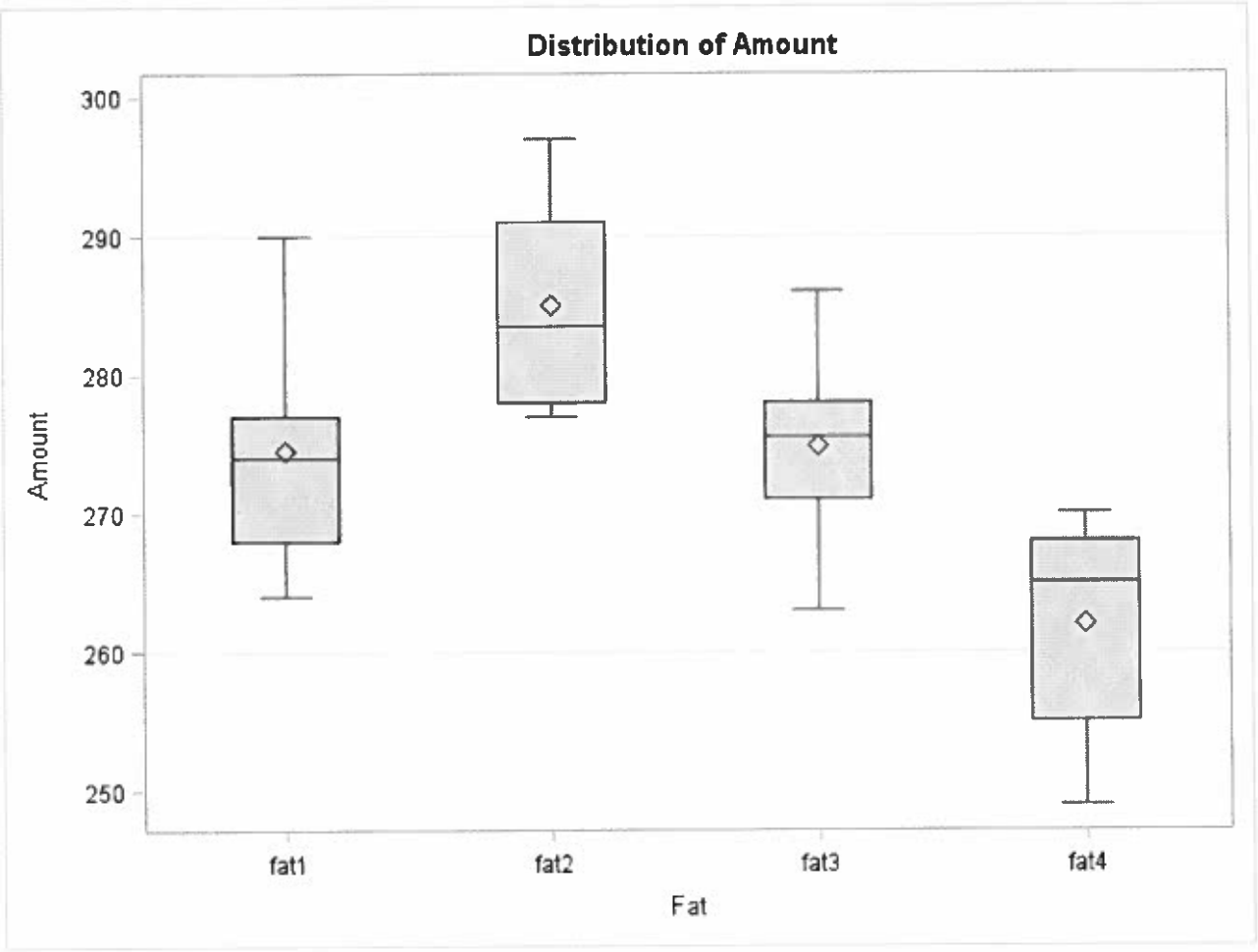
Source	DF	Type I SS	Mean Square	F Value	Pr > F
Fat	3	1595.500000	531.833333	7.95	0.0011

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Fat	3	1595.500000	531.833333	7.95	0.0011


Distribution of Amount
F 7.95
Prob > F 0.0011
300
290
280
270
260
250
Amount
fat1
fat2
fat3
fat4
Fat

The SAS System

The GLM Procedure



The SAS System

The GLM Procedure

t Tests (LSD) for Amount

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	20
Error Mean Square	66.91667
Critical Value of t	2.08596
Least Significant Difference	9.8517

Comparisons significant at the 0.05 level are indicated by *.**

Fat Comparison	Difference Between Means	95% Confidence Limits		
fat2 - fat3	10.167	0.315	20.018	***
fat2 - fat1	10.500	0.648	20.352	***
fat2 - fat4	23.000	13.148	32.852	***
fat3 - fat2	-10.167	-20.018	-0.315	***
fat3 - fat1	0.333	-9.518	10.185	
fat3 - fat4	12.833	2.982	22.685	***
fat1 - fat2	-10.500	-20.352	-0.648	***
fat1 - fat3	-0.333	-10.185	9.518	
fat1 - fat4	12.500	2.648	22.352	***
fat4 - fat2	-23.000	-32.852	-13.148	***
fat4 - fat3	-12.833	-22.685	-2.982	***
fat4 - fat1	-12.500	-22.352	-2.648	***

The SAS System

The GLM Procedure

Tukey's Studentized Range (HSD) Test for Amount

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	20
Error Mean Square	66.91667
Critical Value of Studentized Range	3.95825
Minimum Significant Difference	13.219

Comparisons significant at the 0.05 level are indicated by *.**

Fat Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
fat2 - fat3	10.167	-3.052	23.386	
fat2 - fat1	10.500	-2.719	23.719	
fat2 - fat4	23.000	9.781	36.219	***
fat3 - fat2	-10.167	-23.386	3.052	
fat3 - fat1	0.333	-12.886	13.552	
fat3 - fat4	12.833	-0.386	26.052	
fat1 - fat2	-10.500	-23.719	2.719	
fat1 - fat3	-0.333	-13.552	12.886	
fat1 - fat4	12.500	-0.719	25.719	
fat4 - fat2	-23.000	-36.219	-9.781	***
fat4 - fat3	-12.833	-26.052	0.386	
fat4 - fat1	-12.500	-25.719	0.719	

The SAS System

The GLM Procedure

Bonferroni (Dunn) t Tests for Amount

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than Tukey's for all pairwise comparisons.

Alpha	0.05
Error Degrees of Freedom	20
Error Mean Square	66.91667
Critical Value of t	2.92712
Minimum Significant Difference	13.824

Comparisons significant at the 0.05 level are indicated by *.**

Fat Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
fat2 - fat3	10.167	-3.658	23.991	
fat2 - fat1	10.500	-3.324	24.324	
fat2 - fat4	23.000	9.176	36.824	***
fat3 - fat2	-10.167	-23.991	3.658	
fat3 - fat1	0.333	-13.491	14.158	
fat3 - fat4	12.833	-0.991	26.658	
fat1 - fat2	-10.500	-24.324	3.324	
fat1 - fat3	-0.333	-14.158	13.491	
fat1 - fat4	12.500	-1.324	26.324	
fat4 - fat2	-23.000	-36.824	-9.176	***
fat4 - fat3	-12.833	-26.658	0.991	
fat4 - fat1	-12.500	-26.324	1.324	

The SAS System

The GLM Procedure

Scheffe's Test for Amount

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than Tukey's for all pairwise comparisons.

Alpha	0.05
Error Degrees of Freedom	20
Error Mean Square	66.91667
Critical Value of F	3.09839
Minimum Significant Difference	14.399

Comparisons significant at the 0.05 level are indicated by *.**

Fat Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
fat2 - fat3	10.167	-4.232	24.566	
fat2 - fat1	10.500	-3.899	24.899	
fat2 - fat4	23.000	8.601	37.399	***
fat3 - fat2	-10.167	-24.566	4.232	
fat3 - fat1	0.333	-14.066	14.732	
fat3 - fat4	12.833	-1.566	27.232	
fat1 - fat2	-10.500	-24.899	3.899	
fat1 - fat3	-0.333	-14.732	14.066	
fat1 - fat4	12.500	-1.899	26.899	
fat4 - fat2	-23.000	-37.399	-8.601	***
fat4 - fat3	-12.833	-27.232	1.566	
fat4 - fat1	-12.500	-26.899	1.899	