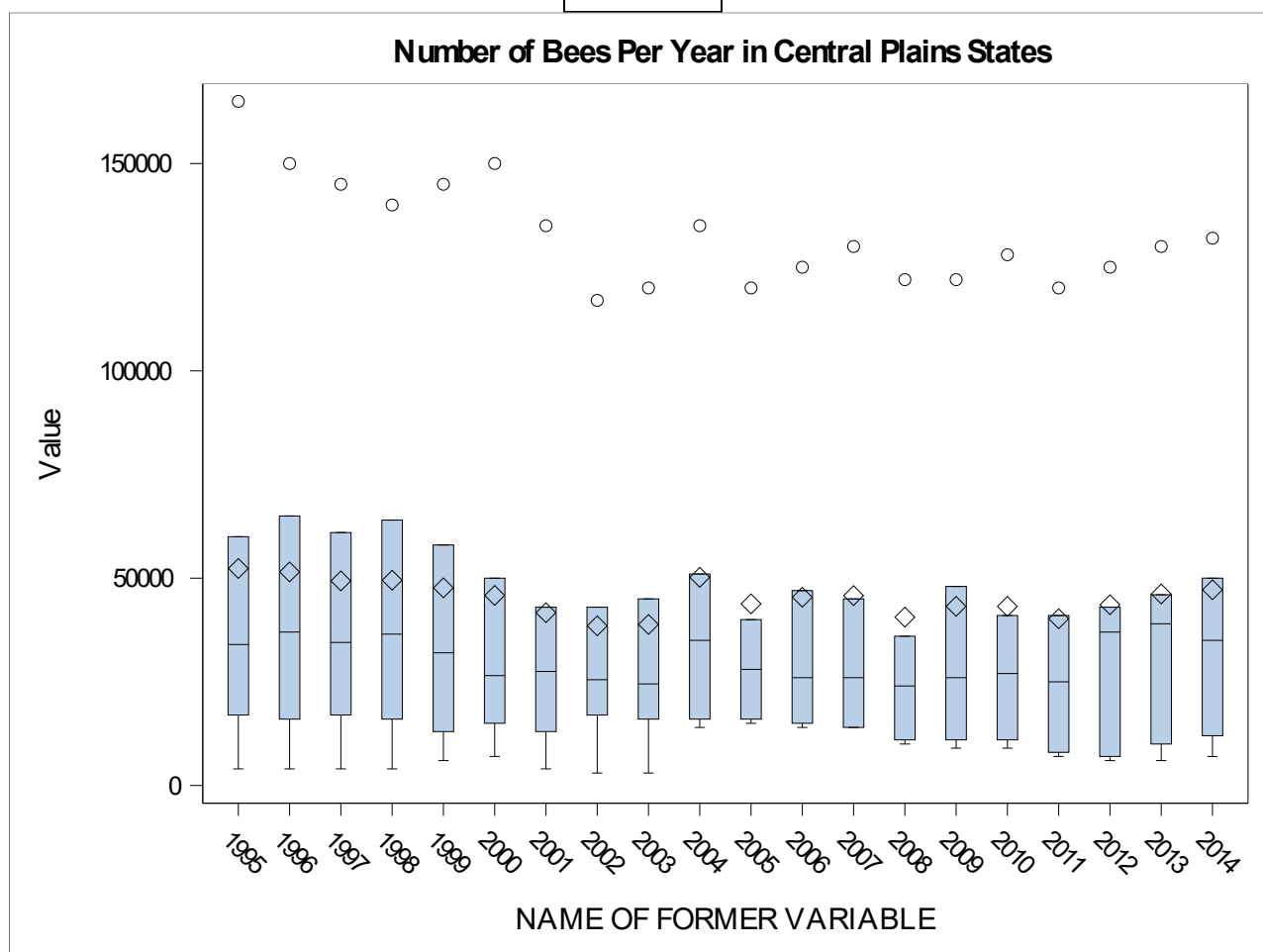


Part 1C Plot:



Exercise 2.

The CLUSTER Procedure Ward's Minimum Variance Cluster Analysis

Eigenvalues of the Covariance Matrix				
	Eigenvalue	Difference	Proportion	Cumulative
1	7853.54187	6890.10250	0.7989	0.7989
2	963.43938	429.66835	0.0980	0.8969
3	533.77103	303.43881	0.0543	0.9512
4	230.33222	50.50585	0.0234	0.9746
5	179.82637	109.92771	0.0183	0.9929
6	69.89865	69.89865	0.0071	1.0000
7	0.00000	0.00000	0.0000	1.0000
8	0.00000	0.00000	0.0000	1.0000
9	0.00000	0.00000	0.0000	1.0000
10	0.00000	0.00000	0.0000	1.0000
11	0.00000	0.00000	0.0000	1.0000
12	0.00000	0.00000	0.0000	1.0000
13	0.00000	0.00000	0.0000	1.0000
14	-0.00000	0.00000	-0.0000	1.0000
15	-0.00000	0.00000	-0.0000	1.0000
16	-0.00000	0.00000	-0.0000	1.0000
17	-0.00000	0.00000	-0.0000	1.0000
18	-0.00000	0.00000	-0.0000	1.0000
19	-0.00000	0.00000	-0.0000	1.0000
20	-0.00000		-0.0000	1.0000

Root-Mean-Square Total-Sample Standard Deviation	22.17071
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Root-Mean-Square Distance Between Observations	140.2199
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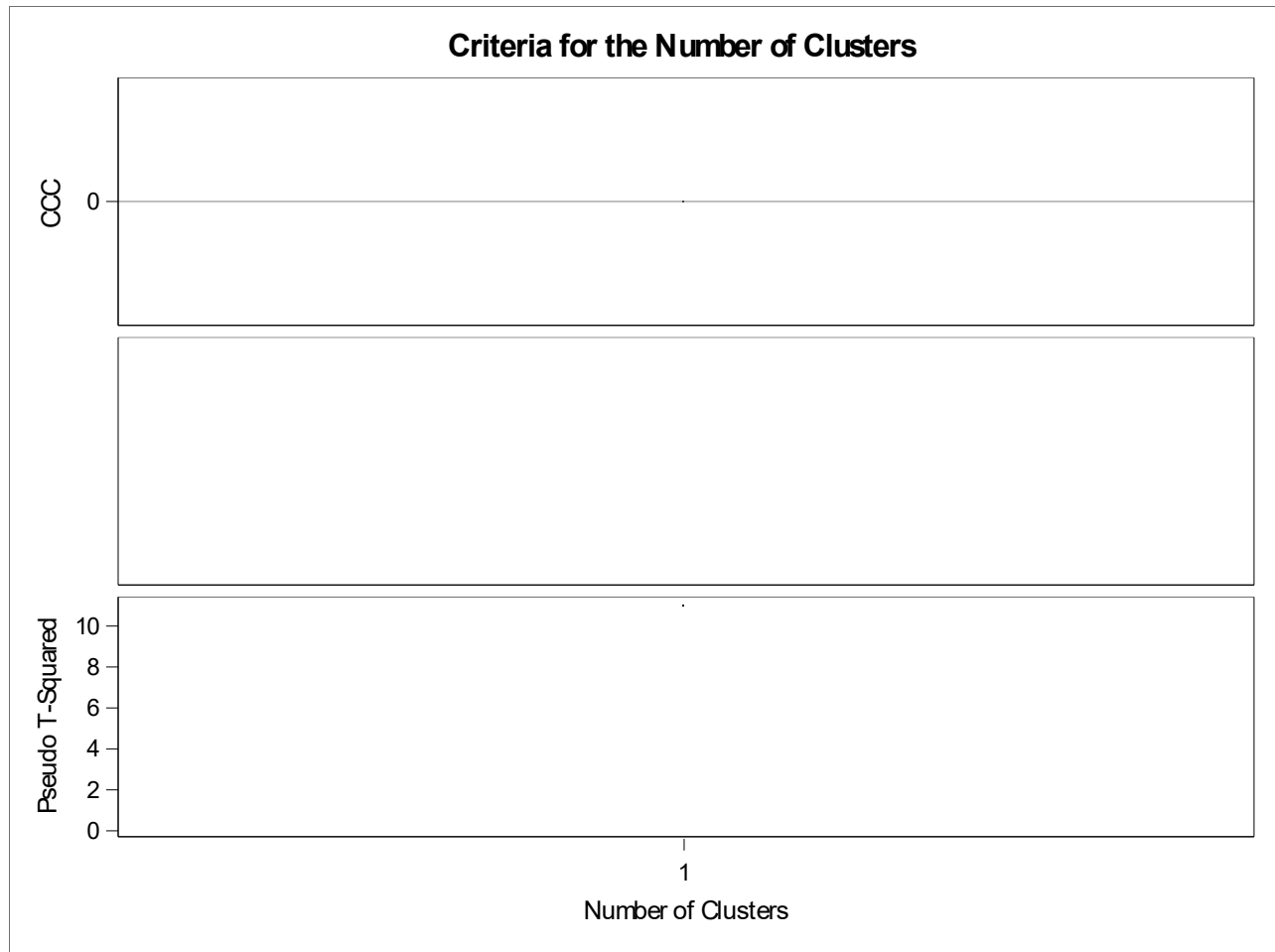
Cluster History							
Number of Clusters	Clusters Joined		Freq	Semipartial R-Square	R-Square	Approximate Expected R-Square	Cubic Clustering Criterion
6	MINNESOTA	NEBRASKA	2	0.0224	.978	.	.
5	KANSAS	MISSOURI	2	0.0329	.945	.	.
4	IOWA	CL6	3	0.0440	.901	.	.
3	CL4	CL5	5	0.0894	.811	.	.

Exercise 2.

The CLUSTER Procedure
Ward's Minimum Variance Cluster Analysis

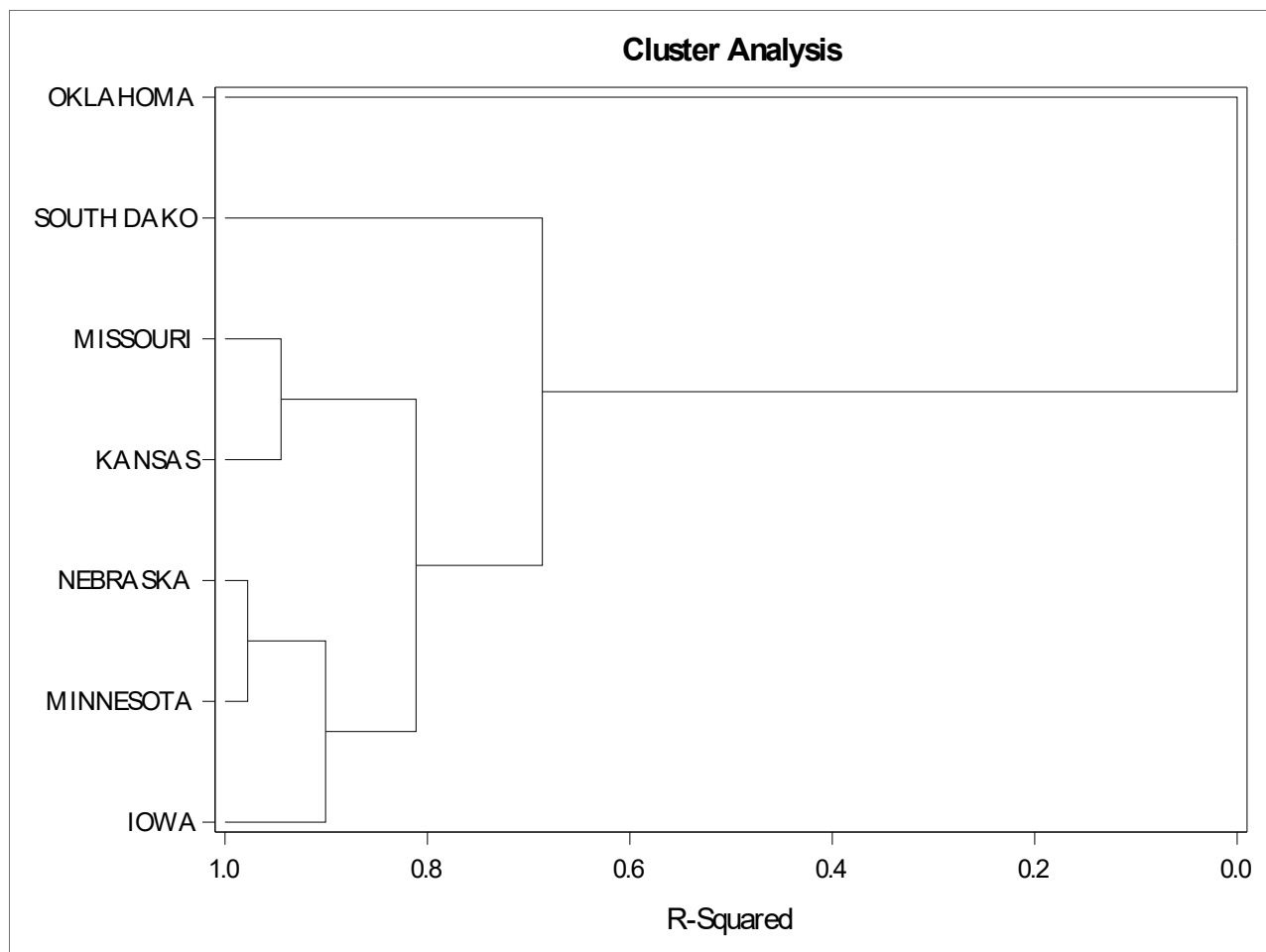
Cluster History							
Number of Clusters	Clusters Joined		Freq	Semipartial R-Square	R-Square	Approximate Expected R-Square	Cubic Clustering Criterion
2	CL3	SOUTH DAKO	6	0.1248	.686	.	.
1	CL2	OKLAHOMA	7	0.6865	.000	.000	0.00

Cluster History					
Number of Clusters	Clusters Joined		Pseudo F Statistic	Pseudo t-Squared	Tie
6	MINNESOTA	NEBRASKA	8.7	.	
5	KANSAS	MISSOURI	8.5	.	
4	IOWA	CL6	9.1	2.0	
3	CL4	CL5	8.6	2.7	
2	CL3	SOUTH DAKO	10.9	2.6	
1	CL2	OKLAHOMA	.	10.9	

Exercise 2.***The CLUSTER Procedure***
Ward's Minimum Variance Cluster Analysis

Exercise 2.

The CLUSTER Procedure
Ward's Minimum Variance Cluster Analysis



Exercise 3.

Obs	Rotation	Fertilizer	_TYPE_	_FREQ_	Mean_CarbonLoss	SD_CarbonLoss	Count_CarbonLoss
1	C-C	HNPK	3	3	-0.25333	0.17542	3
2	C-C	NPK	3	3	-0.16967	0.08686	3
3	C-C	none	3	3	-0.16867	0.12956	3
4	C-O(S)	HNPK	3	3	-0.35633	0.08041	3
5	C-O(S)	NPK	3	3	-0.13600	0.12905	3
6	C-O(S)	none	3	3	-0.19233	0.12629	3
7	C-O-H	HNPK	3	3	-0.34000	0.14509	3
8	C-O-H	NPK	3	3	-0.11433	0.15929	3
9	C-O-H	none	3	3	-0.18267	0.20373	3

Exercise 3.

H Statistic:

H_Val

8.3068783

P value:

ChiSquared_PDF

0.0938051

Is the combination of fertilizer and crop rotation predictive of carbon loss?

Answer: No, as a chi square test shows the H statistic for this study to have a P value of .09 which is too high to be statistically significant (threshold being .05).

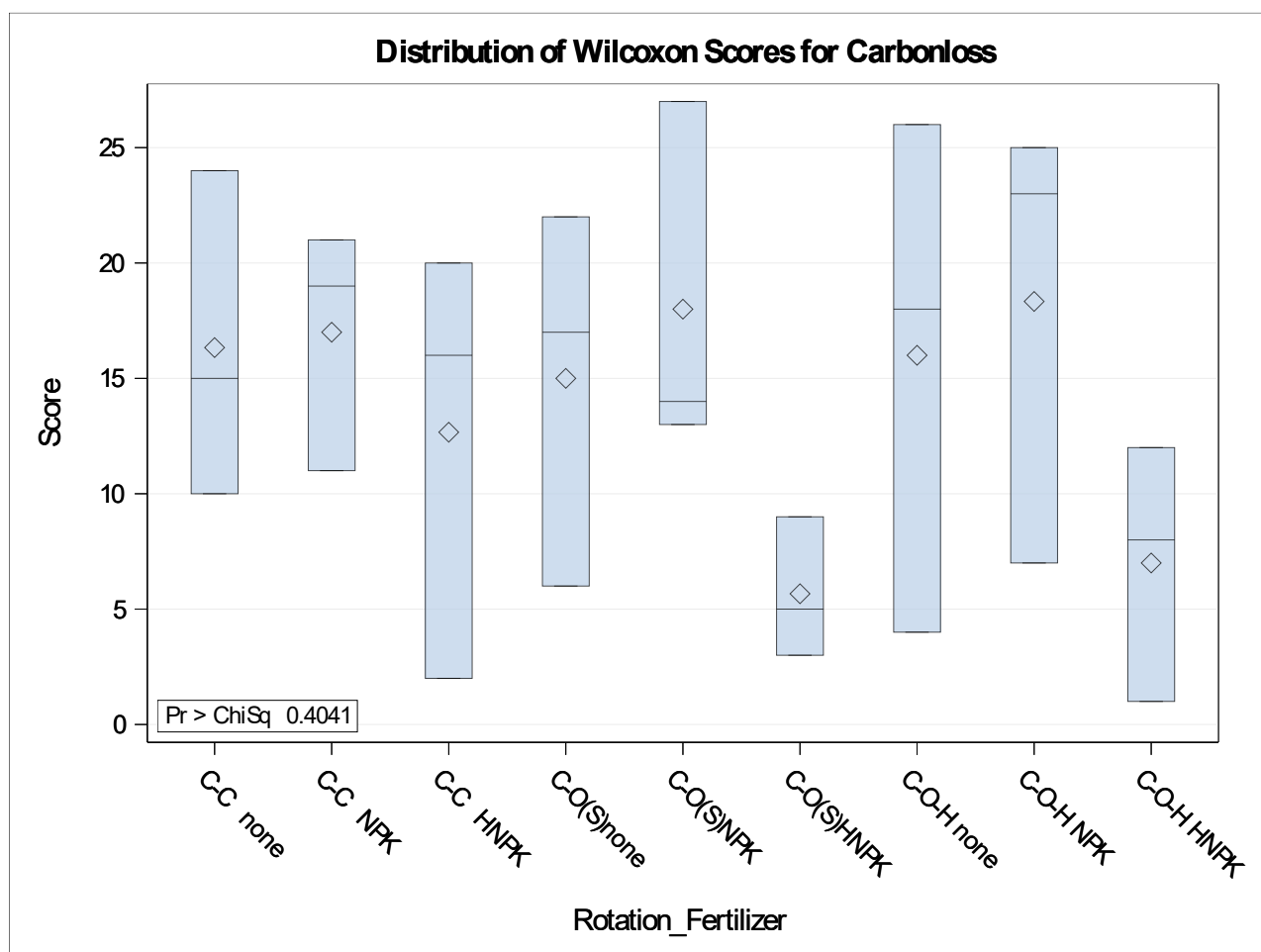
Kruskal Test Function Results:

Exercise 3.

The NPARIWAY Procedure

Wilcoxon Scores (Rank Sums) for Variable Carbonloss Classified by Variable Rotation_Fertilizer					
Rotation_Fertilizer	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C-C none	3	49.0	42.0	12.961481	16.333333
C-C NPK	3	51.0	42.0	12.961481	17.000000
C-C HNPK	3	38.0	42.0	12.961481	12.666667
C-O(S)none	3	45.0	42.0	12.961481	15.000000
C-O(S)NPK	3	54.0	42.0	12.961481	18.000000
C-O(S)HNPK	3	17.0	42.0	12.961481	5.666667
C-O-H none	3	48.0	42.0	12.961481	16.000000
C-O-H NPK	3	55.0	42.0	12.961481	18.333333
C-O-H HNPK	3	21.0	42.0	12.961481	7.000000

Kruskal-Wallis Test		
Chi-Square	DF	Pr > ChiSq
8.3069	8	0.4041

*Exercise 3.**The NPARIWAY Procedure*

Exercise 4

Number of rows:

Finish_19_val_Rows
156

No null Finish values detected by this frequency function:

Exercise 4

The FREQ Procedure

Finish_18	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	5	3.21	5	3.21
2	5	3.21	10	6.41
3	7	4.49	17	10.90
4	7	4.49	24	15.38
5	4	2.56	28	17.95
6	5	3.21	33	21.15
7	5	3.21	38	24.36
8	6	3.85	44	28.21
cons 12	19	12.18	63	40.38
cons 16	19	12.18	82	52.56
cons 24	35	22.44	117	75.00
cons 32	35	22.44	152	97.44
cons 33	4	2.56	156	100.00

Finish_19	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	6	3.85	6	3.85
2	9	5.77	15	9.62
3	8	5.13	23	14.74
4	8	5.13	31	19.87
5	7	4.49	38	24.36
6	6	3.85	44	28.21
7	6	3.85	50	32.05
8	6	3.85	56	35.90
cons 12	22	14.10	78	50.00
cons 16	21	13.46	99	63.46
cons 24	26	16.67	125	80.13
cons 32	30	19.23	155	99.36
cons 33	1	0.64	156	100.00

Exercise 4

Contingency Table:

Weight for 2018 vs Weight for 2019

The FREQ Procedure

Table of Weight_18 by Weight_19											
Weight_18	Weight_19										
Frequency Percent Row Pct Col Pct	125	133	141	149	157	165	174	184	197	285	Total
125	16	2	0	0	0	0	0	0	0	0	18
	10.26	1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.54
	88.89	11.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	88.89	11.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
133	2	15	5	0	0	0	0	0	0	0	22
	1.28	9.62	3.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.10
	9.09	68.18	22.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	11.11	88.24	27.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
141	0	0	11	4	0	0	0	0	0	0	15
	0.00	0.00	7.05	2.56	0.00	0.00	0.00	0.00	0.00	0.00	9.62
	0.00	0.00	73.33	26.67	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	61.11	22.22	0.00	0.00	0.00	0.00	0.00	0.00	
149	0	0	2	12	3	0	0	0	0	0	17
	0.00	0.00	1.28	7.69	1.92	0.00	0.00	0.00	0.00	0.00	10.90
	0.00	0.00	11.76	70.59	17.65	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	11.11	66.67	25.00	0.00	0.00	0.00	0.00	0.00	
157	0	0	0	2	9	2	0	0	0	0	13
	0.00	0.00	0.00	1.28	5.77	1.28	0.00	0.00	0.00	0.00	8.33
	0.00	0.00	0.00	15.38	69.23	15.38	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	11.11	75.00	11.11	0.00	0.00	0.00	0.00	
165	0	0	0	0	0	15	1	0	0	0	16
	0.00	0.00	0.00	0.00	0.00	9.62	0.64	0.00	0.00	0.00	10.26
	0.00	0.00	0.00	0.00	0.00	93.75	6.25	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	83.33	6.25	0.00	0.00	0.00	
174	0	0	0	0	0	1	15	1	0	0	17
	0.00	0.00	0.00	0.00	0.00	0.64	9.62	0.64	0.00	0.00	10.90
	0.00	0.00	0.00	0.00	0.00	5.88	88.24	5.88	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	5.56	93.75	7.69	0.00	0.00	
184	0	0	0	0	0	0	0	10	2	0	12
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.41	1.28	0.00	7.69
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83.33	16.67	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	76.92	13.33	0.00	
197	0	0	0	0	0	0	0	2	13	0	15
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	8.33	0.00	9.62
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.33	86.67	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.38	86.67	0.00	
285	0	0	0	0	0	0	0	0	0	11	11
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.05	7.05
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
Total	18	17	18	18	12	18	16	13	15	11	156
	11.54	10.90	11.54	11.54	7.69	11.54	10.26	8.33	9.62	7.05	100.00

Weight for 2018 vs Weight for 2019

The FREQ Procedure

Table of Weight_18 by Weight_19											
Weight_18	Weight_19										
Frequency	125	133	141	149	157	165	174	184	197	285	Total
125	16	2	0	0	0	0	0	0	0	0	18
133	2	15	5	0	0	0	0	0	0	0	22
141	0	0	11	4	0	0	0	0	0	0	15
149	0	0	2	12	3	0	0	0	0	0	17
157	0	0	0	2	9	2	0	0	0	0	13
165	0	0	0	0	0	15	1	0	0	0	16
174	0	0	0	0	0	1	15	1	0	0	17
184	0	0	0	0	0	0	0	10	2	0	12
197	0	0	0	0	0	0	0	2	13	0	15
285	0	0	0	0	0	0	0	0	0	11	11
Total	18	17	18	18	12	18	16	13	15	11	156

Weight for 2018 vs Weight for 2019

How many wrestlers changed weight classes?

Answer: According to my results, 127 of the 156 wrestlers who qualified for both tournaments stayed in the same weight class while 29 changed weight classes.

Weight for 2018 vs Weight for 2019

The NPARIWAY Procedure

Wilcoxon Scores (Rank Sums) for Variable Weight_19 Classified by Variable Weight_18					
Weight_18	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
125	18	206.00	1413.00	179.303142	11.444444
133	22	646.50	1727.00	195.333101	29.386364
141	15	739.50	1177.50	165.450198	49.300000
149	17	1071.50	1334.50	174.881539	63.029412
157	13	1007.50	1020.50	155.114287	77.500000
165	16	1497.00	1256.00	170.269207	93.562500
174	17	1859.00	1334.50	174.881539	109.352941
184	12	1516.00	942.00	149.549159	126.333333
197	15	2042.00	1177.50	165.450198	136.133333
285	11	1661.00	863.50	143.678720	151.000000
Average scores were used for ties.					

Kruskal-Wallis Test		
Chi-Square	DF	Pr > ChiSq
151.4499	9	<.0001

*Weight for 2018 vs Weight for 2019**The NPARIWAY Procedure*