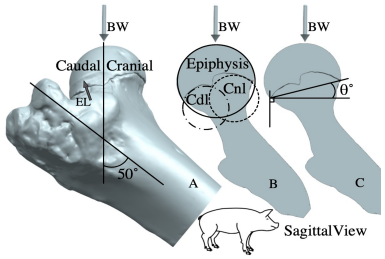
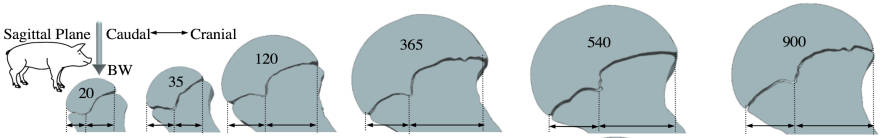
Sagittal Plane Epiphyseal Cupping Radii [mm]

Age [Days]	Epiphysis	Caudal	Cranial	Difference
120 1R	13.8	5.9	10.3	4.4
120 2R	12.75	5.65	12.2	6.55
120 3R	14.45	6.45	11.6	5.15
120 4R	14.3	11.2	11.35	0.15
1201L	13.9	5.5	10.25	4.75
120 2L	12.7	5.15	11.75	6.6
120 3L	14.2	7.05	11.2	4.15
120 4L	14.1	7.1	12.4	5.3
Mean	13.78	6.75	11.38	4.63
SD	0.68	1.93	0.79	2.02

Age [Days]	Epiphysis	Caudal	Cranial	Difference
900 1R	19.45	11.75	12.75	1
900 2R	18.2	8.15	11.3	3.15
900 3R	19.05	11.5	14.45	2.95
9001L	19.35	9.9	12.7	2.8
900 2L	17.85	10.55	11.8	1.25
900 3L	19.3	10.25	15.65	5.4
Mean	18.87	10.35	13.11	2.76
SD	0.67	1.29	1.65	1.58





Epiphyseal Articular Radius 120 to 900 Days

Test For Normality 120 Days

Descriptive Statistics — Box Plot: 2.2

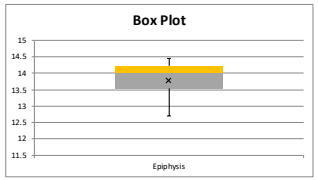
	Epiphysis		*Epiphysis*
Mean	13.775	Min	12.7
Standard Erro	0.24053512	Q1-Min	0.8375
Median	14	Med-Q1	0.4625
Mode	#N/A	Q3-Med	0.225
Standard Dev	0.68033605	Max-Q3	0.225
Sample Varia	0.46285714	Mean	13.775
Kurtosis	-0.4719929		
Skewness	-1.0608864	Min	12.7
Range	1.75	Q1	13.5375
Maximum	14.45	Median	14
Minimum	12.7	Q3	14.225
Sum	110.2	Max	14.45
Count	8	Mean	13.775
Geometric M	13.7598878		
Harmonic Me	13.7443705	Grand Min	0
AAD	0.525		
MAD	0.25	Outliers	None
IQR	0.6875		

Shapiro-Wilk Test

	Epiphysis
W-stat	0.820500426
p-value	0.047232276
alpha	0.05
normal	no

d'Agostino-Pearson

DA-stat	2.091273051
p-value	0.35146803
alpha	0.05
normal	yes



Test For Normality 900 Days

Descriptive Statistics — Box Plot: 2.2

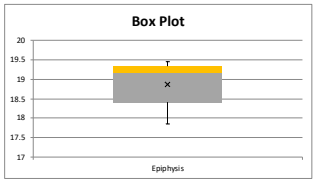
	Epiphysis		*Epiphysis*
Mean	18.8666667	Min	17.85
Standard Erro	0.27527764	Q1-Min	0.5625
Median	19.175	Med-Q1	0.7625
Mode	#N/A	Q3-Med	0.1625
Standard Dev	0.67428975	Max-Q3	0.1125
Sample Varia	0.45466667	Mean	18.8666667
Kurtosis	-1.2633687		
Skewness	-0.9278526	Min	17.85
Range	1.6	Q1	18.4125
Maximum	19.45	Median	19.175
Minimum	17.85	Q3	19.3375
Sum	113.2	Max	19.45
Count	6	Mean	18.8666667
Geometric M	18.8564708		
Harmonic Me	18.8461245	Grand Min	0
AAD	0.56111111		
MAD	0.225	Outliers	None
IQR	0.925		

Shapiro-Wilk Test

	Epiphysis
W-stat	0.83000458
p-value	0.107499425
alpha	0.05
normal	yes

d'Agostino-Pearson

DA-stat	1.731987814
p-value	0.420633274
alpha	0.05
normal	yes



Epiphyseal Articular Radius 120 to 900 Days

Mann-Whitney Test for Two Independent Samples

	Epiphysis	Epiphysis	Difference
count	6	8	
median	19.175	14	5.175
rank sum	69	36	
U	0	48	

	one tail	two tail
alpha	0.05	
U	0	
mean	24	
std dev	7.74596669	ties
z-score	3.09838668	
effect r	0.82807867	
U-crit	11.2590186	8.81818426
p-value	0.00097289	0.00194577
sig (norm)	yes	yes
U-crit	10	7
sig (table)	yes	yes
p-value	0.000333	0.000666
sig (exact)	yes	yes

Calculate the 95% CI

Hodges-Lehmann estimation for the difference betweenpopulation medians (m-n) table

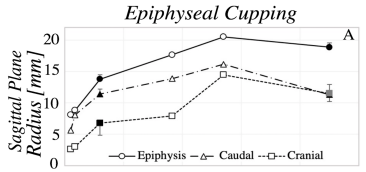
	19.45	18.2	19.05	19.35	17.85	19.3
13.8	5.65	4.4	5.25	5.55	4.05	5.5
12.75	6.7	5.45	6.3	6.6	5.1	6.55
14.45	5	3.75	4.6	4.9	3.4	4.85
14.3	5.15	3.9	4.75	5.05	3.55	5
13.9	5.55	4.3	5.15	5.45	3.95	5.4
12.7	6.75	5.5	6.35	6.65	5.15	6.6
14.2	5.25	4	4.85	5.15	3.65	5.1
14.1	5.35	4.1	4.95	5.25	3.75	5.2

Calculate the 95% CI 1

alpha	0.05	
U-crit	8	MWINV(alpha, n2, n1)
alpha	0.04262404	MWDIST(U-crit, n1, n2)
lower	4.00	SMALL(F9:P20, U-crit)
upper	6.30	LARGE(F9:P20, U-Crit)
median	5.15	MEDIAN(F9:F20)
U-crit+	9	U-crit+1
alpha	0.05927406	MWDIST(U-crit+, n1, n2)
lower	4.05	SMALL(F9:P20, U-crit+)
upper	5.65	LARGE(F9:P20, U-Crit+)

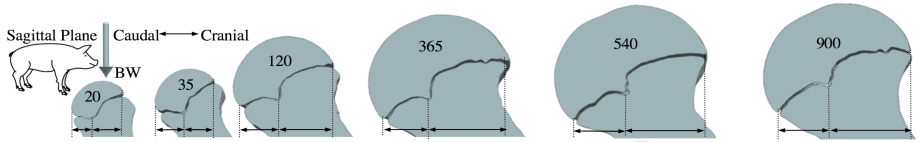
95% CI = [4.0, 6.30]

Effect size Choen's *d* score		Effect size Choen's *r* score	
0.2	Small	0.1	Small
0.5	Medium	0.3	Medium
0.8	Large	0.5	Large



The average radius of epiphyseal articular curvature increased from 120-days-old (*Mdn* = 14.0 mm) to 900-days-old (*Mdn* = 19.2 mm).
A Mann-Whitney test indicated this difference (5.18 mm) was statistically significant, 95% CI [4.0, 6.30], $U(n_{120} = 6, N_{120} = 8) = 0$, $z = 3.10$, $P < .001$, with a large effect size ($r = .82$).

Report sample size in caption and just the U stat in the sentence



Cranial Radius vs Caudal Radius 120 Days

Descriptive Statistics — Box Plot: 2.2

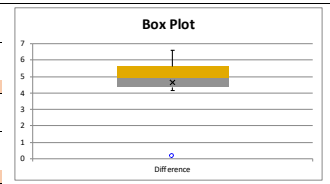
	Difference		*Difference*
Mean	4.63125	Min	4.15
Standard Erro	0.71532569	Q1-Min	0.1875
Median	4.95	Med-Q1	0.6125
Mode	#N/A	Q3-Med	0.6625
Standard Dev	2.0232466	Max-Q3	0.9875
Sample Varia	4.09352679	Mean	4.63125
Kurtosis	3.94259656		
Skewness	-1.7243893	Min	4.15
Range	6.45	Q1	4.3375
Maximum	6.6	Median	4.95
Minimum	0.15	Q3	5.6125
Sum	37.05	Max	6.6
Count	8	Mean	4.63125
Geometric M	3.33633189		
Harmonic Me	0.9959576	Grand Min	0
AAD	1.2984375		
MAD	#NAME?	Outliers	0.15
IQR	#NAME?		

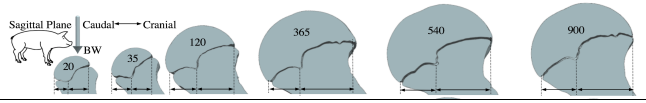
Shapiro-Wilk Test

	Difference
W-stat	#NAME?
p-value	#NAME?
alpha	0.05
normal	#NAME?

d'Agostino-Pearson

DA-stat	#NAME?
p-value	#NAME?
alpha	0.05
normal	#NAME?





Cranial Radius vs Caudal Radius 120 Days

Wilcoxon Signed-Rank Test for Paired Samples

	Caudal	Cranial
median	6.175	11.475
count	8	5.3
# unequal	8	
T+	#NAME?	
T-	#NAME?	
T	#NAME?	

	one tail	two tail
alpha	0.05	
mean	18	
std dev	#NAME?	ties
z-score	#NAME?	
effect r	#NAME?	
T-crit	#NAME?	#NAME?
p-value	#NAME?	#NAME?
sig (norm)	#NAME?	#NAME?
T-crit	#NAME?	#NAME?
sig (table)	no	no
p-value	#NAME?	#NAME?
sig (exact)	#NAME?	#NAME?

Hodges-Lehmann estimation for the difference betweenpopulation medians

Walsh Averages (row+column)/2

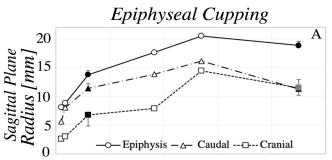
	4.4	6.55	5.15	0.15	4.75	6.6	4.15	5.3
4.4	4.4	5.475	4.775	2.275	4.575	5.5	4.275	4.85
6.55		6.55	5.85	3.35	5.65	6.575	5.35	5.925
5.15			5.15	2.65	4.95	5.875	4.65	5.225
0.15				0.15	2.45	3.375	2.15	2.725
4.75					4.75	5.675	4.45	5.025
6.6						6.6	5.375	5.95
4.15							4.15	4.725
5.3								5.3

Calculate the 95% CI 2

alpha	0.05	
T-crit	3	SRINV(alpha, N)
alpha	0.0390625	SRDIST(T-crit, N)
lower	2.275	SMALL(H7:V21,T-crit)
upper	6.55	LARGE(H7:V21,T-crit)
median	4.9	MEDIAN(H7:V21)
T-crit+	4	T-crit + 1
alpha	0.0546875	SRDIST(T-crit+, N)
lower	2.45	SMALL(H7:V21,T-crit+)
upper	5.95	LARGE(H7:V21,T-crit+)

The 95%CI for the median is:
95%CI = [2.23, 6.55]

Effect size Choen's *d* score		Effect size Choen's *r* score	
0.2	Small	0.1	Small
0.5	Medium	0.3	Medium
0.8	Large	0.5	Large



The 120-day-old average radius of epiphyseal cupping cranial (*Mdn* = 11.48 mm) with respect to the tubercle was larger than cupping caudal (*Mdn* = 6.18 mm) to the tubercle.
A Wilcoxon signed-rank test indicated this difference (5.30 mm) was statistically significant, 95% CI [2.28, 6.55], $T = 0$, $z = 2.52$ $P = .008$, with a large effect size ($r = .63$).

Cranial Radius vs Caudal Radius 900 Days

Descriptive Statistics

	Difference
Mean	2.75833333
Standard Erro	0.646454
Median	2.875
Mode	#N/A
Standard Dev	1.58348245
Sample Varia	2.50741667
Kurtosis	0.81528662
Skewness	0.72792332
Range	4.4
Maximum	5.4
Minimum	1
Sum	16.55
Count	6
Geometric M	2.36645942
Harmonic Me	2.0008194
AAD	1.08888889
MAD	0.95
IQR	1.4625

Box Plot

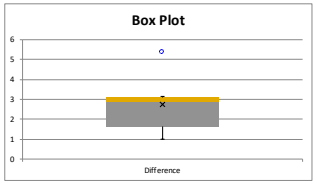
	Difference
Min	1
Q1-Min	0.6375
Med-Q1	1.2375
Q3-Med	0.225
Max-Q3	0.05
Mean	2.75833333
Min	1
Q1	1.6375
Median	2.875
Q3	3.1
Max	3.15
Mean	2.75833333
Grand Min	0
Outliers	5.4

Shapiro-Wilk Test

	Difference
W-stat	0.908912697
p-value	0.429281882
alpha	0.05
normal	yes

d'Agostino-Pearson

DA-stat	0.961169746
p-value	0.618421588
alpha	0.05
normal	yes



Cranial Radius vs Caudal Radius 900 Days

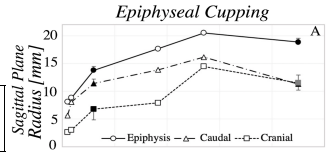
T Test: Two Paired Samples

SUMMARY			Alpha	0.05	Hyp Mean Di	0		
Groups	*Count*	*Mean*	*Std Dev*	*Std Err*	*t*	*df*	*Cohen d*	*Effect r*
Cranial	6	13.1083333	1.64542294					
Caudal	6	10.35	1.29421791					
Difference	6	2.75833333	1.58348245	0.646454	4.26686713	5	1.74194121	0.88574258

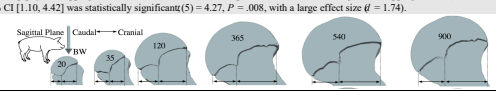
T TEST

	p-value	*t-crit*	*lower*	*upper*	*sig*
One Tail	0.00398126	2.01504837			yes
Two Tail	0.00796252	2.57058184	1.09657042	4.42009625	yes

Effect size	Effect size
Choen's *d* score	Choen's *r* score
0.2 Small	0.1 Small
0.5 Medium	0.3 Medium
0.8 Large	0.5 Large



The 900-day-old average radius of epiphyseal cupping caudal (13.12 ± 1.65 mm) with respect to the tubercle was larger than cupping cranial (10.35 ± 1.29 mm) to the tubercle.
This difference (2.75 mm), 95% CI [1.10, 4.42] was statistically significant ($t(5) = 4.27$, $P = .008$, with a large effect size ($t = 1.74$).



Cranial Radius 120 to 900 Days

Test For Normality 120 Days

Descriptive Statistics

	Caudal
Mean	6.75
Standard Erro	0.6834785
Median	6.175
Mode	#N/A
Standard Dev	1.93316912
Sample Varia	3.73714286
Kurtosis	4.9969618
Skewness	2.11369187
Range	6.05
Maximum	11.2
Minimum	5.15
Sum	54
Count	8
Geometric M	6.55634725
Harmonic Me	6.40261672
AAD	1.275
MAD	0.775
IQR	1.45

Box Plot

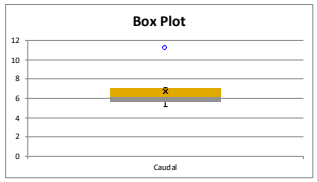
	Caudal
Min	5.15
Q1-Min	0.4625
Med-Q1	0.5625
Q3-Med	0.8875
Max-Q3	0.0375
Mean	6.75
Min	5.15
Q1	5.6125
Median	6.175
Q3	7.0625
Max	7.1
Mean	6.75
Grand Min	0
Outliers	11.2

Shapiro-Wilk Test

	Caudal
W-stat	0.754570414
p-value	0.009175086
alpha	0.05
normal	no

d'Agostino-Pearson

DA-stat	19.28426614
p-value	6.49344E-05
alpha	0.05
normal	no



Test For Normality 900 Days

Descriptive Statistics

	Caudal
Mean	10.35
Standard Erro	0.52836225
Median	10.4
Mode	#N/A
Standard Dev	1.29421791
Sample Varia	1.675
Kurtosis	1.00016307
Skewness	-0.894991
Range	3.6
Maximum	11.75
Minimum	8.15
Sum	62.1
Count	6
Geometric M	10.2782097
Harmonic Me	10.2019979
AAD	0.91666667
MAD	0.8
IQR	1.275

Box Plot

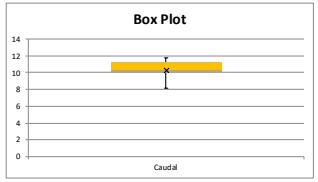
	Caudal
Min	8.15
Q1-Min	1.8375
Med-Q1	0.4125
Q3-Med	0.8625
Max-Q3	0.4875
Mean	10.35
Min	8.15
Q1	9.9875
Median	10.4
Q3	11.2625
Max	11.75
Mean	10.35
Grand Min	0
Outliers	

Shapiro-Wilk Test

	Caudal
W-stat	0.92965276
p-value	0.577422978
alpha	0.05
normal	yes

d'Agostino-Pearson

DA-stat	1.451520176
p-value	0.483956579
alpha	0.05
normal	yes



Caudal Radius 120 to 900 Days

Mann-Whitney Test for Two Independent Samples

	Caudal	Caudal	Difference
count	6	8	
median	10.4	6.175	4.225
rank sum	65	40	
U	4	44	

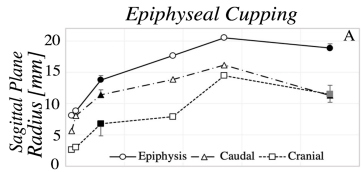
	one tail	two tail
alpha	0.05	
U	4	
mean	24	
std dev	7.74596669	ties
z-score	2.5819889	
effect r	0.69006556	
U-crit	11.2590186	8.81818426
p-value	0.00491164	0.00982327
sig (norm)	yes	yes
U-crit	10	7
sig (table)	yes	yes
p-value	0.003996	0.00799201
sig (exact)	yes	yes

Calculate the 95% CI

Hodges-Lehmann estimation for the difference betweenpopulation medians

(m-n) table

	11.75	8.15	11.5	9.9	10.55	10.25
5.9	5.85	2.25	5.6	4	4.65	4.35
5.65	6.1	2.5	5.85	4.25	4.9	4.6
6.45	5.3	1.7	5.05	3.45	4.1	3.8
11.2	0.55	-3.05	0.3	-1.3	-0.65	-0.95
5.5	6.25	2.65	6	4.4	5.05	4.75
5.15	6.6	3	6.35	4.75	5.4	5.1
7.05	4.7	1.1	4.45	2.85	3.5	3.2
7.1	4.65	1.05	4.4	2.8	3.45	3.15



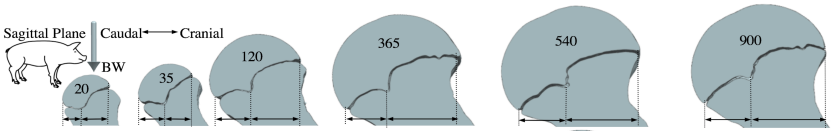
Calculate the 95% CI

alpha	0.05
U-crit	8 MWINV(alpha, n2, n1)
alpha	0.04262404 MWDIST(U-crit, n1, n2)
lower	1.10 SMALL(F9:P20, U-crit)
upper	5.60 LARGE(F9:P20, U-Crit)
median	4.30 MEDIAN(F9:F20)
U-crit+	9 U-crit+1
alpha	0.05927406 MWDIST(U-crit+, n1, n2)
lower	1.7 SMALL(F9:P20, U-crit+)
upper	5.4 LARGE(F9:P20, U-Crit+)

95% CI = [1.10, 5.60]

Effect size	Effect size
Choen's *d* score	Choen's *r* score
0.2 Small	0.1 Small
0.5 Medium	0.3 Medium
0.8 Large	0.5 Large

The average radius of epiphyseal cupping cranial with respect to the tubercle increased from 120-days-old (Mdn = 6.18 mm) to 900-days-old (Mdn = 10.4 mm).
A Mann-Whitney test indicated this difference (4.23 mm) was statistically significant, 95% CI [1.10, 5.60], U(n_{365} = 6, N_{120} = 8), $z = 2.58$, $P = .008$, with a large effect size ($r = .70$).



Caudal Radius 120 to 900 Days

Test For Normality 120 Days

Descriptive Statistics

	Cranial
Mean	11.38125
Standard Erro	0.27949851
Median	11.475
Mode	#N/A
Standard Dev	0.79054118
Sample Varia	0.62495536
Kurtosis	-0.9033142
Skewness	-0.4051989
Range	2.15
Maximum	12.4
Minimum	10.25
Sum	91.05
Count	8
Geometric M	11.3568148
Harmonic Me	11.3319993
AAD	0.60625
MAD	0.5
IQR	0.8875

Box Plot

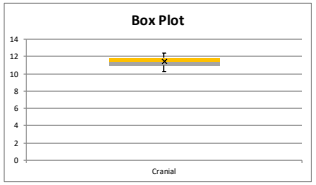
	Cranial
Min	10.25
Q1-Min	0.725
Med-Q1	0.5
Q3-Med	0.3875
Max-Q3	0.5375
Mean	11.38125
Min	10.25
Q1	10.975
Median	11.475
Q3	11.8625
Max	12.4
Mean	11.38125
Grand Min	0
Outliers	

Shapiro-Wilk Test

	Cranial
W-stat	0.925620731
p-value	0.477104801
alpha	0.05
normal	yes

d'Agostino-Pearson

DA-stat	0.662338894
p-value	0.718083482
alpha	0.05
normal	yes



Test For Normality 900 Days

Descriptive Statistics

	Cranial
Mean	13.1083333
Standard Erro	0.6717411
Median	12.725
Mode	#N/A
Standard Dev	1.64542294
Sample Varia	2.70741667
Kurtosis	-0.6500391
Skewness	0.7116371
Range	4.35
Maximum	15.65
Minimum	11.3
Sum	78.65
Count	6
Geometric M	13.0249508
Harmonic Me	12.9445709
AAD	1.29444444
MAD	1.175
IQR	2

Box Plot

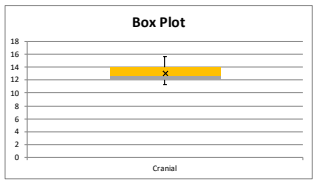
	Cranial
Min	11.3
Q1-Min	0.725
Med-Q1	0.7
Q3-Med	1.3
Max-Q3	1.625
Mean	13.1083333
Min	11.3
Q1	12.025
Median	12.725
Q3	14.025
Max	15.65
Mean	13.1083333
Grand Min	0
Outliers	

Shapiro-Wilk Test

	Cranial
W-stat	0.92845881
p-value	0.568253697
alpha	0.05
normal	yes

d'Agostino-Pearson

DA-stat	0.848440101
p-value	0.654279892
alpha	0.05
normal	yes



Cranial Radius 120 to 900 Days

T Test: Two Independent Samples

SUMMARY			Hyp Mean Di	0
Groups	*Count*	*Mean*	*Variance*	*Cohen d*
Cranial	6	13.1083333	2.70741667	
Cranial	8	11.38125	0.62495536	
Pooled		1.72708333	1.49264757	1.41362642

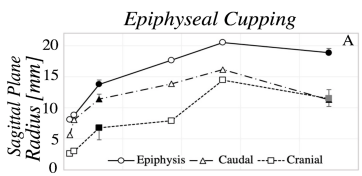
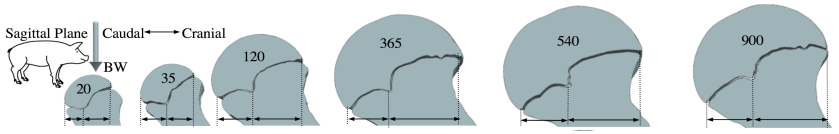
Effect size		Effect size	
Choen's *d* score		Choen's *r* score	
0.2	Small	0.1	Small
0.5	Medium	0.3	Medium
0.8	Large	0.5	Large

T TEST: Equal Variances — Alpha 0.05

	std err	*t-stat*	*df*	*p-value*	*t-crit*	*lower*	*upper*	*sig*	*effect r*
One Tail	0.65981478	2.61752751	12	0.01124362	1.78228756			yes	0.60286333
Two Tail	0.65981478	2.61752751	12	0.02248725	2.17881283	0.28947043	3.16469624	yes	0.60286333

T TEST: Unequal Variances — Alpha 0.05

	std err	*t-stat*	*df*	*p-value*	*t-crit*	*lower*	*upper*	*sig*	*effect r*
One Tail	0.72756823	2.37377508	6.73686484	0.02535271	1.90577131			yes	0.67487812
Two Tail	0.72756823	2.37377508	6.73686484	0.05070542	2.38347672	-0.0070586	3.46122527	no	0.67487812



No difference could be detected for the average raduis of cupping caudal with respect to the tubercle from 120-days-old (11.38 ± 0.79 mm) to 900-days-old (13.11 ± 1.65 mm).
The difference of 1.73 mm, 95% CI [-0.007, 3.46] was not statistically significant, $t(6.74) = 2.37$, $P = .05$, with a large effect size ($d = 1.41$).