Child / Pigeon Volume Comparison.

1. Introduction

What is the comparative volume of a five year old child in pigeons?

2. Volume measurements

In order to determine the comparative volume of a child in terms of pigeons we need some frame of reference upon which to compare them.

Neither pigeon volume, nor human volume is used very often, due to the complexity involved in measuring volume. Generally speaking weigh is a more usual value.

2.1 Volume of the human.

The average weight of a five year old child is generally agreed to be 18.4kg at a height of 109 cm.
We know that the comparison child is 108cm tall, and has not been 5 for very long.
It would be reasonable to assume an approximate weight of 18kg, both for simplicity of calculation and as a scale against the known value.

In order to derive volume from mass we would need to know the average density of a human.
Using a study of 14 subjects measured 7 times at 4 hourly intervals we can derive a mean density of 1.062 g/ cm^3 .

Subject	Density
1	1.043
2	1.06
3	1.061
4	1.085
5	1.056
6	1.052
7	1.045
8	1.059
9	1.049
10	1.066
11	1.074
12	1.074
13	1.055
14	1.088
Mean	1.061928571

[1] http://www.dtic.mil/dtic/tr/fulltext/u2/639241.pdf

This allows us to calculate our subject's volume using Mass / Density = Volume.

In this case 18000 / 1.0619 = 16950.3 cm^3

2.2 Volume of a pigeon.

Much like humans the volume of pigeons is not readily available.
Fortunately we do have data on mass and density.

Birds represent a major hazard to aircraft engines, in order to test aircraft for resiliency to bird impact chickens are commonly used. In order to determine how accurately these chicken impact tests are for modelling aircraft/bird interactions The US Department of Agriculture, Denver Wildlife Research Center collected data on 12 individuals of 12 different species.

Bird	Mass	Dry Density	Wet Density	Plucked Density
Rock Dove	323 +/- 46	0.648	0.802	0.987

The General Linear Models procedure (SAS Institute. Inc. 1988) was used to determine differences in density and feather mass among species and between sexes within species. Because the use of two or more related response variables (i.e. three measurements of density) to address a single hypothesis increases the probability of committing a type I error, the Bonferroni inequality technique was employed to ensure that the type I error rate was under .05 (Bed & Khamis 1991). To maintain this probability level, 0.05 was divided by the number of response variables (three) tested. resulting in significant differences at $P < 0.017$. If differences occurred. Tukey tests were used to determine which means differed.

https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1474-919X.1995.tb08046.x

This provides us with both mass and density for the Rock Dove (Columbia livia).

Feral pigeons (Columba livia domestica) are considered to be the same species as Rock Doves and will readily interbreed.

Using the same calculation as with our human subject we can determine average pigeon volume to be:

323 / 0.648 = 498 cm^3

3. Pigeons per child

Taking the calculated human volume and dividing by pigeon volume gives us our final value for average number of pigeons per child.

16950 cm^3 / 498 cm^3 = 34

4. Conclusions

An average 5 year old child has the same volume as 34 average pigeons.