

Determination of Average Daily Water Consumption and its Impact on Weight Gain in Captive Common Buzzards (BUTEO Buteo)

Okoli C. P.

Department of Veterinary Medicine and Surgery, Faculty of Veterinary Medicine, University of Abuja, Abuja, Nigeria
Email: Prochuks64@yahoo.co.uk, olaaiyedun@yahoo.com

Legakis, A.

Zoological Museum,
Department of Biology, University of Athens, Panepistimioupoli. GR-15784 Athens, Greece.

Aiyedun J. O.

Department of Veterinary Public Health and Preventive Medicine, University of Ilorin, Nigeria.

Abstract – This investigation was to find out whether captive common buzzards need additional drinking water to complement the water they obtain from their preslaughtered meat meals and to determine their average daily water requirements. Twenty five (25) common buzzards were studied at the wildlife hospital and rehabilitation centre Aegina, Greece which weight ranged from 498.4g to 911g. Large quantity of portable water was measured equally into same size ceramic bowls and served each bird under study in separate individual paper boxes.

At the end of 24hours, the left over water was carefully brought out and re-measured to determine the quantity the birds have consumed. A control was set with a ceramic bowl with same quantity of water put in a paper box without a bird to determine the quantity of water lost to the atmosphere through evaporation each day of the experiment. The water lost from the control on a daily basis was corrected for in determining the quantity the common buzzards consumed daily. The weight of the studied buzzards were carefully taken and recorded 6 times each during the study period with W_1 and W_6 as entry and exit weights respectively. The mean of W_1 - W_6 was used for the computation of the average percentage live body weight of the buzzards. The finding was that captive common buzzards took water every day and the average daily water consumption of 724.9g buzzard was 31.4cc or 4.3% of its live body weight.

The investigation shows that the average water lost by evaporation daily (10.7cc) and that consumed by each buzzard daily (31.4cc) add up to 5.8% equivalent of the average live body weight of the studied captive common buzzards which was 724.9g. This value is in agreement with the 10% live body weight equivalent of water suggested by Patrick Redig for raptors. Regression shows that $wt.gain/loss = 0.942 + 1.795 H_2O$. This implies that a unit increase in the average quantity of water consumed resulted in a corresponding increase of 1.795 weight gain by the captive common buzzards. This impact underscores the importance and inevitability of serving additional drinking water to captive common buzzards.

Keywords – Daily, Water, Impact, Weight Gain, Captive, Common Buzzards.

I. INTRODUCTION

Although water is not a nutrient, by definition, it is essential for all life. Water is needed for maintenance of homeostasis, intracellular and extracellular fluids, digestion and absorption, transportation of nutrients, elimination of wastes, hemopoiesis, thermoregulation,

production of hormones and enzymes. Water is a universal solvent for countless elements, organic and inorganic compounds, chemicals and contaminants.

According to a publication by Penn state extension in September 2013, many birds will eat snow in order to get sufficient water in the winter. When their normal water sources are frozen, only raptors get their moisture from their live prey. H. Russel Cross said that for animals, consuming water is more important than consuming food. J.E. Cooper (1988) stated that birds of prey with tuberculosis show chronic clinical signs, loss of weight, good appetite but may drink water in excess.

Common buzzards in the wild are known to feed on a Variety of food ranging from small rodents to small mammals, birds, reptiles, amphibians, large insects and worms. This implies that they take their animal preys whole with the entire viscera and the water there in. Since common buzzards are commonly seen in open country, it is possible that they also drink water from brooks, streams, run-off water from rains and left over from human activities.

In captivity, common buzzards are fed with dressed frozen pre-slaughtered chicken and beef. It is therefore necessary to find out how common buzzards would make up for the short fall in water following captivity, confinement and feeding of food other than what they take in the wild. The determination of the average quantity of water consumed by captive common buzzards per day is a logistic tool for conservationists, teachers of wildlife medicine researchers, ornithologists and wildlife veterinarians. The 25 buzzards were randomly picked from those that were brought into the Hellenic wildlife hospital and rehabilitation center Aegina, Greece. The birds underwent treatment and good care whilst the investigation lasted.

II. MATERIALS AND METHODS

At the beginning each common buzzard for study was carefully wrapped with clean cotton cloth and placed on electronic weighing scale to obtain its weight. After reading off and recording its weight the birds were carefully lowered into perforated paper boxes whose floor was lined with strips of paper. The paper boxes were kept on top of wooden pallets and each paper box had only one buzzard put in it for the study. They were studied in batches of 6 birds at a time.

Portable water was measured with sterile syringes severally and put into clean ceramic bowls of equal capacity and dimension. The birds were served the same quantity of water every day. Their weights were taken and recorded at fairly regular intervals for 6 times throughout the study. The relative quantity of water each bird consumed per day was obtained by deducting the quantity of water left in the ceramic bowls from what was served 24 hour ago.

In order to correct for water lost to the atmosphere through evaporation the same quantity of water served each bird each day was put in a sixth bowl of the same dimension and lowered into a paper box in the same room without a common buzzard to serve as a control. The

quantity of water left in the control bowl was measured with syringe the next day and subtracted from what was served a day before to obtain the quantity of water lost to the atmosphere through evaporation. The value obtained was corrected for before putting down the quantity of water consumed by the studied buzzards for each day.

III. RESULT

Weights (W_1 - W_6) of the Studied Common Buzzards (B_1 - B_{25}) At Regular Intervals, Their Average Weight (g) the Study Period and Their Average Daily Water Consumption (cc).

Table I: interval weight, average weight gain/loss, daily water Consumption

Buzzard	W_1 (g)	W_2 (g)	W_3 (g)	W_4 (g)	W_5 (g)	W_6 (g)	Average wt (g)	Wt. gained/lost (g)	Average qty of H ₂ O consumed per day
B ₁	911	847.5	847.5	838	829.7	829.7	855.0	-56	26.1
B ₂	845	839	867	858.5	853.5	853.9	852.8	7.8	33.9
B ₃	614.2	623	652.2	681.6	723.4	724.1	669.8	55.6	39.5
B ₄	568	636.9	721	689.3	677.2	678	661.8	93.8	33.5
B ₅	823	789.5	786	780.2	777	777.3	788.8	-34.2	26.0
B ₆	567.4	602	664.5	679	705	705.2	653.9	86.5	26.0
B ₇	498.4	523	513	521	534	536	520.9	22.5	27.3
B ₈	619	658.1	705	708.4	713.4	713.4	686.2	67.2	36.2
B ₉	731	788.5	833	845	857	856	818.4	87.4	40.5
B ₁₀	565	641.2	663	671.3	680.1	679.8	650.1	85.1	40.5
B ₁₁	831	819.8	784.5	789.1	795	797.1	802.8	-28.2	33.5
B ₁₂	568.8	573	579.1	578.5	578.1	582	576.6	7.8	30.7
B ₁₃	673.2	679	693.4	693.8	695	696.7	688.5	15.3	32.2
B ₁₄	601.5	619	630	635.2	638	643.7	627.9	26.4	33.4
B ₁₅	550	630.2	639	641.9	644.8	646	625.3	75.3	28.7
B ₁₆	669	720.5	727	759	801.2	803.1	746.6	77.6	29.0
B ₁₇	731.8	720	709	697	688.5	689	705.9	25.9	28.6
B ₁₈	767.5	811	835.5	843	850	852.4	826.6	59.1	34.7
B ₁₉	637.8	621	603	598	597.1	597.5	784.1	146.3	29.5
B ₂₀	694	759.1	803.3	849	885	885.9	812.7	118.7	34.7
B ₂₁	790.4	941.3	948.5	946	939	943	918	127.6	29.9
B ₂₂	568	579.5	603.2	627.5	647	646.1	611.9	43.9	29.7
B ₂₃	695.8	763	875	861.5	865.4	865.7	818.0	122.2	21.0
B ₂₄	598.5	629.8	658.1	662.7	667	668	647.3	48.8	25.6
B ₂₅	620	721.4	818	819.8	823.4	829.4	772.0	152.0	35.4
Average	669.5	702.5	725.6	731	738.6	740.0	724.9	57.4	31.4

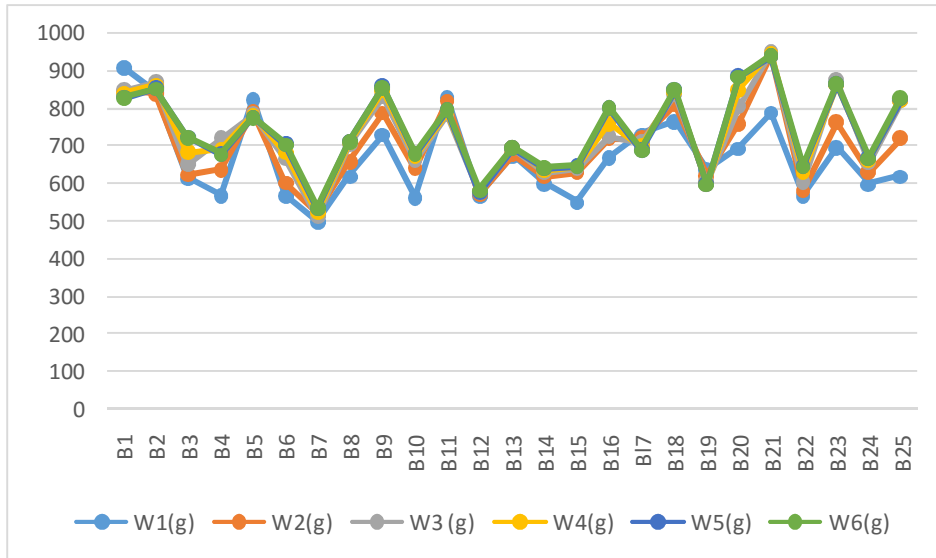


Fig.I. Graph of common buzzard and their weekly interval weights (g)

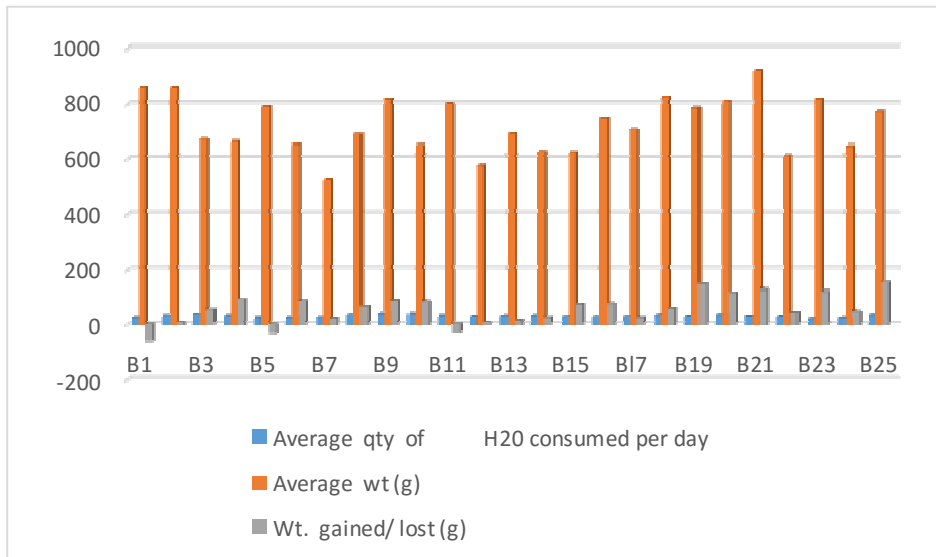


Fig.II. Graph of average weight (g), average qty. of H₂O consumed per day and weight gained/lost (g)

Table II: Anova Table of the Weight (g) of Common Buzzards

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1612598.018 ^a	29	55606.828	48.006	.000
Intercept	77289115.042	1	77289115.042	66724.526	.000
Weight	94080.164	5	18816.033	16.244	.000
Buzzards	1518517.853	24	63271.577	54.623	.000
Error	138999.771	120	1158.331		
Total	79040712.830	150			
Corrected Total	1751597.788	149			

a. R Squared = .921 (Adjusted R Squared = .901)

There is significant difference between the weights (g) at 0.05 level of significance.

Table III: Duncan Multiple Range Test Table

Weight	N	Subset		
		1	2	3
weight1	25	669.5720		
weight2	25		701.4520	
weight3	25			726.3520
weight4	25			730.9720
weight5	25			738.5920
weight6	25			739.9600
Sig.		1.000	1.000	.203

Means for groups in homogeneous subsets are displayed. Based on observed means.

The error term is Mean Square (Error) = 1158.331.

- a. Uses Harmonic Mean Sample Size = 25.000.
- b. Alpha = .05.

From the Duncan multiple range test weight 1 and weight2 are significantly different from every other weight at 0.05 level of significance.

Table IV: Regression Model Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	.942	73.078		.013	.990
	H20	1.795	2.297	.161	.781	.443

- a. Dependent Variable: weight gain/lost

Regression model

$$\text{Weight gain/lost} = 0.942 + 1.795H_{20}$$

I.e. a unit increase in the average quantity of water will result in corresponding increase of 1.795 weight gain in common buzzards.

IV. DISCUSSION

The computation from the controls show that the average quantity of water lost to the atmosphere daily during the study period was 10.7cc

The experiment conducted on water consumption by common buzzards show clearly that the birds require additional water supply alongside what they get from their meat meals. This is underscored by the fact that all the studied buzzards took some quantity of water every day of the study even after correcting for the water lost to the atmosphere through evaporation. This is particularly so whilst they are in captivity without access to whole live animal preys, which obviously would supply them with more water than frozen pre-slaughtered meat rations. There is no doubt that disease conditions may cause reduced food consumption by captive birds, but sick birds are known to take more water. Hamerton A.E, (1938) gave account of the death of a falconet due to impaction of the gizzard and consequent obstruction of the intestinal tract and Cooper J.E. (1955) commented that such conditions is very unlikely if the moisture content of the diet were adequate. Deprivation of water has been incriminating as a cause of visceral gout in reptiles and Cooper J.E. in his treatise believes that it is possible the same applies in birds.

After taking cognizance of invisible water lost to the atmosphere through evaporation, an average buzzard of 723.9g from the studied sample population consumed averagely 31.4cc of water per day which is 4.3% of its live body weight.

The analysis of water consumed against weight gained by the buzzards for the first 10days and another 15days gave regression coefficients of .332 and .302 respectively. The difference in the coefficient could be as a result of the buzzards adjustment to their new environment, recovery from ailments, effects of the medicaments and stress of handling and captivity.

The allometric equation to estimate the daily water consumption of birds generally as updated in 2001:-

$$\text{Bird drinking rate} = 0.059 \times (w)^{0.67}$$

Where w is weight of bird

Using the above equation a common buzzard of 724.9g will consume $0.059 \times 724.9 \times 0.67 = 28.7\text{cc}$ of water per day.

This compares very closely with the figure 31.4cc obtained from this investigation which is barely 9.4% more than the estimate obtained using the allometric equation for drinking in birds.

Captive common buzzards do not only need additional drinking water, they need it ad libitum because of the enormous role water plays in raptor diet and health. Captive common buzzards may abstain from food in a whole day but would not abstain from drinking water for a day. There is significant difference between the weights of the buzzards at 0.05 level of significance and the Duncan multiple range test show that W_1 and W_2 are significantly different from every other weight at 0.05 level of significance.

V. CONCLUSION

Captive common buzzards should be provided with clean drinking water ad libitum in so far as they are not fed with whole live preys as in free wild living. The water will augment what they get from their pre-slaughtered meat meals, reduce the stress of confinement, help them in recovery from diseases, biometabolism of drugs, excretion, homeostasis and digestion. The average daily water consumption of studied common buzzards was equivalent of 4.3% of their live body weight after correcting for the water lost to the atmosphere through evaporation. This implies that captive common buzzards should be served water equivalent to 15% of their live body weight so that even after loss by evaporation, they will still have enough water to drink, From this investigation the average water lost by evaporation daily (10.7cc) and that consumed by each buzzard daily (31.4cc) add up to 5.8% equivalent of the live body weight of the studied common captive common buzzard which was 724.9g. This value is in agreement with the 10% live body weight of water suggested by Patrick Redig for raptors.

REFERENCES

- [1] Patrick T. Redig (1993) Medical Management of Birds of Prey Pg 64, Published Raptor Centre, University of Minnesota.
- [2] J.E. Cooper (1985) Veterinary Aspects of Captive Birds of Prey pg 166, Published by the standfast press, the Old Rectory, Cherington, Tetbury, Gloucestershire.
- [3] Hamerton A.E. (1935). Report in the Deaths Occurring in society Gardens During 1937, Proceedings of the Zoological Society of London 105, 489-526.
- [4] Resource Document (1996) Update 17 Sept 2001. Water Management and Resources Division Ministry of Environment, Land and Parks, North America.
- [5] Animal Nutrition Publications
- [6] Texas A &M University
- [7] Dept of Animal Science
- [8] 33 Kleberg/2471 Tamu/college Station
- [9] Texas 77843-2471.
- [10] Cooper J.E. (1968) Tuberculosis in Birds of Prey. Veterinary Record 82 61.