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

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ABSTRACT

This experimentation is conducted to find out whether captive common buzzards need additional drinking water to complement the water they obtain from their pre-slaughtered meat meals and to determine their average daily water requirements. Twenty five common buzzards are studied at the wildlife hospital and rehabilitation centre Aegina, Greece their weight ranged from 498.4g to 911g. Large quantity of potable 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 is corrected to determine the quantity the common buzzards consumed daily. The weights of the buzzards studied 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 is that captive common buzzards took water every day and the average daily water consumption of 724.9g buzzard is 31.4cc or 4.3% of its live body weight. The investigation shows that the average water lost by evaporation daily and that consumed by each buzzard daily add up to 5.8% equivalent of the average live body weight of the studied captive common buzzards which was 724.9g. Regression shows 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*

INTRODUCTION

Although water is not a nutrient, by definition, it is an essential component of life. Generally, 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. Cooper (1985a) states that as a general rule birds of prey drink very little and therefore incorporation of a drug in drinking water is impracticable. According to Craig and Powers (1976), captive raptors occasionally drown, especially if in an aviary with an unsuitable water bowl or if due to some disability, they are unable to extricate themselves from it. In most cases, the bird is dead before it is found and at post mortem examination, the plumage is waterlogged (or matted if it has dried) and there is fluid in the lungs and air sacs. It is of interest that drowning has also been reported in free living birds of prey and the workers suggested that the raptors might have been attracted to the water by potential prey species.

When birds normal water sources are frozen, only raptors get their moisture from their live prey. Cooper (1968) stated that birds of prey with tuberculosis show chronic clinical signs, loss of weight, good appetite but may drink water in excess. Birds of prey are by definition, carnivorous. In the wild they feed upon animals ranging from grasshoppers, snails and earthworms to small gazelle (Cooper, 1975). 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, runoff water from rains and left over from human activities**.**

In captivity they are usually given meat or dead animals, mainly mammals or birds although commercial diets have been used in zoological collections. Leese (1927) reports that the Arabs fed camel ticks to their falcons. A few birds of prey will take food other than flesh, for example, the African harrier hawk will eat oil palm nuts (Brown and Amadon, 1968). 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.

MATERIALS AND METHOD

The dearth of materials on common buzzard nutrition and correlation between their daily food consumption and weight gain made the adoption of any previously documented research design impossible. However, this experiment was conducted observing standard regulations for the protection of wildlife and ensuring humane treatment and handling of the birds through out the study period. 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. At the beginning each common buzzard used for the study was carefully wrapped with clean cotton cloth and placed on electronic weighing scale to obtain its weight. After reading 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. Potable 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 hours 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 before putting down the quantity of water consumed by the studied buzzards for each day. Basic standard statistical methods were employed for the collection, collation, sorting and analysis of the data obtained from the study. Correlation, regression analysis, ANOVA, Duncan multiple range test were employed to determine the association and impact of daily water consumption by the buzzards on their weight gain.

RESULTS AND DISCUSSION

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. The computation from the controls show that the average quantity of water lost to the atmosphere daily during the study period was 10.7cc. 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 (1935) gives account of the death of a falconet due to impaction of the gizzard and consequent obstruction of the intestinal tract. Cooper (1985) comments 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. In his treaties, Cooper (1985) 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 consume an average of 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:

Bird drinking rate = 0.059 x (w) 0.67, Where w is weight of bird

Using the above equation a common buzzard of 724.9g will consume 0.059 x 724.9 x 0.67 = 28.7cc 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. 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. From the Duncan multiple range test weight 1 and weight 2 are significantly different from every other weight at 0.05 level of significance (table 3).

Table 1: 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)

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_20 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_{l7}	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

Source: Empirical Survey, 2013

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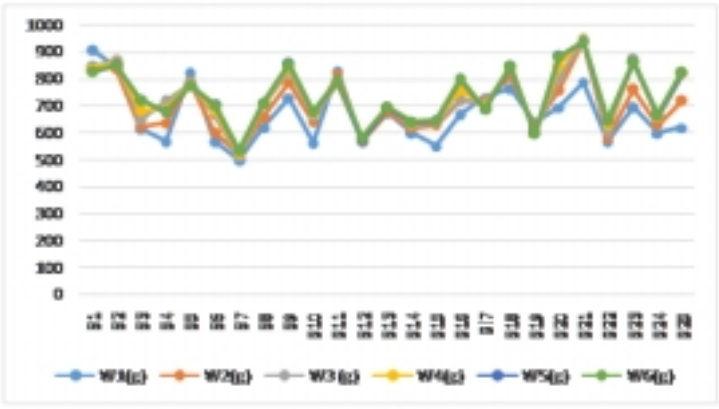

Figure 1: Graph of common buzzard and their weekly interval weights (g)

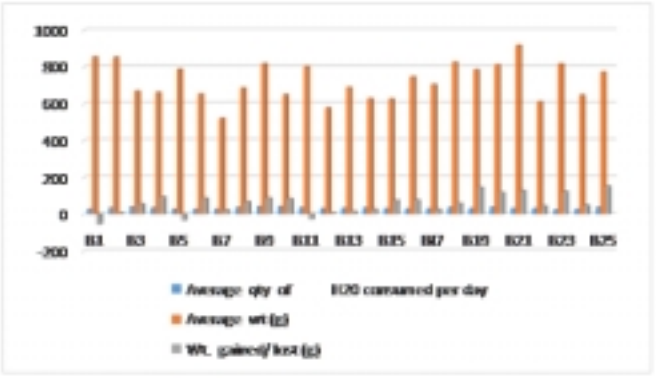

Figure 2: Graph of average weight (g), average qty. of H_20 consumed per day and weight gained/lost (g)

Table 2: 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) p > 0.05 ***Source:*** Empirical Survey, 2013

Table 3: Duncan Mulitple Range Test Table

weight	N	Subset		
		1	2	3
weight 1	25	669.5720		
weight 2	25		701.4520	
weight 3	25			726.3520
weight 4	25			730.9720
weight 5	25			738.5920
weight 6	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. ***Source:*** Empirical Survey, 2013

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Table 4: 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

Regression model

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. ***Source:*** Empirical Survey, 2013

CONCLUSION

Captive common buzzards should be provided with clean drinking water *ad libitum* 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, and help them in recovery from diseases, biometabolism of drugs, excretion, homeostasis and digestion. The average daily water consumption of the studied common buzzards was equivalent 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 captive common buzzard which was 724.9g. This value is in agreement with the 10% live body weight of water suggested by Patrick Redig (1993) for raptors.

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