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Source: Journal of Wildlife Diseases, 8(2) : 115-118

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-8.2.115

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SOME PHYSIOLOGIC BLOOD VALUES OF WILD DIVING DUCKS

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Abstract: Blood samples were obtained from 54 canvasbacks *(Aythya valisineria)*, 30 lesser scaup *(A. affinis)*, 3 ring-necks *(A. collaris)*, and 3 buffleheads *(Bucephala albeola)*, which were wintering on Chesapeake Bay. These blood samples were used for: red blood cell counts (cans. 2.56 x 10^6/mm^3; scaup 2.45 x 10^6/mm^3; ring-necks 2.50 x 10^6/mm^3; bufflehead 2.64 x 10^6/mm^3), packed cell volume (cans. 52.2%; scaup 57.1%; ring-neck 49.1%; buffleheads 54.3%), total protein (cans. 4.4 g/100 ml; scaup 4.4 g/100 ml; ring-neck 3.5 g/100 ml; bufflehead 3.8 g/100 ml), erythrocyte measurements, and electrophoretic analysis of plasma and serum. Variations between individuals of the same species and sex were slight but a possible difference between male and female erythrocyte numbers and packed cell volumes was evident in the canvasback and scaup samples.

INTRODUCTION

To properly evaluate the changes which occur in animals following exposure to infection or intoxication, one must have baseline information from healthy individuals to compare with that obtained from the affected animals. Controls serve this purpose under laboratory conditions, but when abnormal conditions arise in wild populations, information on the normal condition is difficult or impossible to obtain because of the relative unavailability of large numbers of healthy individuals.

Since little information has been published on the blood values of ducks[1,5,8] and most of this is for domestic stock, I believed that examination of a large number of wild ducks would be valuable. In March of 1971, a program was initiated to gather physiologic blood values on several species of wild diving ducks wintering on the Chesapeake Bay.

MATERIALS AND METHODS

Diving ducks were live trapped at the mouth of the Rhode River on the west shore of Chesapeake Bay. All of the ducks sampled were vigorous, in good flesh, and were capable of strong flight when released. None of the approximately 15,000 birds working the trap area appeared ill or disabled during the 4 week sampling period. Immediately after a duck was removed from the trap, 2.5 ml of blood was taken from the jugular vein by heparinized syringe and used for blood smears, red cell counts (rbc), packed cell volume (pcv), total plasma protein (T.P.) and electrophoretic analysis of plasma proteins. Erythrocyte measurements were made with a stage micrometer under the oil immersion lens (970X). Ten erythrocytes were measured from each of ten blood slides from each sex of each species. Only fully mature cells were measured to avoid variability due to size difference of erythrocytes in different growth phases.

A Coulter^R model B electronic particle counter (Coulter Electronics, Hialeah, Fla.) was used for rbc and an International micro-capillary centrifuge, model MB, was used for pcv determinations. Total protein was determined by the micro-biuret technic. Plasma and serum proteins were electrophoretically separated on Sepraphore III^R acetate strips in Gelman^R high resolution buffer at 400v for 60 minutes. The strips were stained with Ponseau S protein stain and the percent total protein was quantitated on a Densicord^R electrophoresis densitometer-552 (Photovolt Corp., N.Y., N.Y.). Duplicate samples of plasma and serum were compared to determine which band was fibrinogen and whether it masked any other protein bands.

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TABLE I. Some physiologic blood values of four species of wild diving ducks.

	erythrocytes per mm^3 X10^6	packed cell volume	total protein g/100ml	erythrocyte measurements (μ) whole cell	nucleus (X)
CANVASBACKS (56)					
M (26)	2.56±0.18[1]	51.4±2.5	4.6±0.9	(12.1-14.3)x(5.5-7.7)X=13.4x6.6	5.5x2.2
F (28)	2.56±0.16	53.1±2.7	4.2±0.9	(12.1-13.7)x(6.0-7.1)X=12.7x6.6	5.3x2.2
Sexes Combined	2.56 -	52.2 -	4.4 -		
LESSER SCAUP (30)					
M (21)	2.40±0.12	56.5±3.1	4.5±0.4	(11.5-13.2)x(7.1-8.8)X=12.6x7.7	6.0x2.0
F (9)	2.52±0.13	58.0±2.9	4.2±0.5	(12.6-14.3)x(6.6-7.7)X=13.3x7.2	6.2x2.2
Sexes Combined	2.45 -	57.1 -	4.4 -		
RING-NECK (3)					
M (2)	2.57 -	49.1 -	3.2 -		
F (1)	2.36 -	49.1 -	4.0 -		
Sexes Combined	2.50	49.1	3.6		
BUFFLEHEAD (3)					
M (2)	2.69 -	54.7 -	3.6 -		
F (1)	2.60 -	53.9 -	4.1 -		
Sexes Combined	2.64	54.3	3.8		

[1] Standard deviation.

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TABLE II. Relative and absolute plasma protein values of four species of wild diving ducks.

	% Plasma Proteins						
	g/100ml						
prealbumin	albumin	alpha-1	alpha-2	beta	fibrinogen	beta-2	gamma
CANASBACKS (56)							
15.0	48.0	2.1	2.9	11.4	10.1	4.5	5.2
0.64±.27	2.08±.58	0.08±.03	0.12±.06	0.49±.12	0.42±.19	0.19±.07	0.22±.09
LESSER SCAUP (30)							
15.6	43.9	1.5	2.3	12.7	13.9	4.3	5.3
0.64±.20	1.89±.28	0.05±.03	0.09±.04	0.53±.10	0.60±.30	0.18±.08	0.22±.11
RING-NECK (3)							
18.0	46.9	1.9	4.0	9.6	10.0	5.5	3.5
0.64	1.68	0.06	0.14	0.34	0.36	0.19	0.12
BUFFLEHEAD (3)							
16.0	48.0	1.1	3.4	13.7	13.1	2.0	2.3
0.57	1.72	0.03	0.12	0.49	0.47	0.07	0.08

RESULTS

Tables I and II summarize the values obtained for each of the four species examined (canvasbacks, lesser scaup, ring-necks, bufflehead).

A comparison of serum and plasma showed the fibrinogen band to be located between the beta and beta-2 (gamma-1 or heavy gamma) peaks. For some reason each globulin band was more distinct when plasma was used. A comparison of total protein values of plasma and serum confirmed that fibrinogen constituted approximately 10% (9-13 %) of the total plasma protein as shown in Table II.

DISCUSSION

These data should be useful in evaluating changes which occur in wild waterfowl under aberrant conditions. It must be remembered however, that these values were obtained in the winter and could differ from those obtained during the reproductive, post-reproductive or migratory seasons.[2,3,5,9] I felt that sampling ducks in mid-winter would give the least variation among individuals, since some infectious diseases which affect blood values would have been acquired by susceptible ducklings earlier in the year and would be latent or cured by this time.[6] There would also be no physiologic differences due to growth or maturation of young birds or sexual activity of adults.

Although measurements for males and females overlapped, there was a tendency toward higher rbc and pcv values among female canvasbacks and scaup. This sex difference may be valid since it has been reported for other vertebrate species.[4,9]

An interesting observation was made while examining several species of sea ducks, which are extremely difficult to trap. These were shot and blood samples taken from cripples while they were still alive. The measurements were extremely variable and it seemed probable that drastic physiologic changes had resulted from the wounding and that the values obtained were not representative of unaltered birds. It was concluded that physiologic measurements taken under similar circumstances should be viewed with some skepticism.

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Received for publication August 4, 1971

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