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Cardiac Output in Ducks.* (31521)

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Changes in arterial blood pressure, venous pressure(1,2) and regional distribution of blood flow in diving ducks(3) have been reported. Although changes in cardiac output have been inferred, based mainly on central venous pressure, right atrial pressure, and distribution of flow, no actual determinations on cardiac output have been made. The object of this experiment was to determine cardiac output of ducks restrained on their backs and not in a diving position.

Materials and methods. Cardiac outputs were determined during the summer on male and female White Pekin ducks (8-14 months of age) by the dye dilution technique adapted for the chicken(4,5), employing a densitometer and indocyanine dye. The dye was injected into the right heart by means of a catheter placed in the right wing vein and pushed near the entrance of right atrium(4). Dye concentration curves were derived from arterial blood flowing from carotid artery through a Waters densitometer and amplified and recorded on an oscilloscope (Electronics for Medicine). Blood flow was calculated from the area under the curves(4). Blood pressure was determined directly from a carotid artery by means of a Statham gauge(4). Total peripheral resistance (TPR) (in units)

was calculated by dividing mean blood pressure (mm Hg) by cardiac output (ml/min).

Results and discussion. The pertinent data are presented in Table I. The body weight of the male ducks was significantly higher than that of females, and the cardiac output per bird was likewise higher (approaching statistical significance), but not on a body weight basis, where the difference was not statistically significant. However, the actual values on a body weight basis appear to be somewhat higher than for chickens and about the same as for turkeys(6). There was no statistically significant sex difference in blood pressure and heart rates of the ducks as there is in chickens(6). This confirms the work of Ringer *et al*(7). The actual level of blood pressure of ducks is of the same magnitude as of male chickens but higher than that of female chickens. The heart rate of ducks is considerably lower than in chickens or turkeys.

Because of the higher cardiac output in relation to mean blood pressure of ducks as compared to chickens, the TPR is appreciably lower in ducks.

Summary. Cardiac output of adult White Pekin ducks restrained on their backs was determined by the dye dilution technique. Mean flows in ml/min/kg were 286.8 and 253.4 for males and females respectively, and

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TABLE I. Cardiac Output, Blood Pressure, and Heart Rate of Pekin Ducks.

	Body wt, kg	Cardiac output, ml/min		Blood pressure, mm Hg			Total peripheral resistance units, U/kg	Heart rate, beats/min
		Per bird	Per kg	Systolic	Diastolic	Mean		
Males (12)								
Mean	3.34	962.9	286.8	178.8	141.8	161.2	.5666	175
S.E.	.066	70.2	17.7	5.0	7.02	7.2	.3827	17.7
Females (9)								
Mean	3.03	751.4	253.4	168.2	133.9	147.2	.62	185
S.E.	.115	90.3	31.2	9.8	10.7	8.9	.082	17.7
Sex difference								
t	2.3*	1.9	.9	.9	.6	1.2	.13	.4

* Significant at .05 level.

the difference was not statistically significant. Total peripheral resistance in units per kg averaged 0.56 for males and 0.62 for females and the difference was not significant. It is pointed out that on a body weight basis cardiac output in ducks is higher than in chickens and of about the same magnitude as for turkeys. TPR tends to be lower in ducks than chickens.

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Antiviral Activity of N¹-Furfurylbiguanide Hydrochloride (FFB) *in vitro*. (31522)

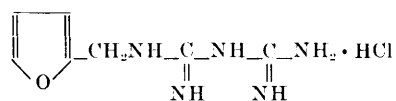
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During recent years we have been investigating the antiviral activity of many biguanide derivatives, among which several derivatives have been found to possess activity against some myxoviruses(1,2). The activity of those biguanide derivatives prompted us to investigate the antiviral activity of a new derivative of biguanide, N¹-furfurylbiguanide hydrochloride (FFB), which primarily had been shown to have a marked inhibitory effect on the plaque formation of Newcastle disease virus by the agar diffusion assay. This report describes the activity of FFB chiefly against vesicular stomatitis, polio- and myxoviruses, tested both by the drug-in-agar disc (diffu-

sion) and drug-in-agar overlay (dilution) methods.

Materials and methods. Compound. N¹-furfurylbiguanide hydrochloride (FFB) was kindly prepared and supplied by the Sumitomo Chemical Co., Ltd., Osaka. It is easily



soluble in water and its acute LD₅₀ to mice was 254 mg/kg by intraperitoneal injection.

Viruses. The Miyadera strain of Newcastle disease virus (NDV), the WSN strain of