

A MORPHOMETRIC STUDY OF THE HEART IN BROILER CHICKEN AFFECTED WITH ASCITES AND RIGHT VENTRICULAR FAILURE

S. EKANAYAKE*, N.U. HORADAGODA*, M.U. JAYASEKARA***,
P. ABEYNAYAKE* AND S.P. GUNARATNE**

*Department of Veterinary Pathobiology, **Department of Farm Animal Health and
Production, Faculty of Veterinary Medicine and Animal Science, University of Peradeniya.

*** Faculty of Agricultural Sciences, University of Sabaragamuwa

Ascites secondary to Right Ventricular Failure (ARVF) is a metabolic disorder seen in fast growing broiler chicken associated with the inability of the cardiopulmonary system to meet the high oxygen demand. The cardiac output (CO) is further increased to satisfy the requirement. Increased CO in broiler chicken commonly results in an increase in pressure in the pulmonary system resulting in pulmonary arterial hypertension (PAH). The thin-walled right ventricle (RV), which acts as a pump, hypertrophies very rapidly in response to this PAH. The ratio between RV and total ventricle (TV) mass is a more objective observation useful in assessing right ventricular hypertrophy (RVH). The RV and TV weights, in relation to live body weights and carcass weights (CW) have also been used as a measure of RVH by other workers. The objective of this study was to determine the relationship between the ratio of RV and TV, and percentages of RV/CW and TV/CW as expressions of the degree of PAH, RVH and ARVF.

Fifty-seven hearts from 38 day-old decapitated and defeathered broiler-carcasses that were affected with ARVF as assessed by the accumulation of fluid in the abdominal cavity, were collected and their CW were recorded. Twenty-eight, age and strain matched apparently normal broiler carcasses without fluid accumulation in the abdominal cavity and from similar management systems and geographical locations, served as the control group. The RV:TV ratio and percentages of RV/CW and TV/CW were computed and analyzed statistically by one-way Analysis of Variance. Observations from an earlier study suggested that a RV/TV ratio of < 0.250 was normal and those between 0.250 – 0.299 and >0.299 were indication of mild to moderate RVH and severe RVH, respectively.

In this study, the RV: TV ratio of the affected hearts (mean \pm SD; 0.443 \pm 0.107) was significantly higher ($P < 0.001$) than that of the normal hearts (mean \pm SD; 0.279 \pm 0.0.039). In the control group, percentages of hearts with RV: TV ratio of < 0.250, 0.250 - 0.299 and > 0.299 were 21.5, 50 and 28.5 respectively. In the affected carcasses, the ratio of > 0.299 and 0.250 – 0.299 were 96.5% and 3.5%, respectively. The percentage of RV/CW in the ARVF affected group (mean \pm SD; 0.199 \pm 0.1) was found to be significantly higher ($P < 0.001$) than that of the control group (mean \pm SD; 0.1 \pm 0.02). The percentage of TV/CW in the affected carcasses (mean \pm SD; 0.435 \pm 0.154) was significantly higher ($P < 0.05$) than that of the control group (mean \pm SD; 0.362 \pm 0.073). Although the above criteria reported apply to affected hearts, it does not apply to apparently normal hearts. The increase in RV mass in relation to TV mass (> 0.299); and the percentages of RV/CW and TV/CW can be used as indicators of PAH, RVH and hence ARVF in broiler-chicken.