

NON-VENTILATED HOOD TO DETERMINE THE BREATHING PATTERN IN QUAILS

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RESUMO

This work determined standard values for respiratory rate and ventilation for commercial quails. The experiment was conducted at the Laboratory of Biometeorology at the São Paulo State University, UNESP-FCAV, Jaboticabal - SP, Brazil. Forty female quails with 30 days of age were assessed - from two subspecies, Japanese with bodyweight $94.60 \pm 15g$ and European $103.87 \pm 32g$. The respiratory rate (breath min⁻¹) and minute ventilation (ml min⁻¹) were measured using a non-ventilated hood, across one minute until it was possible to collect the exhaled air, and repeated on 20 quails of each subspecies, repeated in three days at a mean ambient air temperature of 25°C (i.e., the thermoneutral zone for quails). Least squares analyses were performed to test fixed effects of quail's subspecies (Japanese or European) and body mass on the breathing pattern, and correlation analysis was performed between the breathing pattern variables and body weight. A System of Physiological Measurements for quails was developed for data collection. Through the insertion of a non-ventilated hood on the head of the quail, the air collected went through a 50ml flow head, connected to the spirometer to the measurement of respiratory functions, the volume (ml min⁻¹), and respiratory rate (breath min⁻¹). The signal was converted into numerical values by the data acquisition system (Powerlab 16/30 and LabChart Pro, ADInstruments) and a computer. The results showed that there was no statistical difference ($P = 0.6887$) for the minute ventilation in this age between subspecies (333.33 ± 95.38 and 349.44 ± 161.20 , ml min⁻¹) for Japanese and European quails, respectively. This was because at this age the general average body weight of quails was not statistically different ($P = 0.1384$). A strong correlation between minute ventilation and weight of quails ($r = 0.71$, $P < 0.0001$) was observed with an increase in minute ventilation proportional to the increase in quail weight in both subspecies. Low and negative correlations were observed between the respiratory rate and weight of quails ($r = -0.17$, $p = 0.2644$). The respiratory rate was statistically different ($P = 0.0003$) between subspecies, being higher in Japanese than in European (92.87 ± 15.89 and 74.32 ± 15.15 , breath min⁻¹). Respiratory rate had a low, positive correlation with minute ventilation ($r = 0.09$, $P = 0.5390$). Respiration is closely linked to metabolic heat production by the uptake and consumption of oxygen and production and release of carbon dioxide, thus the importance of its measurement. Besides, quail use respiratory evaporation as the most effective means of latent heat loss when environmental conditions are uncomfortable. In order to balance the body temperature during hot events, quails need to increase air flow and gas exchange rates through the respiratory tract. However, respiratory volume is similar between subspecies at this age, but it varies in accordance with bodyweight and the respiratory rate which is higher in Japanese quail than in European quail.

PALAVRAS-CHAVE: Bioclimatologia, Coturnix, physiology, poultry, respiratory volume

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