

## **PERINATAL ENERGY REGULATION OF STRUTHIONIFORMES - A COMPARATIVE STUDY OF THE NORTH ISLAND BROWN KIWI (*APTERYX MANTELLI*)**

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Birds vary to a great extent in their mode of development (e. g. altricial, precocial). Already at the time of hatching there are clear morphological and behavioural differences. This draws the attention to the phase of the embryos development inside the egg and causes the question if there are general differences in the energy budgets of bird embryos and freshly hatched chicks. In general, the large variety of egg sizes, energy contents of the eggs and the incubation times may result in different energy demands for development. It is still debated whether or not there are obvious differences between the various bird orders. Comparisons on energy deposit (spare yolk) and metabolic rate during pre- and postnatal stages may give useful insights between different developmental strategies. So, a lot of screening data are needed to clarify the basic aspects of perinatal energetics. Therefore we investigated a wide spectrum of different bird species of several orders (measured under identical experimental conditions and methods). Amongst other bird species, we worked on the Struthioniformes (ostrich *Struthio camelus*, rhea *Rhea americana*, emu *Dromaius novaehollandiae*, North Island brown kiwi *Apteryx mantelli*). They represent the largest living birds, they lay the biggest eggs and they show a very slow embryonic development (especially the kiwi has the second longest incubation time known in birds, which amount to 75-85 days). Their hatchlings are highly precocial. These outstanding characteristics make it highly interesting to look at the embryological and postnatal development of these birds with regard to the question if either the developmental parameters of the struthioniformes follow a special course or they resemble those of "normal" birds - and thus support the view of a general basic course (independent of mode of development and egg mass) more or less valid for all birds. Based on our results we found that the Struthioniformes exhibit many extraordinary characteristics in their eggs and in their incubation physiology, departing from expected values. Nevertheless, the basic parameters such as the general occurrence of a plateau phase (including relative timing and length) and the merely facultative occurrence of an internal pipping are within the normal range expected for birds in general. This also applies to the total sum of energy turnover rate during embryogeny. The high amount of spare yolk thus can serve the chick as an exclusive source of energy and material for tissue production (kiwi: 17 days).

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