

Milking the pigeon: extracting the mechanisms involved

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This is a pigeon and chick. Credit: Dr. Tamsyn Crowley

Pigeons, flamingos and male emperor penguins are all able to produce "milk" in their crop to feed their chicks. Research published in BioMed Central's open access journal *BMC Genomics* uses new technology to study the genes and proteins involved in pigeon "milk" production and shows that pigeon "milk" contains antioxidants and immune-enhancing proteins.

Production of crop milk, a secretion from the crops of parent birds, is rare among birds and, apart from [pigeons](#), is only found in flamingos and male [emperor penguins](#). Essential for the growth and development of the young pigeon squab, pigeon 'milk' is produced by both parents from

fluid-filled cells lining the crop that are rich in fat and protein. Research published in BioMed Central's open access journal [BMC Genomics](#) uses new technology to study the genes and proteins involved in pigeon 'milk' production and shows that pigeon 'milk' contains antioxidants and immune-enhancing proteins.

Researchers from CSIRO Livestock Industries and Deakin University, Australia, compared the global gene expression profiles of the crops of four 'lactating' and four 'non-lactating' female pigeons. As the pigeon genome has not yet been sequenced, they used a chicken microarray to find the genes involved. Genes predominantly over-expressed in 'lactating' birds were those involved in stimulating cell growth, producing antioxidants and in [immune response](#). They also found genes associated with triglyceride fat production, suggesting the fat in the 'milk' is derived from the pigeon's liver.

Lead author, Meagan Gillespie, says, "It is possible that if antioxidant and [immune proteins](#) are present in pigeon 'milk', they are directly enhancing the immune system of the developing squab as well as protecting the parental crop tissue". She continues, "This study has provided a snap-shot view of some of the processes occurring when 'lactation' in the pigeon crop is well established. Due to the unusual nature of 'lactation' in the pigeon it would be interesting to investigate the early stages of the differentiation and development of the crop in preparation for 'milk' production to further ascertain gene expression patterns that characterize crop development and 'lactation' in the pigeon." She concludes, "This mechanism is an interesting example of the evolution of a system with analogies to mammalian lactation, as pigeon 'milk' fulfills a similar function to mammalian milk".

More information: Histological and global gene expression analysis of the 'lactating' pigeon crop, Meagan J Gillespie, Volker R Haring, Kenneth A McColl, Paul Monaghan, John A Donald, Kevin R Nicholas,

Robert J Moore and Tamsyn M Crowley, *BMC Genomics* (in press)

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