OVERVIEW OF CROP MILK NUTRIENT COMPOSITION IN COLUMBIFORMES COMPARED TO SELECT HAND-REARING FORMULAS

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Abstract
"Crop milk" is a holocrine secretion produced by several species of birds for the purpose of feeding offspring in a resource-uncertain environment. Several species of pigeons and doves, as well as some species of flamingoes and penguins are reported to produce crop milk. It has been hypothesized that crop milk has allowed Columbidae to flourish in many parts of the world where food availability for raising squabs would otherwise be limited spatiotemporally. Crop milk itself is produced by both parents when the lining of the crop swells to incorporate fat, protein, and other nutrients, and is subsequently shed into the lumen of the crop and regurgitated to the offspring. This physiological process occurs in response to prolactin secretion and brooding behavior. Because this secretion is composed of crop tissue cells, its nutrient composition likely resembles the chemical composition of the crop itself (enhanced by incorporated nutrients). Several reports, as early as the 1930s provide details about basic crop milk nutrient content, initially focused on domestic pigeons. More recently, literature has included more detailed descriptions of the fat content (and differential fat composition based on sex), protein content, carotenoid content, and impacts on gut microbiome of crop milk. In addition, previous work has been reported on the nutrient content of crop milk across Columbidae species with different foraging strategies (more granivorous vs. more frugivorous).

As challenging as it is to determine and/or predict the nutrient profile of the crop milk from any given species, it is equally challenging to determine the most appropriate formula to use for them when faced with a hand-rearing situation. Having different formula options to use across a wide number of species in managed care is valuable. Historically, a variety of different hand-rearing formulas have been used for pigeons and doves, but the overall nutrient profile information is not often complete. Herein, we include a historic summary of several of these formulations and their nutrient profile (as best as it can be determined) as well as some currently available options that are more recently on the market. The nutrient content of these formulas is compared to the previously analyzed nutrient content of crop milk as an initial assessment of compatibility. Further work to analyze not only crop milk but crop milk replacers in greater detail (amino acid or fatty acid profiles, microbiome, etc.) will be valuable to continued management and care of Columbids in managed care.