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## Psittacine bird crop gavage feeding

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Gavage feeding is commonly indicated for anorectic animals or for oral dosing of medications and compounds. This column describes the proper technique for tube feeding in the psittacine bird.

Gavage feeding in avian species, otherwise known as tube feeding, is a procedure that is necessary to provide nutrition for anorectic birds or to deliver medications to ill birds or those being used in drug trials. In the event of crop stasis or ingestion of a toxin, passage of a gavage tube into the crop is necessary so that material can be removed from the crop. The gavage feeding method is also used to deliver medications that are not readily consumed by birds.

### PREPARATION

Ensure you have all the equipment necessary prior to restraint of the bird. Many commercially available options exist for feeding tubes. The two most commonly used types of tubes are curved ball-tipped metal feeding tubes (Jor-Vet, Jorgensen Laboratories, Inc., Loveland, CO) or red rubber tubes (Kendall, Tyco Healthcare, Mansfield, MA). Curved stainless steel ball-tipped tubes are the best choice for psittacine birds because of their ability to bite through a red rubber catheter and potentially swallow the inserted end. Red rubber catheters are an excellent choice for passerines and galliformes because of their pliable nature, which helps prevent trauma to the lining of the esophagus and crop during feeding. To determine the appropriate type of syringe, consider the tube being used: catheter-tip syringes are needed for red rubber tubes and leur-tip syringes are used with stainless steel ball-tip tubes. The size of the syringe will depend on the bird size and the total volume of food/medication being delivered. The length of the tube will be determined by the approximate distance from the beak to the crop. (The crop is a distensible out-pouching of the esophagus



**FIGURE 1** | Restraint of a small psittacine bird. The head of the bird is secured under the ramus of the mandible using the thumb and middle finger, with the index finger stabilizing the top of the head. The back of the bird is placed into the palm of the hand and the fingers are used to secure the wings to the body to prevent excessive motion.

that is located in the cervical esophagus at the thoracic inlet.) Premeasure the tube to confirm how far it will need to be passed and that the tube is an appropriate length.

It may be necessary to use an oral specula or strips of gauze to separate the maxilla and mandible to facilitate placement of the tube in psittacine birds. Prepare the food or medications according to the directions and preload the syringes. Because the lumen of the tube is long and narrow, material of thick consistency may be difficult if not impossible to deliver (this should be tested before the bird is in hand).

### RESTRAINT

First, safely capture the bird. Place a small towel over the back of the bird and secure the head under the ramus of the mandible with the thumb and middle finger, using the index finger to stabilize the top of the head. Hold the body and wings with the opposite hand by either bringing the loose end of the towel snugly over the wings and holding it over the breast bone, or by placing the back of the bird in the palm of the hand and using the towel and fingers to secure the wings to the body to prevent excessive motion (**Fig. 1**). Be sure not to compress the keel—birds do not possess a diaphragm and must be allowed to move their chest to breathe.

### EQUIPMENT FOR AVIAN TUBE FEEDING

- Feeding tubes
- Syringe(s)
- Oral specula
- Food/formula and/or medication
- Towel for restraint
- Gauze for beak restraint in some psittacine birds
- Cotton-tipped applicators

## PROCEDURE

Once the bird is secured and held upright, extend the neck to facilitate tube placement and passage. Avian species lack an upper and lower esophageal sphincter and once the crop is full it may begin to fill the proximal esophagus<sup>1</sup>. Do not restrain the bird with undue pressure applied over the region of the crop or it will likely regurgitate. Approach the bird from the left commissure of the beak and enter the oral cavity with the tube pointing caudo-dorsally and to the right side of the bird's beak (your left). Take caution at this stage not to damage the choana (slit in the roof of the mouth) or enter the trachea. Pass the tube over the tongue and then gently down into the esophagus. Ensure that the tube has not entered the trachea by visually checking that the tube is not within the glottis or by palpating for the presence of the tube in the crop (palpation should allow differentiation of the trachea and the feeding tube) (Fig. 2). Continue gentle passage down the esophagus. Check correct placement of the tube by feeling for the distal tip at the level of the thoracic inlet. Attach the syringe to the tube and slowly inject the feeding formula or medication.

To complete the procedure and remove the tube safely, leave the syringe attached and slowly back the tube feeding apparatus out of the bird. Alternatively you can



**FIGURE 2** | Placement of a stainless steel ball-tipped tube in a psittacine bird. The tube is inserted from the left commissure of the beak and passed gently caudo-dorsally to the bird's right and into the esophagus. Here, the ball tip of the tube is being palpated in the crop with the thumb and index finger to confirm correct tube placement (arrow).

kink the red rubber tubes to prevent leakage when they are removed. A closed system must be maintained (by leaving the syringe attached or kinking the tube) or the remaining contents will leak out and possibly be aspirated as the tube is removed.

If the bird begins to regurgitate, immediately remove the tube and place the bird in a cage to allow it to clear the contents on its own. Do not attempt to suction the contents unless the bird is so weak it cannot shake its head to clear the airway itself.

## Tube feeding formulas/amounts

The basal metabolic rate (BMR) for birds is estimated by the formula:  $BMR \text{ (kcal)} = K(W_{kg}^{0.75})$ , where K is a constant for various orders of birds<sup>2</sup>. The K value for passerines is 129 and for psittacines is 78. A safe volume for crop feeding is 3–5% of the bird's body weight<sup>3</sup>. The following formula can be used to determine the volume to feed:  $\text{volume (ml)} = BMR \text{ (kcal)} / \text{caloric density of the diet (kcal/ml)}$ <sup>4</sup>. This amount should be divided over several feedings throughout the day.

Bird formula is available from several manufacturers (Kaytee Exact Hand-Feeding Formula, Kaytee, Chilton, WI, <http://www.kaytee.com>; ZuPreem Embrace Hand-Feeding Formula, Premium National Products, Inc., Shawnee, KS, <http://www.zupreem.com>; LaFeber Critical Care Bird Formula, LaFeber Company, Cornell, IL, <http://www.lafeber.com>; Harrison's Juvenile Hand Feeding Formula, Harrison's Bird Foods, Brentwood, TN, <http://www.harrisonsbirdfoods.com>). The formula should be heated to body temperature to avoid delayed crop emptying. Avian core temperatures are ~40 °C or 104 °F (ref. 5). Meat or candy thermometers are often used to check the temperature of the formula. Manufacturer's instructions should be followed for heating and reconstitution of commercially available feeding formulas.

Microwaves do not evenly heat the formula and result in 'hot spots', which can cause severe esophageal and crop mucosal burns. A new batch of food should be made for each feeding to avoid bacterial overgrowth and to ensure even heating of the formula. Feedings should be performed every 2–12 hours depending on the nutritional requirements of the bird. A good rule of thumb is the number of feedings per day increases in inverse proportion to the size and age of the bird. An

adult macaw would only generally require feedings twice a day, but a small, young sparrow should be fed every 2–3 hours.

## COMPLICATIONS

The most common complication is regurgitation, which must be recognized immediately. Consequences of regurgitation include partial or complete tracheal obstruction and aspiration pneumonia. If it begins to regurgitate, release the bird so it can shake its head and clear its airway. Cotton-tipped applicators should be kept close by to aid in clearing the glottis of a bird that has regurgitated. Psittacine birds can bite down hard on the metal tubes and create fractures and fissures in the keratin of their beak. If the feeding tube size is similar to the opening of the glottis or if the individual performing the feeding is not certain the tube is in the esophagus (cannot see the tube in the glottis or cannot palpate the tube separate from the trachea), direct instillation of food/medication into the trachea can occur and most likely will prove fatal. Other potential complications include crop burns, esophageal/crop tears, as well as potential ingestion of tubing if an improper size or technique is used<sup>6</sup>. If the feeding tube is ingested, it is recommended that the bird be anesthetized and an endotracheal tube be placed to protect the airway while the feeding tube is extracted.

Contraindications to tube feeding include crop stasis, impactions of the gastrointestinal tract, and full thickness crop mucosal burns. It is important to remember that it is possible to spread infectious diseases between birds if the tubes are not thoroughly cleaned and sterilized between uses.

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