

Columbus Zoo Gibbon Surrogacy Surrogate Rearing Protocol

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With a breeding recommendation from the SSP, a birth management plan must be in place. The Columbus Zoo promotes mother rearing of primates. Only if a mother or infant's health is in jeopardy or there is maternal neglect or abuse will the infant be pulled for hand rearing. This Gibbon Surrogacy Hand Rearing Protocol will then be used as the guide for a successful, early introduction. It can be achieved by simulating mother rearing, early exposure to gibbons and 24/7 continual care from the time the infant is removed from the mother until infant is reintroduced to the mother or a surrogate.

Education of the gibbon surrogate rearing team is essential. This has been learned through the observation of gibbons that have successfully mother reared infants, by a visitation of the Ape TAG hand rearing team at least two months prior to the impending birth, and through videos from zoos that have a successful program. These videos include, hand rearing techniques, appropriate and inappropriate maternal care and introduction of infants to surrogates.

Communication must take place on many levels. Hand Rearing staff, primate staff, curator staff and veterinary staff must cooperate within and between their departments. Meetings should occur regularly and each staff is responsible for reading the records.

Criteria of Hand-Rearing Protocol

The following components of hand-rearing are necessary to ensure an early successful introduction to a surrogate. The following protocol is based on the introduction to a non lactating surrogate.

24-hour or continual care – a caregiver will be responsive to the infant's needs at all times, until the successful introduction of a surrogate takes place. The infant is not to be left alone or placed where there is a physical barrier from the care giver.

Simulating mother rearing - the infant is raised by care givers that simulate age appropriate mother rearing at all times.

Infant reared next to conspecifics – this will begin the day he is pulled, to the day of introduction.

Dedicated space – Formally known as a nursery, this is an area that must be provided for hand rearing solely a gibbon.

Commitment from management - the institution must commit to the philosophy and support of the program.

The infant must be raised with the goal of an early introduction. Two precursors must be met prior to the physical introduction.

1. **Identify Surrogate** Staff will evaluate the suitability of a surrogate to accept hand reared/surrogated infant. Since the infant is raised next to conspecifics, the care giver will observe the interactions between the infant and the pair. As time passes the female may spend more time by the infant. It may be more subtle and the female may watch from afar. It is helpful in the selection of the surrogate. Once the surrogate is chosen she should be placed on birth control if she is not post-reproductive. A surrogate must be able to focus on the young gibbon, not a possible mate.
2. **Infant meets criteria**
A hand-rearing protocol must meet the physical, psychological, and social needs of the infant.

Dedicated Hand Rearing Space

- Be next to conspecifics
- Have auditory, visual, olfactory, supervised tactile stimulation
- Share common features with living space of gibbons (structures, etc.);
- Mimic adult routine
- Capability of being intensive care unit if necessary
- Provides opportunities for age-specific movement, activity, etc.

If there is infant/caregiver safety or gibbon disruption concerns during the gibbon's sleeping hours, a more remote space within the building can be utilized at night.

1. This area is relatively "**gibbon-proof**". It is essential to have a small kitchen and bathroom in proximity to this space, containing a **refrigerator, microwave, sink and storage (washer and dryer is optional)**.
2. The entrance area is equipped with a **footbath**. It is where the keeper leaves his/her shoes, street clothes and changes into **scrubs**. It also can be used for storage.
3. The remote space is only used when keeper and infant cannot be beside gibbons.
 - a. This room contains playing apparatus and enrichment items for an age appropriate infant.
 - b. A **mattress** is on the floor, so keeper and infant can sleep together for warmth and
 - c. contact. An **Isolette** is available for potential I.C.U. If used, keeper should maintain continual contact with the infant by placing hands on infant through isolette openings.
4. **Computer access** is vital for record keeping. A file cabinet for paper daily records and office supplies is needed.
5. An **ambient environment** is consistent with **temperature** and **humidity** of the existing primate building.
6. Diffuse **lighting is provided at night** to allow keepers to care properly for infant.
7. This space should have **mesh** and or **climbing structures** for strengthening motor skills.
8. A **scale** is mandatory to record daily weights.

Preparations one month before impending birth (Birth Management Plan is already in place)

1. Meet with appropriate staff to organize and have a plan for hand rearing.
2. Clean and disinfect designated hand rearing area.
3. Determine **formula** to be used (Nestle Good Start, Similac, etc.) and order small amount.
4. Order small amount of **5% glucose, sterile water** and **pedialyte**. This may be necessary to mix with or substitute for formula.
5. Order supplies and equipment to manage area for several days (**see supply list**).
6. Create a **tentative staffing schedule** to provide dedicated 24 hour coverage.
7. Review visitation notes from Ape TAG Hand Rearing Team and the first two week records of previous hand reared infant gibbon records if available.

Keeper Staff Selection and Training

A requirement for training, working or entering the hand rearing area is a negative TB test.

Selection of staff is based on prior experience, availability, primate knowledge and ability to follow protocols. Trainees work with an experienced hand rearing keeper prior to being on their own.

The trainee must be knowledgeable with the protocol, the infant, conspecifics and equipment. New staff members should work all shifts to become familiar with the entire program. Fewer than ten caregivers are recommended to be the 24/7care team. If this is your institutions first time for hand rearing, a member of the Ape TAG hand rearing team should be present to assist.

1. **Proper hand washing** is the best way to prevent disease. Keepers are asked to wash their hands before entering the area, after changing diapers, before preparing food and other appropriate times.

2. Dedicated attire must be provided for staff to wear while on duty. Masks and gloves are worn when the infant is young. **Foot covers should be worn, if this is not possible remove your shoes.**
3. Anyone that is ill should not be in the area. If one becomes ill during a shift, put on mask and gloves and call in a replacement.
4. Arrive early to allow a slow, calm transfer of the infant and to discuss instructions and changes with previous shift keeper.
5. Keeper on duty should read records from the last time they worked.
6. Keeper must complete records from their shift before leaving.
7. New staff will be introduced to the gibbon family slowly.
8. Hand rearing staff **does not** feed or touch the gibbon family.

Record keeping

Accurate, consistent record keeping by the keeper is an important part of the hand-rearing protocol. The records should include description of formula, amount fed and actual consumption, stool amount and consistency, daily weight of infant, and vitals. This information should be recorded daily into the computer. Paper copies can also be used.

1. It is extremely important to number each page on paper copies and to indicate AM or PM when recording time.
2. The unit of weight used is grams. This is decided by the vet staff and kept constant (but you can also use pounds for the people that don't think in grams.) The infant's weight gain or loss is a factor for formula change and general health.
3. There is a section for urine weight if a measurement of output is required.
4. Medication, amount and instructions are listed under medications.
5. The comment section is for pertinent information such as time spent next to gibbons, tooth eruption, development of motor skills, behaviors of both infant and gibbons,
6. "Total sheets" are an abbreviated form of a 24 hour day. This is convenient for the vet staff and management who require a brief update (see attached record forms.)

Potential decision to examine Infant

An individual is assigned to notify hand rearing staff. Meet with key staff to decide how soon the baby can be returned to the mother. Try to accomplish this procedure in several hours.

1. While dam is sedated, remove the infant for a visual physical by vet staff to determine health for potential immediate reintroduction
2. Examine the infant. Check for dehydration. Weigh the infant, axillary temperature should be above 97 degrees before returning to dam for nursing or offering a bottle, Mouth should moist and gums should be pink
3. Dextrose stick – the only time to use it is when a newborn is pulled. Prick the heel of the infant and express a small amount of blood. Put the blood on the stick to measure the amount of sugar in the blood. Below 40 mg% is a good indicator that the infant has not nursed
4. If possible reintroduce infant in two or three hours, try not to wait more than three days. Protocol will be set depending upon the situation for the reintroduction.

If the reintroduction is not successful

1. Veterinarian will perform a complete physical.
2. Depending on infant's health, decide how often to take vitals.
3. Veterinarian will determine the amount and strength of formula. We start at 10% of the infant's body weight. If the infant tolerates the formula and is not gaining weight then we go to 15 % of the infant's
(Ounces (infant weight) x .15% (15% body weight) multiply answer x 30 mls. Divide by # of feeding in 24 hour. This formula can also be used for 10% body weight, 20% body weight etc.)

4. The age, degree of hydration and temperature must be considered. Do not bottle feed a recently pulled infant if his temperature is under 97.

Bottle Feeding Procedure

1. Disposable volufeeders and disposable nipples are used for all liquids for the first few months. Eight ounce plastic bottles are used as volume increases. The nipple is determined by the infant's ability to suckle. We stock preemie, special care and regular nipples.
2. For a bottle under 20 mls, heat by immersing in hot water which gives us more control of temperature for a limited volume. **Always shake any bottle well before wrist testing**
3. Infant is held close to keeper's breast and fed slowly to prevent aspiration. Emulate nursing position of dam **ventral/ventral (V/V)**.
4. For the first few days the infant is fed approximately 10 mls and then burped. As infant's sucking ability and volume of formula increases, larger amounts can be given between burps.
5. The infant is fed a bottle through the mesh, during the day, as early as 2 months old. This will help the infant become comfortable with this type of feeding as this is the only way the infant can be fed after the introduction to the surrogate.
6. The infant is bottle fed formula every 2 or 3 hours for approximately 3 months. If the infant becomes hungry between feedings, you may offer small amounts of pedialyte, or water (about ½ the volume of the formula.) As solid foods are added it is possible to stretch the feedings to once every 4 hours.
7. Night bottles are discontinued before the introduction. Depending on the age of the infant, keepers may stay to give an evening bottle after introduction.

Solid Foods

1. Before solid foods are offered, let the infant observe the keeper eating. He can smell the food and the keeper's breath, to inspire his curiosity. Having food around to be smelled and touched, even if not eaten, is part of a gibbon's learning process.
2. Food items offered to the infant should be the same items offered to the adult gibbon but modified by cooking. Solids foods are offered when interest is shown and teeth begin to erupt. Soft biscuits soaked in formula are given first, followed by cooked sweet potatoes, cooked carrots and bananas. Some foods are cooked at the beginning for easier chewing. A three day time span is used with the introduction of each new food to avoid allergies. Additional vegetables are started before other fruits. Offer 1 or 2 grams (very small, soft bites) of each new food, and when they accept this increase in 5 gram increments. Increase as the infant grows.
3. When starting to feed solids, hold infant in an upright position. Smash small bites between fingers and put in infants mouth. Be sure they swallow all food before offering more.
4. Food should be placed close to the infant and also next to conspecifics. The infant can watch the gibbons eat. When gibbon keepers are feeding the group, they can also feed the infant through the mesh. This is a helpful preparation for an early introduction.

Vitals:

The first two weeks after the infant has been pulled, vitals should be taken between each bottle feeding while the infant is in a quiet mode or asleep. If active, this procedure is too stressful for infant and keeper. By the third week if the infant is stable, vitals can be taken once each shift at approximately the same time. Taking vitals consistently establishes a pattern. When there is a deviation to this pattern, it may be an indication that something is wrong. A follow up on unstable vitals can lead to early diagnosis, treatment, and a quicker recovery. These records also give a guideline for future hand reared infants. When the infant sleeps through the night, vitals are discontinued on this shift. This is subject to change if infant's health is a concern.

1. **Weight:** On awakening and before the morning bottle, weigh infant without diaper.

Always put the infant on his stomach. For security he can hold a blanket or stuffed animal that has been tared to zero on the scale.

- 2 **Resting Respiration:** Hold infant against your body or on your lap. Visually watch infant's breathing or place your hand on his back or stomach. Count breath for 15 seconds using a watch or clock with a second hand and multiply by 4 for respirations per minute.
- 3 **Resting Pulse:** Use infant stethoscope on infants chest, count each beat for 15 seconds and multiply by 4 for pulse per minute. Each beat has a two sound cadence (**ba-boom**); count as 1. Practice on yourself or another human. If there is an irregular heartbeat notify the vet.
- 4 **Resting Temperature: rectal temperatures can cause prolapse and stress to the infant.** Use a digital thermometer and take an axillary temperature (under the arm). Thermometer should beep when temperature has been reached. Average temperature is about the same as a human. It is not unusual for the infant's temperature to drop at night to the low 97 degrees. Covering and/or holding the infant can help to raise the temperature. If over 100 degrees, check more frequently and alert veterinarian. The temperature may increase if the infant is teething or after inoculations. Under these circumstances, it is still imperative to follow these same procedures.
- 5 **Girth:** Holding the infant, slowly lower him on his back; this can be done on your lap or a flat surface, while the girth is being taken. Make sure the girth tape (measuring tape) is available. Keep him calm and occupied by giving him a blanket or toy to hold. With diaper off, use a measuring tape with centimeters, circle waist with top of tape touching bottom of navel. All staff must be consistent. This procedure is an indicator to determine any gastric distention which may be a sign on enteritis.

Signs of concern:

Physical: Loose stools, constipation, increased girth size, increase/decrease in temperature, cough/congestion, nasal mucous, changes in normal pulse or respiration, lethargy or decrease in activity, loss of appetite, dull hair coat, weight loss, white coating on tongue, infant not gripping keeper

Behavioral Distress that is behavioral is usually verbalized by a scream. The infant may also cling tightly to the keeper. There have been incidents where infants have "shut down" (just closed their eyes and appear to be asleep). This has been seen in stressful situations with several young gibbons i.e., when they are in a noisy, crowded environment, when refusing foul tasting special formula, refusing food when suffering from a mouth infection and being in close proximity to an intimidating gibbon.

Vaccinations: Check AAZV website yearly

An attempt is made to follow; THE APE PREVENTATIVE HEALTH GUIDELINES for vaccinations. In a hand rearing situation it depends upon the age of the gibbon, his health and his time spent in the program. A chart of the recommended pediatric immunization schedule for human infants is included.

Components necessary to expedite an early introduction

Dedicated twenty-four hour care continues from the time the infant is pulled from the dam, until he is returned to her or a surrogate. For the first few weeks of life, the infant is held constantly to provide warmth and contact. He is held **upright** close to the keeper's chest. The keeper must hold or stay in close contact with the infant while performing duties. If anything necessitates removing him from the keeper's body (weighing etc.) he is placed in a safe location **upright**, holding a fuzzy toy or blanket. As the infant becomes older and aware of his surroundings, it is his choice to climb off the keeper and move around. Even then, the keeper remains close through touching and voice contact. At night, he falls asleep on his keeper upright in a ventral/ ventral position. The infant becomes more accepting of any new experience because of his close contact with the keeper.

Never being alone gives him confidence and a sense of security. It does not instill a bond with a keeper as much as it does a bond to the comfort and attention. This program makes the transition to the surrogate stress free.

Training program

Infants are trained or behaviors are captured at a very young age. Behaviors such as open mouth, sticking out tongue, presenting hand, foot and belly, going to the mesh for bottle, hand feeding at the mesh, blood draw, gaiting through a baby door are all worked on at age appropriate times.

Simulating Mother Rearing

The infant is raised by a care giver that simulates age appropriate mother rearing at all times. Eye contact, appropriate gibbon vocalizations, tactile and olfactory stimulation, locomotion, feeding, play behavior are important components of the program.

Eye Contact begins the day the infant is pulled. This develops a bond between the infant and keeper.

Vocalizations are used to identify various behaviors. Play is a big part of a little gibbons day learning to swing climb and brachiate. We encourage age appropriate play, as they will experience this with other juveniles (but no hard biting!).

Tactile and Olfactory Stimulation is used 24/7. Grooming and examining the infant occurs daily.

Locomotion Infant is always carried V/V, V/V is a common holding position for infants. Do not hold the infant as if he is a human primate. Non human primate babies cling to their mother's instinctively.

Therefore, infant should be held loosely to encourage clinging.

Feeding through the mesh starts at approximately 2 months old when the infant becomes more aware of his actual bottle. A hand rearing keeper holds him in her arms on one side of the mesh while a gibbon keeper gives him a bottle through the mesh. Feed this way during the daytime so that it becomes a relaxed way for the infant to get his bottle. Prior to the introduction, mesh feeding is imperative. The gibbon must reliably come to the mesh for his bottle. When the gibbon family is fed their diet the infant is also offered food. Familiarity of the keeper staff with the infant is important, because as soon as the introduction is made they start taking a more active role.

Exposure to gibbons should start the day after the infant arrives for hand rearing (with veterinary permission). It is important that he experiences visual, auditory, and olfactory stimulation from gibbons from the beginning. It is imperative that he will be raised in the environment where he will eventually live. Experience shows infants that spend time next to gibbons from the beginning are much calmer and have an easier transition.

Hand rearing keepers have a dual responsibility when they spend time next to the gibbons. Constantly observing interaction within the family provides valuable information. Every action, even sitting quietly, is an opportunity to show the infant appropriate gibbon behavior. It is important that the infant learn to respond appropriately to any behaviors or sounds in the building. If there is a gibbon confrontation or high tension, the keeper reacts to the sounds as if she was a gibbon mother. She holds the infant close, as if protecting him. This teaches the infant to go to his surrogate at times of "fright or flight," and to ignore the day-to-day noises. The infant gibbon develops appropriate responses to his surrounding environment. During gibbon play times, the keeper is relaxed and playful.

Once the infant is moving on his own, he needs to have the confidence to move around his whole habitat. We expose him to all parts of his exhibit, including the chutes, door gating, platforms and water sources. He must learn to gate through a baby door only large enough for him to pass through. The infant is encouraged to enter through the door to an empty cage. This will be a familiar experience when the infant needs to follow his surrogate to another area.

Criteria for an early introduction:

1. Staff should agree on readiness of the surrogate and infant. Ideally, the infant and surrogate have established a comfortable bond. The infant feels secure beside the surrogate. The surrogate reacts if the infant shows distress.
2. The surrogate has to allow the infant to receive nourishment. Cooperative feeding may exist. Either the infant is mobile and comes to the bottle or the surrogate brings the infant to the bottle.
3. An introduction should not proceed with a potential surrogate that displays aggression.

4. If affirmative behaviors are not observed, contact the hand rearing surrogate team of the Ape TAG for possible relocation of the infant.
5. Infant is completely familiarized with all routine and husbandry practices.
6. Have a pre introduction health assessment by the vet staff on the infant.
7. Prepare for a "Plan B" if possible. This involves having an alternative surrogate if the introduction does not go as expected. Contact the hand rearing surrogacy committee for assistance.
8. Five days before the introduction, keeper and infant spend 24 hours a day in the gibbon area. The nighttime atmosphere of this area becomes familiar to the infant, which completes his pre-introduction criteria. We do not intend to separate infant and surrogate once they are successfully introduced, therefore, all components must be in place.

Introduction Day:

1. Daily routine for feeding and cleaning is normal. Cage is prepped for introduction, heavy bedding, scatter food and soft enrichment items.
2. Surrogate is separated from the group and placed in an area next to the infant.
3. Keep observers to a minimum (remote cameras can be used to facilitate observations)
4. While the infant is offered a bottle through the mesh, the hand rearing keeper attending the infant leaves quietly.
5. The door is opened for the surrogate to enter.
6. Be patient. Surrogate and infant will determine contact time.
7. In a successful introduction, surrogate and infant are never separated. There may be variations in care from a surrogate. The surrogate is now the primary care giver.
8. Due to the fact that the infant was raised in this program, there is minimal stress to the infant and surrogate. A bond that began during the introduction process can now be secured.

After the introduction:

1. Allow time for a strong bond to develop between surrogate and infant before integrating another group member.
2. Carefully select which family member will be introduced next and allow time (few weeks) to adjust and solidify a level of comfort before integration of the next group member.
3. Once the male and all group members are spending 24 hours a day together, the introduction is considered complete.