

How a Diaphragm Affects Handling of Animals

Our topics for this week are

- **Companion pets without a diaphragm muscle**
- **Handling techniques to avoid in animals without a diaphragm**
- **How some animals breathe without a diaphragm**

The diaphragm is a dome-shaped muscle that separates the thoracic cavity from the abdominal cavity. It plays a crucial role in mammalian respiration by contracting and relaxing to facilitate breathing. When the diaphragm contracts, it flattens, creating a vacuum that draws air into the lungs. When the diaphragm relaxes, it aids in expelling air in the opposite direction than the direction of inhalation. The diaphragm can also be involved in actions of coughing and sneezing.

Breathing is still possible if the movements of a mammal's chest are restricted because the vacuum needed to breathe can be produced by contractions of the diaphragm. However, reptiles and birds do not have a diaphragm. Restricting movements of their chest can suffocate them.

BIRDS

Birds do not have tidal breathing flow of mammals. Bird lungs are always filled with air held in air sacs which are thin-walled air bellows. Most birds have nine air sacs with some, the cranial group, located near the head and the caudal group near and in the abdomen. The lungs are situated between these two sets of air sacs and are composed of a dense network of tiny, parallel tubes called parabronchi, where gas exchange takes place. Air sacs are able to move air in and out in a continuous, one direction flow. Two inhalations and exhalations are required to move air through one cycle of air that was inhaled and exhaled from the body.

Some of the air from air sacs are delivered to the bones providing some distributed warmth in cold weather, dissipation of heat in warm weather, and adding buoyancy when in water for water birds.

Handling Birds

Handlers must remain mindful that it is easy to restrict a bird's respiratory movements by holding them too tightly, which can cause unnecessary struggling and lead to shock. The sternum's movement must not be restricted or they cannot breathe. Their tracheal rings are

complete and relatively resistant to collapse when birds are held by the neck. Slight compression around the chest during restraint can eliminate their ability to breathe.

REPTILES

Like birds, reptiles do not have a diaphragm. They also do not have air sacs, but they do have an efficient lung structure with a larger surface area for gas exchange. Compression of their chest is hazardous but not to the extent it is in birds. In reptiles, their metabolism is much slower so their need for gas exchange is lower. Breathing is often a slow process, with some reptiles able to hold their breath for extended periods. Many reptiles also use a method called "gular pumping", using the mouth cavity as bellows to aid in inhalation of air.

Handling Reptiles

As with birds, reptiles should not have their chest compressed when being handled. Small lizards are cupped in a hand for restraint. Medium to large-sized lizards are restrained by grasping them from above their back. The thumb and index finger is placed on the lower part of the neck and three fingers behind one shoulder. The other hand restraining the pelvis is positioned with an index finger in front of a hindleg, the thumb behind the other hindleg, and three fingers on the base of the tail.

Intracoelomic (IC) injections are given into the abdominal cavity. They are particularly hazardous in reptiles since they do not have a diaphragm. IC injections in reptiles can cause compression of their lungs and there is risk of puncturing or cutting an internal organ in the injection needle.

If you have comments or you're interested in particular animal handling subjects, contact us at CBC@BetterAnimalHandling.com

Now let's recap the key points to remember from today's episode:

- 1. Birds and reptiles do not have a diaphragm to assist breathing if their chest is compressed.**
- 2. Restraint of birds and reptiles can be achieved with compression of the sides of their neck and restricting movements of their pelvis.**
- 3. Most intracoelomic injections of medications that are relatively safe in mammals are not safe in reptiles due to the lack of a diaphragm.**

More information on animal handling can be found in my books, ***Animal Handling and Physical Restraint, Concise Textbook of Small Animal Handling, and Concise Textbook of Large Animal Handling*** all published by CRC Press and available on Amazon and from many other fine book supply sources.

Additional information is provided at: www.betteranimalhandling.com . This website has more than 350 past podcasts with notes on handling of dogs, cats, other small mammals, birds, reptiles, horses, cattle, small ruminants, swine, and poultry.

Don't forget, serious injury or death can result from handling and restraining some animals. Safe and effective handling and restraint requires experience and continual practice. Acquisition of the needed skills should be under the supervision of an experienced animal handler.