Welcome! I am an Embry-Riddle Aeronautical University student currently studying Computer Science and Astrophysics. This tour was created to introduce YOU to the Cattle Egret and the biomechanics of its flight, or, "mechanical laws relating to the movement [and] structure of living organisms,” for the Wayne State College A. Jewell Schock Natural History Museum and the MACRO Project (The Oxford, 2006).

Cattle Egrets are a small shore bird called *Bubulcus ibis*, though they are also known as the Buff-Backed Heron, the Elephant Bird, the Rhinoceros Egret, and the Hippopotamus Egret. The Cattle Egret, "unlike other herons and egrets, [the Cattle Egret] typically feeds in dry fields, often following cattle and waiting for them to flush insects into view," which is how it got its common name (Cattle Egret, 2016, audubon.org). Preferring to live in grassy fields, they make dense colonies of stick nests in trees or wetlands, and forage in upland areas like fields and plains.

Like 99% of all birds, Cattle Egrets can fly. They can take off directly from the ground without needing to run. There are four main forces involved with anything that flies: lift, thrust, weight, and drag. These forces act on birds the same way they act on planes, jets, and rockets. When the bird flaps its wings, it is creating forces called *lift* and *thrust* by pushing against the air*. Lift* pushes the bird up, and *thrust* pushes it forward. *Weight* is caused by gravity and pulls the bird back towards the Earth. *Drag* is caused by friction from the air, and pushes against the bird when it is trying to fly forward.

"Adult Cattle Egrets are all white with a yellow bill and legs. [During breeding season,] they have golden plumes on their head, chest, and back. Juveniles, on the other hand, have dark legs and bills" (Cattle Egret, n.d., allaboutbirds.com). Adults measure about 46 to 56 centimeters in length from bill to tail and weigh 270 to 512 grams, or about one pound. Their wingspan ranges from 88 to 96 centimeters, an average of 1.8 times their body length which gives them a lot of power to push themselves off from the ground. The average feather length is 17.7 cm, almost 50 percent the size of the their wings.

Airfoil is the shape of a wing, and is very important for flight in birds. "The increased speed over a curved, larger wing area creates a longer path [for] air" to travel, reducing the air pressure above the wing which increases the lift that the bird can generate (How Birds Fly, 2011). Very lightweight, their feathers have a large surface area to maximize the amount of thrust the Cattle Egret can generate. The Cattle Egret uses fast and short flapping while flying to generate a lot of thrust quickly, as opposed to a gliding bird like the Albatross, that does very little flapping and mostly glides using varying air currents. Birds have beaks instead of jaws like you and me, because beaks are hollow and much much lighter to reduce weight, and are streamlined which decreases the drag. Long and skinny, Cattle Egret beaks are mostly used to pick out and grab large insects with ease. Careful not to mistake it for the Snowy Egret though! The Cattle Egret has pink legs and yellow beak, whereas its close cousin, the Snowy Egret, has black and yellow legs and beak.

Studying how birds navigate through the air can help us design more efficient flying machines. You’ll notice, an airplane looks a lot like a bird. The nose is the beak, it has a long and skinny part like the body, there is a tail on the airplane that is like the feet on the bird, and the wings are, well, the wings! By replicating nature, we are bringing science and engineering to its purest form--we may as well stick with what works, and birds have been flying for quite a long while. Thank you for your time here at the Wayne State College A. Jewell Schock Natural History Museum today. I’d like to remind you that the Cattle Egret is a small, white, heron-like bird that is quite common in the southwestern United States near receding wetlands and some drylands. Watching birds in nature can show us the beauty of flight that lies right outside our windows, so keep an eye out for this bird to see if you can identify it in flight!

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