

Attainable Sustainability

ACC's Horseshoe Crab Sustainability Project

ACC's one-of-a-kind sustainability project meets a milestone of over one million juvenile crabs released!

In 2018 after working with local regulators to receive a class 1 type 4 aquaculture permit, ACC introduced our Horseshoe Crab Sustainability Project. This unique program was aimed at complementing our 50-year history of horseshoe crab conservation and ensuring a stable supply of horseshoe crabs now, and for future generations.

The program was so successful that, in 2019, we were able to secure grants to help organizations release horseshoe crabs in Asia. In 2021, we achieved a major milestone and released our 1,000,000th crab in the waters of Massachusetts. In 2022, we made another milestone when we were issued a US patent on the system! (US Patent #11425894). To date, over 1.4 million juveniles have been released in Massachusetts!!

Our team collects horseshoe crab eggs, facilitates fertilization through IVF, nurtures hatchlings as they mature into juveniles, and strategically releases them back into their natural environment. This program only uses eggs collected from bait crabs that are sacrificed for the eel, conch, and whelk fisheries, extending their genetic legacy for generations to come.

Please visit acciusa.com for more information and future updates!

Horseshoe Crabs & the Biomedical Industry — Know the Truth

What makes a horseshoe crab's blood so special?

Horseshoe crab blood carries factors that react to antigens found on and in gram-negative bacteria walls by forming a clot. The clot isolates the bacteria and protects the crab from infection. The blood also begins a healing process similar to human healing: a wound forms a clot, a scab, and eventually heals.

What makes limulus ameobocyte lysate, or LAL, so important?

The LAL test is the most sensitive, accurate, and cost-effective test on the market today to detect contaminating endotoxins. It was first approved by the FDA in the 1970s and is now considered the gold standard because it can, in a relatively simple test, detect endotoxin in the parts per billion. Prior to LAL, hundreds of thousands of rabbits were used to test for

endotoxins. Animals were injected with samples of the product being manufactured and monitored to see if they developed a fever which may indicate the presence of gram-negative bacteria. LAL-based assays are more humane, more accurate, and more cost-effective than rabbit-based tests. Plus, they can give results in a test tube, in about an hour. There are very few people you are likely to meet in your lifetime who have not benefited from a bacterial endotoxin test.

What types of things are tested with the blood?

If endotoxin enters your bloodstream, it can make you sick and possibly even kill you. For this reason, the US FDA has mandated that all injectable or indwelling materials must be tested for endotoxin contamination before being released for sale. This is to protect the public from products that are not sufficiently free of materials that can make a patient ill from exposure to gram-negative cell wall material. The test ACC manufactures is used for medical devices, such as knee replacements, stents, heart valves, and intravenous solutions; it's also used for drugs, vaccines, insulin, and chemotherapy drugs. In essence, anything injected or implanted into the human body must be free of endotoxin.

LAL is also used to make a diagnostic assay, Fungitell®, that can detect the presence of invasive fungal infections. This is a fast and accurate assay used in hospitals for critically ill patients and in patients who are at risk. In 2024 alone, over 900,000 people were tested using this assay.

I have read somewhere that crab blood is worth \$15,000 a quart. Is this true?

Absolutely not — this is a myth sensationalized by some media. Manufacturing LAL, which is made from the white blood cells of horseshoe crabs, is a complex process that is regulated by the FDA and must be done under extremely clean conditions. A typical LAL test costs less than \$20. In terms of the impact it has had on human health and safety, it is safe to say it has saved many lives and is therefore priceless.

Where do the crabs you bleed come from?

Most of the crabs that come to our facility are from Massachusetts waters, Vineyard Sound, Nantucket Sound, and Buzzards Bay. Fishers catch them using different techniques, but they must follow strict regulations on size, number of crabs harvested, and abide by strict quotas.

How does the process of bleeding crabs work?

Every crab that enters our facility is checked for health, has its sex determined then the vendor and origin recorded. This is all reported to regulators monthly. The process itself is very similar to when people donate blood. The crabs are placed in a very clean laboratory, where we disinfect a portion of the shell and carefully insert a sterile needle. The crabs have a sinus in the dorsal aspect of their body just under the shell that holds excess blood; we collect from that region. The crabs are held in a very specific manner, limiting the blood that can be harvested from the dorsal sinus. The majority of the blood, which remains in the gill area, is untouched. The process takes only a few minutes and the crabs are held in darkened areas and kept moist before being returned to the supplier. Studies have shown that the crabs tolerate this process very well, and the overwhelming majority of animals survive.

What threats face the horseshoe crabs today, are they endangered?

Crabs in the United States are regulated and monitored carefully. They are not endangered and, in many areas, have growing populations. In other parts of the world, they are victims of pollution and humankind's development of coastal areas and are not so closely monitored.

Like any sea creature, horseshoe crabs are dependent on a suitable environment in which to live and reproduce. Water quality is an important factor, as is having suitable beaches in which to lay their eggs. Fertilizers, septic systems, and other forms of pollution can greatly reduce the quality of water on which the crabs depend. Sea walls, rip-rap, and jetties can manipulate the natural movement of sand on beaches and affect spawning habitat. Beach nourishment, the practice of bringing in truckloads of sand to beaches to replenish what's lost or make them look nice, can bury millions of eggs before they hatch. Crabs are also used as bait for conch and eels, which is another source of man-made mortality. Fortunately fisheries managers use the best science available to monitor the population and utilize structured decision making to determine quotas etc. It is safe to say there are tens if not hundreds of millions of crabs in the US.

What does ACC do to support conservation?

ACC has always promoted and practiced a catch-and-release fishery where the overwhelming majority of crabs survive the process of blood extraction. We work closely with fishermen and regulators to minimize the impact we may have on crab populations. ACC was instrumental in creating a minimum size limit for crabs to ensure only mature crabs are collected, and in helping to keep a biomedical-only fishery in Pleasant Bay, Massachusetts, where all the crabs collected are released. We have supported conservation efforts that include the use of bait bags, decreased catch limits, and prohibition of fishing

for crabs around peak spawning periods. We also participate in the Massachusetts "rent-a-crab program," where crabs destined for use as bait are brought to our facility first. This program helps to limit the overall impact on crabs. ACC takes part in the Atlantic States Marine Fisheries Commission (ASMFC) Horseshoe Crab Advisory Panel, where we helped develop the Best Management Practices (BMPs) for the industry. We also collect data for the regulators from every crab that enters our facility, which is invaluable to understanding population dynamics. Most recently, ACC has implemented a one-of-a-kind sustainability project where we can hatch and grow juvenile crabs in the lab and then release them to the wild. You can learn more about this exciting new program on the ACC website.

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What information should more people know about horseshoe crabs?

Horseshoe crabs and their ancestors have lived on Earth for approximately 400 million years and have survived several mass extinctions. They are not harmful and do not sting or bite.

When you see a horseshoe crab shell washed up on the beach, it is likely a molt, and not a dead crab. Crabs can only grow by shedding their shells and growing larger ones. Old shells are discarded, and many beachcombers worry crabs are dying when they are really just growing up. Even as recent as the 1950s, crabs were destroyed by the tens of thousands by people on Cape Cod and elsewhere fearing they were harmful to shellfish beds or for use as fertilizer and pig food. In fact, they are useful for shell fishermen by helping to till and keep sediment aerated. They are an important part of the international ecosystem.

What can I do?

Water quality and human development are major threats to all fragile ecosystems such as the embayments where horseshoe crabs reproduce and grow. Do your part in limiting the impact humans have on water quality and beach erosion. If you ever see a crab upside down on the beach, gently roll it over so it can return to the water. And remember, the next time you or a loved one receives an injection, IV, or implant, be sure to thank a horseshoe crab!

Your Goals. Your Endotoxin Experts.

A Partnership In Change

Where do you start? Bacterial endotoxin testing is an essential tool for quality control of raw materials, in-process sample screening, and in-process water system maintenance. It's also a test required by regulatory bodies to release your finished products.

Whether you're bringing testing in house, looking to switch from gel-clot to kinetic, validating a sustainable recombinant reagent, or converting to ACC as your supplier, you can count on ACC every step of the way. With 50 years of experience in the BET industry, we have your answers.

ACC Is With You at Every Step

Our experts will learn about your company and tailor a process to help you meet your goals.

- 1 QUALIFY ACC AS SUPPLIER**
Ensure compliance with strict quality and safety standards, reducing the risk of product recalls, regulatory penalties, and supply chain disruptions.
- 2 METHOD DEVELOPMENT OF SAMPLES**
Optimize test sensitivity, reduce interference from complex drug formulations, and validate the most effective BET detection approach.
- 3 VALIDATE SYSTEMS/ EQUIPMENT**
Minimize the risk of false positives or negatives, enhances data integrity, and ensure consistent performance over time.
- 4 VALIDATE SAMPLES**
Ensures accurate and reliable results by confirming that the test method is suitable for the specific drug formulation.
- 5 WRITE PROCEDURES**
Well-documented procedures help minimize errors, improve reproducibility, and ensure that all personnel follow the same validated methods.
- 6 TRAIN STAFF**
Well-trained personnel minimize errors, enhance test consistency, and maintain data integrity.
- 7 IMPLEMENT NEW PROCESSES IN QMS**
Continuous improvement through QMS updates strengthens quality control, enhances staff accountability, and supports reliable, reproducible test results, ultimately ensuring product safety and regulatory readiness.
- 8 YOUR GOAL!**
**SUCCESSFUL
VALIDATED
CHANGE**