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Hurricane Preparation and Recovery
for North Carolina

Dairy Producers Guide



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DISCLAIMER

Information in this document was provided by USDA and various university Extension staff and based on shared experiences preparing for and recovering from hurricane impacts. However, individual producer situations will vary, and STATE OR LOCAL GUIDANCE OR REGULATIONS, AND INSURANCE POLICIES SUPERCEDE THE RECOMMENDATIONS IN THIS GUIDE. This guidance should not be interpreted as required actions by regulatory or insurance agencies. Check with your local Extension agent; county, State, or Federal contact; consultant; or insurance agent regarding the appropriateness of these recommendations to your specific situation.

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Dairy Producers Guide

This guide will focus on:

- Facility and infrastructure considerations to minimize disruptions due to power loss and heavy rain
- Preparing and securing facilities to protect cattle and property
- Initial recovery following a hurricane

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Introduction

Preparing for and recovering from hurricane events



People who live and work in the Southeastern United States are unfortunately familiar with the devastation and loss of life and property that can accompany a hurricane event. While hurricanes have always been a threat to the Southeast, with an average of over two strikes per year since 1900, the threat posed by hurricanes is growing. Recent studies suggest that as ocean temperatures continue to rise, hurricane intensity is increasing. Hurricanes of the future will likely be slower-moving, higher category hurricanes that produce destructive winds and flooding.

To help producers remain resilient and productive in the face of this threat, the U.S. Department of Agriculture (USDA) Southeast Climate Hub developed this manual containing steps that can be taken to prepare for and recover from hurricane events. This manual is separated into four primary sections:

- The **Building a Resilient Operation** section outlines a range of considerations and systems that producers can put in place to increase their resilience to hurricanes.
- The **Long-Term Operation Maintenance** section lists specific pre-hurricane actions and periodic checks to be done on an annual basis (before hurricane season) and monthly basis (during hurricane season).
- The **Short-Term Preparedness** section lists specific actions to be done in the week before a hurricane arrives.
- The **Post-Hurricane Recovery** section outlines activities that producers can take to minimize their losses following a hurricane. It begins with actions immediately following a hurricane that are focused on safety and continues with ongoing actions a week out and a month out.

The guide also includes four appendices, including two customizable templates for a **Farm Emergency Plan** and an **Emergency Contacts List**. Directions on what to include in these two documents is outlined in the **Building a Resilient Operation** section. Their use is described in the **Short-term Preparedness** section. Both the plan and list should be periodically reviewed, as mentioned in the **Long-term Operation Maintenance** section. The appendix also includes an **Initial Site Planning** guide that can be referenced if purchasing or leasing new land, and **Resource Links** to helpful Federal, State and University Extension websites that are also referenced throughout the guide.

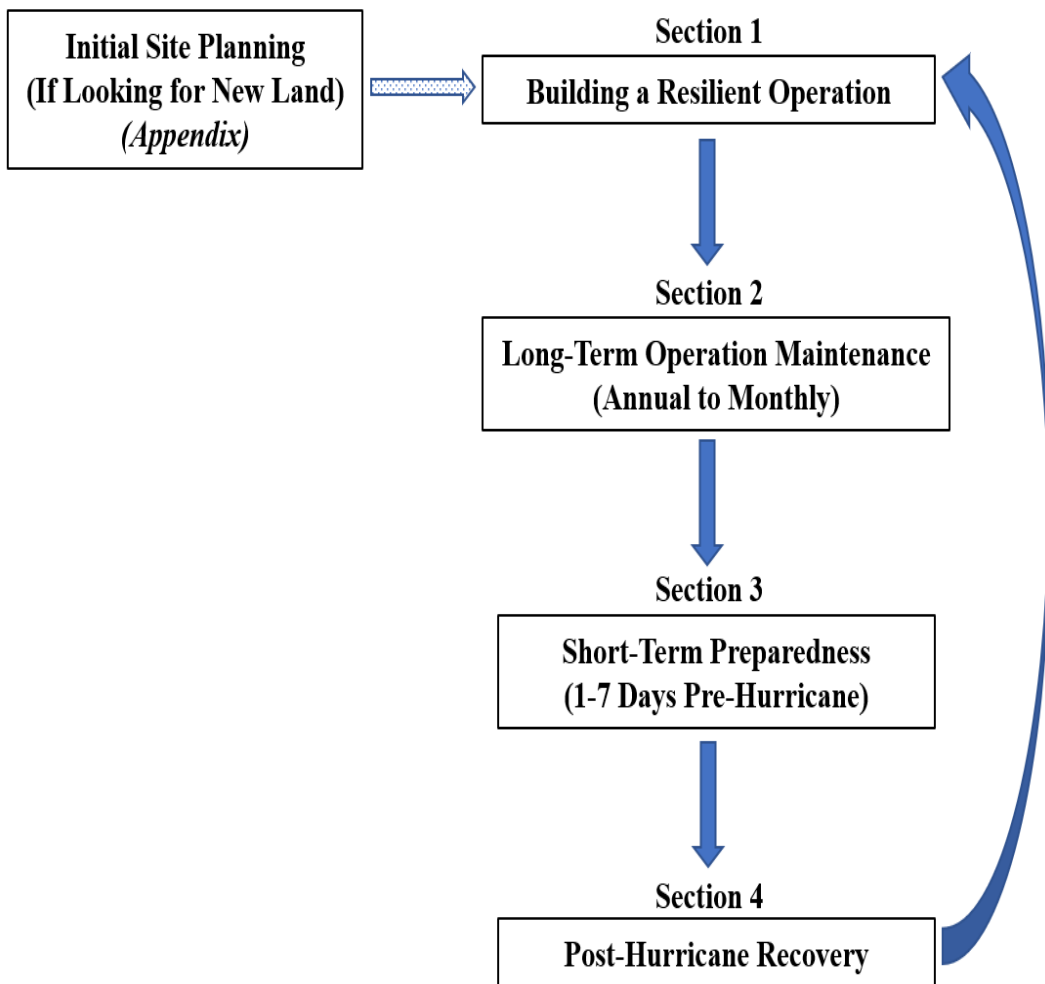


Figure 1. Flowchart for Dairy Producers Guide

Building a Resilient Operation

Systems that are recommended to be put in place well before the arrival of any hurricane to increase productivity and reduce your risk of damage and reduce recovery time

Agricultural operations in the Southeast U.S. can implement a range of measures to increase their resilience to hurricanes and tropical storms. Contact your local Extension office and other State and Federal resources for further information.

Personal Safety

- For safety tips and resources that facilitate informed decision making before, during, and after a hurricane strikes, see the U.S. Department of Homeland Security (DHS) [Ready.gov website](#) and NOAA National Weather Service [Weather-Ready Nation Hurricanes website](#).

Recordkeeping, documentation, and insurance

- The importance of pre- and post-hurricane documentation cannot be overstated. Assistance for disaster recovery may not be available until weeks or months after a hurricane. Therefore, it is important for purposes of insurance compensation and recovery assistance to do thorough recordkeeping of the damages and losses sustained on your farm as well as your cleanup and recovery efforts.
- The worst time to find out that you do not have enough insurance, or the right insurance, to cover your damages is when you need help recovering. Regularly review your insurance policies with your agent to be sure you have adequate coverage, including flood insurance, for your facilities, vehicles, farm buildings and other structures, and livestock. Be aware that there are limitations on how soon insurance coverage will take effect. Generally, insurance policies will not cover damage if the policy was not in place before a hurricane has formed.
- Establish an inventory system so that you know exactly what's on your farm at all times for potential insurance claims and disaster recovery assistance. It is critical to have a documented inventory (photos, videos, and written lists and descriptions) of your farm buildings, vehicles, and valuable equipment on your farm *before* a disaster occurs. Maintain accurate records of harvest, equipment inventories, and supplies purchased. This inventory and documentation will be essential for filing insurance claims after the hurricane. Keep copies of this inventory in multiple places such as on your computer, off-site in a safe location, and on a cloud-based server using an established procedure to update and transmit the information weekly.

- Take these records with you should you choose to evacuate for a hurricane:
 - Inventories and documentation for insurance and disaster recovery
 - Farm Emergency Plan
 - Emergency Contacts List
- For more information, see:
 - The USDA Risk Management Agency (RMA) Crop Insurance [website](#) for news and information about insurance. Use their [agent locator](#) to search for approved insurance providers.
 - The U.S. DHS Federal Emergency Management Agency (FEMA) National Flood Insurance Program [website](#) to learn more about flood insurance options for qualifying home and business owners.

Infrastructure

Buildings

- Consult topography and flood maps when building new facilities, storing feed and hay, and moving animals. Consider the potential for higher elevation areas on the property to become evacuation sites.
- Locate buildings above the 100-year flood zone whenever possible, and construct buildings and other structures to a minimum wind rating of 140 miles per hour (mph), preferably 180 mph. For more guidance on protecting farm structures and buildings from winds and flooding, see the FEMA [Compilation of Wind-resistant Provisions](#) and [Design Guide for Improving Critical Facility Safety from Flooding and High Winds](#).
- Check local, county, and State codes for any requirements to supply backup power during short-term emergencies.
- Know the location of your main circuit breaker and breaker box. The box is generally located inside of buildings, but additional breakers may be located outside.
- Ensure that the breakers, including the main breaker, are correctly labeled. Correct labeling will help you ensure power is cut to the appropriate appliances or to the entire building.

Internal paddock

- Design an internal paddock in a higher area with access to drinking water and near the hay barn or feeding facility to keep cattle safe and well fed and to prevent them from leaving the property. External fences typically go down during hurricanes, and smaller paddocks are easier to repair. The internal paddock should be at least 100 square feet per head for paved lots and 500 square feet per head for unpaved corrals.

Power and backup power

Circuit Breakers

- Know the location of your main circuit breaker and breaker box. The box is generally located inside of buildings, but additional breakers may be located outside.
- Ensure that the breakers, including the main breaker, are correctly labeled. Correct labeling will help you ensure power is cut to the appropriate appliances or to the entire building.

Back-up power

- Create a Backup Power Plan, and store with your Farm Emergency Plan (see “Emergency planning and creation of Farm Emergency Plan” below).
- Check local, county, and State codes for any requirements to supply backup power during short-term emergencies.
- To provide power when the power goes out, supply critical operating areas with a standby generator wired with a transfer switch. Critical areas common to all dairies include wells, milking parlor, irrigation pumps and pivots for maintaining lagoon levels, feed center (feed bins and mixer), and calf barn. Size the standby generators to meet the minimum requirements of equipment required for operations. Maintain at least 2 week’s supply of fuel.
- Install additional electrical transfer switches to allow the use of generators during extended power outages for non-critical, daily loads. Areas for consideration include:
 - Secondary well(s) to provide water for animals, irrigation, and other day-to-day activities
 - Freestall barns to run heat abatement or ventilation systems
 - Farm shop for working on equipment
 - House
- Post the operating procedures near each generator. Consult your owner’s manual for specific safety, maintenance, and operational recommendations.

Roads

- The primary driveway into the farm should have adequate drainage to prevent flooding. The road should be well packed with a solid base that will hold up to heavy equipment and trucks during extreme conditions. For more information on maintaining unpaved roads, see the [USDA Environmentally Sensitive Road Maintenance Practices for Dirt and Gravel Roads](#).
- If you do not have a secondary entrance to your farm, construct one if possible to provide alternative access from a different road in the event the primary entrance is blocked.

- If the farm is in a location where all roads leading in and out may flood, purchase or make arrangements to rent or borrow a boat that can safely navigate the floodwaters to gain faster post-hurricane access to your property.

Drainage

Total water management is essential, including irrigation and drainage systems, and must take into account the water table and soil drainage.

- Increased sand content improves drainage, whereas higher silt and clay contents reduce drainage. In soils prone to developing a hard pan, perform deep tillage using a subsoil implement such as a ripper-bedder, or strip tillage to help improve soil percolation and reduce the time that water stands in flooded areas.
- Develop surface and subsoil drainage including a system of canals, ditches, beds, and/or drain tiles. Ditches between beds must have enough capacity to accommodate and channel excess water.
- Consider creating water retention areas to reduce overall flooding during small to moderate-intensity hurricanes.
- Make sure culverts are properly designed regarding size and location.
- For more information about water management, see:
 - Sustainable Agriculture Research & Education’s (SARE) *Building Soils for Better Crops* [Irrigation](#) and [Drainage](#) chapters

Water table

- The amount of flooding will be determined by your land’s topography, the amount of precipitation received, and the pre-hurricane water table. The higher the pre-hurricane water table, the more likely that flooding will occur for a given amount of precipitation. The chance of flooding can be estimated by measuring the pre-hurricane water table and considering the effects of varying precipitation amounts:

A general rule of thumb is that 1 inch of rain will cause the water table to rise about 10 inches in fine-textured soils, 6 inches in most of the flatwoods sandy soils, and 4 inches in coarse sands. It may take 4 to 6 days for the water table to return to its desired levels following rains of 1 inch or more. For example, if the water table is at 50 inches, 6 inches of precipitation will cause localized flooding on fine textured soils, but no flooding would occur on sandy soils.

Irrigation

- Locate irrigation pumps in elevated areas to reduce flooding risks to the pump, and install them with a backflow prevention device to avoid contamination in case of power loss. Keep the access road to the pump clear so that it is easier to bring in generators or diesel-powered pumps after a hurricane.

Trees and windbreaks

- Remove trees that could potentially blow down and block the entrance to the farm.
- If land is elevated and unprotected, consider creating windbreaks along the edge of fields. This is particularly valuable if adjoining land has bare soil and can prevent or reduce sandblasting of plants, feed supplies, and animals during a hurricane.
- Trees and shrubs used as windbreaks should be native species that will develop strong, deep root systems and be hardy enough to resist breaking during high winds. For example, red cedar (*Juniperus virginiana*) resists strong winds very well. Keep trees or shrubs pruned and free of dead or dying branches.
- For more information, see the USDA National Agroforestry Center [website](#) for information about how windbreaks can provide economic, environmental, and community benefits.

Debris disposal

- Create a plan for salvage operations including a method of debris disposal. Learn what materials and the specifications regarding composition of materials the landfill nearest your farm will accept, and identify alternatives if needed. For disposal of chemicals or other hazardous materials, follow specific procedures to meet U.S. Environmental Protection Agency (EPA) requirements.

Livestock concerns

Water storage

- Acquire a water tank suitable for hauling clean water to cattle in pastures for drinking after a hurricane has hit.

Burial site

- Have an approved burial site for catastrophic losses pre-approved by your State's department of agriculture.
- Some states require that livestock producers have an approved emergency burial/disposal plan in place before disposing of carcasses following a catastrophic event. The plan should include contact(s) for approval and assistance. For more information, contact the North Carolina [Department of Agriculture and Consumer Services Veterinarian Division](#).
- For more information about on-site composting of animal carcasses, see the USDA Animal and Plant Health Inspection Service [Livestock Mortality Composting Protocol](#).

Emergency planning

Farm Emergency Plan

- U.S. Department of Labor Occupational Safety and Health Administration (OSHA) regulations require an employer with more than 10 employees to have a printed copy of an emergency action plan readily accessible to all employees. (If you have 10 employees or fewer, the emergency plan may be reviewed orally.) For more information about emergency preparedness for farm workers, see the [OSHA Agricultural Safety Fact Sheet](#).
- Consider bringing together a disaster planning team, which could consist of the farm owner and engaged family members, the farm manager, herd veterinarian, an insurance representative, county Extension agent, and other individuals.
- Create your Farm Emergency Plan. See **Appendix: Farm Emergency Plan** for a sample plan that you can customize for your operation. The plan should include a checklist of tasks necessary to secure the facilities, fuel supplies, chemical supplies, and equipment; protect any animals on site; disconnect electricity and gas service; ensure that critical supplies are well stocked; etc.
- Make sure all of your employees know the formats (electronic or hard copy) and locations where the Farm Emergency Plan is stored.
- Work with your nutritionist to develop a backup plan for feeding animals in case you cannot unload feed in bins or experience delays in restocking ingredients and concentrates inventories.
- Consider creating a “hurricane suggestion box” where employees can place ideas for training and planning they believe would increase the operation’s resilience and safety in the face of a hurricane, based on their previous experience.

Maps and signage

- Prepare or update maps for all facilities, including locations of alternate entry/exit routes, electrical equipment (with shut-off options), fuel storage tanks (both above and below ground), propane tanks, compressed gas (for welding, etc.), and chemical spill equipment.
- Post signs around the premises stating that trespassing is not permitted. Following a disaster, unauthorized and unwanted visitors such as onlookers, rescue agencies, or humane organizations, or persons trying to assess damage or gain information about animal care may be attempting to access your property. Agriculture authorities can assist with proper language and signage.

Hurricane tracking apps

- Download one or more computer and mobile device applications (apps) that model hurricane track predictions, send alerts, and track hurricane impacts.

Given the rapid advance of mobile technologies, check for new options each year prior to hurricane season. The NOAA National Hurricane Center [website](#) is a good source for keeping up to date on the latest hurricane activities. For more information about emergency alerts, see the U.S. DHS Ready.gov [website](#).

Roles and responsibilities

- Designate an Emergency Response Team for your farm. Members of the team should be:
 - Thoroughly trained and physically capable of performing assigned duties
 - Knowledgeable about the hazards found on the farm
 - Trained in decision making regarding when to take actions themselves and when to wait on outside
- Define a chain of command with clearly defined primary and secondary roles and each person’s responsibilities. Some individuals may not be reachable after a hurricane, so alternative levels of authority need to be established to resolve critical issues quickly. In your Farm Emergency Plan, list who will be responsible for each task and how they’ll report fire, flooding, building collapses, and other emergencies. Identify procedures to be followed by the people who remain to handle critical operations.

Communication

Emergency Contacts List

- Develop and maintain a list of all people connected with your operation that should be contacted in an emergency. See **Appendix: Emergency Contacts List** for a template that you can customize. The Emergency Contacts List should include names, phone numbers, email addresses, locations, and all other pertinent information for individuals (owners, family members, employees, employee family members), emergency responders, State and local agencies, contractors and suppliers, and anyone else who is on your farm on a regular basis or provides crucial emergency services. Contacts specific to dairy operations that should be considered include feed mills, milk haulers, and agencies responsible for permits and inspection of lagoons.
- Keep copies of your Emergency Contacts List—hard copies as well as electronic copies—in multiple locations including your home, office, and vehicle; with all family members and key employees; and in additional safe locations. It is a good idea to have this information stored on your and your employees’ phones.

Lines of communication with local businesses and officials

- Establish communication with your local law enforcement and fire department, electricity and gas providers, and other key groups to help them understand the nature of your business so that they can respond as needed in the event of a hurricane. Let them know the number of employees typically on site,

the potential impact of the hurricane on animal welfare, and the potential environmental hazards that could lead to environmental contamination, such as if the lagoon overflows or its structure ruptures.

Post-hurricane Communications

- Purchase a battery-powered or hand-crank radio to stay up to date about conditions beyond your property in case you lose electricity for an extended period of time.
- Consider ahead of time the locations where producers and others could meet if all communication lines are down (e.g., a local feed or equipment supplier).
- Contact a local AM radio station to see whether it could serve as a communication channel in the aftermath of a hurricane.
- For more information about communicating before, during, and after a major disaster, see the FEMA [website](#).

Electricity and gas

- Contact your local utility company for possible guidance on disconnecting power from downed lines to prevent harm to employees or livestock in the immediate area. Record their instructions in your Farm Emergency Plan.
- If certain equipment requires specialized shutdown procedures, train employees in these procedures.

Equipment operation

- Train personnel in the safe operation of unfamiliar equipment (such as generators or drainage pumps) that they may have to use in case of a hurricane.
- Make sure the appropriate employees are prepared to set up your backup generators. They should refer to your Backup Power Plan for information about where generators and generator fuel can be found, where they should be placed in preparation for a hurricane, and how they are to be connected to the electrical loads they will power.

Drones

- Consider getting an unmanned aerial vehicle (UAV) (i.e., drone) pilot license and to purchase a UAV. Small UAV quadcopters or hexacopters that can be equipped with visual or RGB cameras are relatively cheap (\$500 to more than \$2,000). Use of UAVs will help with damage assessment if accessing your operation directly is impossible or unsafe. For regulations and more information about operating a UAV, see:

—U.S. Department of Transportation Federal Aviation Administration
Unmanned Aircraft Systems [website](#)

—University of Florida IFAS Extension [Preflight and Flight Instructions on the Use of Unmanned Aerial Vehicles \(UAVs\) for Agricultural Applications](#)

Chemical safety

- Take the necessary steps to prevent chemical spills from storage tanks containing fuel, herbicides, pesticides or other potentially dangerous liquids.

Basic emergency response skills

- Train all members of your Emergency Response Team in the use of various types of fire extinguishers, first aid, and CPR (cardiopulmonary resuscitation).

Long-Term Operation Maintenance

Periodic checks of systems already in place
(described in the previous section)

Prior to hurricane season

Survey your operations to assess the potential impact that high wind or heavy rain or flooding would have on livestock and facilities, and identify any changes that should be addressed. If in doubt, contact your local Extension office and other State and Federal resources for further information specific to your circumstances.

Annual review of emergency planning tasks

Farm Emergency Plan review and reassessment

- Review your Farm Emergency Plan with your employees to ensure that they are familiar with all elements. Make any necessary additions or updates.
- Review your Emergency Contacts List with your employees, and update it with current names and contact information.
- Review items provided in the “hurricane suggestion box,” and add them to your Farm Emergency Plan or training list as relevant.

Employee training

- Identify key tasks that employees will need to complete during hurricane preparation and recovery operations.
- Once each year, provide training for all employees who will participate in the key tasks identified above.

Personal health and safety tasks

- Make sure you and your employees have up-to-date tetanus shots.
- For information and links to time-specific guidance for preparing yourself and your home, visit the Ready.gov Hurricanes [website](#).
- Download the FEMA [Mobile App](#) to learn emergency safety tips, receive real-time weather alerts and important disaster planning reminders, information about shelters and recovery centers, and more.

Recordkeeping, documentation, and insurance

- At the time of renewal, review insurance policies with your insurance agent and update coverage as needed. Make sure you have adequate flood insurance and coverage for vehicles, farm buildings and structures, and livestock.
- Keep records of harvest, equipment inventories, and purchases of supplies up to date. Long-term records will help to establish a production baseline from which losses can be determined. Be sure that copies of each are in a safe location as described in the **Building a Resilient Operation** section above.

Infrastructure

Buildings and facilities

- Inspect all buildings and facilities for structural soundness. Perform maintenance on facilities and infrastructure to repair items such as loose roofing materials or improperly/inadequately grounded electrical equipment to reduce hazard risk during a hurricane.

Drainage

- Inspect drainage ditches, lines, and other drainage areas, and clean them out before and during the peak hurricane season. Keep ditches clear through a good maintenance program including chemical weed control. Regrade areas of the property that are prone to flooding to improve drainage.
- Remove any debris and clean as needed to maintain drainage.
- Check any new construction areas, housing developments, or Department of Transportation projects nearby to see whether they are affecting your land's drainage. Determine where the water is draining now, and address any new drainage needs before hurricane season begins.

Maintenance of trees, windbreaks, and roads

- Remove dead and dying branches from trees on your property. Keep power line easements free of trees that could potentially fall on the lines during a hurricane. Trees that have grown and now present a risk to utilities, fences, or facilities should be trimmed or removed.
- Maintain windbreaks with regular pruning, especially if they are close to aerial power or telephone lines. To learn more about proper pruning practices, see:
 - Inland Urban Forest Council [A Practical Guide to Proper Pruning of Trees and Shrubs](#)
 - The OSHA Line-Clearing Tree Trimming Operations [website](#)
- Evaluate roads for any repairs or improvements that need to be made before hurricanes arrive.

Generators

- Do routine annual maintenance on backup generators. Replace old stored fuel with new, fresh fuel. Replace fuel filters, test all generator circuits, and make sure you have all necessary supplies on hand, including spare belts and fuel filters.
- Consider what would happen if utilities were not available on each task on your dairy to determine if additional standby generators or electrical switches are needed. Add electrical transfer switches and portable standby generators as needed.
- Ensure that all essential equipment functions when powered by the backup generator.

Emergency equipment and supplies

- Maintain an ample supply of emergency medical supplies, and have raincoats and boots available for employees.
- Maintain a supply of drinking water and dry and canned food sufficient for at least 2 weeks for employees who become stranded at the farm or who need to return to the farm before utility and emergency services are restored.
- Maintain an ample supply of weather-proofing supplies such as tarps and sandbags; fencing supplies; plumbing supplies; lumber, construction tools, nails, and ropes; portable lights; batteries; and battery-powered or hand-crank radios.

Livestock concerns

- Work with your veterinarian to develop a disaster response plan, and select a team of employees who will be responsible for treatment of any sick or injured animals and criteria for humane methods of euthanasia when necessary. Review and revise the plan as needed annually. Provide training to all team members.
- Review feed inventories each month with your nutritionist, and discuss possible options for feeding. Keep them apprised of potential vendors who could provide feed ingredients if the current vendor is not able to deliver feed.

Monthly considerations during hurricane season

See **Appendix: Resource Links** for local Extension offices and other State and Federal resources which you may consult for further information.

Weather monitoring

- During the June to November hurricane season, pay regular attention to long-term weather forecasts. Check your weather tracker daily if a hurricane is forecast to move closer to your area.

Equipment and supplies

- Review the list of equipment in your Emergency Response Plan and make any necessary repairs.
- Review inventories and order additional supplies in the event that normal operations are disrupted for a week or longer.
- Refresh emergency medical supplies, water, and dry and canned food supplies.
- Note supplies that take longer to deliver, and order early to ensure they are available immediately after a hurricane.

Farm equipment

- Contact your equipment manufacturers to establish procedures for dealing with damaged equipment. Make sure you won't invalidate your warranty if you attempt repairs yourself.

Fuel

- Consider fuel needs for tractors, generators, and farm vehicles. Any fuel stored on site poses a contamination risk if storage tanks are not adequately protected from flooding, especially if stored at a low elevation; however, if secure storage facilities are available on site, arrange for fuel deliveries several days prior to the expected hurricane impact.

Generators

- Inspect and service emergency generators so they are ready when needed. Verify there is adequate fuel to power the generator for at least 2 weeks.

Livestock

Feed and veterinary supplies

- Make sure you have a minimum of a 2-week supply of feed. Give the feed company plenty of notice as they will be working to provide additional inventory to others in the area as well as secure their facilities. Have a secondary vendor on call in case the hurricane impacts your primary vendor. Work with your nutritionist to develop a backup plan for feeding animals in case you cannot unload feed in bins or experience delays in restocking ingredients and concentrates inventories.
- Make sure you have what you could need to address the potential increased incidence of mastitis, metabolic, and reproductive disease. Also have on hand vet wrap and materials needed for treatment of any wounds.
- Make sure you have enough detergent, acid, chlorine, paper towels, pre-dip, post-dip, and spare parts to repair milking equipment.

Short-Term Preparedness

Specific actions to be done in the week
before a hurricane arrives

Bracing for the hurricane

(1-7 days before a hurricane is forecast to strike)

First and foremost, take whatever precautions necessary to protect your family, your employees, and yourself. After that is accomplished, focus on protecting your farm. Once forecasters have put your area in a hurricane's path, there are a number of precautions you should take to prepare.

Employee safety

- Determine whether individual employees plan to evacuate or stay during the hurricane. For those who evacuate, establish a schedule for checking in after the hurricane to provide updates so they know when they can return as well as the extent of damages. For employees who stay, be sure they have safe lodging and have a plan for them to report in.
- Inform workers of changes to the normal work schedule. To allow time for workers to get home safely, all activities should cease well before the hurricane arrives, including milking, providing additional feed, and putting out hay for animals in pastures.
- If housing on the farm or an employee's home is not considered secure, consider renting a hotel room for the employee and their family to use for showers after the hurricane if electricity is out for extended period of time.
- Consider securing a caterer or food truck to provide meals for employees and their families after the hurricane.

Employees' roles and responsibilities

- Review your Farm Emergency Plan with all employees and discuss each person's responsibilities.
- Continue to monitor hurricane track and strength updates. Listen closely for evacuation orders in your area.
- Develop a care schedule for the animals. At no time should any employee be expected to put their life in danger to care for the animals.

Communications

- Ensure that all communication equipment, including weather radio, AM/FM radio, and other devices, is in good working order. Keep mobile devices fully charged. Have rechargeable battery packs or charging cables for your vehicle to maintain communication. Texting may be a more valuable form of communication than calling when the phone networks may be overwhelmed.

Food, water, and cash

- Make sure your operation still has a 2-week supply of drinking water as well as dry and canned food.
- Secure cash reserves for purchasing supplies after the hurricane. In widespread power outages, credit and debit cards will not work, and many vendors do not accept checks.

Recordkeeping, documentation, and insurance

- Ensure that important documents, including important legal documents, bank records, and identification documents, are in a safe, dry place and that duplicates are in alternative locations off site.
- Document the condition of your facilities and your livestock. Take photographs and video (where helpful), record forage crop maturity, and estimate yield, as this will aid with insurance claims and disaster recovery assistance.
- If you have insurance through FEMA's National Flood Insurance Program, your policy may cover up to \$1,000 in loss avoidance measures such as sandbags and water pumps to protect insured property. Check with your insurance provider to confirm. Keep copies of all receipts and a record of the time spent performing the work and submit these documents to your insurance adjuster when you file a claim to be reimbursed.

Equipment

- Ensure that all emergency equipment is ready (e.g., flashlights, irrigation pumps, compressors, heavy machinery).
- Make sure chainsaws are in good working condition, and have on hand other tools, gloves, and safety supplies for removing and handling debris. Stock up on fuel mixture for chainsaws as well as bar and chain oil. Sharpen the chain, keep the saw file and saw wrench close at hand, and make sure you have a spare chain.
- Move all non-critical farm equipment to higher elevations or store in secure buildings.
- Move pesticides, herbicides, and fertilizers to a secure place, on high ground above any potential flooding if possible.

- Ensure that tanks containing fuel, fertilizer, and other liquids are kept full and tied down.
- Make sure that farm equipment you will need after the hurricane—such as tractors with front-end loaders or skid-steer loaders, bulldozers, excavators, and portable generators—is fully fueled and operational. If essential equipment is not in working order and repairs are not feasible, consider leasing the necessary equipment.
- Back up data on computers, and turn off and unplug computers and other electronic equipment prior to the hurricane’s arrival to prevent permanent damage from electrical surges, and store these items safely.

Infrastructure

Backup generators

- Be sure your backup generators are fully operational, with full fuel tanks and portable fuel storage tanks. Your generators may have to run for several days until the power company can restore electricity. Review the owner’s manual for the maximum run time and other unit specifics.

Fuel

- Make sure you have a minimum of a 2-week supply of diesel and gas. Be sure the supplier understands how much you use daily and that it is necessary for providing animal care and avoiding a potential overflow of a lagoon. If secure storage facilities are available on site, arrange for fuel deliveries several days prior to the expected hurricane impact. Consider fuel needs for tractors, generators, and farm vehicles.
- Service stations will not be able to supply fuel if they do not have electric power for the pumps, so make sure portable fuel storage tanks are full.
- Any fuel stored on site poses a contamination risk if storage tanks cannot be adequately protected from anticipated flooding. Move them to higher ground or secure in place.

Electricity and gas shut-off

- Consult your Farm Emergency Plan and follow procedures for disconnecting electrical power and gas to some or all buildings and any non-critical equipment in danger of being flooded.

Buildings and grounds

- Check on the security of roofing and siding materials and windows and doors, and make sure all other building components are tied down securely.
- Secure loose items that could become hazardous projectiles and injure people or livestock or damage buildings and equipment.

- Close the perimeter gate to the facility to ensure that any animals that get loose during the hurricane are contained within the center area (e.g., pens, pasture).
- Anchor calf hutches, and do not tether calves to the hutch. Consider using round bales to build a windbreak.
- Remove shades and anchor any portable shade frames.
- Move and anchor irrigation pivots into a position that will minimize damage from the wind.

Lagoons

- Pump lagoons to the lowest legally allowable levels to provide space for the predicted rainfall and prevent an overflow. Contact the [North Carolina Department of Environmental Quality](#) for specific details.

Roads

- If the roads leading to the farm are likely to flood, stage your boat in a secure, easy-to-access location.

Drainage

- Check drainage ditches and culverts around your facilities, and remove debris.
- Pump down all water from ditches to the maximum extent possible.

Supplies

- Review inventories and order additional supplies in the event that normal operations are disrupted for a week or longer.
- Purchase animal health supplies to address the potential increase of mastitis, metabolic, and reproductive disease. You should also have vet wrap and other materials needed for treatment of any wounds.

Feed and forage

- Check your feed inventory yourself and call the feed mill if you are low to schedule a delivery ahead of the hurricane. Do not depend on someone else to do this, as your feed manager will likely have their hands full.
- Forage should be stored in a well-drained area or a barn immediately after harvest. If hay bales are still in the field that may be subject to flooding, the bales should be moved to higher ground immediately. If time allows, fields that are ready for harvest should be harvested to prevent damage from the hurricane and loss of nutrients (and quantity).
- For animals in pastures, provide additional hay in a location that will not be flooded. For animals in confined facilities, increase the amount of feed offered to approximately 1.5 times normal in the event feeding is delayed during or after the hurricane.

Livestock

There are many preparations that should be done in advance of the hurricane that will minimize damage and protect livestock. Some of the preparations that should be considered include:

- Move cattle housed in older structures that may be damaged by the wind to pastures that would provide greater protection from the impending hurricane. Make sure cattle have plenty of feed prior to the hurricane.
- Lower grain augers and other items that could be blown over.
- Move equipment to open areas to minimize damage from collapsing structures.
- Fill portable water tanks for watering cattle in pastures without a pond after the hurricane. If you do not have a water tank suitable for hauling clean water to cattle in pastures for drinking, purchase one prior to the hurricane.

Personal safety the day before the hurricane hits

- Perform a final verification of the hurricane track and strength. Listen closely for evacuation orders for your area.
- Obey all mandatory evacuation orders. Failure to do so, can put you and your workers at risk, and could tie-up rescue resources. Do not require your personnel to be present on the farm either, since they also have to prepare themselves and their families.
- Employees who will evaluate should do so at least 1 day prior to hurricane impact. For staff who will remain on site, confirm that they have access to structures on high ground or elevated slabs or pylons that can withstand hurricane winds and rain, sufficient stores of clean water and food, medical supplies, working radios or cell phones, and sufficient battery or generator power. Those workers remaining on site will likely need to rely on mobile device communication with evacuated supervisors and colleagues, since local radio and television communications often black out for several hours as a hurricane passes. Local first responders may also be out of communication at the time of hurricane impact.
- Personnel remaining on site to monitor the farm until the last moment should keep an eye on water levels in low-lying areas so that they may give sufficient warning and allow workers to exit the operation before levees, surrounding roads, and highways are blocked with floodwaters.

Post-Hurricane Recovery

Activities that can be taken to minimize losses immediately after, a week after, and a month after a hurricane

Immediately after the hurricane has passed

When the hurricane has passed, proceed with extreme caution as you begin to inspect for damage. Consider all downed power lines to be energized and lethal! If there are structures that were damaged, there will be debris that could have exposed nails, screws, splinters, or sharp edges that could potentially cause injury to people and animals.

Safety

- Check on family and employees by phone or in person as soon as possible. Remind everyone of the potential dangers that might exist after the hurricane.
- Do not rush back into a facility until you are sure it is safe. Use extreme caution due to the unsafe conditions presented by weakened trees and damaged structures, equipment, and electrical and gas systems.
- Continue to watch the weather forecast. Are waters still forecast to rise more than they are now? Some floodwaters peak up to a week after the hurricane.

Electricity and gas

- Avoid downed power lines in, as these may still be live and represent an electrocution hazard. Operate on the assumption that all downed power lines are live. Remember that a downed power line on a fence may energize the fence.
- When restoring electricity to flooded buildings, use extreme caution and consult with an electrician and your power provider. See the Alabama Cooperative Extension System guidance on [restoring electrical power](#) after flooding.
- Natural gas or liquefied petroleum (LP) gas leaks can cause deadly explosions. Check for natural gas or LP leaks, and if a leak is suspected, turn off the gas, evacuate the area, and notify your gas company and local law enforcement. Tell employees to stay clear.

Groundwater

- After a flood event, groundwater should be used with caution if contamination is suspected anywhere in the general vicinity. It is advisable to have a sample analyzed for potential contaminants and if the groundwater source has been subject to flooding, treat the well with chlorine to reduce the risk of bacterial contamination prior to using the water.

Roads and buildings

- Before entering any buildings, check for levee breaches, rising or incoming water, and evidence of structural fire or damage.
- As soon as it is safe, call in the employees needed for inspection and clearing debris from roads. Cordon off areas that are unsafe.

Security

- Watch your farm for unwelcome visitors like looters. Secure your equipment and farm entrances, and make sure your security cameras are operational.

Recordkeeping, documentation, and insurance

- In the aftermath of a hurricane, take detailed notes of damage with accompanying photographs demonstrating the losses, as this may be critically important later. Do not begin cleaning up or repairing damage until you have thoroughly documented the damage. Contact your insurance adjuster as soon as possible to decide on the best plan moving forward with potential damage to your operation. (See “Within a week following hurricane impacts” below regarding post-hurricane documentation.)
- If you have experienced flooding and have flood insurance through the FEMA National Flood Insurance Program, visit their [website](#) for information about starting a claim.

Emergency assistance with livestock

- Inspect cows and heifers. If any animals are injured, work with staff to get proper treatment started as soon as possible.
- If you cannot milk, feed, or properly care for animals, check with your county agent, local or State livestock or dairy association, local dairy producers, or department of agriculture for assistance with moving animals to other dairies as soon as possible. Work with the Sheriff’s office or emergency management agency to make them aware of the situation.

Livestock mortality

- If there has been significant mortality, document the numbers and follow the procedures outlined in your Farm Emergency Plan for the disposal of the carcasses, according to your State’s regulations. (Refer to the **Building a Resilient Operation** section for details and links to the relevant State office.)
- Notify the appropriate State agency of the losses and contact the USDA Farm Service Agency (FSA) regarding the Livestock Indemnity Program (see “Recovery assistance” under “Within a week following hurricane impacts”).

Lagoons

- Check lagoon levels and pump as needed to prevent any spill. Maintain records of volumes pumped and locations the waste is applied as outlined in your nutrient management plan.

Fencing and feed

- Check animals in pasture and inspect fencing. If a fence was damaged, either repair it or move animals to another pasture that will keep them secured.
- Inspect all feed ingredients to make sure they are free of debris. If the feed is contaminated, discard it so that it is not fed, and replace it with clean feed.
- For hay that was stored in a barn or in a covered stack that has been soaked with rain, unstack to facilitate drying and prevent mold growth.

Within a week following hurricane impacts

Personal health and safety

Take care of yourself during recovery. Disasters and the recovery period afterward take a toll on human health. Disaster recovery takes a long time and can be very stressful. For guidance to help you through this difficult time, see:

- Colorado State University Extension's [Coping with Natural Disasters](#)
- North Carolina State University Extension's [Tips for Handling Family Stress After Disasters](#)

Communications

- The local supply/seed stores are often natural sources of information if the power is down and electronic communication is limited. In addition, radio stations have generators that allow them to transmit if their towers are not damaged.

Recovery assistance

- Before beginning cleanup, talk with your insurance company and consult with disaster assistance program agents to learn about available programs, eligibility requirements, and application procedures (see "Disaster assistance" below for more information about assistance programs).

Documentation of damage

- Many disaster assistance programs will become available after the disaster, perhaps even years later, and an operation can only receive assistance for damage that was documented. For instance, the [Emergency Conservation Program](#) (ECP), administered by the FSA can compensate farmers for repairing damage due to a natural disaster or severe drought which would create new conservation

problems. The work must be documented, and farmers must have received authorization from their local USDA office in advance.

Photos and video

- Take photos or video first and use the chainsaw second. Photograph and take video of damaged facilities and property and/or livestock mortality with written notes describing what is in the pictures and where they were taken. This “after” documentation will be used with your pre-hurricane “before” documentation to clearly show your losses.

Drones

- If you own and have a license to operate a UAV (i.e., drone), utilize it now to take aerial photographs of damage to your operation. Local extension offices might have access to drones and personnel with a drone pilot license to assist you

Written records

- Keep a notebook with you throughout the recovery period. Describe the work you did and record all expenses. Keep a running log of names and what was discussed during conversations with insurance, State, and Federal agency contacts to create a valuable, third-party record of your recovery efforts that can be used later as documentation for disaster assistance programs. You may not remember everything that was discussed at these meetings, so have a second person involved in the conversations if possible so that one can ask questions and the other can take notes.

Disaster assistance

- Communicate early and often with recovery assistance contacts. Check in with them throughout the recovery process. Note that assistance will vary from one hurricane to the next and one budget year to the next.
- Call your local FSA Office to report any losses or damages and inquire about available assistance programs, application procedures, and deadlines.
- Check in with your local Cooperative Extension office, USDA agencies, and your State department of agriculture to see what assistance may be available following the hurricane.
- Consult the following resources:
 - FEMA Individual Disaster Assistance website to find the closest recovery center and other resources to assist you during your recovery
 - USDA Disaster Resource Center’s Storms website for updates on emergency designation areas and available assistance programs
 - Farmers.gov, including the five-step Disaster Assistance Discovery Tool to learn which USDA disaster assistance programs are available to assist you with your recovery
 - U.S. Department of Labor’s Disaster Unemployment Assistance Program website

- To learn more about USDA Disaster Assistance Programs that may be right for you, see:
 - Livestock Indemnity Program (LIP)—FSA program for eligible livestock owners and contract growers who experience above-normal livestock deaths due to specific weather events as well as disease. To receive benefits, producers must file a “notice of loss” within 30 days of livestock death or injury and submit an application for payment within 60 days after the calendar year in which the loss condition occurred.
 - Emergency Assistance for Livestock, Honey Bees, and Farm-raised Fish Program (ELAP)—FSA program that provides payments to qualifying producers to help compensate for losses
 - Emergency Farm Loans—FSA program that provides eligible farmers and ranchers low-interest loans to help them recover from production and physical losses
 - Disaster Set-Aside Program—FSA program that allows eligible FSA borrowers to skip an annual installment payment and move it to the end of the loan repayment period
 - Emergency Watershed Protection (EWP) Recovery Assistance—USDA Natural Resources Conservation Service (NRCS) program that provides financial and technical assistance to quickly address serious and long-lasting damage to infrastructure and land
 - EWP Floodplain Easement Program (EWPP-FPE)—NRCS program option for converting land to permanent easements for the purpose of improving floodplain management and reducing the threat to life and property
 - Environmental Quality Incentives Program (EQIP)—Year-round NRCS rehabilitation program with funding authority to provide financial assistance to repair and prevent excessive soil erosion caused or impacted by natural disasters
 - Emergency Conservation Program (ECP)—FSA program with technical assistance through NRCS that helps eligible farmers and ranchers repair damage to farmlands caused by natural disasters

Insurance claims process

- Begin the insurance claims process (Federal, private, or both). Accurate losses of inventory and equipment may not be fully documented yet, but insurance claims can take months to resolve following hurricane events, so start the paperwork now

Infrastructure assessment and repairs

- Assess damage to equipment and infrastructure and form a prioritized list of needed repairs.
- Gather quotes from qualified vendors to make repairs to facilities and equipment. Vendors are often overwhelmed in the months following a

hurricane, so making contact soon after the hurricane is important for an expedient response.

- Monitor fuel levels in backup generators and order additional fuel as needed.

Floodwater contamination

- “Floodwater” refers to the overflow of external sources of water such as rivers or canals and not to direct precipitation that may pool in or near your fields or facilities.

Feed and water supply

- If you have a well, regardless of whether the wellhead was flooded, submit groundwater samples for microbial and chemical testing to ensure that the aquifer was not contaminated. Also monitor wells for coliform contamination.
- Floodwaters may contain elevated levels of pathogenic bacteria and chemicals, which cannot be removed from feed once contaminated. The U.S. Food and Drug Administration (FDA) considers all human and animal foods that come into contact with floodwaters to be adulterated. If you must destroy and dispose of food products, keep documentation showing that the crop did not enter the food supply.

Forage Crops

Crops for animal consumption

- All forage that has not been harvested should be inspected to determine its suitability as feed. Do not harvest forage from fields contaminated by floodwater containing chemicals or human pathogens. Forage in non-flooded fields will have reduced quality due to increased ash contamination from wind and rain, could have increased concentrations of toxins from prussic acid (forage sorghum, sudan grass, and sorghum-sudan grass), and will be subject to mycotoxin contamination after the hurricane.
- If your crop was intended for animal food, see FDA guidance at:
 - [Crops Harvested from Flooded Fields Intended for Animal Food: Questions and Answers](#)
 - [Resources for Animal Food Producers in Flooded Areas](#)
- If your fields have been flooded with off-farm water sources, be aware of weed seeds that have not traditionally been a problem on your farm but could have been carried in and be aware of the management implications from this in subsequent seasons.

Soil contamination

- If floodwater entered your fields, consult your local U.S. Food and Drug Administration (FDA) office and State, industry, and/or university Extension specialists for guidance before harvesting forage. The U.S. FDA recommends determining the source of floodwaters (and the likelihood that they carried

human pathogens), letting fields dry before reworking, and testing for pathogens. Other specialists suggest a 30- to 60-day wait period to reduce bacterial contamination of soil. Chemical contamination may require a longer waiting period depending on the chemical and the level of contamination.

- Collect soil samples throughout the flooded portion of your fields and test them for known contaminants and general chemical contamination. For more information about soil testing, visit the [North Carolina Cooperative Extension website](#).
- Take measures to avoid cross-contamination between flooded and non-flooded fields. Do not use equipment in a non-flooded field that was used in a flooded field unless it has been cleaned and sanitized.

Food-handling equipment

- If electrical service was interrupted and caused milk to warm, dump all milk in the tank and clean and sanitize before milking. Record the amount of milk dumped and report to your milk handler.
- Thoroughly clean and sanitize all milking equipment prior to milking. Physically remove dirt or debris on the outside of the milking equipment with a brush or with water and a detergent to avoid contamination of milk during milking.

Livestock health and biosecurity

- Make employees aware that the animals have been stressed and that they should expect more health issues including mastitis, dystocia, metabolic disease, and lower reproductive performance. Depending on the severity of the hurricane, these issues may persist for several days or weeks following a hurricane.
- Evaluate animal health, and work with your veterinarian or nutritionist to address any issues. Increased incidence of mastitis, metabolic disease around calving, decreased reproductive efficiency, and respiratory disease are most common. Be sure to follow label directions related to milk and slaughter withholding times for any animals that are treated.
- If bedding in freestalls or calf hutches is wet, remove and replace with dry bedding as quickly as possible.
- Make sure you have a biosecurity sign at your farm entrance and enforce proper biosecurity measures at all times.
- Watch for insects, such as fire ants, as well as displaced wildlife. Rodents and snakes can cause a problem in your livestock houses, feed, feed lines, etc. and will be more prevalent after a hurricane and flooding.

Milk-hauling and feed

- Contact your milk hauler and cooperative or milk plant to advise them of changes in milking schedule and access to the dairy.

- Check stored feeds for damage. Replace or patch plastic covers on silos to prevent spoilage, and sample inventoried hay and feed ingredients that were potentially damaged by rain to determine any change in feeding value.
- Discard any feed that was damaged or begins to mold. Do not feed to animals as this may cause illness.

Within a month after hurricane impacts

Recovery assistance and insurance claims

After many natural disasters that result in widespread damage, additional programs often become available to aid with agricultural losses. These programs are not guaranteed, however, and are generally handled on a case-by-case basis depending on the hurricane's impact. In addition, some programs require additional processing time for a special appropriation from the U.S. Congress and Presidential approval.

While a special allocation may not be immediately available, it is important to document losses and to illustrate to your legislators the impact of the hurricane on your operation. This information will help promote policy decisions and additional allocations that may become available.

- Continue to follow up on the insurance claims process. Begin filing for any additional State or Federal disaster assistance programs for hurricane recovery.
- Visit the USDA Disaster Resource Center Storms [website](#) for updated information about FEMA aid and other disaster programs.
- Continue to document everything and keep a record of conversations with agency contacts. This creates a valuable, third-party record of your recovery efforts that may be used later as documentation for assistance programs.

Organic certification

- If your farm is organic, it is important to consider how the hurricane impacts may affect your certification. Temporary variances from some organic practices are possible, so contact your certifier to determine whether your practices qualify. It is most important to report prohibited substances that may have infiltrated your farm during the hurricane.

Infrastructure and equipment

- Continue to check for any structural or equipment damages or losses and document each incident when discovered. Check feed storage bins for any damage or leaks that may have developed, and repair as needed.
- Continue to gather quotes from qualified vendors to make repairs to facilities and equipment. Vendors are often overwhelmed in the months following a hurricane, so making contact soon after the hurricane is important for an expedient response.

- Monitor buildings for water damage or mold development, and monitor wells for coliform bacteria.
- Continue to refill fuel tanks and check backup generators until full power is restored.
- Perform general and preventative maintenance on any equipment that was flooded. Keep all receipts for parts and labor as well as a list of any equipment that is determined to be a total loss.
- Examine drainage ditches and canals to determine to what extent they were silted in by floodwaters and need repair and cleaning of debris. Clean and/or repair drainage ditches if necessary.

Inspections of livestock houses

- Inspect all structures for damage and determine if they are safe for housing animals. Safely remove any debris that may have blown in and become a hazard to animals or employees.

Livestock health and feed

- Continue to evaluate animals for any prolonged or lingering stress due to power outage, heat stress, etc. Evaluate reproduction to determine the impact of future calving schedules and milk production.
- Evaluate impacts of the hurricane on feed inventory, and make adjustments to the feeding program as needed to account for losses.

Appendix

Farm Emergency Plan

Hurricane preparedness can have a direct effect on your farm's profitability and long-term survival. For agricultural operations in hurricane-vulnerable regions, it is critical to have a Farm Emergency Plan in place outlining key tasks and different people's roles and responsibilities as you brace for the hurricane. Your Farm Emergency Plan can save valuable time in a chaotic situation when multiple challenges clamor for immediate attention, helping you prioritize your actions and recover from the hurricane as efficiently as possible.

Use this sample plan to customize for your operation. Preparation for these tasks—putting the systems in place—is described in the main guide (see “Emergency planning and creation of Farm Emergency Plan” in the **Building a Resilient Operation** section). Though there is some overlap with the tasks listed in the **Short-term Preparedness** section, this sample plan is intended to be a document you can use during an actual emergency.

Before the hurricane

Tracking the hurricane

- Use your storm tracking app. The NOAA National Hurricane Center [website](#) is a good source for keeping up to date on the latest hurricane activities. Learn more about emergency alerts at the U.S. DHS Ready.gov [website](#).

Emergency Response Team

- Gather the members of your farm's Emergency Response Team, who have been thoroughly trained in their respective tasks and are knowledgeable about the hazards found on the farm.
- Review the chain of command and individuals' primary and secondary roles and responsibilities.
- Discuss modes of communication as well as alternatives in case any communication channels become unusable during or after the storm.
- Review your farm's Emergency Contacts List.

Employees' status and location

- Review procedures to account for all people and employees after an emergency evacuation. Determine who will evacuate and who (if anyone) will stay during the storm. For those who evacuate, establish a schedule for checking in after the storm. For those who stay, be sure they have safe lodging and sufficient food and water and establish a clear plan for them to check in.

Maps and emergency escape routes

- Using the map of your farm with all buildings and contents, review emergency escape routes and hurricane preparation procedures for each building, facility, and area of the operation.

Emergency equipment and supplies

Locate the following equipment and supplies:

- Emergency medical supplies for both humans and animals
- Raincoats and boots
- Weather-proofing supplies such as tarps and sandbags
- Fencing supplies
- Plumbing supplies
- Lumber, construction tools, nails, and ropes
- Portable lights, batteries, and battery-powered or hand-crank radios

Food, water, and cash

- Make sure there is a 2-week supply of dry and canned food and drinking water (at least ½ gallon per person per day) stored on site if personnel will be staying on site.
- Secure cash reserves to use for purchasing supplies after the storm.

Facility security

- Ensure that important documents are in a safe, dry place.
- Check on the security of roofing and siding materials and windows and doors, and make sure all other building components are tied down securely.
- Secure outside objects around your farm, so that they don't blow away or become hazardous projectiles.
- If there is a perimeter gate to the facility, close it to ensure that any animals that get loose during the storm are contained within the center area (e.g., pens, pasture).
- Protect greenhouses [if applicable].

- Check drainage ditches and culverts around your facilities for debris.
- Pump down all water from ditches.

Equipment

- Ensure that all emergency equipment is ready (chain saws, compressors, heavy machinery, etc.).
- Move all non-critical farm equipment to higher elevations or store in secure buildings.
- Move pesticides, herbicides, and fertilizers to a secure place, on high ground if possible.
- Make sure that farm equipment you will need after the storm, such as tractors with front-end loaders or skid-steer loaders, is fully fueled.
- Be sure your backup generator(s) are fully operational. Fill the fuel tank(s) and portable fuel storage tanks.

Fuel

- Make sure you have a minimum of a 2-week supply of diesel and gas. Be sure the supplier understands how much you use daily and that it is necessary for farm operations. If secure storage facilities are available on site, arrange for fuel deliveries several days prior to the expected storm impact. Consider fuel needs for tractors, generators, and farm vehicles.
- Any fuel stored on site poses a contamination risk if storage tanks cannot be adequately protected from anticipated flooding. Move to higher ground or secure in place.
- Since fuel may be unavailable if service stations have no power, make sure portable fuel storage tanks are full.
- Ensure that tanks containing fuel, fertilizer, and other liquids are kept full and are tied down.

Backup generators

- Retrieve backup generators and fuel and place them where needed.
- Connect generators to critical electrical loads as outlined in your Backup Power Plan.

Electricity and gas shutdown

- [Outline the shutdown procedures for electricity and gas, according to instructions you are given by your utilities and other experts.]
- [Outline the shutdown procedures for specific equipment.]

Service or equipment to be shut down	Procedures for shutdown

Forage Crop

- [Add actions specific to your crop.]

Animal care

- Develop a care schedule for the animals, making sure that your employees' safety comes first.
- Check your feed inventory and schedule a delivery from the feed mill ahead of the storm if necessary.

Immediately after the hurricane

Safety

- Make safety your first priority. Do not rush back into a facility until you are sure it is safe. Use extreme caution due to the potentially injurious situations presented by weakened trees and damaged structures, equipment, and electrical and gas systems.
- Continue to watch the weather forecast. Are waters still forecast to rise more than they are now? Some floodwaters peak up to a week after the storm.

Electricity and gas

- Avoid downed power lines, as these may still be live and represent an electrocution hazard. Operate on the assumption that all downed power lines are live. Remember that a downed power line on a fence may energize the fence.
- When restoring electricity to buildings that have flooded, use extreme caution and consult with an electrician and your power provider. See the Alabama Cooperative Extension System guidance on [restoring electrical power after flooding](#).

- Natural gas or liquid petroleum (LP) gas leaks can cause deadly explosions. Check for natural gas or LP gas leaks, and if a leak is suspected, turn off the main property gas line, evacuate the area, and notify your gas company and the authorities. Tell employees to stay clear.

Roads and buildings

- Before entering any buildings, check for levee breaches, rising or incoming water, and evidence of structural fire or damage.
- As soon as it is safe, call in the employees needed for inspection and clearing debris from roads.
- Cordon off areas that are unsafe.

Security

- Watch your farm for unwelcome visitors like looters. Secure your equipment and farm entrances, and make sure your security cameras are operational.

Insurance and documentation

- Do not begin cleaning up or repairing damage until you have thoroughly documented the damage. Contact your insurance adjuster as soon as possible to decide on the best plan for moving forward with potential damage assessment, cleanup, and repair.
- If you have experienced flooding and have flood insurance through the FEMA National Flood Insurance Program, visit their [website](#) to learn how to start a claim.

Initial Site Planning

Considerations when deciding on a new location to establish
or purchase land for dairy operations

The National Oceanic and Atmospheric Administration (NOAA) developed a [map](#) for illustrating the probability that an area of the country will be hit by multiple hurricanes, expressed as the number of years between storms (known as the return period, Figure A1). While no model can determine when and where hurricanes will strike during any given hurricane season, the map below is a good indication of relative hurricane risk.

It is important to remember that this map represents a long-term average and that even if the average return rate for a hurricane is 25 years, hurricanes could still occur at one spot on successive years or even in the same year. It is also important to understand that while most data show only where hurricanes have made landfall, hurricanes can also move hundreds of miles inland causing significant wind damage and flooding.

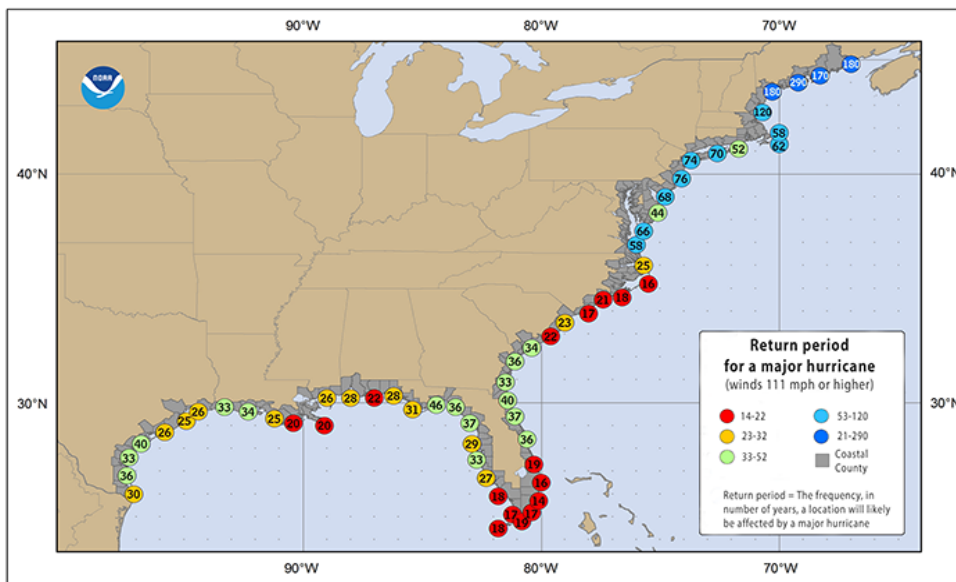


Figure A1: Return period (years) for major hurricanes for the coastal Eastern United States. Graphic provided by the National Oceanographic and Atmospheric Administration (NOAA).

Use NOAA's [Historical Hurricane Tracks tool](#) for a map and dates of hurricanes that have impacted your area in the past 150 years. The timing and track of historic hurricanes may be different than those for future hurricanes and should be used with caution.

Site characteristics

Topography

- When planning for long-term preparedness, evaluate a potential site for your operations with an eye toward reducing the risk of surface flooding or coastal storm surge. It is unlikely that all risks can be avoided. However, the negative considerations of an elevated open site are often less than those of low-lying areas susceptible to flooding. Land should be gently sloping with adequate drainage.
- When possible, choose a site that has higher elevation areas so that buildings are constructed outside of a flood zone and farm equipment can be easily moved to avoid flooding.

Flood risk and storm surge

- Assess historic and predictable patterns of flooding to determine which areas are at the highest risk of damage during extreme weather.
- Consult the following Federal and State-level resources for estimating flood risk:
 - U.S. Department of Homeland Security Federal Emergency Management Agency (FEMA) [Flood Map Service Center](#)—for official flood maps
 - North Carolina Flood Risk Information System [website](#)
- Determine proximity to bodies of water at risk for storm surge. In some areas, storm surge can cause flooding many miles inland from the coast. View the NOAA [National Storm Surge Hazard Map](#) to assess your risk and plan a safe evacuation route.

Facilities

- When planning a dairy, one of the first considerations is where to build the facilities that will avoid flooding zones and provide all-weather access, easy access to utilities, appropriate drainage and soil characteristics for constructing a lagoon, and natural wind flow for ventilation. To the degree feasible, locate buildings, feed center and storage, and other facilities away from power lines and in areas less subject to flooding.
- Design an internal paddock in a higher area with access to drinking water and near the hay barn or feeding facility to keep cattle safe and well fed and to prevent them from leaving the property. External fences typically go down during the hurricanes, and smaller paddocks are easier to repair. The internal paddock should be at least 100 square feet per head for paved lots and 500 square feet per head for unpaved corrals.

Burial site

- Identify a location for an approved burial site for catastrophic losses approved by the State department of agriculture or appropriate agency in the event there is a large number of animal deaths.

Roads and utilities

- Choose a site with good roads that will allow multiple escape routes when evacuating from hurricanes and tropical storms that can cause rising flood waters, storm surge, or downed trees.
- The primary driveway into the farm should have adequate drainage to prevent flooding. The road or drive should be well packed with a solid base that will hold up to heavy equipment and trucks during extreme conditions. The material used to construct the base will vary within the U.S. Southeast considering the sandy soils in the Coastal Plain and limestone or slate-based soils in the Piedmont.
- A secondary entrance should be constructed to provide access from a different road in the event the primary entrance is blocked.
- Plan to have utilities and other critical infrastructure permanently constructed on higher ground to avoid equipment and infrastructure damage during flooding.
- Search for areas with resilient electrical grids. Avoid relatively isolated sites with limited access to electrical utilities.

Natural windbreaks

- If possible, choose a site with natural windbreaks, such as wooded areas surrounding the field.

Emergency Contacts List

You may customize this for your operation. Delete items that do not pertain to your commodity or location and add companies or organizations specific to your commodity.

Individuals

Name(s)	Role(s)	Phone number(s)	Notes
	Owner(s)		
	Members of the Emergency Response Team		
	Other key employees or managers		

Emergency Services

Organization	Name(s)	Phone number(s)	Notes
Emergency medical responders			
Hospitals			
Fire department			
Sheriff's office			
Emergency management agency			
Veterinarian			

Utilities, Roads, and Trees

Organization	Name(s)	Phone number(s)	Notes
Electric utility or cooperative			
Natural gas utility			
Water utility			
County road department or State Department of Transportation			

Insurance Companies

Organization	Name(s)	Phone number(s)	Notes
Commodity insurance companies			

Contractors

Organization	Name(s)	Phone number(s)	Notes
Electrical contractor			
Plumbing contractor			
Mechanic			
Fuel supplier			
Generator servicing			
Equipment dealer			
Equipment rental company (emergency generators, lifts, etc.)			

Federal, State, and County Organizations

Organization	Name(s)	Phone number(s)	Notes
State Department of Agriculture			
State Board of Animal Health			
County/university Extension office			
County emergency management agency			
County Health Department			
USDA Farm Service Agency			
USDA Natural Resources Conservation Service (NRCS)			
U.S. Department of Homeland Security Federal Emergency Management Agency (FEMA)			
State Department of Agriculture or agency responsible for permits and inspection			

Resource Links

North Carolina Resource Links

University Extension, State, and Federal websites

University Extension Websites	Purpose
<u>Dairy</u> *	Resources to help dairy farmers improve management and productivity
<u>Extension Office Locator</u> *	Contact information for university Extension Agents in your county
<u>Disaster Preparedness and Recovery</u> *	Resources to help prepare for and recover from hurricanes and other disasters
<u>Extension Disaster Education Network (EDEN)</u>	Information and program resources to help with hurricane preparedness and recovery

* North Carolina Cooperative Extension Service

State Websites	Purpose
North Carolina <u>Governor's Office</u>	News and information from the Governor, including evacuation orders and emergency declarations
North Carolina Department of Agriculture and Consumer Services (<u>NCDA&CS</u>)	Main source for answers to your agricultural-related questions
<u>NCDA&CS Veterinary Division Livestock Animal Health Programs</u>	News and resources to help you prepare for, respond to and recover from emergencies, including hurricanes
<u>North Carolina Division of Emergency Management Agency</u>	News and resources to help you prepare for, respond to and recover from emergencies, including hurricanes

Federal Websites	Purpose
United States Department of Agriculture (USDA)	News and announcements related to agricultural commodities and disaster recovery programs
USDA Disaster Resource Center	Resources to help you build long-term resilience to and recover from hurricanes and other disasters
USDA Office Locator	Contact information for USDA offices in your county, including FSA, NRCS, Rural Development, and Conservation Districts
USDA Farm Service Agency (FSA)	Assistance with securing loans, receiving payments, and applying for disaster relief programs
USDA FSA North Carolina	Focus on State FSA resources, including financial and technical information sharing
USDA Natural Resources Conservation Service (NRCS)	Financial and technical assistance for farmers, ranchers and forest landowners
USDA NRCS North Carolina	Focus on State NRCS resources, including financial and technical information sharing
USDA Risk Management Agency (RMA)	Assistance with Federal Crop Insurance and managing risk
USDA RMA Agent Locator	Contact information for local RMA offices in your county
US Department of Homeland Security Federal Emergency Management Agency (FEMA)	News and information to help you prepare for and recover from hurricanes and other disasters
US Department of Homeland Security Hurricane Preparedness	Resources to help individuals prepare for and recover from hurricanes
US Department of Commerce National Oceanic and Atmospheric Administration (NOAA)	Resources to view historical, current and predicted hurricane activity and warnings in your areas
NOAA National Hurricane Center	Current and forecasted tropical cyclone activity, educational resources, and advisory warnings for your area of interest
NOAA National Weather Service Weather-Ready Nation	Latest news, information and technology to enable informed decision-making before, during, and after a hurricane strikes

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USDA Southeast Climate Hub
<https://www.climatehubs.usda.gov/hubs/southeast/>

To access this guide, as well as those produced
for other commodities, please visit:
<https://www.climatehubs.usda.gov/hubs/southeast/topics/>



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