

IN THE FIELD

- TECHNOLOGY
- FARM MANAGEMENT
- CROPS
- LIVESTOCK
- COMMUNITY

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PROTECT LIVESTOCK IN EXTREME WEATHER

Animals such as chickens, cattle, goats, and llamas can be adversely affected by extreme weather. Individuals can heed these safety guidelines to avoid subjecting such animals to the stress, discomfort and illness that can result from exposure to extreme weather.

Extreme weather is seldom fun for anyone. Although people often have the means to escape inclement weather, animals are at the mercy of their caregivers.

Protecting animals during extreme weather is not restricted to domesticated pets. Those who have livestock on their properties must recognize that these animals will need various levels of care as well. Animals such as chickens, cattle, goats, and llamas can be adversely affected by extreme weather. Individuals can heed these safety guidelines to avoid subjecting such animals to the stress, discomfort and illness that can result from exposure to extreme weather.

Suitable shelter

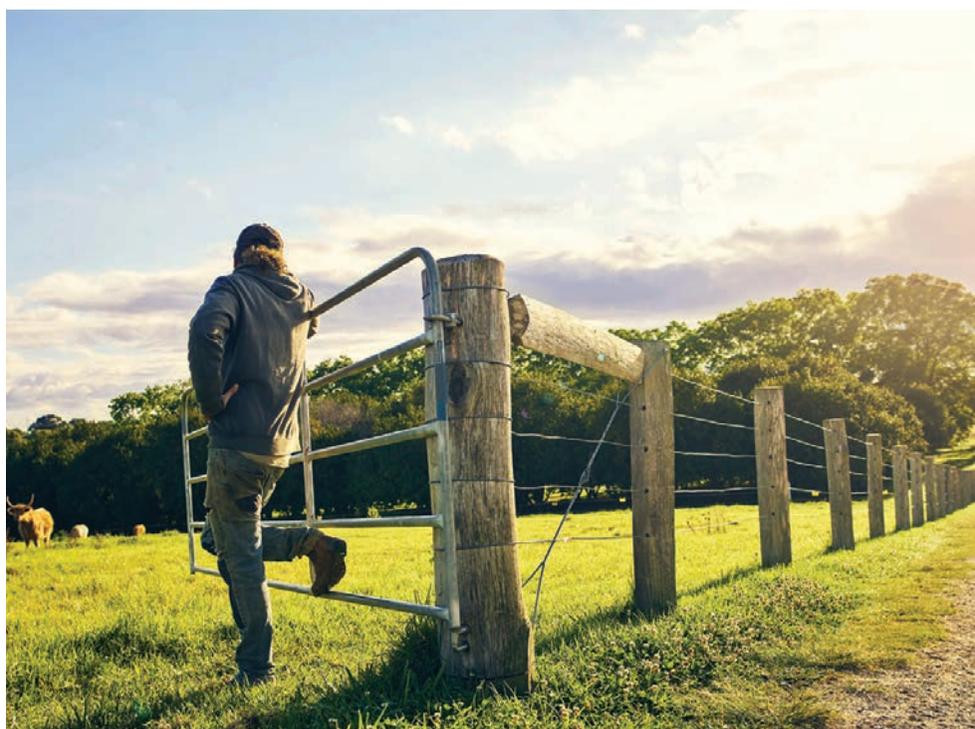
One of the best ways to safeguard livestock from extreme weather is to ensure they have a place to escape the elements. Animals can get sunburned and may overheat, so make sure shelters can block the sun's rays on hot days while also allowing for air to circulate through the dwelling.

It's also key that the shelter be capable of accommodating all of the animals at the same time.

Livestock shelters do not have to be complicated. They can be as elaborate as a barn or as simple as carports or tarps and shade cloth.

Fresh water

Access to fresh, clean water is also



essential. Dehydration can set in, particularly for animals with thick coats or those that are young or elderly. Animals tend to expend a lot of energy to cool down or stay warm, so they will need an ample supply of water to remain hydrated and healthy.

Standing water can become a breeding ground for parasites and insect larvae. Therefore, change water frequently to make sure it is sanitary. Some farm experts advise aerating troughs to help prevent algae growth or mosquito infestations. A small amount of raw apple cider vinegar may help as well. However, always discuss water sanitation methods with a veterinarian before testing them out on farm animals.

Mold-free feed

Hot, humid temperatures can cause mold to grow on hay and other feed sources. Cows do not like to eat moldy hay and it can make horses ill. The University of Minnesota Extension says horses are particularly sensitive to dust from mold spores and can get a

respiratory disease similar to asthma in humans called recurrent airway obstruction, or RAO, which is often referred to as heaves.

Hay needs to be dried out before it is fed to animals. Any feed should be stored in cool, dry conditions and inspected before being dispersed to livestock.

Hair cut

Wooly animals may benefit from a shear prior to the onset of hot weather, advises the Maryland Small Ruminant group. Do not shear too short. For instance, a one-inch fleece can dissipate heat and help the sheep keep cool.

Rest

Livestock should not be worked and handled during the heat of the day. Their productivity levels may be diminished, and the extra exertion may affect their health. Rest will help them stay happy and healthy until the extreme weather has subsided.



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ADVANTAGES AND DISADVANTAGES TO ROBOTIC MILKING

The automatic milking is the milking of dairy animals especially of dairy cattle, without the human labour. The automatic milking systems (AMS) are also called the voluntary milking systems (VMS), and they were developed in the late 20th century.

Automation in milking

The cow and the milking machine is partial automation compared to hand milking. The rotary milking parlor offers higher efficiency compared to the stationary milking parlors but still requiring manual labour with milking machines.

Advantages of robotic milkers

The robotic milking systems can free up labor, they do not need to be managed. They are becoming more common worldwide. They improve the quality of the life due to the reduced labour demands and greater time flexibility. They can cut four to five hours of the labor a day.

The robotic milkers can do more than just milk the cows. They can collect the valuable data and information like the individual cow milk production, milk's electrical conductivity (the indicator of its quality), the cow activity, and the cow rumination data.

The milk can have the same somatic cell count (SCC) or the lower one, compared to the people doing milking, the farm can achieve the same or better herd health and reproduction. Less water and cleaning chemicals tend to be used with the robotic milkers, compared to the parlors but the electricity usage might

run higher.

The automatic milking systems are working well in the free-stall and the bedded pack barns, and for the grazing operations. Higher-forage rations entice the cows to enter the AMS, most farmers feed the flavour-enhanced pellets. The pellets encourage the cows to visit the milkers. A second preferred choice to feed at the robots is roasted soybeans.

AMS requires a complete automation of the milking process. The milking unit comprises the milking machine, the teat position sensor (usually the laser). The robotic arm for the automatic teat-cup application and removal and the gate system for controlling the cow traffic.

The automatic milking decreases the contact between the farmer and the herd. It removes the farmer from such close contact with the animal. It offers increased milking frequency. Milking frequency may increase to three times per day. This may result in less stress on the udder and increased comfort for the cow.

Disadvantages of robotic milkers

The cow movement through the robotic milkers can be slowed by the activities such as the manure scraping, the herd health, and the hoof trimming. Cow throughput can be slowed if the robot has problems attaching the unit because the cow has dark teats, long hair on her udder, a tilted udder, or teats that touch each other.

There's the fact that some cows may not want to have anything to do with the robots at first, training the cows to AMS

can take a long time and would not be classified as a pleasant experience.

While the robots free the people from having to milk most cows, there is a trade-off. You must be on call 24 hours a day, seven days a week, in case there's a problem, and the big problem is the cost of getting the farm set up with the robotic milkers.

The dairy farmers learn how to handle minor repairs. Some parts are expensive to replace if their warranties have expired. These include the lasers that locate the cows' teats and the hydraulic arms which move in and out from underneath cows.

The final manual labour tasks remaining in the milking process were cleaning and inspection of the teats and attachment of the milking equipment (milking cups) to the teats. It is a complex task and it requires the accurate detection. The tasks have been automated successfully in the voluntary milking system (VMS), or the automatic milking system (AMS).

Robotic milking has higher initial cost. Whether it is economically beneficial to invest in an AMS instead of the conventional milking parlor depends on the constructions costs. The investments in the milking system and costs of labour.

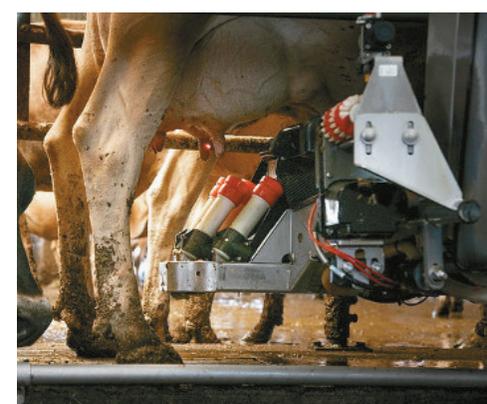
The AMS is expensive for smaller scale farms, and large dairies can operate more cheaply with the milking parlor. Robotic milking has increased electricity costs to operate the robots but this can be more than the outweighed by the

reduced labour input.

Robotic milking has increased complexity. While the complexity of equipment is the necessary part of technological advancement, the increased complexity of the AMS milking unit over the conventional systems increases the reliance on the manufacturer maintenance services and possibly increasing the operating costs.

The system requires the high quality of management as all milking cows have to visit the AMS voluntarily. AMS works best in zero-grazing systems. In pasture systems, the cows graze in the fields and they are required to walk to the milking parlour. The cows do not attend the milking unit if the distance to walk is too great.

In the conventional milking, the cows are observed before the milking equipment is attached, and the ill or injured cows can be earmarked for attention. The automatic milking removes the farmer from such close contact with the animal.



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THE ROLE OF TECHNOLOGY IN AGRICULTURE

When asked to think of industries that utilize technology in unique ways, few people may immediately think of agriculture. But technology has left a significant footprint in every industry, and the agricultural sector is no exception.

The National Institute of Food and Agriculture notes that modern farms operate a lot differently than the farms of yesteryear. Dramatic changes have taken place within the agricultural industry over the last few decades, helping farming operations become more efficient and profitable as well as safer and more eco-friendly.

Robots, temperature and moisture sensors, aerial images, and GPS technologies are now routinely employed within the agricultural industry. The NIFA notes that the value of such technologies cannot be understated. Thanks to the technologies at their disposals, farmers no longer have to uniformly apply water, fertilizer and pesticides to their farms. Technology now allows them to use only the minimum amounts required as they zero in on individual plants and target specific areas of their farms. The NIFA notes that the utilization of these technologies produces some very real benefits, including:

- Higher crop productivity
- Reduced impact on natural ecosystems
- Less runoff of chemicals into rivers and groundwater
- Increased worker safety

Safer, more efficient and more eco-friendly operations can only make the agricultural industry more successful in the decades to come. That's especially notable as the world continues to confront climate change and how it might affect the food supply.

Modern industry is driven by technology. Advancements in technology have changed how business is conducted, with some industries undergoing dramatic changes since the dawn of the 21st century.

While agriculture might not be the first industry people think of when reflecting on the changing nature of industry, The National Institute of Food and Agriculture notes that modern farms are vastly different than those from a few decades ago.

Farmers have long relied on technology to make their operations as efficient, productive and profitable as possible. Precision agriculture, which refers to technological advances designed to propel agriculture into the modern, computerized and information-based world, is helping the agricultural sector become more profitable and efficient while also improving safety and making agriculture more eco-friendly. In addition, the NIFA notes that the modern agricultural industry employs technology such as robots, temperature and moisture sensors, aerial images, and global positioning systems.

If it sounds complicated, that's because it is. For example, modern sensors can detect soil conditions, potentially producing hundreds of readings per second. These sensors help farmers know the best possible time to plant seeds so they can reach their full potential. That improves both the efficiency of modern farms as well as their output.

The NIFA also notes that agricultural technology has reduced waste. For instance, thanks to agricultural technology, farmers no longer have to apply water, fertilizers and pesticides uniformly across entire fields. Technology has shown that farmers can simply target specific areas or even treat individual plants differently. That saves time and allows farmers to use only minimal quantities of water, fertilizer and pesticides. In addition, according to the NIFA, employing agricultural technology in this fashion leads to higher crop productivity and reduces runoff of chemicals into rivers and groundwater, thereby reducing the farm's impact on local ecosystems.

Modern farms are technological marvels where various technologies are being employed to produce crops more efficiently and safely than ever before.





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DID YOU KNOW?

Since just after World War II, the number of people employed in agriculture has dropped by half. Most of America's farms are small and nearly all are family-run—but they're also disappearing. In 1935, the number of farms peaked at almost 7 million. By 2019, that number had dropped to about 2.02 million farms.

COVID-19 put additional pressure on an already strained industry: In March 2020, farm bankruptcies jumped by 23%. And in the 12-month period ending June 30, 2020, 580 American farmers filed for chapter 12 bankruptcy protection. Issues during the pandemic included

everything from breakdowns in the supply chain to the closures of processing plants.

We've relied on authoritative sources that include the American Farm Bureau Federation, the U.S. Department of Agriculture, and industry and trade groups.

In 1870, about half of all Americans had jobs in agriculture, according to the Bureau of Labor Statistics. Today, the United States Department of Agriculture (USDA) reports that farmworkers comprise less than 1% of salary workers in the U.S. Nevertheless, production is still huge. U.S. farmers raise hundreds of millions of egg-laying hens, harvest millions of tons of fruits and vegetables, and keep the rest of the world supplied with corn, wheat, and soybeans. A single acre of land can grow 50,000 pounds of strawberries or 3,000 pounds of wheat, according to the American Farm Bureau Federation; and in 2020 alone, an estimated \$135 billion in U.S. agricultural products were exported around the world despite disruptions to the supply chain.

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WHAT IS SUSTAINABLE AGRICULTURE?

Many transitions have taken place in the agricultural industry over the last several decades. The widespread adoption of various technologies over the last 20-plus years has helped farmers streamline their operations, making their farms more efficient and less wasteful as a result. In addition, many farmers have embraced sustainable farming, which is a relatively recent approach to agriculture.



According to the Union of Concerned Scientists, sustainable agriculture is a complex, multi-faceted concept. Sustainable agriculture intends to contribute to a robust economy by making farms profitable.

The National Institute of Food and Agriculture notes that sustainable agriculture encompasses a wide range of production practices, including some associated with conventional farming and some linked to organic farming.

Farmers who embrace sustainable agriculture also aim to have a positive effect on the environment and their surrounding ecosystems. That's accomplished by embracing strategies that focus on building and maintaining healthy soil, managing water wisely, minimizing pollution, and promoting biodiversity.

As a result, sustainable farming should not be mistaken for organic farming, or vice versa. However, the UCS notes there's a strong likelihood that certified organic produce at local grocery stores are byproducts of farms that embrace sustainable agriculture.

COMMON SUSTAINABLE AGRICULTURE PRACTICES

The concept of sustainability varies by industry. Within the agricultural industry, sustainability is a multifaceted concept that has become increasingly popular in recent decades.

which can reduce erosion and improve the health of the soil.

According to the National Institute of Food and Agriculture, sustainable agriculture seeks to increase profitable farm income, promote environmental stewardship, enhance quality of life for farm families and communities, and increase production for human food and fiber needs. In an attempt to reach those goals, farmers who embrace sustainable agriculture may look to various practices.

- **Integrated pest management:** Integrated pest management techniques aim to minimize the use of chemical pesticides that can prove harmful to the environment and local wildlife. According to the University of California Statewide Integrated Pest Management Program, IPM strategies like habitat manipulation and the planting of disease-resistant plants are designed to promote long-term prevention of pests and the damage such pests can cause.

- **Cover crops:** The Union of Concerned Scientists, a nonprofit organization that aims to employ independent science to address the planet's most pressing problems, notes that cover crops are planted during the offseason when soils have traditionally been left bare. Cover crops can help prevent soil erosion and replenish the nutrients in the soil. Cover crops also can limit weed growth, reducing the need for herbicides that can prove harmful to the environment.

- **Agroforestry:** The Association for Temperate Agroforestry defines agroforestry as an intensive land management system that incorporates trees and/or shrubs to optimize the benefits they provide when deliberately combined with crops and/or livestock. The shade and shelter provided by trees and shrubs can protect plants, animals and water resources.

- **Reduce or eliminate tillage:** According to the UCS, traditional plowing, or tillage, can cause a significant amount of soil loss, even as it prepares fields for planting and reduces the likelihood of weed problems. Eliminating or reducing tillage involves inserting seeds directly into undisturbed soil,

- **Crop/livestock integration:** The UCS notes that there is growing evidence to suggest that the careful integration of crop and animal production can help farmers make their farms more efficient and profitable.

Sustainable agriculture is a complex concept that can benefit farmers, their local communities and the environment in myriad ways.



HOW FARMERS ARE USING DRONES



and quickly identify issues affecting their crops before those issues escalate into something larger.

- **Soil analysis:** Another potential benefit of agricultural drones highlights their role in analyzing soil. Agricultural drones utilize complex mapping functions to gather data about the soil, including areas where it might be stressed. That enables farmers to develop accurate soil samples that can be used to guide decisions in regard to irrigation and fertilization.

- **Reduce waste:** SenseFly notes that data gathered by drones can help farmers determine the vigor of their crops at various stages of growth. Such information can prevent overfertilization and overwatering, thereby reducing waste and runoff, benefitting the planet as a result.

- **Planning:** Drones can be used to collect data on crop growth and health at various times throughout the growing season. That can help farmers develop accurate predictions regarding harvest quality and crop yield, making it easier for them to plan ahead.

Agricultural drones are one of the many examples that illustrate how technology has changed and will continue to change the ways modern farmers conduct business.

The farmers of yesteryear might not be too familiar with their surroundings if they were to visit a modern farm. While the men and women who made their livings as farmers decades ago would no doubt still recognize certain farm features that have withstood the test of time, they might not understand the inner workings of the modern farm, particularly in regard to the role technology now plays within the agricultural sector.

Technology has changed agriculture in myriad ways. The methods farmers employ to produce food and improve the efficiency of their operations has changed as technology has evolved. One of the more noticeable changes that's hard to miss on modern farms is the use of agricultural drones.

Drones have been around for decades. Sometimes referred to as "unmanned aerial vehicles," or "UAVs," drones can be utilized in ways that can save farmers money and protect the planet.

- **Monitor crops:** According to senseFly, the commercial drone subsidiary of Parrot Group, drones can help farmers effectively monitor their crops. With a drone flying overhead, farmers can spot

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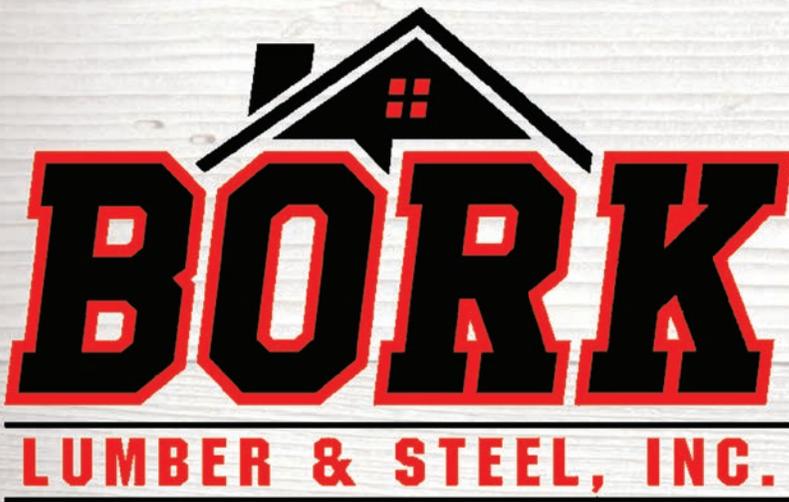
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