

## Automatic Fogging System in Dairy Shed

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Managing temperature is a crucial element of dairy farming that significantly affects the health and milk production of dairy cows. Cows are highly sensitive to environmental changes, and extreme temperatures can lead to physical stress, which in turn affects their milk production, reproduction, and overall health. It is essential to maintain an optimal temperature range for dairy cows to ensure they remain comfortable and productive. Ideally, the temperature should be kept below 25 degrees Celsius, as temperatures above this threshold can lead to heat stress, resulting in a variety of health issues for the animals.

Heat stress in dairy cows is often characterized by a decrease in feed intake, which subsequently leads to reduced milk output. When cows are uncomfortable due to high temperatures, their bodies divert energy away from milk production to regulate their internal temperature. This not only affects the volume of milk produced but can also compromise its nutritional quality. Additionally, prolonged exposure to heat can lead to reproductive challenges, such as decreased fertility rates and extended calving intervals, further impacting the profitability of dairy operations. Implementing effective temperature control measures is crucial for optimizing dairy farm productivity. This includes utilizing technologies and systems that help mitigate the effects of heat, such as cooling fogger systems, which can significantly lower ambient temperatures within cow housing areas. By ensuring that cows are kept in a comfortable environment, farmers can enhance not only milk production but also animal health and, which are essential for long-term and profitability in the dairy farming sector.

One of the most notable benefits of cooling fogger systems is their ability to enhance air quality within the dairy farm. The fine mist produced by these systems not only cools the air but also helps reduce airborne dust and contaminants, which can contribute to respiratory issues in cows. Better air conditions support improved health and reduces the risk of diseases, leading to lower veterinary costs and improved productivity. Healthy cows are more likely to be productive, and they can also contribute to a more sustainable farming operation (1).

### The flow of operation in the system can be summarized as follows: (2)

- The Power Supply Unit powers all components.
- The temperature sensor (e.g., DHT11) measures the temperature and sends the data to the Arduino.
- The Arduino processes the temperature data and, if necessary, sends a signal to the Relay.
- The Relay controls the Motor based on the signal from the Arduino.
- The Arduino also sends data to the Display to show the temperature or other status information.

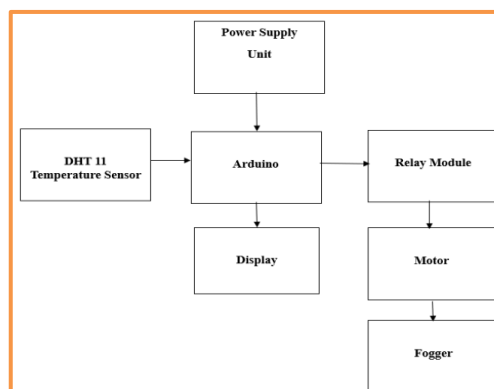


Fig 1: Block Diagram (Reference-2)

## Working methodology

When a temperature sensor checks the humidity and temperature in the atmosphere and sends the data to the Arduino module. Arduino unlocks the relay module if the temperature exceeds the fixed-point or threshold value set by the operator. This relay module also activates the high-pressure pump and the fogger/mister. These foggers and misters are mounted under the shed's or animal house's roof. Foggers emit fine mist droplets that resemble fog/mist. These small water droplets evaporate before reaching the shed's surface. As a result, the temperature of the shed and animal house begins to drop. The temperature in the shed exceeds the lower set-point temperature. The temperature is captured by this sensor and sent back to the microcontroller module. This period, the friction pump is switched off by the relay. And the Fogger/Mister is turned off by these friction pumps. This Fogger machine Pipeline is usually made of PVC pipe with a diameter of 20 mm. This tubing has a thickness of 2.5 mm. These pipelines have Foggers and Misters installed. A distance of 8 to 10 feet should be held between each Fogger/Mister (3).

## Fogger system for cow shed: (4)

Fogger systems for dairy sheds provide a modern and efficient method to create a comfortable healthy environment for dairy cows. This system consists of specially designed , pumps and controllers that work together to release a fine Mist of water droplets into the air. Here are some of the key Aspects of fogger system for cow shed:

1. Humidity control: maintaining the optimal humidity level is crucial for cow comfort and respiratory health. Foggers systems can be programmed to release missed at in the world effectively increasing the humidity in dry environment School assist in preventing issues caused by dry conditions such as a treated respiratory systems and Cracked hooves. However, it's important to strike a balance as existed humidity can lead to other issue so carefully monitoring is essential.
2. Dust and odor reduction: can accumulate dust which can be harmful to both cows and farm workers the mis produced by fogger system can help settle dust particles preventing them from becoming Airborne. This significantly reduce the risk related respiratory issues and improve the overall air quality within the cowshed for the more the foggers We combine with odor-neutralizing agent to minimize unpleasant smells, creating a more pleasant working environment.
3. Managing flies and pests: flies and pest are not only a nuisance to cows but also Carriers of diseases. Fogging systems may incorporate insecticides aur natural repellent to control flies, mosquitoes and other pest from the foggers effectively dispersed these agents throughout the cowshed creating a barrier that deter insects. this reduces the stress experience by cows and help maintain the overall health and well-being.
4. automated controls and regulation: fogger systems can be automated and controlled through sophisticated controllers. These controllers allowed for free size adjustment of missing interval duration and volume based on factors such as temperature and humidity levels. Some systems can even be integrated with sensors and weather data to optimize misting operations ensuring maximum effectiveness and efficiency.

## Conclusion

The incorporation of automatic fogging systems within dairy sheds provides an efficient and reliable method to combat heat stress and environmental challenges faced by dairy cattle. These systems enhance comfort, regulate humidity, improve air quality, and support better milk production and animal welfare. As automation becomes more integrated into livestock management, fogging technologies stand out as essential tools for improving farm sustainability and productivity

## References

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