



A Monthly e Magazine
ISSN:2583-2212
June 2024 Vol.4(6), 2239-2243

Popular Article

Dealing Summer Stress in Backyard Poultry Farming with Cost Effective Ecofriendly Cooler

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<https://doi.org/10.5281/zenodo.12551007>

Abstract

Backyard poultry farming is a vital supplementary activity for empowering rural households in developing nations like India, but this sector faces challenges such as slow growth rates, high mortality, disease susceptibility, inadequate nutrition, poor housing management. Increasing environmental temperatures specially in summer causes heat stress, leading to reduced feed intake, weight gain, feed efficiency, and egg production, as well as higher mortality rates. To address these constraints, an innovative and cost-effective eco-friendly cooler has been introduced for backyard poultry farming, especially in areas without electricity. The eco-cooler operates on the Joule-Thomson and Venturi effects, cooling the air as it enters the poultry shed, thereby reducing the temperature by 3°C to 5°C. This cooling effect decreases heat stress symptoms like panting and respiratory distress, improves bird activity, and reduces mortality rates. Additionally, the eco-cooler enhances ventilation, increasing oxygen levels and preventing harmful gas buildup, thereby, improving overall poultry health, productivity and welfare.

Keywords: Backyard poultry, Eco-cooler, Temperature, Heat stress, Ventilation, Environment

INTRODUCTION

Rural chicken rearing serves as a crucial supplementary activity for empowering rural households in developing nations like India, offering valuable animal protein (meat & egg), income, boosts up women and unemployed youth. Nonetheless, this sector grapples with various obstacles, including sluggish growth rates, elevated mortality rates, susceptibility to illnesses, subpar nutrition and housing management and inadequate healthcare services. The escalating trend of **continuous increment in environmental temperature** poses an additional peril to rural poultry farming, compounding existing challenges and potentially intensifying **heat stress** among poultry.

Heat stress in summer reduces feed intake, weight gain, feed efficiency, egg production and

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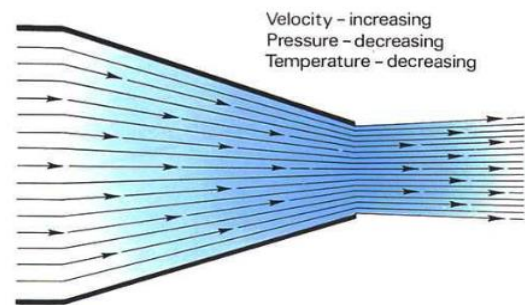
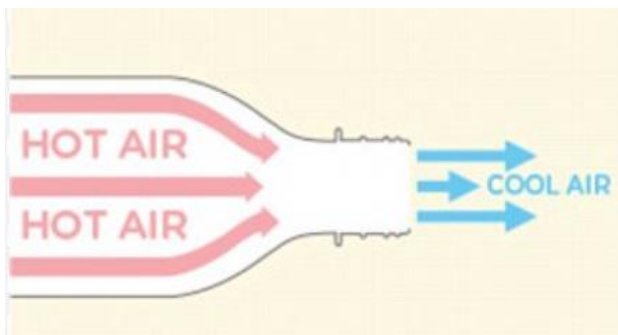
causes mortality among chicks in backyard and small-scale poultry farming due lack of proper housing management and lack of scientific knowledge among poultry farmers particularly in rural areas results in economic losses.

In order to overcome these constraints, there is a need of introducing innovative & cost-effective ecofriendly cooler for backyard poultry farming even in the areas where there is **no electricity** available.

WORKING PRINCIPLE OF ECO-COOLER

Eco-cooler works on the **Joule-Thomson effect and Venturi effect** which explains the relation between Pressure, Temperature and Velocity of gases.

As hot air rushes into each plastic bottle, it is pushed to the rim where it begins expanding. This expansion then leads to the cooling of the air as it enters the poultry shed. This cooling results from pressure change. Subsequently when hot air rushes into the bottle, the gas contracts as it approaches the rim of bottle. This results in decrease in the pressure. Based on Venturi effect, the drop in pressure results in an increase in velocity. As air quickly disperses into the room, its temperature



PRINCIPLE

drops.

HOW TO MAKE AN ECO-COOLER?

- ❖ Gather as many used soft drink and water bottles. The bigger the size difference between the body and the rim of the bottle, the better will be the results.
- ❖ Measure the size window you want to make the eco-cooler, and cut the sturdy 2mm medium density cardboard in the same size.
- ❖ Cut the holes in the board according to the measurement of the rim of the bottle. Make sure the cuts are spaced out according to the body size of the bottles.
- ❖ Using a scissor, cut the bottle in half -along the body of the bottle.
- ❖ Cut away the top of the bottle cap. This will help fix the bottle into the cardboard.



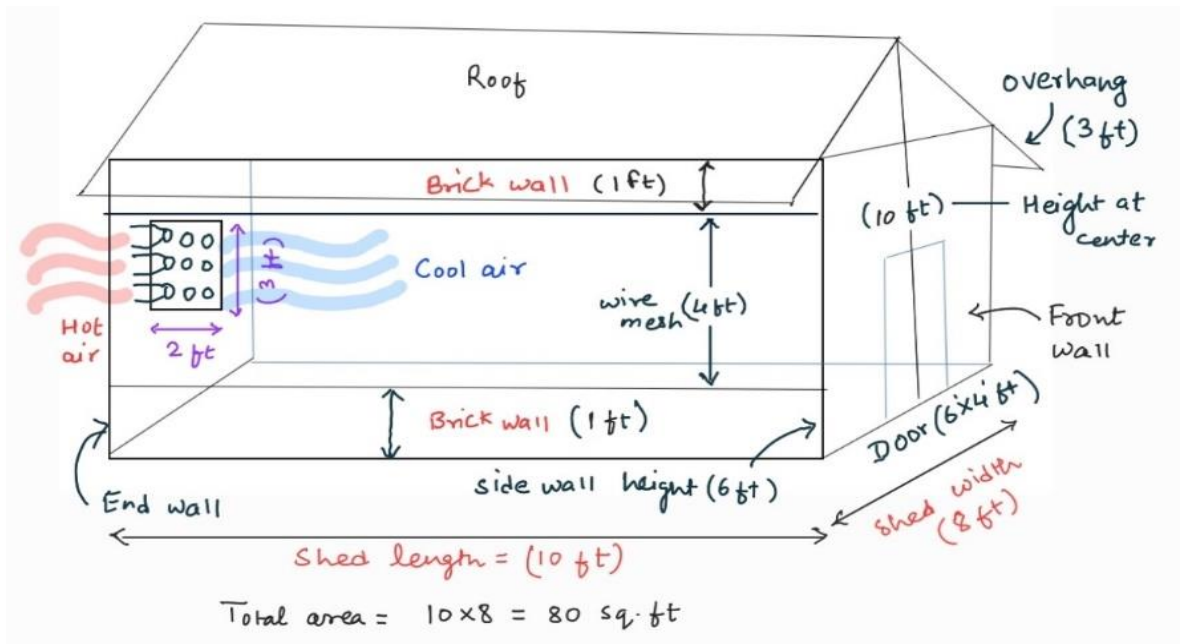
- ❖ Pushing the cut bottle from the outer side of the cardboard, twist the cap from the inner side and tighten it, to keep the bottle in its place. Repeat for the remaining bottles and fix the Eco-cooler from the outer side of the window.



Outside view



Inside view



Layout showing installation of eco-cooler in poultry shed



Due to decrease in temperature of shed or coop by 3⁰C to 5⁰C, effect of heat stress has reduced to certain extent and ventilation of shed or coop also been improved. There were decrease in panting, open mouth breathing and respiratory distress observed during hot summer days. Along with this, behavioral changes also observed such as increase in activity and reduced resting period. Birds become less susceptible to infectious diseases ultimately heat induced mortality has been reduced.

As far as Backyard or small-scale poultry farming is concerned, poultry sheds or coops are generally made up of tins and woods to reduce the building cost, but in summer season the environmental temperature easily reaches above 45⁰C during peak summer days and hot air currents directly enter into the shed. Poultry shed made up of tins are easily heated and heat stress causes high mortality, reduces growth rate, weight gain, feed efficiency and egg production, poor egg quality, lower hatchability, increased water consumption, impaired immune function and more susceptible to infectious diseases results in economic losses.

Placing the Eco-Cooler in the window of end wall or side wall of shed with the wide part of the bottles facing outside, hot air currents will rush into each bottle, which is pushed to the rim where it starts to expand and this expansion is what cools the air before it enters the poultry shed. **This cool air currents will reduce the temperature of shed by 3⁰C to 5⁰C.**

Another major advantage of installing eco-cooler is **Ventilation**. Continuous cool airflow prevents the buildup of heat inside the coop or enclosure. Good ventilation causes increase in Oxygen level of shed and prevent the accumulation of harmful gases like Ammonia. In rural areas during summer, farmers generally used wet cloth or wet gunny bags to cover the poultry shed or coop which blocks the ventilation as well as light and increased humidity results in reduced feed intake and activity. In such conditions, eco-cooler helps to overcome the problems of heat stress, ventilation and air flow.

CONCLUSION

The Eco-cooler is easy to make by anyone and raw materials are easily available, making Eco-Coolers a cost-effective environment friendly solution that can be easily implemented in poultry sheds in rural areas where electricity is not available. Eco-cooler is built using non-biodegradable waste plastic bottles which are responsible for environmental plastic pollution. Eco-Cooler not only helps birds struggling with scorching heat, but is an example of upcycling old plastic material and building something constructive with urban waste, (Best from waste).



REFERENCES

Ashis Paul, a Bangladesh native, invented an efficient, cheap way for people to cool down their homes called Eco-cooler. He created his air-cooling system using waste empty plastic bottles.

