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Popular Article

Optimizing Layer Chicken Productivity Through Advanced Winter Management

Dr. Reena Kushwaha

MVSc. 4th Semester, Department of Poultry Science,
College of Veterinary Science & Animal Husbandry, (DUVASU), Mathura 281001 India

Contact info: Email: have.peace22@gmail.com

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Introduction

The winter season introduces significant physiological and environmental challenges for commercial layer poultry production. The drop in ambient temperature acts as a stressor, triggering a cascade of metabolic and behavioral changes in birds that can lead to reduced egg yield, poorer feed efficiency, and heightened disease susceptibility. Effective winter management is not merely a reaction to cold but a proactive, integrated strategy balancing thermal comfort, air quality, and nutritional precision to maintain flock health, welfare, and profitability.

Understanding the Physiological Impact of Cold Stress

When environmental temperatures fall below the bird's thermoneutral zone (typically 18-24°C for mature layers), the bird enters a state of cold stress. To maintain core body temperature (~41°C), it must increase its metabolic rate, leading to a higher demand for energy. This results in increased feed consumption specifically for thermogenesis, often at the expense of production. Concurrently, birds reduce water intake, which can disrupt nutrient absorption and eggshell quality. Furthermore, the confinement and sealing of houses to retain heat create a perfect storm for poor air quality, elevating the risk of respiratory pathologies.

A Scientific Framework for Integrated Winter Management

1. Precision Brooding and Insulation

The foundation of a healthy flock is laid during brooding. Pre-heating the house 24 hours prior to chick arrival ensures a stable environment. The temperature at chick level



should be meticulously maintained at 35°C (95°F) initially, then reduced by approximately 0.7°C (5°F) per week. Modern heating systems like radiant tube heaters or infrared brooders are superior as they warm the birds and litter directly rather than just the air, providing more uniform heat and reducing energy costs.

Scientific Insight: Chicks have a high surface-area-to-volume ratio and underdeveloped thermoregulatory systems before 10-14 days of age. Inadequate brooding temperature forces them to use energy for heat instead of growth, compromising early immune development and future uniformity.

Actionable Steps: Employ windbreaks like gunny bags on incoming vents. Ensure a deep litter base (at least 6 inches) of highly absorbent material like rice husks or softwood shavings to provide insulation from the cold floor and facilitate microbial activity that generates some internal heat.

2. The Ventilation Paradox: Moisture and Ammonia Control

Ventilation in winter is a calculated exchange of air to remove moisture, gases, and pathogens without creating drafty conditions. Birds exhale significant water vapor, and their manure is approximately 75-80% water. In a closed house, this dramatically increases relative humidity, which condenses on cold surfaces and wets the litter.

Scientific Insight: The enzyme urease, present in poultry litter, hydrolyzes uric acid in manure to form ammonia (NH₃). This reaction accelerates in damp, alkaline conditions. Ammonia levels as low as 25 ppm have been shown to damage the ciliated epithelium in the trachea, impairing the mucociliary escalator—a primary defense mechanism against inhaled pathogens like Avian Influenza virus, Infectious Bronchitis virus, and E. coli.

Actionable Steps: Use minimum ventilation fans controlled by timers to provide constant, low-level air exchange. The goal is to maintain relative humidity between 50-65%. Use sliding curtains or inlets to direct incoming cold air upward to mix with warm air before reaching the birds, preventing "cold drafts." Regularly monitor ammonia levels with a gas detector tube, aiming to keep them below 10 ppm.

3. Strategic Nutritional Interventions for Cold Stress

The diet must be reformulated to meet the heightened energy demands of cold weather. **Scientific Insight:** The Heat Increment of Feed (HIF)—the heat produced during nutrient metabolism—can be leveraged. Increasing the dietary energy level, particularly through fats and oils which have a higher HIF than carbohydrates, provides both concentrated energy and



internal warmth. However, simply increasing feed without adjusting other nutrients can lead to deficiencies.

Actionable Steps: Increase the metabolizable energy (ME) of the ration to 3400-3450 Kcal/kg by incorporating 2-3% added fat or oil. Maintain a balanced amino acid profile, especially digestible Lysine and Methionine, to ensure the extra feed is used for both energy and egg mass production, not just fat. Cold stress can increase the metabolic turnover of vitamins A, E and C which are crucial antioxidants. Supplementation may be beneficial. As water intake decreases, ensuring adequate calcium and phosphorus levels is critical to prevent thin-shelled eggs. Slightly reduce dietary sodium to around 0.16-0.18% to minimize water excretion and wet litter problems. Reduced water intake in cold weather is a major concern. Water is essential for feed digestion, nutrient transport, and thermoregulation.

Actionable Steps: Provide slightly warmed water (10-15°C) to encourage consumption. Ensure water lines are not exposed to freezing temperatures. Sanitize water lines regularly with approved products like hydrogen peroxide or chlorine-based disinfectants to prevent biofilm buildup, as stagnant water is a breeding ground for pathogens like *E. coli* and *Salmonella*.

4. Photoperiod Management for Consistent Lay

Light is a primary environmental cue for the hypothalamic-pituitary-gonadal axis, which regulates reproduction.

Scientific Insight: Short day lengths suppress gonadotropin-releasing hormone (GnRH), leading to a decline or cessation in egg production. Providing a consistent and adequate photoperiod is crucial.

Actionable Steps: For most layer strains, provide 14-16 hours of constant light per day. Use timers to ensure precision. LED bulbs are highly efficient, providing consistent lumens with less energy and heat loss. Ensure light intensity is sufficient (a minimum of 20-30 lux at bird level) and that bulbs are clean.

5. Proactive Health and Disease Mitigation

The winter environment predisposes flocks to specific disease challenges. A robust biosecurity program is non-negotiable. Common Winter Ailments: Respiratory complexes involving Newcastle Disease (ND), Infectious Bronchitis (IB), followed by secondary bacterial infections like *Mycoplasma gallisepticum* (Chronic Respiratory Disease) and *Ornithobacterium rhinotracheale* (ORT) are common. Wet litter also promotes coccidiosis outbreaks. Essential oils such as eucalyptus (1,8-cineole) and menthol have documented



expectorant and anti-inflammatory properties. When used as a water-soluble supplement, they can help soothe respiratory tracts irritated by dust or low-grade ammonia and act as natural decongestants. Ensure vaccination programs for ND, IB, and other endemic respiratory viruses are up-to-date, as a robust immune response is the best defense against secondary infections.

Conclusion

Successful winter management for layer chickens is a multifaceted endeavor rooted in understanding avian physiology and environmental science. It requires a synergistic approach where optimal ventilation, thermal comfort, precision nutrition, and stringent biosecurity are interlinked. By moving beyond simple warmth preservation to actively managing the house's microenvironment, producers can effectively neutralize the challenges of cold stress, ensuring their flock remains healthy, productive, and economically viable throughout the winter months.

