

Association of Avian Health Professional

WELCOME

to
Poultry Health Webinar

Mitigation of Summer Stress in Poultry Production



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What is Stress?

- Stress is a state of worry caused by a difficult situation; is a natural response to address challenges & threats in life
- All living beings have a limited amount of stored up resources, which help them to adapt to unstable conditions; a challenge or a threat
- As long as these challenges are minor or within tolerable limits, they manages to make use of its reserves, adjust to the situation & come out with little or no damage
- Stress is the situation when these challenges are more in intense forms or greater in numbers, that serious chemical, physical & psychological changes take place within an animal with far reaching consequences

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Types of Stress In Chicken

Avoidable Stress

- Overcrowding
- Poor Ventilation
- Wet Litter
- High Ammonia
- Dehydration
- Poor Hygiene
- Mycotoxin
- Starvation
- **Disease**

Un-avoidable Stress

- Extreme Climate; **Heat Stress** ←
- Chilling, High Humidity
- Rapid Growth
- Handling/Transfer
- Vaccination
- Transportation
- Routine Medication
- Debeaking

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Heat Stress In Poultry

What is Heat Stress?

- A situation when chicken faces difficulty in achieving balance between body heat production & body heat loss
- It may occur at any age and with all kinds of poultry
- Chicken does lot better in cold weather than in hot weather
- Having such a high body temperature (105 – 107° F) to start with, makes heat related ailments much more prevalent for chickens



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Heat Stress in Poultry

➤ Heat Stress (HS) is not only uncomfortable for a chicken, it also damages organs, cause egg deformation and even death

➤ Genetics, Feather cover, Age, Body Weight and flock maintenance all affect a chicken's heat tolerance



➤ As chicken ages, it becomes more susceptible & more sensitive to elevated Temperature

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Effect of Heat Stress in Poultry

- Temp above Thermoneutral zone disturbs normal physiological function & induces cell injury
- Heat stress causes several physiological changes, like oxidative stress, acid-base imbalance, and suppressed immunocompetence, which results increased mortality, reduced feed intake leading to poor productivity
- Heat Stress are 2 types; Acute Heat Stress (AHS), which is intense environmental Temp for a brief period & Chronic Heat Stress (CHS), which is high Temp for a longer duration
- Both AHS & CHS challenge genetic, nutritional & managerial issues with serious effects on poultry performances
- CHS has permanent damaging effect on broiler; when persist longer, it damages the muscles affecting meat quality & lowering breast muscles yield
- HS disrupts lipid metabolism by affecting enzymes involved in lipid breakdown resulting excess fat deposition
- HS reduces protein content of the muscles, decline in muscle pH, water holding capacity & juiciness of chicken meat

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Heat Stress Effect on Physiology of Chicken

- Chickens are homeotherms & regulate their body Temp across a wide range of external Temp. But high ambient Temp overwhelm the thermoregulatory mechanisms, resulting imbalance between the amount of metabolic heat produced & their capacity to dissipate body heat in the environment
- Chickens lack sweat glands, which would facilitate latent heat loss by evaporation (perspiration), and have limited un-feathered body surface areas for effective loss of sensible heat through conduction, radiation, & convection
- As the ambient Temp rises, the thermal gradient between the body surface & the surrounding environment lessens with dissipation of sensible heat decreasing, results chickens suffering from environment-induced hyperthermia. This increase their respiratory rate (thermal polynea or panting) to maximize the loss of latent heat via evaporation of water from the respiratory tract
- Relative humidity (RH) imposes a ceiling on water evaporation resulting latent heat dissipation. Thus, elevated ambient Temp associated with high RH limits heat removal from the body and intensify the harmful effects of HS on chickens

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Heat Stress Effect on Physiology of Chicken

- Under persistent HS conditions, thermal polynea turns into a slower & deeper panting phase, called thermal hyperpnea.
- Dehydration, the most intuitive panting-related disadvantage, results in higher water intake. Panting also increases CO_2 exhalation leading to hypocapnia, eventually to respiratory alkalosis, a disorder of the acid-base balance
- Alkalosis poses a risk to the egg industry because it reduces blood ionized calcium, which negatively affects eggshell mineralization
- HS-induced respiratory alkalosis is a great threat to broiler. Chickens under HS frequently lift their wings to expose featherless part to enhance the sensible heat flow to environment
- After 70 years of genetic research, the modern fast-growing & highly efficient broilers are less thermotolerant & more susceptible to HS than slow-growing lines due to extremely high metabolic rates and poorly developed cardiovascular & respiratory systems.

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Effect of Heat Stress In Poultry

High Temp => 27° C with RH => 70%,
Challenges to Birds Thermoregulatory center



Thermoregulatory Strategies

- Increase Panting
- Decrease Feed Intake
- High Respiratory Rate
- Elevated Wings

Genetic Changes

- Suppressed Expression of Myogenic Genes TFs, IGF, MyoD, MyoG
- Increased Expression of Genes Involved In Protein catabolism & Cell Apoptosis



Metabolic Changes

- Suppressed Thyroid activity
- Reduced muscle protein content
- Increased Fat deposition



Physiological Changes

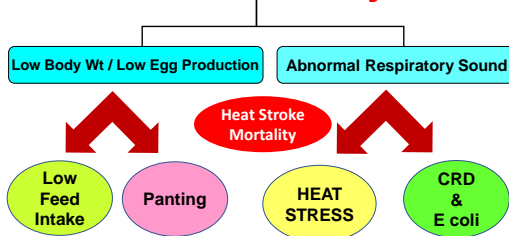
- Immuno-Suppression
- Respiratory distress inviting E coli & CRD
- Imbalance of Gut Microbiota, damage of Intestinal Integrity & Villi Structure – Poor Intestinal Health; Dysbacteriosis & Necrotic Enteritis
- Increased water intake leading to poor digestion & watery droppings
- Reduced Feed consumption; Poor Weight gain with high FCR in Broiler and reduced Egg production in layer/breeder
- Increased Fat deposition and reduced protein content in muscles
- Heat stroke mortality

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Ground level Summer Daily Issues



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Summer Stress period - Target In Broiler Production



- Mean Age to 33 - 35
- Body Wt of 1.95 – 2.00 Kg
- Control Heat-Stroke Mortality

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Summer Stress Mitigation Keys

To Achieve the Saleable Body Wt near 2Kg

Feed (Available Nutrients) Intake need to be near Standard on day-to-day basis



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Summer Stress Mitigation

COLD STRESS	COLD	Thermo-Neutral	WARM	HEAT STRESS
Below 10°C	10 – 18°C	18 – 24 °C	25 – 30°C	Above 30°C
Exhaustion	Adjustment	Comfort Zone	Adjustment	Exhaustion

Av Day Temp = (2 x Highest Temp + Lowest Temp)/3
 Ex Today's Highest Temp is 34 & Lowest was 25; Av Temp of Today is (2x 34 + 25)/3 = 93/3 = 31°C
Birds are under Heat Stress

To achieve maximum performance, poultry house Temperature must be kept consistently within the bird's **Thermo-neutral or comfort zone**

Otherwise, the bird will expend additional energy for Panting to regulate its Body Temperature resulting poor Body Weight Gain & Poor FCR

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Reducing Poultry House Temperature



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Summer Stress Mitigation

Hanging Gunny on both side with Dripper water can Reduce Shed Temperature by 6° Celsius



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Reducing Poultry House Temperature



Thatched Broiler House



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Reducing Poultry House Temperature



Inside Thatching – False Ceiling



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Reducing Poultry House Temperature



Inside Thatching – False Ceiling



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Reducing Poultry House Temperature



Inside Thatching – False Ceiling



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Reducing Poultry House Temperature



Outside - ASBESTOS Roof Thatching



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Reducing Poultry House Temperature

SIDE PANDALS



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Reducing Poultry House Temperature

TREE PLANTATION



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Reducing Poultry House Temperature



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Reducing Poultry House Temperature - Fogger



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Reducing Poultry House Temperature- Sprinkler



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Improving Air Movement at Bird's level

Well Ventilated Poultry Shed for Free Cross Air Movement & Ceiling Fan 1 for 300 Broiler

Good Air Circulation helps birds losing Heat through Dissipation which helps minimizing HS & Heat-Stroke Mortality



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Summer Stress Mitigation - Bangladesh Layer Farm



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Summer Stress Mitigation - Cool Drinking Water 24 Hours



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Modifying Feeding Practice for Targeted Body Weight

- Frequent Feeding
- Early Morning Feeding
- Cool Hours Feeding
- Feed Withdrawal

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Modifying Feeding Practice for Targeted Body Weight

- Early Morning Feeding at 5:30 – 6:00 am
- 2nd Time Feeding at 8:00 am
- Feed Withdrawal at Noon Hours
- Evening Time Feeding at 5:00 pm
- Night Time Feeding at 9:30 pm

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Modifying Feeding Practice for Targeted Body Weight



Frequent Feeding



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Modifying Feeding Practice – Feed Withdrawal



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Modifying Feeding Practice – Feed Withdrawal

Feed Withdrawal depends on the Climate of the given Day and Age of the Birds

- Feed Withdrawal should start at 12 days Age in Broiler and continue till Culling/Lifting
- Objective of Feed Withdrawal is to reduce Metabolic Heat production during hot period of the day to minimize Heat Stress, Panting & possible Heat Stroke Mortality
- Fresh & Cold Drinking Water must be available 24 hours including Feed withdrawal period
- Vitamin C and Electrolytes may be added to Drinking water of Feed Withdrawal period to minimize dehydration & Immuno-Suppression.
- Alternatively Lemon & Jaggery may be added to drinking water
- Age in Day 12 – 14: 2 Hours from 1 pm – 3 pm
- Age in Day 15 – 17: 3 Hours from 12 Noon – 3 pm
- Age in Day 18 – 20: 4 Hours from 11 am – 3 pm
- Age in Day 21 – 23: 5 Hours from 10 am – 3 pm
- Age in Day 24 – 26: 6 Hours from 10 am – 4 pm
- Age 27 Day Onwards: 8 Hours from 9 am – 5 pm
- Feeder must be Lifted or Taken away to avoid unnecessary jumping/Fighting by hungry broilers
- If climate is comfortable in any given day in between this period, Feed Withdrawal may be suspended for that day

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Modifying Feeding Practice – Feed Withdrawal

ফিড রেস্ট্রিকশান

মুরগীর খাবার বন্ধ রেখে পালনের নাম রেস্ট্রিকশান। দিনের একটা নির্দিষ্ট সময় খাবার বন্ধ রাখতে হবে:

- > 12 - 14 দিন বয়সে: ২ ঘন্টা - ১টা থেকে ৩টা পর্যন্ত
- > 15 - 17 দিন বয়সে: ৩ ঘন্টা - ১২টা থেকে ৩টা পর্যন্ত
- > 18 - 20 দিন বয়সে: ৪ ঘন্টা - ১১টা থেকে ৩টা পর্যন্ত
- > 21 - 23 দিন বয়সে: ৫ ঘন্টা - ১০টা থেকে ৩টা পর্যন্ত
- > 24 - 26 দিন বয়সে: ৬ ঘন্টা - ১০টা থেকে ৪টা পর্যন্ত
- > 27 দিন বয়স হইতে দিনে ৪ ঘন্টা - সকাল ৯টা থেকে ৫টা পর্যন্ত

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Modifying Feeding Practice – Feed Withdrawal



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Modifying Feeding Practice for Targeted Body Weight



Night Time Feeding with Additional Drinker

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Increasing Energy & Nutrient Density in Feed

- Feed Intake decreases due to discomfort Environment, Heat Stress & Panting leading to poor uptake of Nutrients in the body system
- On the other hand, requirement of Micro-nutrient like Vitamins, Minerals, Electrolytes & Amino Acids increased to combat Heat Stress
- High Protein diet causes excess production of Metabolic Heat, therefore protein may be @ lower possible limit while formulating summer diet keeping required digestible AA level through synthetic Amino Acid inclusion
- To supply the much needed Energy under reduced feed intake in summer time, it is advisable to increase fat% by addition of edible oil in ration
- Vitamins, Trace Minerals & Electrolytes dense Feed formulation is suggested to satisfy the increased requirement to combat Heat Stress & to maintain productivity

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Summer Tragedy – Heat Stroke Mortality



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Mitigation of Summer Stress for Optimum Poultry Productivity



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Thank You



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