

# Management Options to Combat Heat Stress

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# Housing

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- › Type of housing is an important consideration for a well ventilated and heat controlled facility.
- › However, the main concern is more with the biological approaches as little can be done to alter house design in the midst of a pending heat stress.

# Feeding

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- › The greatest proportion of economic loss with heat stress is the result of **lower feed intake**.
- › Increased feed intake results in increased heat production with the strong possibility of significantly increasing mortality.

# Cont. ...

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- › There are a number of ways to encourage feed intake and help to off set, to some extent, the reduced growth rate;
  1. Running feeders
  2. Pelleting feeds
  3. Using meal feeding
  4. Continuous lighting programs
  5. High density diets

# Fasting

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- › Since increased feed intake increases heat output, reducing feed intake will obviously reduce heat output.

# Cont. ...

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- › Removing feed **after** the onset of heat stress **is of little value.**
  - Time is required for feed to clear the digestive tract and thus reduce heat output.
  - Fasting must take place prior to the onset of heat stress.

## Cont. ...

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- › It has been well documented that **fasting birds for up to 72 hours will increase survival time.**
- › **Fasting** intervals as short as **3 hours prior** to the initiation of heat stress have also been shown to enhance bird survival.
- › Fasting for 6 to 8 hours prior to the hot time of the day should give the optimum results since the bird will consume little during the heat stress period and thus total length of time off feed could be 12 to 14 hours.



# Cont. ...

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- › People may worry about low feed intake and reduced growth during heat stress;
  - Birds will compensate during the cooler part of the evening, or if there are several days of cooler weather before the birds are marketed
  - Compensatory growth will usually bring weight up to near normal levels.

# Acid-Base-Balance

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- › Enhanced respiration rate during heat stress results in carbon dioxide loss and acid-base balance alterations.
- › However, these effects of altered acid-base balance are little understood.

# Cont. ...

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- › Weight gain has been enhanced with:
  1. Water carbonation
  2. Supplementation with acids such as ammonium chloride ( $\text{NH}_4\text{Cl}$ ) or hydrochloric acid (HCl)
- › This suggests that acid-base balance is critical for maximizing weight gain.

# Water Management

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- › Water consumption is an important consideration with heat stressed birds.
- › However, its importance is sometimes down played by the fact that 80% of the bird's heat production during heat stress is dissipated via panting (evaporative cooling).

## Cont. ...

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- › Addition of various **salts** to water alters the **bird's osmotic balance**, resulting in **increased water consumption**, thus influencing water balance during heat stress.
- › The increased water consumption benefits the bird by acting as a heat receptor as well as increasing the amount of heat dissipated per breath.

## Cont. ...

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- › Such thermo balance effects are principally observed when water temperature falls below 28°C.
- › Birds in positive water balance are better able to maintain normal body temperature.

## Cont. ...

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- › This has special significance for the commercial broiler as heat stress increases urine production, independent of water intake, thus forcing birds to sustain higher water consumption levels than required to simply replace water loss due to evaporative cooling.

## Cont. ...

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- › Data indicated that **increasing water consumption by 20%** over basal levels (by acid treatment or reduced water temperatures) can increase **heat loss per breath** by as much as **30%**.



# Drinking Water Temperature

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1. There are significant interactions between adding salt to drinking water and water temperature.
  - If the **temperature** of the drinking **water** is **below** that of the bird's **body**, adding **potassium chloride (KCl)** will **increase** consumption.
  - If the temperature of the water **equals** that of the bird's body no response in water intake is noted with KCl addition.
2. **Lowering the temperature** of the water, with no salt addition, also **improves water intake**.

# Mineral Fortification

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- › During heat stress, mineral excretion via the urine and feces is increased.
- › Whether specific benefits with mineral supplementation exist, independent of their effect on water intake, is not known.
- › However, it would appear that potassium based salt mixtures are superior to sodium when added to drinking water.

# Ration Composition

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- › The **increased energy intake**, during heat stress, may increase growth rate, but invariably at the cost of higher mortality.
- › One must choose between birds of heavier weight or increased mortality.

# Protein Consideration

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- › This is an area where a fair bit of controversy exists.
- › There are those who recommend increasing dietary protein level and those that recommend reduced levels with improved essential amino acid balance.
- › There appears to be sufficient research to suggest that **reduced protein** is the avenue of choice as this has been shown to improve growth and enhance survivability.

# Growth Promotants

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- › Growth promotants have been credited by some in reducing gastrointestinal tract mass.
- › Since the gastrointestinal tract represents a significant source of metabolic heat one might anticipate a significant interaction with heat stress.

## Cont. ...

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- › There is limited work to indicate that some antibiotics do result in enhancing the performance of heat stressed broilers.
- › Whether this is an effect of their action in reducing gut contents is not known.

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