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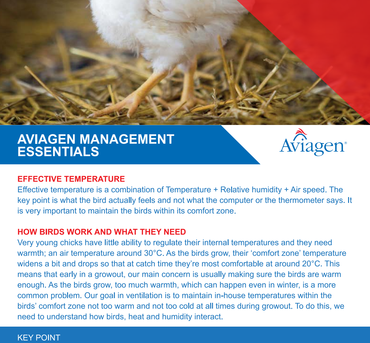
THE INSIDE CHIRP | POULTRY NEWS VOL 12



EFFECTIVE TEMPERATURE MANAGEMENT

AVIAGEN MANAGEMENT ESSENTIALS

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EFFECTIVE TEMPERATURE

Effective temperature is a combination of Temperature + Relative humidity + Air speed. The key point is what the bird actually feels and not what the computer or the thermometer says. It is very important to maintain the birds within its comfort zone.

HOW BIRDS WORK AND WHAT THEY NEED

Very young chicks have little ability to regulate their internal temperatures and they need warmth; an air temperature around 30°C. As the birds grow, their 'comfort zone' temperature widens a bit and drops so that at catch time they're most comfortable at around 20°C. This means that early in a growout, our main concern is usually making sure the birds are warm enough. As the birds grow, too much warmth, which can happen even in winter, is a more common problem. Our goal in ventilation is to maintain in-house temperatures within the birds' comfort zone not too warm and not too cold at all times during growout. To do this, we need to understand how birds, heat and humidity interact.

KEY POINT
• Early in a growout, the main concern usually is keeping birds warm enough. As the bird grows, too much warmth is a more common problem.

EFFECTS OF TEMPERATURE AND RELATIVE HUMIDITY ON BIRDS

Temperature and humidity work together to determine bird comfort, but for simplicity in the following paragraphs we'll look at temperature first, then humidity and then explain how their interaction affects birds.

Birds are basically air-cooled. That is, air moving over the birds picks up their body heat and transfers it to the environment. Birds do not sweat, and so do not enjoy this kind of built-in evaporative cooling system. They do get some evaporative cooling effect through breathing and panting (Figure 1). However, they rely mainly on direct body-to-air heat transfer for cooling. If you see birds lifting their wings, they're feeling hot and exposing more of their bodies to the air to get rid of the excess heat.

Figure 1:
Birds do not sweat and so cannot cool themselves in this way. They shed almost all excess body heat by direct body-to-air heat transfer. In times of heat stress they begin panting in order to rid their bodies of more heat.

HUMIDEX = 'FEELS LIKE' TEMPERATURE

Temperatures are listed across the top and humidity down the side.

The temperature that correlates with each level of humidity combine to make a humidex value (or 'feels like' temperature).

Humidity	Temperature 20°C	25°C	30°C	35°C
50 %	22	28	36	45
60 %	24	30	38	46
70 %	25	32	41	49
75 %	26	33	42	50
80 %	26	33	43	52
85 %	27	34	44	53

HUMIDEX GUIDELINES FOR LOADING POULTRY

ENVIRONMENT

The following table illustrates the relationship between RH and apparent temperature (the temperature the bird actually feels). If RH is outside the target range, the temperature of the house should be adjusted as indicated and in line with bird behaviour. Temperatures shown in red are at the ideal humidity range.

AGE (DAYS)	DRY BULB TEMPERATURE AT RH%* °C			
	40 RH%	50 RH%	60 RH%	70 RH%
DAY OLD	36.0	33.2	30.8	29.2
3	33.7	31.2	28.9	27.3
6	32.5	29.9	27.7	26.0
9	31.3	28.6	26.7	25.0
12	30.2	27.8	25.7	24.0
15	29.0	26.8	24.8	23.0
18	27.7	25.5	23.6	21.9
21	26.9	24.7	22.7	21.3
24	25.7	23.5	21.7	20.2
27	24.8	22.7	20.7	19.3

* Temperature calculations based on a formula from Dr. Malcolm Mitchell

Note:
Chicks from donor flocks of less than 30 weeks will require a start temperature 1°C warmer than the given temperature profile in the table above.

- Monitor temperature and relative humidity regularly (twice daily in the first 5 days and daily thereafter) and check automatic equipment with manual measurements at chick level.
- Calibrate automatic equipment at least once per cycle.
- Variation in humidity will influence the effective temperature experienced by the chicks.
- High humidity increases the effective temperature.
- Low humidity decreases the effective temperature.

In addition to simply changing house air, getting wind on the birds can help them cope with high temperatures. The wind-chill effect of moving air creates a lower effective temperature for them. For example, if you have air in the house at 32°C (and average humidity) moving at 2,54m/s, it will feel to fully-feathered birds like 27°C air. The effect is even greater for younger birds, which may be chill stressed. Tunnel ventilation creates the most effective wind-chill cooling. In non-tunnel houses, stirring or circulation fans can help.

Figure 2:
Fast moving air over birds creates wind-chill effect that can be very beneficial, especially for larger birds. However, younger birds are more sensitive to wind-chill effects and may be chill stressed.

For fully feathered birds to stay comfortable, there has to be a substantial difference between house air temperature and their own internal temperature., which normally is above 37,8°C. As the in-house air temperature rises higher and higher, the birds' heat shedding mechanisms become less and less effective. The birds' internal temperatures then begin to rise and the slow down or stop eating and growing. If the situation isn't controlled, they will eventually die.

Figure 3:
For fully feathered birds, as the air temperature rises above 27°C, birds' heat shedding ability becomes less effective. As they begin to experience heat stress they slow down or stop eating. If heat accumulation in their bodies isn't stopped, they will eventually die.

Birds can tolerate higher temperatures during the day if night time temperatures drop 14°C or more below daytime highs. During the cool night time birds can get rid of excess body heat built up during the day. Running fans to get air moving over the birds during the night can help by reducing the 'effective' night time temperature. The birds can then start the next day fresh, which helps keep performance up and lessens the risk of possible mortalities if daytime temperatures are very high.

Birds also lose some body heat through breathing. This is why you'll see birds begin to pant when they feel overheated. It's like a back-up cooling system that usually starts working when temperatures rise 4-6°C above their current 'comfort zone' temperature. What's happening is that the birds are trying to maximize the evaporative cooling effect they get from the air passing over the moist linings of their air-ways and lungs. This cooling method works best when the air is relatively dry. If the air is already holding a great deal of moisture, it can't readily evaporate the birds' moisture and the evaporative cooling effect doesn't work as well.

Figure 4:
Birds can tolerate higher daytime temperatures if they are able to cool off during the night. The effect is most pronounced when night time temperatures drop 14°C below daytime highs. Running fans at night to move air over the birds can help by reducing the night time 'effective' temperature.

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