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THE INSIDE **CHIRP** | POULTRY NEWS VOL 7

STEPS TO SUCCESSFUL **BROODING**

AVIAGEN MANAGEMENT ESSENTIALS

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INTRODUCTION

To promote early development of feeding and drinking behavior, which will allow the target body-weight profile to be achieved with maximum uniformity and good welfare.

AT PLACEMENT, THE ENVIRONMENTAL CONDITIONS REQUIRED ARE:

- Air temperature of 30°C, measured at chick height in the area where feed and water are positioned.
- Floor temperature of 28°C - 30°C.
- Litter temperature of 28°C - 32°C.
- RH of 60-70%.

Prior to the chicks arriving, litter material should be spread evenly to a depth of 2-5 cm. Where floor feeding is to be practiced after brooding, litter depth should not exceed 4 cm. Litter depth can also be reduced where litter disposal is an issue. Where a thinner layer of litter is used, it is essential that the correct floor temperature (28°C - 30°C) is achieved prior to chick arrival. Providing more than 5 cm of litter can create a problem of litter movement leading to chicks becoming buried, especially if the litter is spread unevenly.

At placement, and for the first 24 hours after placement, chicks should not have to travel more than 1 m for access to water. Ensure drinker space is correct for the drinker type used (**Table 1**). Water lines should be flushed 1-2 hours prior to chick arrival. Flushing is required if there is a risk of biofilm build-up (e.g., if water soluble additives are added to the water). However, take care to ensure that chicks are never given cold water. The water supplied to the chicks should be approximately 18 to 21°C (**Table 2**). Adapt the water pressure for young chicks, considering manufacturer's guidelines.

Table 1:
Recommended drinking space requirements during brooding.

Type of Drinker	Drinker Space
Bell drinkers	8 drinkers per 1000 chicks/ 125 chicks per drinker
Nipples	12 birds/nipple
Mini-drinkers or tray	12 mini-drinkers per 1000 chicks; 80 chicks per mini-drinker tray

Table 2:
Effect of water temperature on water intake.

Water Temperature	Water Intake
Less than 5°C	Too cold, reduced water consumption
18-21°C	Ideal
Greater than 30°C	Too warm, reduced water consumption
Above 44°C	Birds refuse to drink

In hot climates, water temperature should be lower than environmental temperature. Ensure water tanks and pipes are out of direct sunlight and well insulated. It can be advantageous to flush nipple lines at least twice a day for the first 3-4 days to keep the water flow high and the water temperature cool.

Any treatment of water with products (such as water-soluble additives) that could encourage the growth of bacteria in the pipes should be followed by an effective water sanitation program. This program should not affect the birds' performance, even subsequently, when they are in lay. Ensure that all chicks have easy access to feed. At placement, feed should be a sieved crumb provided on supplementary feeder trays (1 per 80 chicks) and on paper to give a feeding area occupying at least 90% of the brooding area. Paper can provide easier access to feed and the sound of paper can attract the birds' curiosity to find feed. The type of paper used in the brooding area should not easily cake or become slippery.

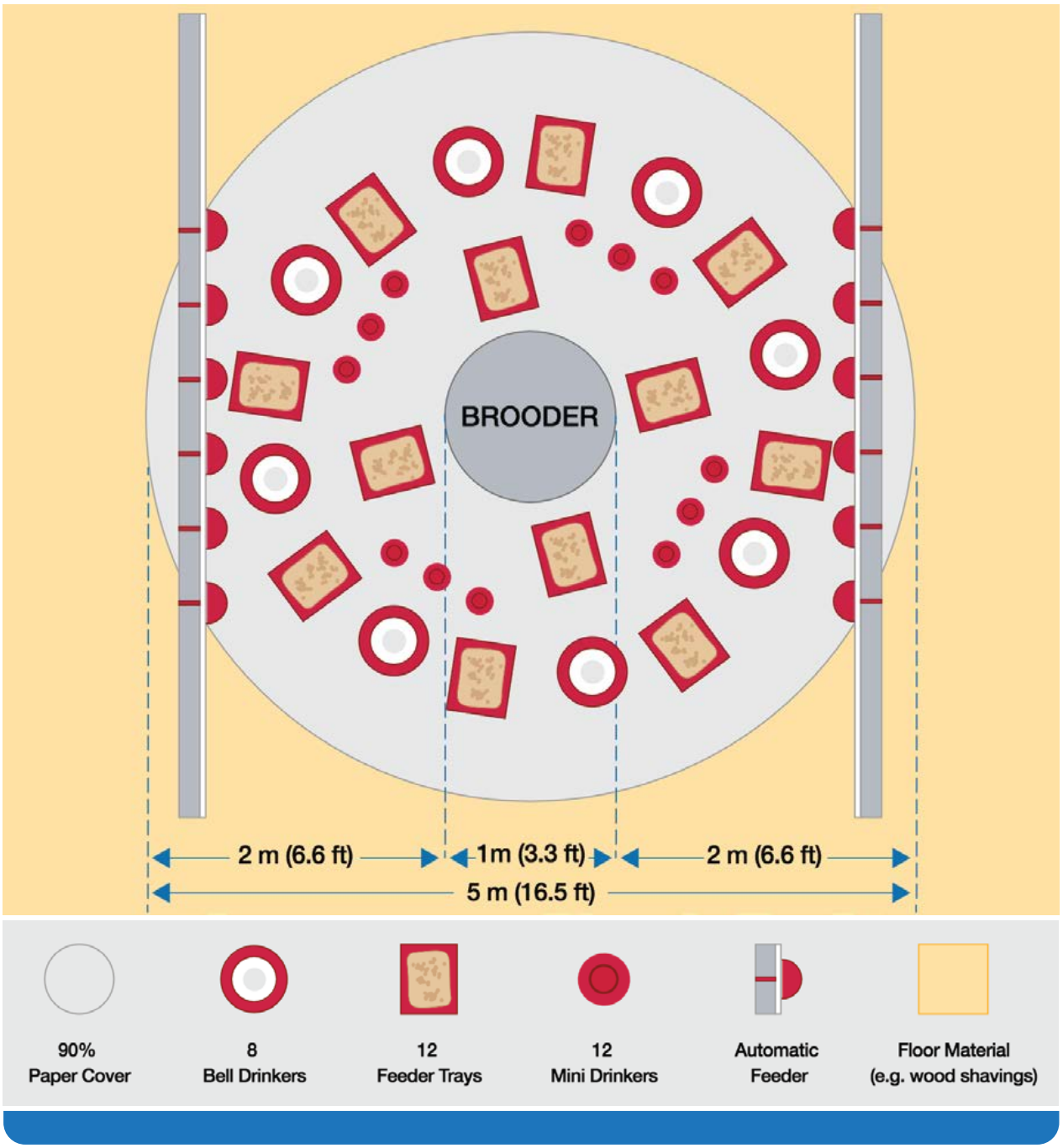
During brooding, the light intensity should be 80-100 lux in the area where the feed and water are positioned to encourage feeding and drinking behavior. The remainder of the house should be dimly lit (10-20 lux).

SPOT BROODING

In spot brooding, the heat source (canopy, pancake, radiant heaters and charcoal brooders) is local so chicks can move closer to, or away from, the heat source and select for themselves a preferred temperature. Manufacturers' guidelines should be consulted for equipment positioning and heat output. Brooding rings are used to control early chick movement.

The layout for a spot brooding set-up, which would be typical for 1,000 chicks on day 1, is shown in **Figure 12**. The brooder surround floor should be covered with paper except directly under the brooder. Chicks should be placed in an area that gives an initial stocking density of around 40 chicks/m2.

Figure 12: Example of a typical spot brooding layout (1,000 chicks).



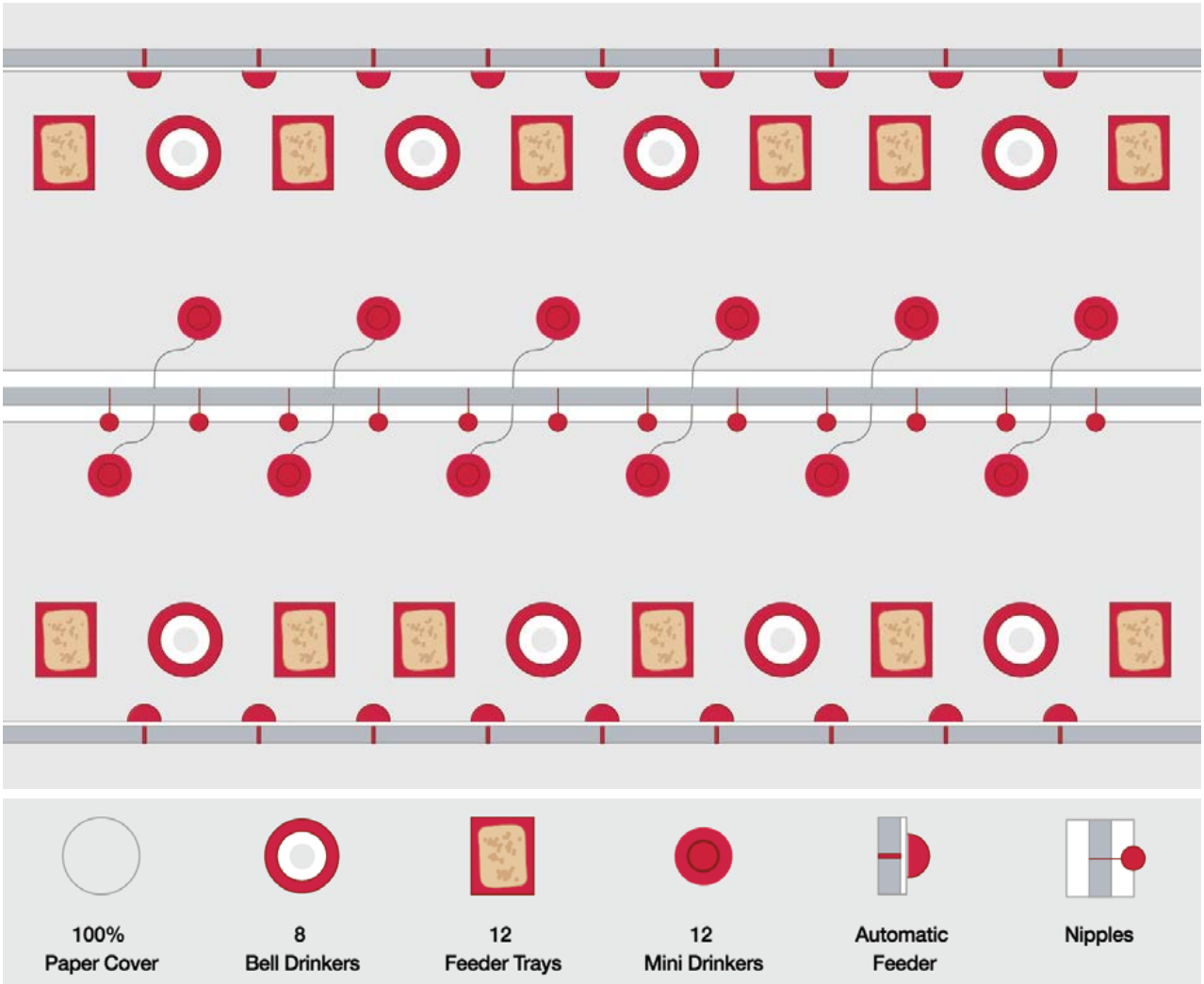
WHOLE-HOUSE BROODING

In whole-house brooding (**Figure 13**), there is no temperature gradient within the house. House temperature is more constant and the ability of the chicks to move to a preferred temperature zone is limited.

The main heat source for whole-house brooding can be direct or indirect (using hot air), although supplementary brooders might also be provided.

Whole-house brooding can also be done using part of the house only. In this case, the whole house must be heated before releasing the chicks. Heating the whole house will encourage chick movement into the empty area of the house when access is given at around 7 days of age.

Figure 13: Typical whole-house brooding layout for 1,000 chicks.



KEY POINTS

- Pre-heat the house and stabilize temperature and humidity at least 24 hours prior to chick arrival.
- Ensure cleanliness of water and litter.
- Arrange equipment to enable the chicks to reach feed and water easily.
- Position supplementary feeders and drinkers near the main feeding and drinking systems.

CHICK ARRIVAL AND PLACEMENT

At placement, the chicks should be placed into the brooding area carefully and as quickly as possible. Chicks should not stay in the boxes longer than absolutely necessary, as this increases the risk of dehydration, resulting in reduced welfare, poor chick start, uniformity and growth.

After placement, empty cardboard chick boxes should be removed and disposed of without delay. Plastic boxes should be returned for recycling after adequate disinfection protocols have been followed.

Chicks should be left to settle for 1 to 2 hours in their new environment after they have been placed. After this time, a check should be made that all chicks have easy access to feed and water and that environmental conditions are correct. Adjustments should be made to equipment and temperatures where necessary.

KEY POINTS

- Unload chicks carefully and place them without delay.
- Do not leave empty chick boxes lying around.
- Check feed, water, temperature and humidity after 1 to 2 hours and adjust where necessary.

BROODING MANAGEMENT

Brooding is the first 7-10 days of a chick's life. Subsequent high levels of flock performance and welfare are dependent upon achieving high standards of management during this period.

It is important to replenish feed and water frequently. During the early stages of brooding (the first 3 days), the maximum daily feed allocation should be provided in small amounts given frequently (i.e., 5-6 times per day). This feeding method will avoid problems of food becoming stale and will encourage chicks to eat.

Open source drinkers (supplementary drinkers and bell drinkers) should be cleaned out and refreshed regularly, as bacteria can multiply rapidly in open water at brooding temperatures. Supplementary drinkers supplied at placement should be gradually removed so that by 3-4 days of age, all chicks are drinking from the automated drinking system.

For the first 2 days, chicks should be provided with 23 hours light and 1 hour dark. After the first 2 days, daylength should be gradually reduced so that it is down to a constant 8 hours by 10 days of age. In open-sided houses, daylength will depend on date of placement and the natural daylength patterns.

During early brooding, where chick movement is controlled by a brooding ring, the area contained by the rings should be expanded gradually from 3 days of age to increase floor space and improve feeding and drinking space. Actual increases in brooding area should be

determined by chick behavior, body-weight gain and feeding, drinking equipment and litter condition. Rings should be removed completely by no later than 10 days of age (Table 3). In situations where coccidiosis outbreaks are a concern for the farm, it is beneficial to delay the release of chicks to the full house. Controlling stocking density progressively during the first 3-4 weeks is an excellent way to influence litter humidity and temperature for optimal intestinal development, coccidia sporulation and cycling.

Table 3:
Example of increase in brooding area

Age	Birds/m²
1-3 days	40
4-6 days	25
7-9 days	10
10 days	Final stocking density

Temperature and RH should be monitored and recorded daily, and appropriate adjustments to the environment made in response to chick behavior to ensure that environmental conditions are optimized. The number of feeders and drinkers, and the heating capacity of the brooder must be appropriate for stocking density to prevent adverse effects on performance..

ENVIRONMENTAL CONTROL

HUMIDITY

Chicks kept at appropriate humidity levels are less prone to dehydration and generally make a better, more uniform start. It is important that house RH levels in the first 3 days after placement are between 60 and 70%. RH within the house should be monitored daily using a hygrometer. If it falls below 50% in the first week, the environment will be dry and dusty. The chicks will begin to dehydrate and action should be taken to increase RH. RH can be increased by using the misters in the house or a portable backpack sprayer to spray the walls with a fine mist. If increasing RH in this way, care must be taken to ensure that excess moisture is not added to the environment as this will result in reduced litter quality, increased ammonia leading to respiratory diseases and possible footpad and leg issues, coccidiosis and reduced bird performance due to evaporative cooling.

TEMPERATURE

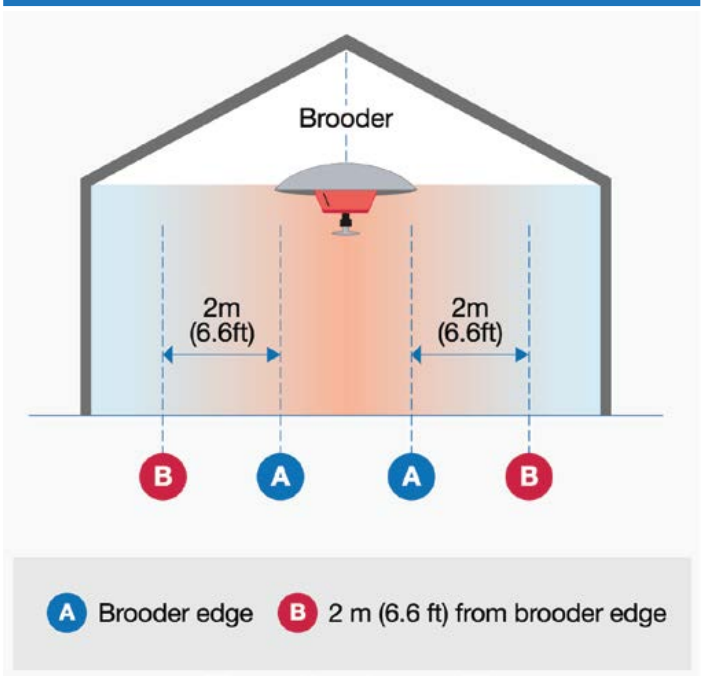
Optimal temperature and humidity is essential for chick health and appetite development. In both spot and whole-house brooding systems, the objective is to stimulate appetite and activity as early as possible. As chicks cannot regulate their own body temperature very well until 12-14 days of age, provision of the correct environmental temperature and adjusting environmental temperatures appropriately during brooding in response to bird behavior are critical. A temperature guide appropriate for an RH of 60-70% is given in **Table 4**. With whole-house brooding, particular attention must be paid to monitoring and controlling house temperature and humidity, as the ability of chicks to move to a preferred temperature zone is limited.

With spot brooding, temperature gradients are created within the house. Figure 16 shows the temperature gradients surrounding the spot brooder. These are marked A (brooder edge) and B (2 m from brooder edge). Respective optimum temperatures are shown in **Table 4**. Follow manufacturers' recommendations for equipment positioning and heat output.

Table 4:
Recommended temp guide at bird level at an RH of 60-70%

Age (days)	Whole house brooding temp °C	Spot Brooding	
		Brooder edge (A) temp °C	Brooder edge (B) temp °C
day old	30	32	29
3	28	30	27
6	27	28	25
9	26	27	25
12	25	26	25
15	24	25	24
18	23	24	24
21	22	23	23
24	21	22	22
27	20	20	20

Figure 16:
Spot brooding temperature gradients



INTERACTION BETWEEN TEMPERATURE AND HUMIDITY

The temperature experienced by the chick is dependent on dry bulb temperature and RH. Birds lose heat to the environment by evaporation of moisture from the respiratory tract and by conduction and convection of heat. At high RH, less evaporative loss occurs, increasing the animals' apparent temperature. High RH, therefore, increases apparent temperature at a particular dry bulb temperature, whereas low RH will decrease apparent temperature.

The temperature profile given in Table 4 assumes an RH in the range of 60-70%, but if RH differs from this, optimum temperature may need to be altered accordingly. Table 5 shows the principles of how the dry bulb temperature required to achieve the target temperature profile given in Table 4 may alter in situations where RH differs from 60-70%. The figures in Table 5 are meant as a guide only and the actual change to dry bulb temperature required at differing RH percentages may vary from those given. House temperature at chick level should be adjusted in accordance with chick behavior to ensure chick comfort is maintained.

If behavior indicates that the chicks are too cold or too hot, the house temperature should be adjusted appropriately.

Table 5:

Principles of how dry bulb temperatures required to achieve equivalent temperatures may change at varying RH. Dry bulb temperatures at the ideal RH at an age are colored red.

Age (days)	Dry Bulb Temperature at RH%				
	Target	Ideal			
	Temp °C	40	50	60	70
day old	30	36.0	33.2	30.8	29.2
3	28	33.7	31.2	28.9	27.3
6	27	32.5	29.9	27.7	26.0
9	26	31.3	28.6	26.7	25.0
12	25	30.2	27.8	25.7	24.0
15	24	29.0	26.8	24.8	23.0
18	23	27.7	25.5	23.6	21.9
21	22	26.9	24.7	22.7	21.3
24	21	25.7	23.5	21.7	20.2
27	20	24.8	22.7	20.7	19.3

The above table shows the influence of RH on the effective temperature of the bird. The temperature actually felt by the bird (effective temperature) is influenced by RH.

For a given temperature:

The birds will feel **COOLER** if the RH is **LOW**.	The birds will feel **WARMER** if the RH is **HIGH**.

If the RH is increasing during minimum ventilation, it is most likely because the minimum ventilation rate is insufficient. To correct high or increasing RH, the minimum ventilation rate should be increased and bird comfort re-evaluated before decreasing the temperature set-point.

MONITORING HUMIDITY AND TEMPERATURE

Temperature and humidity should be monitored at least twice a day for the first 5 days and then daily, thereafter. Measurements of temperature and humidity should be taken at chick level. Figure 17 indicates the correct positioning of automatic temperature/humidity sensors (above bird head height).

Conventional thermometers should be used to cross-check the accuracy of electronic sensors that continuously record temperature and humidity, and control automatic systems.

Figure 17:
Correct location for temperature and humidity sensors.

VENTILATION

Ventilation without drafts is required during the brooding period to:

• Maintain temperatures and RH at the correct level.
• Replenish oxygen.
• Remove excess moisture, carbon dioxide and noxious gases produced by the chicks and possibly the heating system.

Poor air quality due to under ventilation at brooding may cause damage to the chicks' lung surface, making birds more susceptible to respiratory disease. Because young chicks are prone to wind-chill effects, the actual air speed at floor level should not be more than 0.15 m/sec (30 ft/min). Any ventilation applied during brooding should not impact bird temperature.

KEY POINTS

- Achieve a humidity level of 60-70% for the first 3 days.
- Maintain temperature during brooding as recommended.
- Adjust temperature according to RH to achieve recommended environmental temperatures.
- Monitor temperature and humidity regularly.
- Check automatic equipment with manual measurements at chick level.
- Establish a minimum ventilation rate from day 1 to provide fresh air and remove waste gases.
- Avoid drafts.
- Respond to changes in chick behavior.

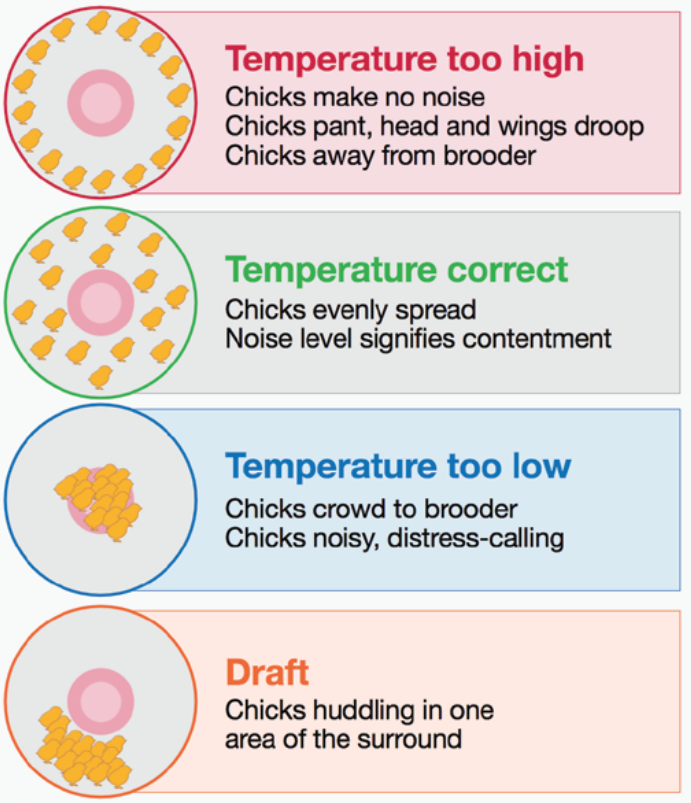
MONITORING CHICK BEHAVIOUR

Temperature and humidity should be monitored daily, but by far the best indicator of correct brooding temperatures is frequent and careful observation of chick behavior.

SPOT BROODING BEHAVIOR

With spot brooding, correct temperature is indicated by chicks being evenly spread throughout the brooding area as shown in Figure 18. Uneven chick distribution is a sign of incorrect temperature or drafts.

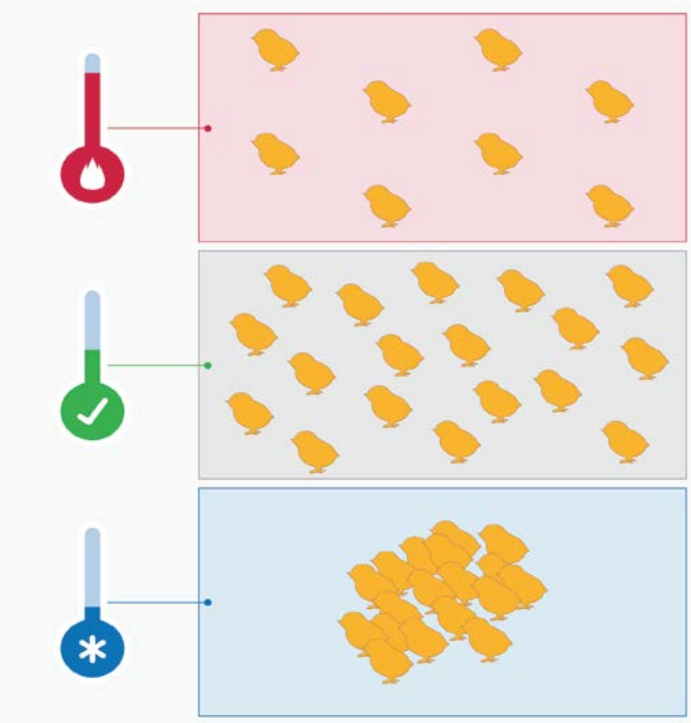
Figure 18:
Monitoring chick behaviour



WHOLE HOUSE BROODING

In whole-house brooding, monitoring chick behavior is less easy, because there are no obvious heat sources. Often, the chicks' vocalizations may be the only indication of distress. Given the opportunity, birds will congregate in areas where the temperature is closest to their requirements. If environmental conditions are correct, chicks will tend to form groups of 20-30, with movement between the groups, and continuous feeding and drinking will occur. Different distributions of chicks in whole-house brooding at different temperatures are given in Figure 19.

Figure 19:
Typical distribution of chicks in whole-house brooding (without chick surround) at different temperatures.



AIR QUALITY

Poor air quality, in particular high levels of CO2 and CO (>3000 ppm CO2 and >10 ppm CO), will impact chick behavior. If air quality is poor, chicks may become lethargic and stop eating. It is important to monitor chick behavior for these signs, making routine measurements of air quality and adjusting ventilation accordingly.

KEY POINTS

- Closely and frequently observe chick behaviour.
- Adjust house environment in response to chick behaviour.

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