COLD WEATHER BREEDER MANAGEMENT REVIEW

The cold weather is with us again and so many of us are not fully prepared or do not always realise that the accumulation of small ventilation and management mistakes can be so detrimental to optimum performance at any level of the production cycle.

This article acknowledges that there is already an abundance of detailed information on minimum ventilation and tries to outline the important points to focus on. It refers mainly to tunnel ventilated houses where most of the problems will be.
Also there are some important management points for production and hatchability that need considering.

Ventilating the chicken house

Type of house:
There are different types of design:

- Fully automated "controlled environment" houses with control of the seasonal ventilation
- Closed-in semi-environmental houses with tunnel ventilation, either with black curtains or solid walls and no minimum ventilation system
- Open-sided houses with tunnel ventilation and no minimum ventilation or modified minimum ventilation
- Open-sided houses with no ventilation.

Outside temperature and humidity:
Outside air temperature is not constant on any given day. There are big differences between the day and night time temperatures especially in the desert, valley and mountainous areas. At the same time outside humidity is also not constant. In fact it may change as much as air temperature on any given day.
The two are inversely related: the higher the temperature the lower the humidity and the lower the temperature the higher the humidity.
Of course other factors such as rain, being close to water (e.g. sea or river or rice fields) will also influence the level of humidity in the air at that locality.
Generally the result of not understanding this point is that ventilation, especially at night time is quite often too strong, when the same daytime settings are employed. This may effect birds in cages more than floor litter flocks, as they are off the ground.

Ventilation:
The basic goal of ventilation is that the air smells fresh, the stale air, ammonia, dust and excess heat/humidity is removed from the house and that the flock does not experience respiratory problems. At night time many fear that with reduced ventilation, the ammonia will build up or that by only running one fan, this may burn out and then there is no ventilation!
It is more difficult to run minimum ventilation in **tunnel ventilated houses**, because all the air enters the house from one small area on each side of the house, which makes it difficult to have uniform air distribution at the correct speed the full length of the house. This incoming air is generally not directed up towards the ceiling to mix with the rising warm air, but instead drops quickly to the floor and replaces the warm air, which causes chilling.
Houses with good minimum ventilation systems are easy to control.
Open-sided houses with clear curtains can be ventilated nicely by turning off the fans. Observe the wind direction and keep the curtains on that side of the house closed up more. It is important to remember that the higher the chicken house (multi-rise style houses), the colder that it becomes, and the stronger the outside air speed!

Open-sided houses using black side curtains and maintaining the environment, as if it were “100% dark out” may experience problems to maintain adequate ventilation rates 24 hours a day. Open the curtains during the dark hours and close them up again before the natural day starts. Care should be taken on full moonlit nights and where security floodlights are used!

Tunnel ventilation:
Ventilation experts state that:

- When the outside temperature falls below the level needed to operate less than half of the fans, this type of system should not be used”
- When fewer than three 1.25 meter fans are required do not tunnel ventilate”.

This would suggest that this type of ventilation requires fans of a smaller 60 cm ø size (24”) working on timers or a secondary minimum ventilation system.
There are many different cross ventilation systems available today with a combination of small inlets and smaller fans on the side of the house. The European style with extraction at the ridge and side inlets is also popular. These systems work on static pressure controls. The reader is best advised to consult the ventilation specialists, if deciding to make any modifications to existing set-up.
Many open-sided houses with tunnel ventilation have side curtains. In this case switch off the fans and open the curtains at night time, even if it is cold. The ventilation will be better.

Relative humidity:
Generally, when ventilation is managed to control **relative humidity** to below 70% the ventilation is adequate for the birds’ requirements. A relative humidity reader is essential.

Air temperature:
Warm air can hold more water than cold air, which has very little ability to hold water (the “sponge effect”). If houses are reasonably insulated, heaters can be employed to heat the air, which improves the water carrying ability of the air. Cold air must be warmed by proper mixing with the warm house air. This is achieved through the use of the smaller air inlets.

Inlet area:
Generally in tunnel ventilated houses with no minimum ventilation system, there is far too much pad inlet space open during the cold weather months and the incoming air does not mix well with the warm house air. How this pad inlet area is “closed up” needs careful consideration, as it effects the way the air enters the house and mixes with the warmer air at bird level. Is the curtain covering the pad area closed up horizontally to expose a small gap at the top, on the inside or the outside of the pad? On the outside is better as the pressure inside keeps the curtain tight against the pads and gives more control of the incoming air. It is better if there is another curtain on the inside of the pad area to help exclude all draughts.
Extra inlets or pipes uniformly spaced down the side walls is a much better option that allows better mixing of the incoming air with the warm rising air.
The incoming air should be directed towards the ceiling so that as it drops it mixes with the warmer rising air; the water carrying ability of the air is thus improved. In many tunnel ventilated houses this does not happen!
When curtains are used either to close up the pad area or down the side of the house in open-sided houses, quite often there are many gaps and holes that allows in much more air than is believed and destroys the static pressure.

Static pressure:
Many farms are not equipped with a static pressure meter. This simple piece of equipment is probably more useful than a thermometer! It is important that the air entering the house through a given space for the number of fans required to be running is travelling at the correct speed. When there are cracks (holes in curtains, around cooling pads, at the eves where the side wall meets the roof, around the fan housing) the entering air speed is slow and the cold air drops on the birds chilling them.

Air speed:
It is often forgotten that the outside wind direction will also effect the inside air speed, if it is overly strong. Blocked and damaged flutes also have an effect.

Size of fans:
For tunnel ventilated houses it is much better to have a group of smaller 60 cm ø (24") diameter fans that can be run on timers. The best is to distribute these small fans along one sidewall and to place some inlets in the other sidewall. Also it is possible to have two small fans on each side of the house in between the small air inlets.
The second choice where night time temperature is not too cold and only tunnel ventilation is available, is to place a few inlets along the 2 sidewalls between the pads and fans and above the pad area if this pad area is fully closed up, to balance fresh air distribution.
Small fans help to increase the time fans are running and so avoid ammonia peaks.
When the house only is equipped with the large 36 or 48" fans a practical method that works is to cut a piece of wood to reduce the inside diameter of the fan to 30-35", so that it does not put so much pressure to burn out the motors. This should be at the discretion of the reader.

Use of timers:
This is very important. There are many articles produced by ventilation experts, which go into more detail about how to decide on the timer settings.
It is very important for the producer to be inside the house and decide the night time settings themselves. This cannot be done from the feed room control panel! Go to the end of every house and regulate the ventilation as required for the night.
Many poultry people tend to look at the control panel in the feed room and will be satisfied, if the registered temperature is within the optimum parameters. This does not consider that this cold humid air is still travelling at the same speed, as maybe during the day time and may not reflect at all what is happening inside and at the other end of the house.
A "night check" can be made once the lights are out to determine that the ventilation right down to the end of the house is correct. This includes modifying the air inlet area. Only when the operator is walking in the house and the birds are calm, can he/she determine if the timer settings are correct, as the fans will be off at some stage and the operator will be able to smell if the build up of gasses when the fans are off is correct or not.

Management factors

Flock health:
This cold humid air is very likely to cause respiratory problems. The cold air falls rapidly to the floor displacing the warm air and can cause chilling. This cold air cannot absorb the excess water in the atmosphere and so litter becomes caked, ammonia is formed and this inflames the respiratory passages, further increasing the likelihood of respiratory problems. It also causes enteritis in young birds, as the gut is chilled by the contact with cold and humid litter.

Water management:
Excessive water consumption is detrimental in cold weather. This extra water must be excreted along with the faeces and the cold air is not capable to remove this excess without the flock becoming cold unless the air is heated.

Feather loss:
The degree of feathering of the flock must be considered. The worse the feather-cover the more the cold heavy air will cool the birds excessively.
The feathering can be severely depleted for various reasons; aggressive males and mating activity; aggressive feed cut back after peak to control bodyweight and egg weight; insufficient sulphur amino acids to replace the fallen feathers, due to poor formulation, choice of ingredients or separation in the transport system; and birds in cages lose more feathers due to rubbing against the wire.

Compensating feed for the colder weather:
It is better to stay within the range of feed suggested by the breeder. During rearing if more feed is required to stop bodyweights stalling due to a cold weather effect make use of the feeding programme. If the "5/7" programme is used it is very easy to give an extra feed day on the first of the two no feed days. If daily feeding or the "6/7" feed day system is being used, challenge feed (5-10 grams) can be given on 2-3 days per week, as required.
During production add the extra feed on top of the base amount being fed for that level of production and record the amount separately e.g. 175 g + X g for cold weather.
A practical rule for the extra feed required for body maintenance is to give about 1% more feed (1.75 g at peak) for each 1°C temperature below the required house average 18-20°C (Leeson and Summers- Broiler Breeder Production 2000).
During production by adding this extra feed, as described above, as the temperature warms up the "extra" feed can be removed accordingly, enabling the correct control of egg weight and bodyweight.

How to calculate the minimum temperature and extra feed:
There is a well used industry formula;
(Max. recorded temperature – Min. recorded temperature)*2/3 + Min. recorded temperature.
e.g. Min. temperature 10°C; Max. temperature 18°C
Calculation (18-10)*2/3 + 10 = 15
The inside house target is 18-20°C therefore 3-5°C temperature must be compensated for.

An example: at peak production eating 175 g daily feed and 18°C house target temperature;
1.75 g (1% of daily feed) for each 1°C = 1.75 X 3 = 5.25 grams of feed (using a 2750 kcal/kg breeder ration). The writer acknowledges that there are more refined calculations, but wants to keep it as practical as possible.
As temperature is not exactly constant it is better to maintain a "rolling" 3 day average and make changes to this figure, rather than on the day the change occurs.

Monitoring egg weight on a daily basis will show if egg weight is being maintained or not. Quite often failure in egg weight will show before loss in bodyweight and eventual loss of production and will allow for a correction in the feed allocation. Likewise, as the weather warms up, this technique will help to ensure that the reduction of this extra feed is carried out correctly.

Hatching egg management:
The size of the germinal disc prior to incubation is considered to be of importance for the future development of the embryo. A minimum number of cells seem to be necessary to ensure adequate embryonic growth. Due to oxygen exposure, as well as other factors, some cells will inevitably be lost during storage. Eggs coming from young breeders with a smaller germinal disc are more sensitive to this.
In the winter season, because of the contact with colder air flow, eggs laid in cages or in automatic nests cool down quicker, which may result in a lower germinal cell multiplication prior to cool room storage and higher consequent embryonic mortality.
Increasing the egg collection frequency followed by rapid removal to a clean environment at 21°C for a maximum of 6 hours helps to control the above risk. This also helps to reduce the risk of internal egg bacterial contamination, as the speed of air-cell formation depends on the difference in temperature between the newly laid egg and its environment. The greater this temperature difference, the higher the risk for germs to be "sucked" through the shell and trapped inside.

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