Key issues for the successful transportation of chicks

The health and productivity of poultry can show a large variation under different circumstances. Understanding the effects of the conditions leading to this variation helps to balance the inputs for a better performance. A good start is essential and the reactions of vulnerable day old chicks to these complex conditions can vary.

by Gerrit van der Linde, Heering, The Netherlands. heeringholland.com

Breeding includes genetics and breeders; hatching egg includes weight, storage time and conditions and so every indicated factor is a combination. A day old chick will respond to the environment and the better it is able to do so, the more comfortable it will be, giving it a good start in life. If the balance is wrong, stress will result in poor development, with affected immunity, early feed intake and digestion, uniformity and weight gain and in severe cases even mortality. It does not make sense to put maximum effort and investment into a state-of-the-art hatchery, when precious chick quality and hatchability are damaged during transport.

Transportation

Transportation of day old chicks will influence feed and water deprivation, possible climate stress (temperature, humidity, CO_2, air speed) and all for a certain duration. It is true that transport cannot improve the quality of the day old chick, but it could certainly harm it. If transport is required for good reasons, it should be done properly, to avoid unnecessary losses, because if done correctly, it does not have an influence on chick quality.

Reasons to transport day old chicks are:

- Hygienic distance between hatchery and farms, between different age groups.
- Production variations, in which case day old chicks need to be sold or bought elsewhere.
- Breeding stock imports from far origins.

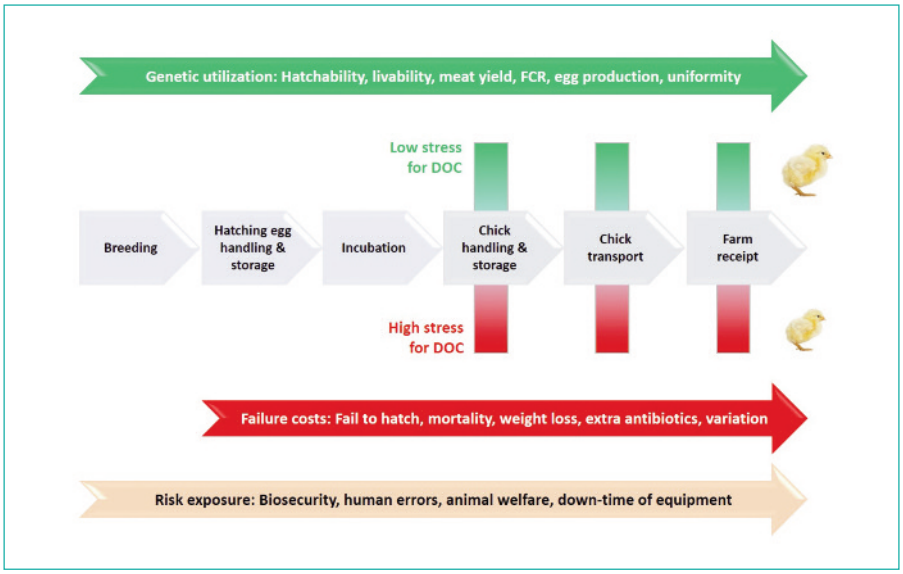

Fig. 1. Complex factors influence day old chick quality.

There are many examples of large integrated poultry projects in the Middle East with limited distance between different poultry houses, of which we have seen a negative impact on health status.

There are recent trends in avoiding day old chick transport, by transporting the 18-day old embryo or by first feeding the day old chick and then transporting it a few days later. However, the risk of breaking hatching eggs during transport and the extra facilities needed in the brooder house are in favour of day old chick transport.

It is important for chicks to have a good start with optimal body temperature.

The chick that has been fed shows a much higher heat production with the risk of high temperatures during transport. It has established a feeding rhythm that should not be interrupted for more than a normal digestion cycle. This includes the time of loading, transport and unloading. If this time is exceeded, the damage may well be higher than the advantage of early feeding.

The inbuilt suspension and feed and water in the residual yolk make a day old chick well equipped for transportation, and with added feed or water supply during transport, the time frame can be stretched to 72 hours, allowing for international transport of, for example, breeding stock.

Day old chicks have a remarkable ability to handle and recover from early stress. Chick handling in hatcheries, noise, darkness, vibrations during movement seem to have hardly any influence on their comfort after the stressor is gone. Even early food deprivation, leading to lower body weight at a few days old seems to be compensated for by growth later in life. However, an increase in internal body temperature from 40 to 41°C over 12 hours

Continued on page 23

Continued from page 21
in early life, caused by environmental stress resulted in 30g lower body weight at 35 days.

Traditional poultry transportation takes place in chick boxes or crates. In warm climates, open trucks are used, in relative small quantities and over short distances or time (100km, two hours). In the colder or more humid season, the chicks are often protected by a cover. This simple and relatively cheap solution is accepted widely, even though some mortality on arrival does occur.

Quality standards for transport get stricter with increasing farm size and higher quantities, distances, hygiene levels, food security standards and reliability. The bird physiology tends to change as well, giving need for more ventilation and cooling, and stricter climate control.

Awareness of the present damage caused by day old chick transport is a first important step to improve transport performance and arrive at a profitable day-old-chick truck fleet. In our view, day-old-chick trucks and their drivers should be as professional as hatchery equipment and staff. Transport performance consists of chick quality, uniformity, hygiene, capacity and reliability. The positive side of investing in more developed chick transport is that, if chosen accurately, this will pay off.

Improved chick quality and farm performance may result in higher return on investment in transport compared to the average investment in hatchery and farms.

Chick quality

The most important aspect is quality of the day old chick. In other words, what will be the performance on the farm? Different phases in the production chain influence the quality (parent stock management, egg transport and storage, incubation and day old chick transport) where it is difficult to assess the contribution of these separate aspects.

Stressful factors during transport can be loading and unloading, duration of the trip, air speed, humidity, shocks and vibrations and noise. Most important, however, is the temperature, since bird response to non-optimal temperatures can cause serious harm. Body temperature of the chick during transport should be maintained between 39.5 and 40.0°C. This parameter is not easy to measure, but can be used to assess your transport system.

Transport chicks in a well climatised truck.

Climate factors

The combination of humidity, air speed and temperature decides whether the transport will be a success. Body temperature, measured as navel or cloaca temperature is most reliable, where navel temperature is normally 0.5°C lower than internal cloaca temperature, and it is more deviated by ambient temperature. However, air temperature in the chick box can be a guideline as well, where 30 to 33°C is regarded optimal, as in start-up during brooding. Most practical to measure is the air temperature in the truck, but the right air temperature depends on the air speed. The higher the air speed, the smaller the difference will be with the air in the chick box, so the higher the temperature set point should be.

As an example, in a closed truck with little ventilation, air temperature set points can be as low as 24°C, while in better ventilated trucks this set point reached 30°C in order to keep the temperature in the chick box within range.

A low air speed is always connected to a large temperature variation in the truck, the hottest chick boxes will still be around 33°C, if not higher. In an open truck, the variation will be larger, where no real air flow or temperature control is present. For this reason, this type of transport only fits in moderate ambient temperatures and short transportation times. This implies that chicks will suffer quality loss in an open truck, and if the distance would be longer, this would result in mortality.

Humidity is measured as relative humidity and expressed as a percentage. There is a strong relation with temperature. When the temperature increases, the relative humidity will drop. That is why in moderate climates, when we heat cold air in the winter, we read the lowest humidity levels, around 20%. Since this causes no harm during transport, acceptable levels can be defined between 20 and 80%. However, this is only valid at comfort temperature, so 30-33°C as mentioned before.

At lower or higher temperatures, high humidity is dangerous and should be limited to around 60%. The reason is that at low temperatures humid air takes more heat from the chicks than dry air, so the cold stress will be increased.

At high temperature and humidity, the evaporative cooling that chicks achieve by breathing quickly (panting) is reduced, leading to heat stress where mortality rates and quality losses increase.

Humidity control by humidification in chick trucks is not advisable in our view, since an increase in humidity is not necessary in winter (where levels are low) and dangerous in high temperatures.

A commonly heard argument is that chicks dehydrate during transport, and humidifiers should counteract that. The reality is that chicks dehydrate because of their panting behaviour at high temperatures, which implies a water loss.

Temperature control is the way to solve this problem, not humidification. The moisture production of chickens, especially at high temperatures should not be underestimated.

In a desert climate, with high temperature and low humidity, a cooling pad system can be used to reduce the temperature and increase humidity. The challenge in climate control in a day old chick truck is two-fold: first, the ambient climate conditions have to be transformed to the proper temperature and humidity, where in the loading space the air should be distributed equally in order to provide an optimal climate to each chick box. The aim is to achieve 30-33°C in the chick boxes, and a body temperature between 39.5-40°C. In a desert climate, temperature (and humidity) have to be altered, to achieve an optimal internal climate.

Fig. 2 shows an actual report of chick transport in a Heering truck, as obtained from the online Heering Link system. At ambient temperature over 50°C, the inside temperatures are kept around 27°C, with little variation between front, middle and

Continued on page 24

Table 1. Comparing transport options.

	18-day-old embryo	One-day-old chick	Three-day-old chick
Transport temperature	35°C	28°C	28°C
Shock resistance	Low	High	High
Nutrition	No	No/yes	Yes
Time frame	24 hours	24-72 hours	<3 hours
Heat production	0.25 Watt	0.55 Watt	1.0 Watt

Continued from page 23
back of the loading space. A pre-cooling system reduces temperature and brings humidity up to around 60%. CO_2 value is around 1500ppm.

Reliability

In modern chick trucks, many day old chicks are brought together in a relatively small volume. Climate conditions are maintained within small margins and rely on forced ventilation and climate control. When these systems fail, damage will be done in a short time. We need very reliable systems to ensure safe and comfortable transport during the complete lifetime of the truck. This makes reliability a key factor. Optimum material and technology choice, correct design, maintenance and repair, and if suitable back-up systems contribute to this reliability.

Truck requirements

Most truck chassis, from vans to semi-trailers, can be used as base for a day old chick truck. An important feature is air suspension to reduce damage to hatching eggs. A weight calculation is necessary to specify the required axle weight capacities.

For smaller trucks on 12 or 24 volt ventilation, sufficient alternator and battery capacity are important.

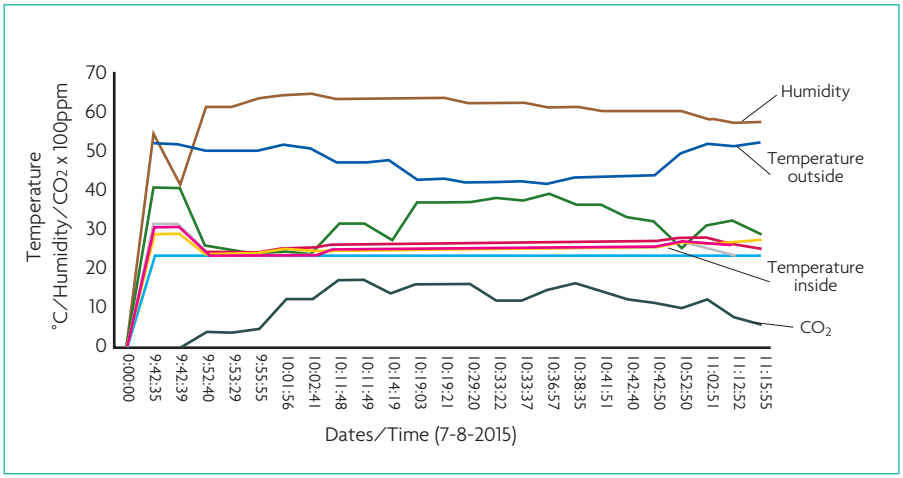

Fig. 2. Climate report of a chick transport through Heering Link.

Trends

Hygiene requirements tend to get applied more strictly, with more regular cleaning and disinfection, and stronger disinfectants, that can be applied in on-board disinfection systems. With increasing farm size, the quantity of day old chicks per truck increases, as well as the transport distance.

With increasing growth potential of broilers, heat production increases over the years, with a reducing yolk sac content at hatch. The trucks change from open trucks to closed ones, with ventilation, heating and cooling. Specially developed truck bodies are necessary to ensure equal air flow. Track and trace systems follow the truck and its climate online, making it an inclusive part of the hatchery.

More attention to chick transport will improve chick quality, uniformity, hygiene, capacity and reliability. ■