Delivering the 'right' amount of water for today's broiler chickens

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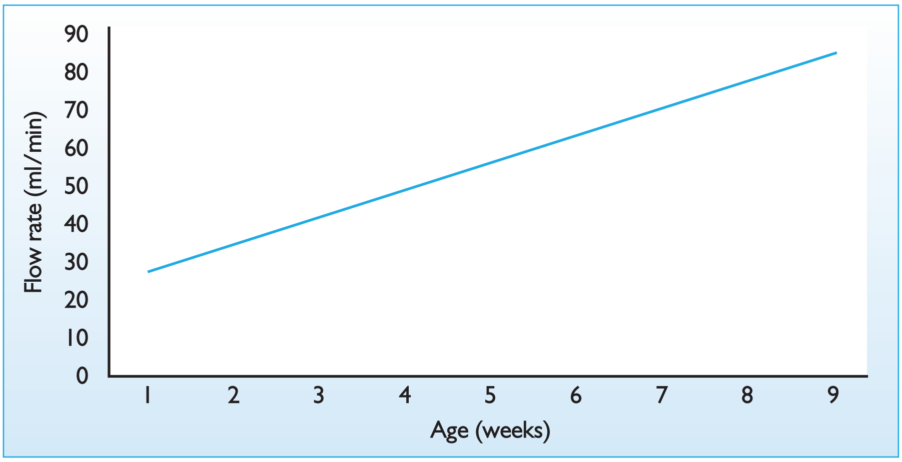

Fig. 1. Flow rate in ml per minute versus age in weeks.

Water is undeniably an essential element for life as we know it. In fact, water is so important that it is the one key element that astronomers look for on extraterrestrial bodies to determine the possibility for the existence of life, even in its most simple of forms.

But like all good things in life supplied in extremes (too little, or too much), water can be a double edged sword.

This fact has been exemplified in the past several months, where the United States in particular has experienced extreme drought, causing a dramatically reduced feed grain supply, pressuring poultry industry profitability with dramatically increased prices for feed – the primary cost input in growing chickens.

Corn and soybean crops simply did not receive enough water. Conversely, hurricane Sandy brought so much flood water that life for countless tens of thousands of people living in the northeastern United States will be changed for years to come, if not forever. Both of these incidents are stark reminders that we need water, but in the proper amounts.

Achieving potential

Broiler chickens are not fundamentally any different than human beings. If water is not supplied in sufficient quantity, chickens will significantly underperform relative to their genetic potential. They just simply do not grow like they should.

Conversely, if water is supplied in outsized quantities (in other words, too much), then we have another set of problems with wet floors, increased ammonia levels, higher incidence of footpad dermatitis, and poor litter quality.

Both of these situations (too much; not enough) have a tremendous adverse effect on the health and growth of the chickens and ultimately, the profitability of chicken production enterprises. So what is the 'right' amount of water that we should be delivering to our broiler chickens?

It has been well established for some time that a broiler chicken requires approximately 1.75lb (0.77kg) of water for every pound of feed that the bird consumes.

Although this ratio remains constant throughout a chicken's life, the amount of water required increases as the bird grows and more feed is consumed. Our goal should be to try to match the amount of water a chicken needs relative to its weight in order to efficiently process the feed it consumes. Furthermore, we should endeavour to deliver that quantity of water at just the appropriate rate so that we do not under-deliver, or over-deliver water; causing some of the previously mentioned problems that occur with too much or too little of a good thing.

As humans we can relate to this. We would not choose to consume water on a hot day through a small hollow coffee 'stir stick', nor would we tip high a full glass of water, unless we intended to 'wear' a significant portion of the contents of that glass on our clothing.

Certainly, there are watering system management issues that impact water delivery performance such as:

- Air locks in the water system.
- Drinker line heights that are too high or too low.
- Clogged water filters and drinkers.
- Properly adjusted line pressure (and the list goes on).

Chickens are indeed limited in their water intake by the rate which they are physiologically able to consume it. Not enough flow, performance suffers; too much flow and water runs off the chicken's wattles onto the floor. Both situations create unacceptable problems.

Desired drinker flow rate

Fortunately for growers, a chicken's ability to consume water at various ages has been calculated and published, thanks to research conducted at Mississippi State University by Dr Berry Lott. The desired drinker flow rate to match a chicken's feed consumption rate has been quantified and yields the following equation:

(Bird age in weeks x 7) + 20
= flow rate in ml per minute

This same equation can be further represented graphically as shown in Fig. 1.

So what conclusion can or should we draw from this scholarly and practical information? Answer: We need to make our nipple drinker selection based upon the flow rate 'sweet spot'.

Furthermore, we need to base this selection on a drinker that has a fairly wide pressure bandwidth, enough to achieve the water flows within this drinker 'sweet spot'. In other words, we need to select and employ a drinker that can deliver this

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desired flow rate bandwidth, complete with a standpipe pressure somewhere between 3" and 24-30" (7.6cm and 61-76cm) of water column. This generates the pressure adjustment resolution required to make the fine adjustments in water flow needed as our chickens grow.

Some will contend that in hotter, drier climates we need greater flow rates than specified by Dr Lott's research. Following this assertion, there are drinkers on the market that produce water flow rates from 150ml/minute up to 350ml minute.

Since we already know that a bird can consume water at a maximum of 85ml/minute (in the case of a large 9lb (4kg) chicken), we rightly can expect that a good portion of this water (in excess of 85ml/min) will end up on the floor and likely cause the aforementioned problems.

As a result of this excess flow, manufacturers of high flow rate drinkers require the use of a catch cup to 'catch' the wattle water runoff, in the hope that the birds will ultimately consume this excess flow.

Unfortunately, some of these drinkers flow so much that not even a catch cup can prevent all of the excess water from reaching the floor and creating problems with litter condition.

Compounding this inherent difficulty with exceptionally high flow rate drinkers is that, in many cases, these drinkers are controlled by pressure regulator standpipe systems that only measure 18" (46cm) or less.

This combination of lack of adjustment bandwidth and high flow make them very difficult to manage and adjust properly.

There is an additional problem with the catch cups themselves; they become a breeding ground for bacteria, algae and mould. Thirty years ago when the nipple drinker was first being introduced, one of its major selling benefits was the ability to eliminate the open trough and open cup drinking systems that dominated the industry at the time. These open type systems were also widely recognised as unsanitary and required significant labour to keep clean and disease-free.

Nipple drinker advantages

The advantage of the nipple drinker, when designed and employed properly, is that it provides chickens with the right amount of fresh water, on demand, and without the sanitation issues associated with cups and troughs.

Furthermore, a properly designed nipple drinking system does not leak and does not contribute to excessively wet floors, thereby maintaining good litter quality. As a result of these real advantages, the broiler industry over a short span of years, has wholly embraced the nipple drinking system.

So what is the hot climate solution? Knowing that our birds can only consume water at a specific rate driven by physiological limitations, and that they will require additional water in hot climates with open-sided buildings, our solution has to be increasing the availability of water to the birds. In other words, in these special situations we need to reduce our bird density per drinker so that more birds have the opportunity to drink at any given time.

When seeking or evaluating a broiler watering system, consider the following requirements:

- A quality-built and designed nipple drinker that does not leak and which will provide good long term service.
- A nipple drinker that has a flow rate profile that fits the broiler chicken's 'sweet spot'.
- A drinker with a proper flow rate profile that can be controlled over a wide range of pressures provided by an appropriately sized standpipe (preferably anywhere from 24-30" in length), yielding enough adjustment resolution in order to fine-tune drinker flow rates.
- A system design that can adequately carry the requisite water volumes needed based upon the size of house and the size and number of birds being raised.

Following the path of good science and then employing that information with appropriate equipment selection will go a long way in assuring successful results. ■