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Impact of early brooding drinking water temperature on broiler performance

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Broiler chickens consume approximately 1.70 times as much water as feed, making water the most significant input. A comparison of broiler flock water usage for 2010-2011 to 2000-2001 showed chicks drank as much as 38% more water the first week (Williams et al.) which emphasizes the need for an adequate supply from the start of their lives. It is common practice in the industry to flush water lines up to 24 hours prior to chick placement to assure fresh cold water has time to warm and will not chill newly hatched chicks. However with the emphasis on water sanitation, many producers flush water lines immediately prior to chick placement to assure that the first consumed water is fresh, sanitized and presents minimal microbial challenge. While these practices are conflicting, there is very little, to no data, supporting what temperature of water is preferred by modern newly hatched chicks or if water temperature during the early brooding period has an impact on long term performance.

Since chicks lack the ability to regulate their own body temperature during the first few days, adequate warmth is required to stimulate the chicks to find food and water. This is achieved in modern broiler barns with radiant heating which efficiently warms surfaces and not the air. Depending upon location of water lines and heaters, the drinking water temperature could be impacted during the brooding period when water usage is minimal and moves slowly, particularly if distribution lines feeding the nipple drinker lines are located in the ceiling or if drinker lines are under radiant heaters. In barns designed for full house brooding where new chicks are spread evenly throughout the entire barn, water movement through lines is even further minimized during the first few days as compared to partial house brooding where concentrating the chicks in smaller areas of the barn would increase water flow in drinker lines more quickly.

In view of the multiple factors that could be impacting drinking water temperature during early brooding and the fact that little is known about what water temperature is optimal for modern commercial broiler strains, a series of trials was conducted to determine how drinking water temperature during the first four days of brooding might impact bird performance. This time period was selected since it represents when the barns are the warmest and water usage is at the minimum amount.

Experimental Design

Results

One of the most important observations in trial 1, was how quickly the 40 ° F water warmed and the 100° F water cooled when the brooding temperature of the barn was 88-90° F at day of age and adjusted down by ½ to 1°F each day. At each hourly check, the water needed to be adjusted to maintain the target temperatures in the water lines. This was the primary reason why the 50 and 90 ° F water temperatures were chosen for trials 2 and 3. The most significant finding was that the 100° F water did impact early growth as shown in Table 1 with birds significantly lighter by day 15 than the chicks drinking the cold or moderate temperature water. Although by day 31, the weight difference was no longer significantly different, the chicks which had receive the 100° F water their first 4 days remained lighter through day 42. No significant differences were noted for either feed conversions or mortality throughout the trial (Tables 2 and 3).



When the water temperatures were adjusted to 50, 70 and 90 ° F in trial 2,

no differences in average weights, feed conversion or mortality were observed (Tables 4, 5 and 6). And the follow up trial 3 confirmed these same findings through day 14 (Table 7).

In conclusion, chicks found water warmed to 100° F detrimental to their early start but water at 40, 50, 70 or 90 °F did not impair performance when provided during the first four days of brooding. The key observation in the trial by the diligent team monitoring and adjusting the water temperature was how quickly the colder water warmed in a barn heated to optimize chick comfort. This indicates that if the environment is comfortable for the chicks then flushing in fresh water into the water lines does not pose a threat for chilling the birds. While well designed broiler barns should not result in over heated drinking water during brooding, it is well worth investigating the water temperature for operations that struggle with early chick weights when management practices appear adequate. °

Table 1. Impact of drinking water temperature during first 4 days of brooding on weight of male broilers

Water Temperature (°F)	Day 7	Day 15**	Day 31	Day 42
	Average weight Grams / pounds			
40	186/.41	501/1.08*	1733/3.82	2793/6.15
70	188/.41	501/1.08*	1725/3.80	2792/6.15
100	167/.37	463/1.01 ^b	1654/3.64	2716/5.98

** Results are significantly different (P<0.05)

Table 2. Trial 1- Impact of drinking water temperature during first 4 days of brooding on adjusted feed conversion of male broilers

Water Temperature (°F)	Day 15	Day 31	Day 42
	Feed Conversion lb of feed per lb weight		
40	1.165	1.545	1.746
70	1.182	1.566	1.745
100	1.175	1.574	1.765

Table 3. Trial 1-Impact of drinking water temperature during first 4 days of brooding on Mortality (%) of male broilers

Water Temperature (°F)	Day 7	Day 15	Day 31	Day 42
	Mortality (%)			
40	1.33	5.33	5.33	6.67
70	0.0	1.33	2.67	4.00
100	0.0	0.0	1.33	2.67

Table 4. Trial 2- Impact of drinking water temperature during first 4 days of brooding on weight of male broilers

Water Temperature (°F)	Day 7	Day 14	Day 28	Day 46
	Average weight Grams / pounds			
50	187/.41	488/1.07	1652/3.64	3529/7.77
70	186/.41	487/1.07	1677/3.69	3512/7.73
90	187/.41	485/1.07	1621/3.57	3533/7.79

Table 5. Trial 2- Impact of first 4 days drinking water temperature on adjusted feed conversion of male broilers

Water Temperature (°F)	Day 14	Day 28	Day 46
	Feed Conversion lb of feed per lb weight		
50	1.295	1.498	1.714
70	1.300	1.495	1.686
90	1.300	1.481	1.715

Feed conversion calculated by dividing total feed consumed by weight of birds and mortality weight

Table 6. Trial 2-Impact of first 4 days drinking water temperature on Mortality (%) of male broilers

Water Temperature (°F)	Day 7	Day 14	Day 28	Day 46
	Mortality (%)			
50	0.0	1.00	2.00	3.00
70	2.0	4.00	4.00	4.00
90	2.0	4.00	4.00	5.00

Table 7. Trial 3-Impact of first 4 days drinking water temperature on Mortality (%) of male broilers

Water Temperature (°F)	Day 7	Day 14	Day 14
	Average Weight Grams/ lbs		Average Feed Conversion Pound feed per pound weight
50	178/.39	421/.93	1.225
70	181/.40	448/.99	1.212
90	182/.40	445/.98	1.251

