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ESTIMATING BOBWHITE CLUTCH HATCH DATE FOR RESEARCH

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The rain is falling, the quail are singing, and we are doing our best to keep up. It is an exciting time and we are monitoring nests and chicks across the region. We will have several updates about specific projects during June, but we would now like to take the opportunity to educate you about what we are doing as often as possible. One thing you might wonder is how do you determine when a nest is going to hatch. The following article explains this process in detail.

As a research biologist studying a very elusive bird species it can be difficult to determine much about their nesting or brooding habits. It has been said that one of the least known aspects about quail is the brooding stage of life (the time from hatching out of the egg to fledging or leaving the parents). With some of our studies, it is very important that we know, with as much accuracy as possible, when the clutch (or eggs) hatch so we can monitor the chicks. It is important to be as accurate as possible because chick survival has been estimated to be as low as 0% during drought years (2010-2011) to as high as 64% during wet years (2012-2013) here in the Rolling Plains of Texas. If chicks are perishing within the first few days of life we might be missing some potential cause of mortality or movements that are caused by some lack of habitat needs.



When we find a bobwhite nest in the field we do not know the date that it will hatch. Egg candling can be used to closely estimate the hatch date.

Researchers have been estimating hatch dates for a wide variety of bird species for decades. There are two main methods for estimating hatch dates for birds (1) candling or (2) floating. Each method has its pros and cons. We have conducted a study that has shown even with these tradeoffs both methods are fairly accurate at estimating hatch dates for bobwhite clutches.



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The candling method is fairly straight forward. This method was once done by placing a candle being held behind the egg to see if an embryo was growing inside. We are using a new form of light (a small mag light) instead of a candle these days. Below you can see what we are looking for when we place a light up to the egg. Early into incubation (0-4 days) the egg appears yellow and allows light to pass through (Figure 1). But, after 5 days the egg appears to take on a reddish color due to blood vessels growing around the embryo (Figures 2 and 3). In the following days the embryo grows almost exponentially. Blood vessels increase and a darkening appears around the center of the egg (Figure 4). As the eggs near the 20-23 day mark you can see the embryo (or now chick) moving about in the egg (Figures 5 and 6). At 23-24 days into incubation the chick begins to push on the egg wall (call pipping) until it creates a ring opening at the end of the egg and achieves freedom.

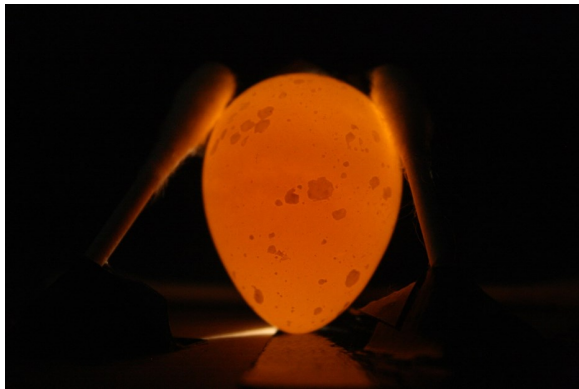


Figure 1

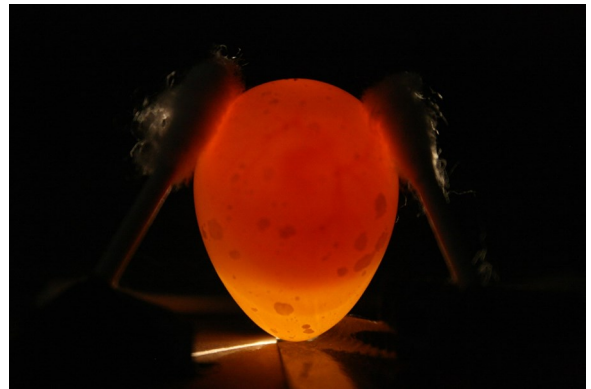


Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



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The floatation method relies mainly on the overall egg itself. We place the entire egg into a glass cup filled half way with water and depending on what angle or level the egg floats we can estimate how far into incubation the hen has carried the clutch. Early into incubation, the egg will sink to the bottom of the glass. This is because of the density of the material in the egg. There is little to no embryo growth occurring so the egg will remain on the bottom and laying on its side (Figure 7). At 3 days of incubation the embryo inside the egg begins to develop and the egg will begin to rise from the bottom. As the embryo grows it creates an air pocket at the top of the egg (Figure 8). As the chick increases in size so does this air pocket. It causes the egg to change angle and float in water. At 6-8 days the egg will “stand” straight up on the bottom of the glass. The following days the egg will leave the bottom of the glass and work its way to the water surface. At 9-14 days the egg will have reached the top of the water surface. As the egg nears hatch date (~24 days) the top of the egg will rise out of the water (Figure 9). This flotation is caused by the now large, air pocket (Figure 10).

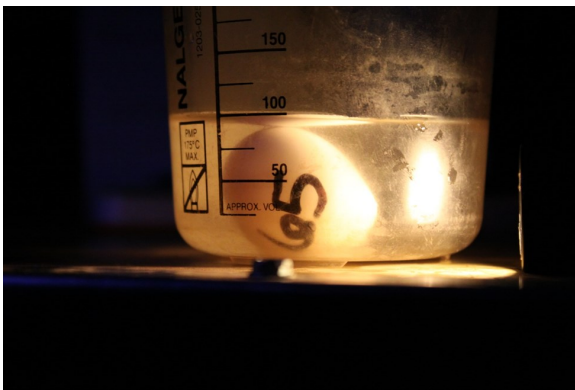


Figure 7

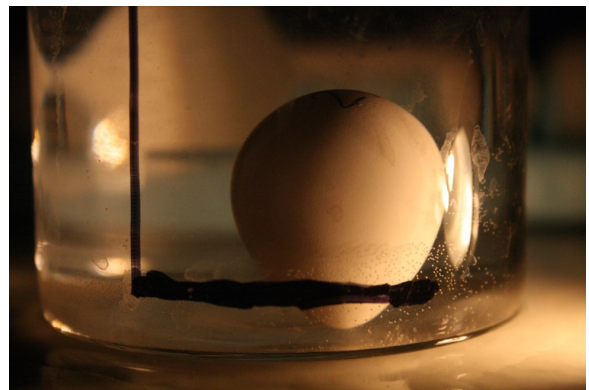


Figure 8

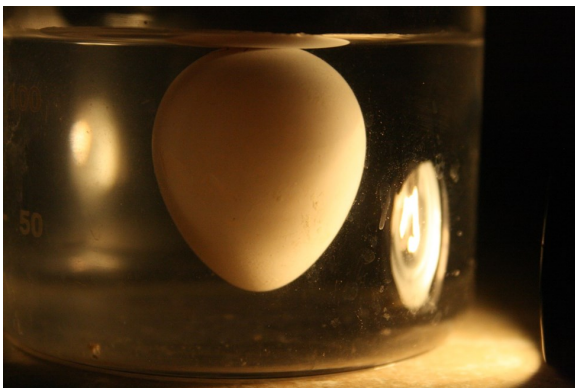


Figure 9

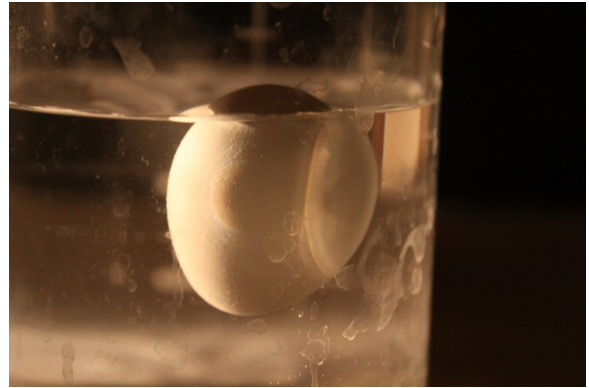


Figure 10

We have analyzed some of the data we have collected over the years when we estimated the hatch dates by using both of these methods and they are accurate to within ½ a day. We are able to be on top of the brood just about as soon as they are ready to leave the nest or just after they have moved away with the hen and male. We will be providing you many updates about specific projects that are using these techniques over the next month.