

Egg in a Jar Experiment

Abstract:

The Egg in a Jar experiment tested whether different substances would have an effect on different stages of eggs. We used corn syrup, Coca-Cola and white vinegar as our three substances, uncooked/raw eggs, and hardboiled eggs. We placed one individual egg in three jars filled with each of the substances, and monitored them for 2 weeks (14 days). We found that in both of the jars filled with Coca-Cola, we saw similar results between the uncooked/raw and the hard boiled eggs. Both had changes in their egg shell colour, but little changes in the inside egg. For the Corn Syrup filled jars affected eggs, we found similar results in the egg shell itself but significant differences in the inside of the egg. For our last substance we noted significant changes to both the egg shell and the inside of the egg for both the uncooked/raw egg and the hard boiled egg. We found that the White Vinegar dissolved both the outer shells of each of the eggs, but in the uncooked/raw egg the outer shell became a rubbery sac filled with the inside of the egg. Whereas in the hard boiled egg, the outer shell developed into three different layers. We concluded that the hard boiled egg incurred more changes than the uncooked/raw eggs in the three different substances over the same duration of time. While we note that some substances have similar or mirrored changes in both eggs, overall the hard boiled eggs demonstrated more changes than the uncooked/raw eggs. [254 words]

Question:

How will different liquids affect the size, colour, texture, and hardness of a hardboiled egg versus a raw egg when they are fully immersed?

Purpose and hypothesis:

Purpose: To see how different substances (corn syrup, Coca-Cola, and vinegar) affect both raw eggs and hard boiled eggs.

Hypothesis: We expect to see a more significant change and affect to the hard boiled eggs than the raw eggs in respect to the appearance and hardness of the egg shell, and size of the egg.

What We Think Will Happen (Individually to Each Egg):

Condition	Raw Eggs	Hard Boiled Eggs
Corn Syrup	Rasha - If we see any effect with this egg, it will be a change to the colour of the shell. I think it will show a light stain.	Rasha - I do not expect to see a difference between the expected effect for the raw egg.

	Kara - I think that the egg will not be affected at all.	Kara - I believe that the egg will harden.
Coca-Cola	Rasha - I think the egg's shell will darken and weaken significantly. Kara - I think that the egg shell will darken and become weaker.	Rasha - I expect to see a significant change to the egg's shell. It may start flaking. Kara - I believe that Coca-Cola will have no affect on the egg.
Vingaer	Rasha - I also think the egg might pickle. Kara - I think that the egg will pickle like a cucumber.	Rasha - The egg's shell may become weaker. I believe the change will be most significant on the inside. I think that will elasticise the inside of the egg. Kara - I think the egg will rot and have a terrible smell.

Materials:

- 6 white eggs (3 uncooked/raw, 3 hard boiled)
- 6 clear mason jars (500ml)
- Corn Syrup (1L)
- White Vinegar (1L)
- Coca-Cola (1L)
- 3 ziplock bags
- Permanent marker
- String
- Scissors
- Damp cloth (room temperature)

Procedure and method:

Step 1: Assemble all items for the experiment on working station.

Step 2: Hard boil eggs (3).

- 2a. Place eggs in a pot and immerse in water.
- 2b. Place the pot over medium heat for 10 minutes.
- 2c. Once eggs are cooked, take them out of the water.

2d. Allow eggs to cool (5 minutes) at room temperature.

Step 3: Measuring each of the raw eggs and the hardboiled eggs with white string both width (around middle) and length (around top and bottom).

Record each of these measurements by using a ruler.

Put each eggs strings in plastic ziplock bags, labeling their measurements and what egg they are from (eg. corn syrup, Coca-Cola, or vinegar)

The aim of this step is to compare the eggs from the start of the experiment to the eggs at the end of the experiment.

Step 4: Fill each of the mason jars with approximately 500 ml of each substance (corn syrup, vinegar, and Coca-Cola).

Let sit for 1-2 minutes for the substance to settle.

Step 5: Place 1 uncooked/raw egg into one of the mason jars filled with corn syrup. Place 1 uncooked/raw egg into one of the mason jars filled with vinegar.

Complete as described with the remaining uncooked/raw egg into the mason jar filled with Coca-Cola.

Continue process as outlined with the hard boiled eggs into the remaining filled mason jars (corn syrup, vinegar and Coca-Cola)

Once eggs are dropped do not disrupt the environment of the egg placed into the substance.

Step 6: Observation shall be recorded at the end of the 24 hour mark each day, starting from when the experiment started (eg. if experiment was began at 10am, observation will be recorded at 10am each subsequent day). Experimenters should record both written and visual changes. Pictures are recommended to help with observation.

Step 7: Based on the daily observation, the experiment may be terminated at anytime before the two week period ends.

Step 8: Experimenters will take out each of the eggs from their mason jars. Eggs should be cleaned using a damp cloth at room temperature (as not to affect the eggs).

Step 9: Eggs shall be remeasured and recorded.

Step 10: After eggs have been recorded and fully observed, both eggs and substances shall be disposed of in the appropriate manner.

Step 11: Record final conclusions and answer discussion questions. Final conclusions should note the different changes that have happened to the eggs in relation to size of egg (using string measurements), appearance of shell (shiny, dull, whiteness), and hardness of shell (transparency, crumbs). If desired the experimenters can chose to crack the hard boiled eggs.

Note:

Start Date/Time: Monday, January 24 at 10:35 pm

End Date/Time: Monday, February 6 at 10:35pm.

Egg measurements:

Uncooked/Raw Eggs

Initial start of the experiment

Egg 1 (Coca-Cola) =	Width: 14.2 cm	Length: 16.5 cm [blue]
Egg 2 (Vinegar) =	Width: 14.7 cm	Length: 17.2 cm [yellow]
Egg 3 (Corn Syrup) =	Width: 13.9 cm	Length: 14.8 cm [pink]

After removing from jars

Egg 1 (Coca-Cola) =	Width:15.4 cm	Length: 17 cm [red]
Egg 2 (Vinegar) =	Width:16.9 cm	Length: 19.9 cm [white]
Egg 3 (Corn Syrup) =	Width:14 cm	Length: 16.7 cm [green]

Hard Boiled Eggs

Initial start of the experiment

Egg 1 (Coca-Cola) =	Width: 13.46 cm	Length: 15.74 cm
Egg 2 (Vinegar) =	Width: 13.97 cm	Length: 16.51 cm
Egg 3 (Corn Syrup) =	Width: 13.71 cm	Length: 16.25 cm

After removing from jars

Egg 1 (Coca-Cola) =	Width: 12.95 cm	Length: 15.49 cm
Egg 2 (Vinegar) =	Width: 14.98 cm	Length: 17.27 cm
Egg 3 (Corn Syrup) =	Width: 13.71 cm	Length: 16.25 cm

Observation chart:

Uncooked/Raw Eggs

Week one:

Day Count	Vinegar	Coke-Cola	Corn Syrup
One - Initial start day - January 23	Egg sank to bottom of jar initially. When observed approx. 1.5 hours later, egg has	Egg sank to bottom of jar and remained there. No bubbling.	Egg stayed at the top of the liquid, with assistance submerged itself

	<p>moved its way to the top of the jar. Bubbling around egg.</p>		<p>approx. $\frac{3}{4}$ into liquid. No bubbling.</p>
<p>Two - First observation - 24 hours - January 24</p>	<p>Egg appears slightly bigger. Some colouring change - orange at bottom of egg. Bubbling persists.</p>	<p>Egg has not moved or have any noticeable differences in its shell or size.</p>	<p>Egg has not moved. Still approx. $\frac{3}{4}$ in the liquid.</p>
<p>Three - Second observation - 48 hours - January 25</p>	<p>Egg appears bigger in glass - almost the length of the width of jar. More colouring change, appears more throughout egg. Same orange colour. Bubbling persists.</p>	<p>Egg has shifted slightly forward. No other noticeable changes to the egg.</p>	<p>Egg has moved slightly upwards out of the liquid - less than 1 cm.</p>
<p>Four - Third observation - 72 hours - January 26</p>	<p>Egg appears the same size as previous day. Colouring is almost completely orange for the whole egg (transparent white outer shell). Shell appears to be dissolving/coming off the egg. White film is visible coming from the egg.</p>	<p>Egg has not moved. Small white blemish on egg appears on egg. Approx. $\frac{1}{2}$ cm in height.</p>	<p>Egg has not moved, still in the same place as previous day. No noticeable changes to the egg.</p>
<p>Five - Fourth observation - 96 hours - January 27</p>	<p>Egg appears the about the same size (might be slight growth). Colouring is less orange and more white than previous day - orange is still very present. White film is still visibly coming from the egg. Bubbling persists around the egg.</p>	<p>Egg appears same size as previous day. Some brown spots are appear on the shell but overall is still white.</p>	<p>Egg has not moved since previous day. No noticeable changes to the egg.</p>

<p>Six - Fifth observation - 120 hours - January 28</p>	<p>Egg appears to be floating slightly above the bottom of the jar. Its slightly bigger. Orange colouring is more present today. More white film coming from where the shell should be. Film goes from the egg all the way up to the top of the jar. Less bubbly around the egg.</p>	<p>Egg appears same size as previous day. Same brown spot as previous day, slightly darker. No new colourings of note.</p>	<p>Egg has not moved since previous day. No noticeable changes to the egg</p>
<p>Seven - Sixth observation - 144 hours - January 29</p>	<p>Egg has moved slightly to one side of the jar. Colouring is more white today but orange is still seen through the white. White film still coming from the egg, long strands are less thick. Less bubbling than previous day.</p>	<p>Egg appears the same size as before. Dark spots on the egg are darker, and more have appeared. More noticeable.</p>	<p>Egg has not moved since previous day. No noticeable changes to the egg</p>

Week two:

Day Count	Vinegar	Coke-Cola	Corn Syrup
<p>One - Seventh observation - 168 hours - January 30</p>	<p>Egg did not move from the previous day. More white colouring than orange. White has a milky colouring to it. Less white film coming from the egg, no long strands to the top. Significantly less bubbling around egg - only found at the very top of the egg near the white film.</p>	<p>Egg has not moved from previous day - same size as before. Dark spots still persist. No other noticeable changes.</p>	<p>Egg has not moved since previous day. No noticeable changes to the egg</p>

<p>Two - Eighth observation - 192 hours - January 31</p>	<p>Egg has not moved from previous day. Looks slightly larger than before. Same colouring as previous day. Same little bubbling at the top of the egg. Less white film coming from egg.</p>	<p>Egg has moved slightly to the front. Different side of the egg visible. More dark spots are visible.</p>	<p>Egg has not moved since previous day. No noticeable changes to the egg</p>
<p>Three - Ninth observation - 216 hours - February 1</p>	<p>Egg has not moved from previous day. Egg has same colouring as previous day (milky white with little orange peeking through). Almost all bubbling is gone. No film floating to the top but is visible on the egg itself.</p>	<p>Egg has not moved from previous day. Same colouring changes as previous day - dark spots in the same spots.</p>	<p>Egg has not moved since previous day. No noticeable changes to the egg</p>
<p>Four - Tenth observation - 240 hours - February 2</p>	<p>Egg has not moved from previous day. Colouring appears more milky white than orange. Only a couple bubbles persist. Film is still gathering on the egg - no more than previous day.</p>	<p>Egg has not moved from the previous day. No noticeable changes in colouring.</p>	<p>Egg has not moved since previous day. No noticeable changes to the egg</p>
<p>Five - Eleventh observation - 264 hours - February 3</p>	<p>Egg has not moved from previous day. Egg still is more milky white than orange, like previous day. Slight white film floating to the top of the jar. Bubbling in the same area as previous day.</p>	<p>Egg has not moved since previous day. More brown spots have appeared on the visible parts of the egg.</p>	<p>Egg has not moved since previous day. No noticeable changes to the egg</p>
<p>Six - Twelfth observation - 288 hours - February 4</p>	<p>Egg has not moved from previous day. Same milky white</p>	<p>Egg has not moved since previous day. No noticeable</p>	<p>Egg has not moved since previous day. No noticeable</p>

	colouring from previous day. No floating film coming from egg. Still visible on the egg itself. Bubbling persists in the same area as before.	changes to the brown spots on the egg.	changes to the egg
Seven - Thirteenth observation - 312 hours - February 5	Egg has not moved from previous day. Same milky white colouring. No floating film but it present on the egg. Bubbling in the same area as before.	Egg has not moved since the previous day. No noticeable changes to the brown spots on the egg.	Egg has not moved since previous day. No noticeable changes to the egg
Final - Fourteenth observation - 336 hours - February 6	Egg has not moved since the previous day. Same milky white colouring - less orange. Slight white film floating from egg - still present on the egg as well. Bubbling in the same area as previous day.	Egg has not moved since the previous day. Egg brown spots have not darkened since previous day.	Egg has not moved since previous day. No noticeable changes to the egg

Hardboiled Eggs

Week one:

Day Count	Vinegar	Coke-Cola	Corn Syrup
One 1st observation after 24 hours - date: Jan. 24	Heavy bubble formation around egg (egg at the bottom of the jar)	No change (egg at the bottom of jar)	Egg at the bottom of the jar (due to the consistency of the substance, it took the egg 1 min. To reach the bottom of the mason jar)
Two 2nd observation after 24 hours - date: Jan. 25	Heavy bubble formation around the egg (egg is now at the top of the jar).	No change in the egg.	Egg shell looks normal. Egg looks bigger in size. Egg is not at the top of the

	The shell of the egg looks very weak and is slightly yellowing.		jar - only half the egg is immersed in corn syrup.
Three 3rd observation after 24 hours - date: Jan. 26	Heavy bubble formation around egg continues. Egg seems lighter and is floating at the top of jar.	No change in the egg.	No change in egg size or shape.
Four 4th observation after 24 hours - date: Jan. 27	No change in egg in bubble formation. Egg seems to be yellowing. White film is surrounding the egg.	Some browning of the egg shell can now be seen.	No change in egg size, shape, or shell colour.
Five 5th observation after 24 hours - date: Jan. 28	Yellow spots continue to appear on the egg shell. Heavy bubbles continue to help egg float to top of the jar.	Browning continues (over all egg and not specific spots)	No observable change.
Six 6th observation after 24 hours - date: Jan. 29	No observable change.	No observable change.	No observable change.
Seven 7th observation after 24 hours - date: Jan. 30	Egg shell appears softer. It no longer makes a clink sound when it hits the glass of the jar on the inside. Bubble formation is less than the day before. Yellowing of the egg shell can still be seen.	Browning of the egg shell has increased dramatically. While the entire egg looks light brown now, some darker spots can be observed in specific areas.	No observable change.

Week two:

Day Count	Vinegar	Coke-Cola	Corn Syrup
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<p>One 8th observation after 24 hours - date: Jan. 31</p>	<p>Bubble formation continues to decrease. No yellowing can be observed on egg shell. White film around egg increased.</p>	<p>Large dark spots can now to observed in concentrated areas on egg.</p>	<p>No observable change.</p>
<p>Two 9th observation after 24 hours - date: Feb. 01</p>	<p>No observable change.</p>	<p>No observable change.</p>	<p>No observable change.</p>
<p>Three 10th observation after 24 hours - date: Feb 02</p>	<p>No observable change.</p>	<p>No observable change.</p>	<p>No observable change.</p>
<p>Four 11th observation after 24 hours - date: Feb 03</p>	<p>There is no bubble formation around the egg. Egg is floating at the top of the jar. While film is on the bottom of the jar. Egg does not seem to have a shell anymore.</p>	<p>Egg shell is a very dark brown. Shell is very spotted. Older spots are growing in size and darkening in colour.</p>	<p>No observable change.</p>
<p>Five 12th observation after 24 hours - date: Feb 04</p>	<p>No observable change.</p>	<p>Size and colour of spots increase. Shell still seems strong.</p>	<p>No observable change.</p>
<p>Six 13th observation after 24 hours - date: Feb 05</p>	<p>No observable change.</p>	<p>Size and colour of spots continue to increase.</p>	<p>No observable change.</p>
<p>Seven 14th observation after 24 hours - date: Feb 06</p>	<p>No observable change.</p>	<p>No observable change.</p>	<p>No observable change.</p>

Results:

Observation Notes from Removing Eggs from Jars & Cracking Eggs *Uncooked/Raw Eggs*

Egg 1 - Coca-Cola

- Smells like stale Coca-Cola.
- Liquid has the same colouring as regular Coca-Cola would have.
- Little white specs floating at the top of the jar.
- Egg looks darker, now a dark tan to light brown colour all over with dark brown spots.
- Eggshell texture is gritty, can see the 'grits' on the shell.
- Egg smells like a mixture of Coca-Cola and slightly egg (like when Coca-Cola is left in glass for a period of time)
- Can feel but not hear the yolk move inside the egg when shaken.
- When rinsed with water, little of the 'grit' and colour is removed.
- Cracked easily.
- Yolk and egg whites were watery with no thickness to them.
- No discolouration of the yolk or whites.
- Shell appears thinner but substantially so.
- Shell feels slightly weaker than a normal shell.
- Inside of the shell is still white

Egg 2 - Vinegar

- Strong vinegar smell from the jar.
- White stringy film floating a the top of the jar.
- Egg feels smooth and wet, like rubber (from a balloon or wet condom)
- No visible hard white shell on the outside. Translucent outer sac instead.
- Can see the yolk and egg whites move inside the egg sac, when moved around.
- Yolk appears orange but the egg itself is a dense white colour.
- Egg smells like vinegar.
- Egg feels 'squishy'. Can be slightly manipulated with hands.
- Cannot feel or hear the yolk move when shaken.
- Cannot crack like a normal egg due to the lack of hard outer shell.
- Punctured with a knife, egg exploded with little force of the knife.
- Yolk appears normal in colour and thickness.
- Egg whites are watery and very white.
- Inside of the egg still smells like vinegar.
- Outer egg sac looks and feels like a unblown balloon (rubbery)

Egg 3 - Corn Syrup

- Does not smell bad, smells like corn syrup.
- Shell is still white with no visible difference.
- Cannot hear or feel the yolk inside the shell when shaken.
- Yolk and egg whites looked a little more orange than usual, same consistency as a normal egg.
- Shell was not hard to crack but was hard to open once cracked.
- Shell feels tougher, more resistant.

Observation Notes from Removing Eggs from Jars & Cracking Eggs
Cooked/Hard boiled Eggs

Egg 1 - Coca-Cola

- Coca-Cola is now flat (no gas)
- No distinctive smell when the jar is opened
- The egg shell is very dark (dark brown). This is something that was not apparent when the egg was in the jar
- The egg shell is very textured
- There are consistently darker spots on certain parts of the egg.
- The egg shell is very weak and when touched, parts of the shell break off on the finger
- The egg shell became lighter when it was left (5 min.) outside of the jar (however, this could be the fact that the egg is now dry)
- When cracked, the inside of the egg (the layer directly beneath the shell) was discoloured as well.
- The Egg yolk was unaffected

Egg 2 - Vinegar

- Vulgar vinegar and rotten egg smell
- Liquid looks murky
- White film (from the egg) floats in the water and at the bottom of the jar
- Egg no longer has an egg shell (most of the shell was found in bits and pieces at the bottom of the jar).
- Egg has developed three different layers. Each layer is lighter than the other (two of the layers almost look transparent).
- Two of the transparent layers have filled with liquid and air
- The egg is very rubbery and very squishy
- When squeezed, the egg does not bust easily due to rubbery nature
- Parts of the egg seemed leathery
- The inside of the egg is unaffected
- The egg yolk was unaffected

Egg 3 - Corn Syrup

- No distinctive smell to the egg or the corn syrup
- The corn syrup looks and smells exactly the same as it did at the start of the

experiment

- The egg shell was unaffected (size, texture, colour)
- When cracked, the egg yolk was dark blue, gray, and purple

Analysis:

Egg Appearance Analysis

Eggs in Coca-Cola:

Both of the raw/uncooked and hardboiled eggs had the same changes in their appearances when submerged in Coca-Cola for 14-days. The egg shells turned a brown - light tan in colour and had some grit on the surface. The inside of the eggs had no changes to the inner egg.

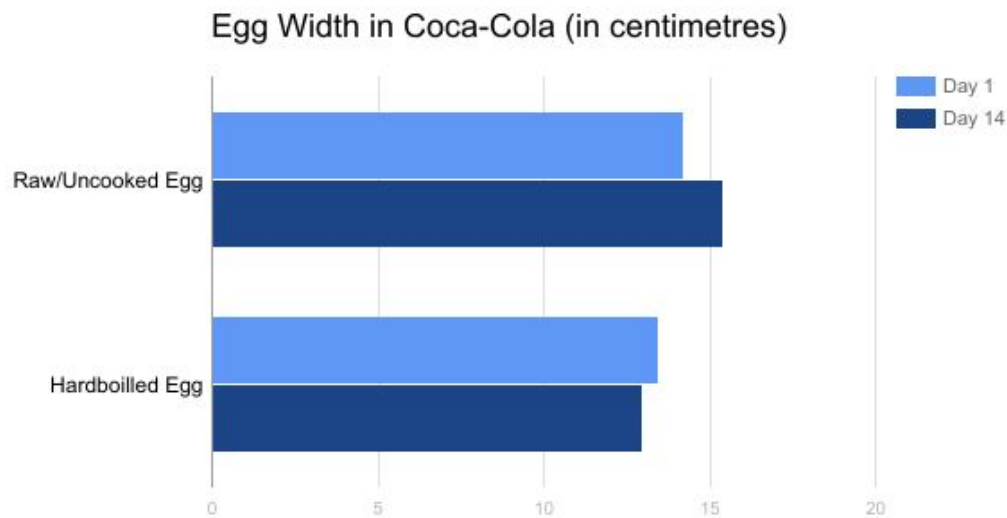
Eggs in Vinegar:

Both of the raw/uncooked and hardboiled eggs had similar changes in their appearances when submerged in Vinegar for 14-days. The raw/uncooked egg experienced a shedding of the hard shell, and transformed into a rubber-like sac containing the inner egg. The hardboiled egg experience a shedding of the hard shell, and transformed into a sac containing three distinct layers of air and liquid. The inside of the both the eggs had no changes to the inner egg.

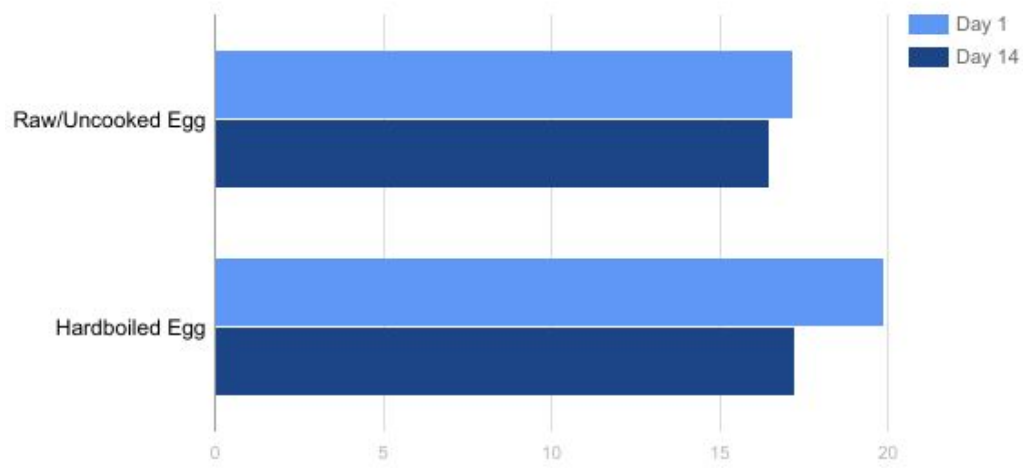
Eggs in Corn Syrup:

Both of the raw/uncooked and hardboiled eggs experienced the same results to the shell. Both shells became harder and remained white. However, the inside of each of the eggs experienced different results. The inside of the raw/uncooked egg became more orange in colour. While the inside of the hardboiled egg became dark blue, gray and purple in colour.

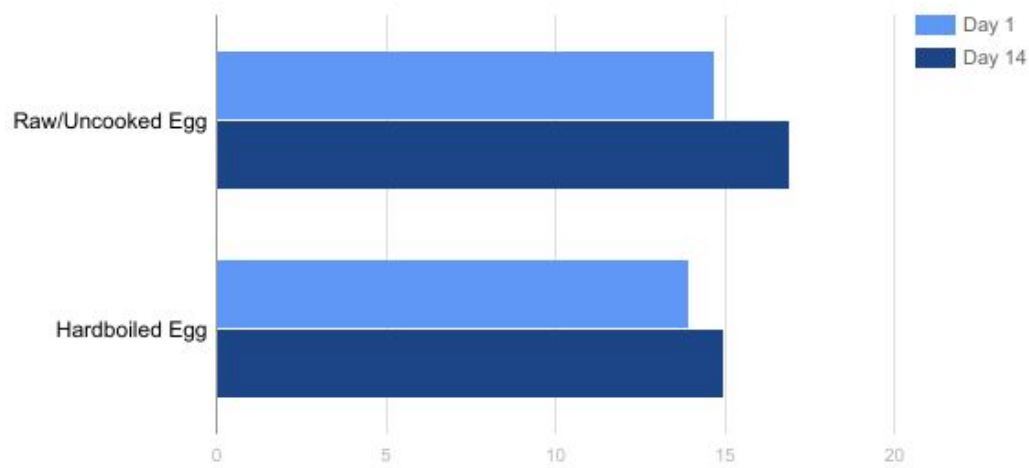
Egg Size Analysis



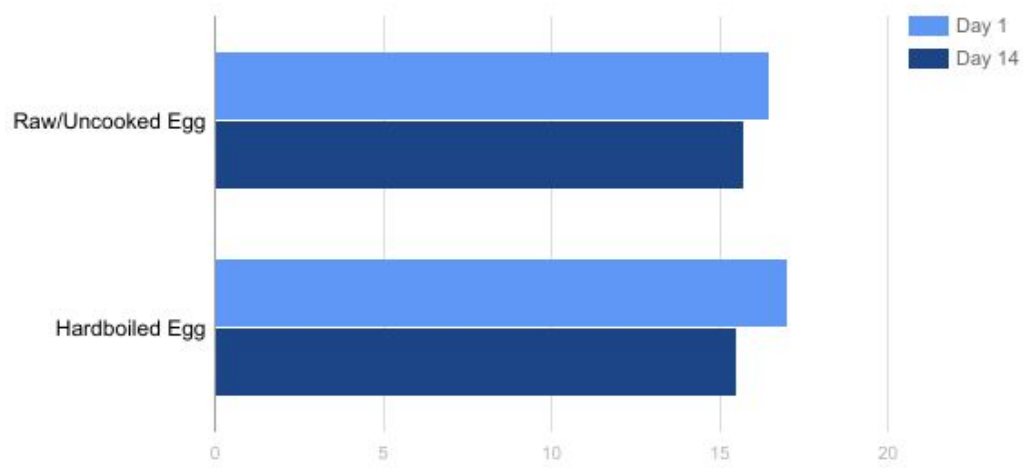
Egg Length in Vinegar (in centimetres)



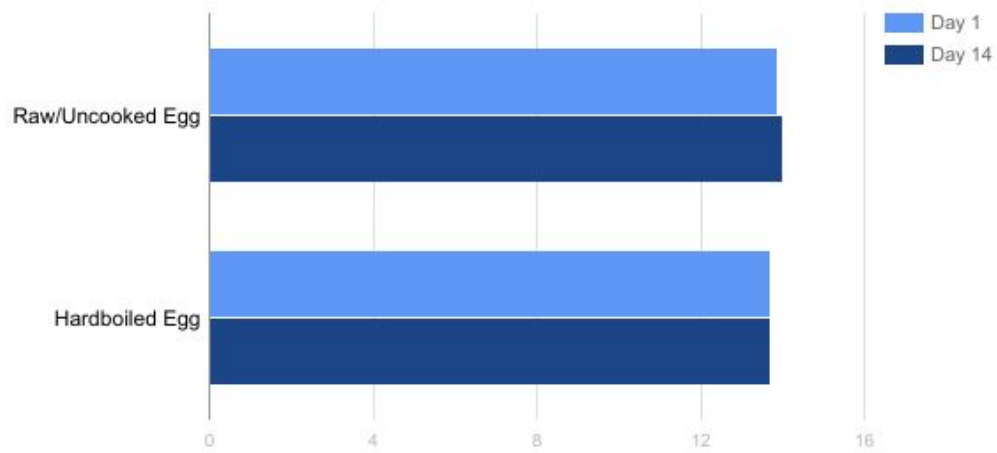
Egg Width in Vinegar (in centimetres)

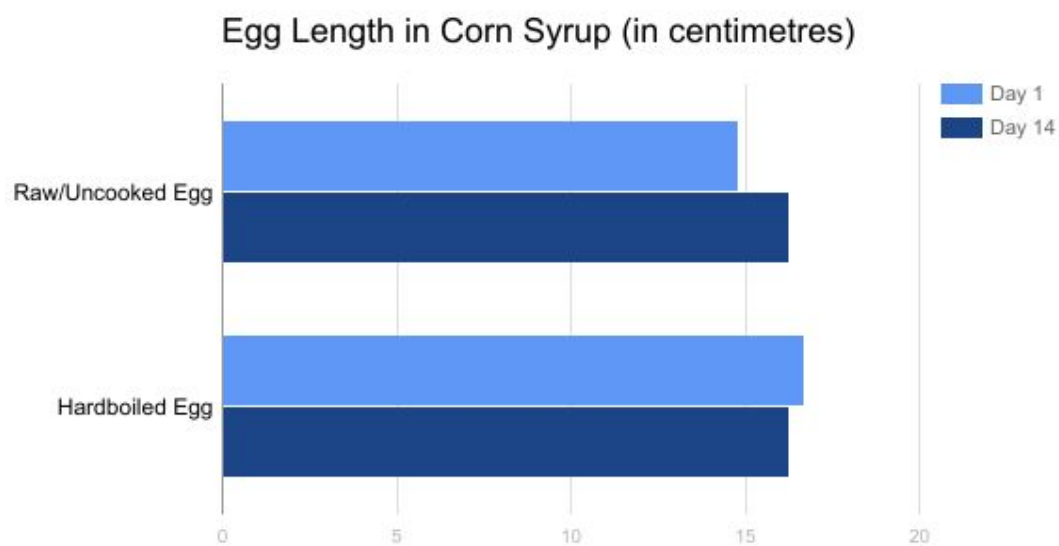


Egg Length in Coca-Cola (in centimetres)



Egg Width in Corn Syrup (in centimetres)





Conclusion:

At the initial start of the experiment, we expected to see a more significant change and affect to the hardboiled eggs than the raw eggs in respect to the appearance and hardness of the eggshell, and size of the egg. Upon the completion of the experiment, the findings concluded that eggs, hardboiled and raw alike, displayed the similar physical appearance when immersed in white vinegar, Coca-Cola, and corn syrup. Each of the substances reacted to the hardboiled eggs and raw eggs at a different time during the experiment; however, by the end date, the results were very similar.

The hardboiled and raw eggs in Coca-Cola discoloured in the same manner with both sets of eggs displayed browning of the shell that intensified throughout the experiment. Moreover, both eggs developed similar, if not exactly the same, texture, dark spots, and brittleness to the eggshell by the conclusion of the experiment. We saw that the colour of the substance itself, reacted with the shell, and thus we can conclude that darkness of the Coca-Cola will stain or dye the white eggs to a brown to light tan colour.

The hardboiled and raw eggs in corn syrup displayed exactly the same exterior. While visual observation told that the eggs were becoming bigger in size was evident enough, no other significant change took place while eggs were immersed in corn syrup. One must note that the eggs, while placed in a fair amount of corn syrup, refused to be totally immersed in the substance. Both eggs maintained to float at the top of the corn syrup with only one-half in the liquid. Upon further investigation we found that the shells themselves, hardened and became stronger while in the corn syrup. Thus from this evidence, we have concluded that the thickening aspect of the corn syrup, hardened the egg shells in both the raw and hardboiled eggs.

The eggs immersed in white vinegar also displayed similar results when it came to the exterior. Both sets of eggs lost their hard exterior shell through the vinegar's chemical reaction; the vinegar dissolved the shell. Both raw and hardboiled eggs became afloat after the first day in the vinegar due to heavy bubble formation around the eggs caused by this chemical reaction. The raw egg, after losing its shell, became soft and elastic in nature, similar to that of a rubber ball. This egg loosely maintained its shape after losing the shell, with the ability to be squeezed lightly. The hardboiled egg did not see any physical change regarding colour; however, it did see a formation of air and liquid development under the surface of the egg white. Thus from our evidence, we can conclude that white vinegar had significant effects on the appearance of the egg, dissolving the hard physical shell, leaving a rubber-like material in its place.

Further observations provided evidence that we did not intentionally aim for. Upon gathering the desired evidence for the size, shape, and conditions of the egg shell, we decided to study the inside of the shell out of mere curiosity. The hardboiled egg immersed in Coca-Cola developed a browning colouration on the membrane directly under the egg shell. No other part of the egg on the inside showed significant results. The hardboiled egg immersed in white vinegar, while it did not change the colour of the egg, it did change the structure of the egg. First, the egg became more rubbery; second, a part of the egg filled with air; third, a part of the egg filled with liquid. The hardboiled eggs immersed in corn syrup did not change or alter in any observable form during the entire experiment.

In this experiment, we also hypothesised that these substances would have significant changes in the size of the eggs. To properly measure this throughout the experiment we took two separate measurements using string. Our first measurement, or our initial measurement, occurred before we placed the eggs in substances. Our second measurement, came at the end of the experiment, after we had removed the eggs from the substances. We measured both the length and the width of the eggs by placing the strings around the middle of the egg, and from the top of the egg to the bottom. These measurements gave us an approximate size of the egg, and from here we could measure changes to the size of the egg.

Based on our measurements, we found that each of the raw and the hardboiled egg changed in size depending on what substance it was submerged in. Further we saw that differences in size also varied between the raw and hardboiled egg in their length and width based on what substance it was submerged in. In our first substance, Coca-Cola, the length of both the raw and hardboiled diminished in size. Whereas the width of the eggs varied in their changes, the raw egg expanded in size, where the hardboiled diminished.

In the second substance, corn syrup, we found that the width of the egg either expanded in size or remained stagnant. As we found that for the raw egg, it expanded slightly, but in the hardboiled egg it did not. However like in the Coca-Cola, we found varied results in the length of each egg. The raw egg, like its width, expanded in size, while the hardboiled diminished slightly in size. In our last substance, vinegar, we saw similar results in both the length and the widths of the raw and hardboiled eggs. In both the lengths of the raw and hardboiled eggs, the vinegar diminished their size. However, in vinegar, the widths of both the raw and hardboiled expanded in size. Thus based on our evidence, we are able to conclude that different substances have significant effects on the size of the eggs based on their width and their lengths.

Discussion:

Our consistency with the observation time, experiment duration, and maintaining the similar environments in which the raw and cooked eggs were placed is something that went extremely well. This all insured that all interactions with the eggs were left to the substances in the jars. This also eliminated human interaction with the eggs, which eliminated human error. Moreover, the consistency in the observation period (making sure we make observations at the same time after 24 hours from the previous observation) allowed the eggs proper time to be affected by the the substance in the jar, which gave us a clearer observation notes regarding how much the change the eggs underwent in 24 hours.

Something that may have contributed to minor errors is the fact that the eggs were not placed in the jars at exactly the same time. They were placed in on the same afternoon; however, the hardboiled eggs were places roughly half an hour after the raw eggs due to cooking and cooling time. This means that the raw eggs experienced longer time in the jars. Another factor leading to errors could be attributed to the fact that the raw and hardbolied eggs were not in the same household during the experiment. However, since the eggs were in a closed container, the effect of that is very minimal.

What would we do differently: Some of the things we would perform differently during this experiment is try different liquids with different acidity and different PH levels in order to demonstrate how different liquids affect the egg shells. Moreover, we would try to leave the eggs in the jars for a longer period of time in order to show the results of prolonged exposure.