Egg Science

More than a billion eggs are purchased this time of year during Passover and Easter seasons. Take advantage of timely egg sales to do a bit of classroom experimentation with them.

Grade Level 2-8

What you need:

- a hard-boiled egg (one for each group)
- an uncooked egg (one for each group)
- a table or other smooth, hard surface
- a pencil and paper to record observations

You don't have to tell groups which egg is which. Designate them Egg A and Egg B

What to do:

Experiment one

1. Gather one of each type of egg.
2. Get both eggs spinning on a large, smooth table or desk.
3. Stop both eggs, then release them. Observe what happens and record why you think each egg behaved the way it did.

Experiment two

1. Spin both eggs again. You'll want to get them spinning at about ten revolutions per second, which you can do with a firm flick of your wrist. Observe what happens, record your observations, and discuss why each egg behaved differently.

Learn

Experiment one – What happened?

Hard-cooked eggs will remain stationary after you force them to stop, but a raw egg will start spinning again. That's because unlike the cooked egg, the raw egg still has liquid inside. The liquid inside doesn't stop spinning when you stop the outer shell because of inertia. Even though you stopped the outside of the egg with your hand, the moving liquid inside starts the shell spinning again.

Experiment two – What happened?

Two mathematicians, Keith Moffat of Cambridge University and Yutaka Shimomura of Keio University in Japan, studied the spinning of eggs and discovered this answer, which they published in the scientific journal Nature. They concluded that after an egg starts spinning horizontally, two forces – known as friction and slippage – combine to get the egg wobbling. As it starts wobbling, some of the horizontal spin gets transferred to a vertical spin (some of the kinetic energy of the spinning egg translates into potential energy, raising its center of gravity). As that happens, the same forces that make a gyroscope spin on its end start making the egg spin on its end.

Why does this effect only happen on the hard-boiled egg? Because the inside of a raw egg is runny, the moving liquid inside lags behind the movement of the shell. This lag causes a drag effect on the egg, slowing the spin rate down and dissipating the egg's kinetic energy. Because this reduces the friction between the egg and tabletop, there is not enough energy available to be transferred into vertical spin and raise the egg on its end.

What if my hard-boiled egg didn't spin on its axis?

If the egg was boiled on its side and not vertically in the pot, the yolk might be a bit off balance.

Investigate

1. Now you are going to do some experimenting. What other objects would you like to try the "egg trick" on? Here are some things to have on hand (eggs, pebbles, coins, almonds, Smarties, peanut M&Ms). Try them out, record your observations and then your thoughts about how these objects behave compared to the hard-boiled and raw eggs.

Visit NPR.org's Egg Science for a more in-depth look at the science behind the phenomenon in Experiment two: **http://www.npr.org/programs/atc/features/2002/mar/egg/science.html**