

Egg Denaturation and Coagulation

Session 5: April 23, 2014

In our Spring 2014 JW Iron Chef Club we're studying the science of cooking!

In our fifth session, we explored the way that cooking changes the texture and taste of eggs.

Concepts We Explored:

Students observed egg protein denaturation by:

- observing the texture, taste, and appearance of a fried egg cooked VERY quickly over really high heat
- cooking scrambled eggs, “egg in a nest”, frittata, and hard-boiled eggs—each recipe used a different intensity of heat in order to achieve a different texture in the finished product.

Review:

Chemical reaction (material cannot return back to original form)

Tips:

Fresh eggs will sink; stale eggs will float.

To retrieve shells out of your cracked eggs, use another piece of shell to scoop.

Discussion:

Pastured local eggs vs. factory-farmed eggs: flavor, appearance, nutrition, price

Helpful Videos:

Lima Family Farm:

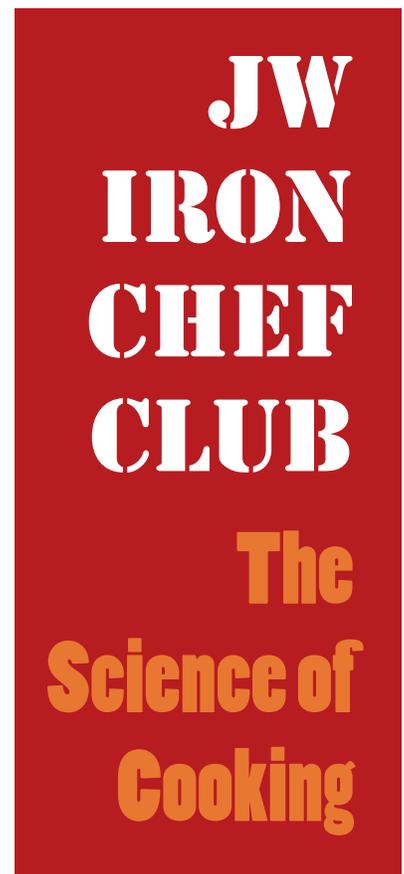
https://www.youtube.com/watch?v=hsCCwGhFt_c

Scrambled Eggs and Omelets with Jacques Pepin:

<https://www.youtube.com/watch?v=57afEWn-QDg>

TED Cookie Talk: includes emulsion, egg denaturation, caramelization, maillard reaction, and chemical leaveners

<http://m.youtube.com/watch?v=n6wpNhyreDE>



Club Cooking Instructor

Jen Carson

baker and owner
of LilliPies

Club Science Instructor

Janet Gaudino

8th Grade
Physical Science,
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GARDEN STATE ON YOUR PLATE:
A PROGRAM OF PRINCETON SCHOOL
GARDENS COOPERATIVE, INC.

Frittata

Recipe courtesy of Alton Brown from Good Eats, Zen and the Art of Omelet Maintenance

Total Time: 20 min

Prep: 10 min

Cook: 10 min

Yield: 6 servings

6 eggs, beaten

1 ounce Parmesan, grated

1/2 teaspoon black pepper

Pinch salt

1 teaspoon butter (or olive oil)

1/2 cup chopped roasted asparagus (or other cooked vegetable)

1/2 cup chopped country ham (or other cooked meat or vegetable)

1 tablespoon chopped parsley leaves

Preheat oven to broil setting.

In medium size bowl, using a fork, blend together eggs, Parmesan, pepper, and salt. Heat 12-inch non-stick, oven safe saute pan over medium high heat. Add butter to pan and melt (or add olive oil). Add asparagus and ham to pan and saute for 2 to 3 minutes. Pour egg mixture into pan and stir with rubber spatula. Cook for 4 to 5 minutes or until the egg mixture has set on the bottom and begins to set up on top. Sprinkle with parsley.

Place pan into oven and broil for 3 to 4 minutes, until lightly browned and fluffy. Alternately, you can flip the frittata onto a clean plate, then slide the uncooked side back onto the surface of the pan. Remove from pan and cut into 6 servings. Serve immediately.

Hard Boiled Egg

1. Place eggs in a pot filled with cold water: Set eggs in a single layer in a saucepan. Water should cover eggs by one to two inches.
2. Boil the water: Bring the water to a full, rolling boil, and cover the saucepan. Turn off the stove, remove the pot from the burner, and let it stand, covered, for 12 minutes (set the timer).
3. Submerge the eggs in cold water: Drain the pot, and transfer the eggs to a bowl of cold water, to stop the cooking process.
4. Crack and peel the eggs: Tap each egg a few times to crack its shell, then roll it on a work surface to break the shell completely. Start peeling, dunking the egg into the bowl of water as you go to wash away any bits of shell.

SCRAMBLED EGGS

Making the perfect scrambled eggs isn't difficult. The key is whisking the eggs thoroughly and vigorously before cooking them. Whisking incorporates air, which produces fluffier scrambled eggs. And fluffier is better!

Overcooking is a common problem with scrambled eggs. For starters, scrambled eggs should never be even the slightest bit brown — that means they're burnt! But the perfect scrambled eggs should be soft and just a little bit moist.

One last thing: Eggs should always be cooked in a nonstick sauté pan. And for that reason, you should always use a heat-resistant rubber spatula.

8 eggs

½ cup whole milk (or 1 Tbsp. liquid for each egg used)

2 Tbsp clarified butter or whole butter

Salt and pepper, to taste

1. Crack the eggs into a mixing bowl and beat them until they turn a pale yellow color.
2. Heat a heavy-bottomed nonstick sauté pan over medium-low heat. Add the butter and let it melt.
3. Add the milk to the eggs and season to taste with salt and pepper. Then, grab your whisk and whisk like crazy. You're going to want to work up a sweat here. If you're not up for that, you can use an electric beater or stand mixer with the whisk attachment. Whatever device you use, you're trying to beat as much air as possible into the eggs.
4. When the butter in the pan is hot enough to make a drop of water hiss, pour in the eggs. Don't stir! Let the eggs cook for up to a minute or until the bottom starts to set.
5. With a heat-resistant rubber spatula, gently push one edge of the egg into the center of the pan, while tilting the pan to allow the still liquid egg to flow in underneath. Repeat with the other edges, until there's no liquid left.
6. Turn off the heat and continue gently stirring and turning the egg until all the uncooked parts become firm. Don't break up the egg, though. Try to keep the curds as large as possible.
7. Transfer to a plate when the eggs are set but still moist and soft. Eggs are delicate, so they'll continue to cook for a few moments after they're on the plate.

Serves 4

Egg in a Nest

By Aida Mollenkamp

Difficulty: Easy | Total Time: 10 mins | Makes: 2 servings

For a more sophisticated variation, rub the bread with a little roasted garlic before you start.

- 2 (1-inch-thick) slices bread
- 1 tablespoon unsalted butter
- 2 large eggs
- Kosher salt
- Freshly ground black pepper

1. Cut or tear a 2-inch hole out of the center of each slice of bread.
2. Melt the butter in a large nonstick frying pan over medium heat until foaming. Add the bread slices. Crack an egg into each bread hole, season with salt and pepper, and cook until the bottoms are golden brown, about 3 to 4 minutes. Using a flat spatula, flip and cook until the second side is golden brown, about 3 minutes more for runny yolks. Serve immediately.