HOME BAKING ASSOCIATION
HomeBaking.org

Cookie Science:

Ingredient Functions

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Cookie Business - Cookie Creations

More than JUST Cookies!

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Flour

- STRUCTURE
- Absorbs liquid
- Cake – finer and lower protein
- All-purpose – protein level depends on the brand
- Bread – thicker, chewier texture, higher protein
- Bleached flour – can absorb more liquid, color

Sugar - Functions

- Sweetness
- Texture
  - Moistens – liquefies when heated
  - Tenderizes – sugar is hygroscopic, so it prevents water from being used for gluten development
- Leavening during creaming through air incorporation
- Color – browns through caramelization and Maillard browning

Sugar - Types

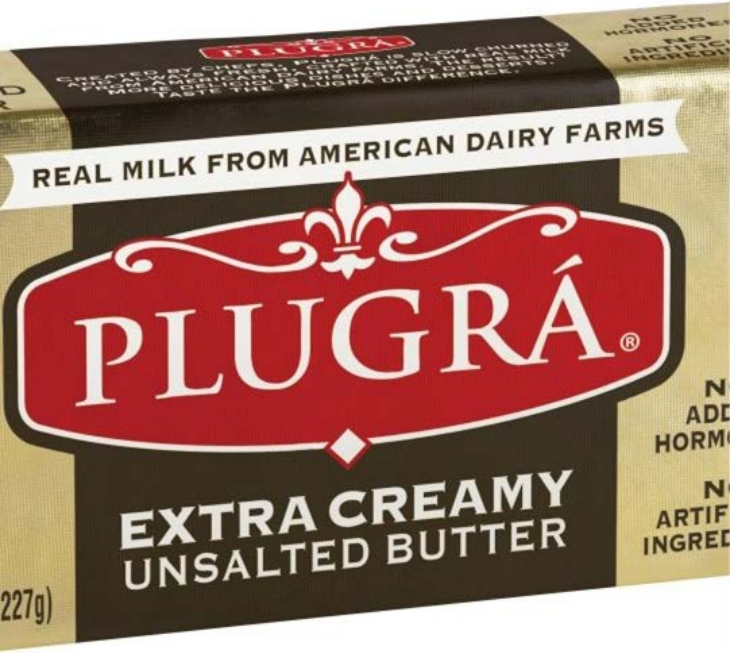
- Granulated – made from sugarcane or sugar beets
- Brown – granulated sugar + molasses
  - More butterscotch flavor and draws in more moisture due to molasses
  - Dark has more molasses
- Powdered sugar – more finely ground than granulated sugar

Fat - Functions

- Tenderizes – coats starches and proteins to prevent gluten development
- Creates sensation of being moist because can’t be absorbed by starches or proteins
- Leavens – creaming incorporates air
- Flavor – most often flavor, all fats contribute richness
- Browning – milk solids in butter Maillard reaction

Fat - Types

- Butter
  - Melting point (90°F) similar to body temperature so melt-in-you mouth sensation
  - CRUCIAL to cookie dough outcome
  - Room temperature
    - Gives slightly when pressed with your finger but still hold its shape
    - Flexible but no cracking
    - 65-67°F
    - Optimal temp in order to incorporate enough air in creaming and keep cookies correct thickness
    - Better to be too cool than too warm

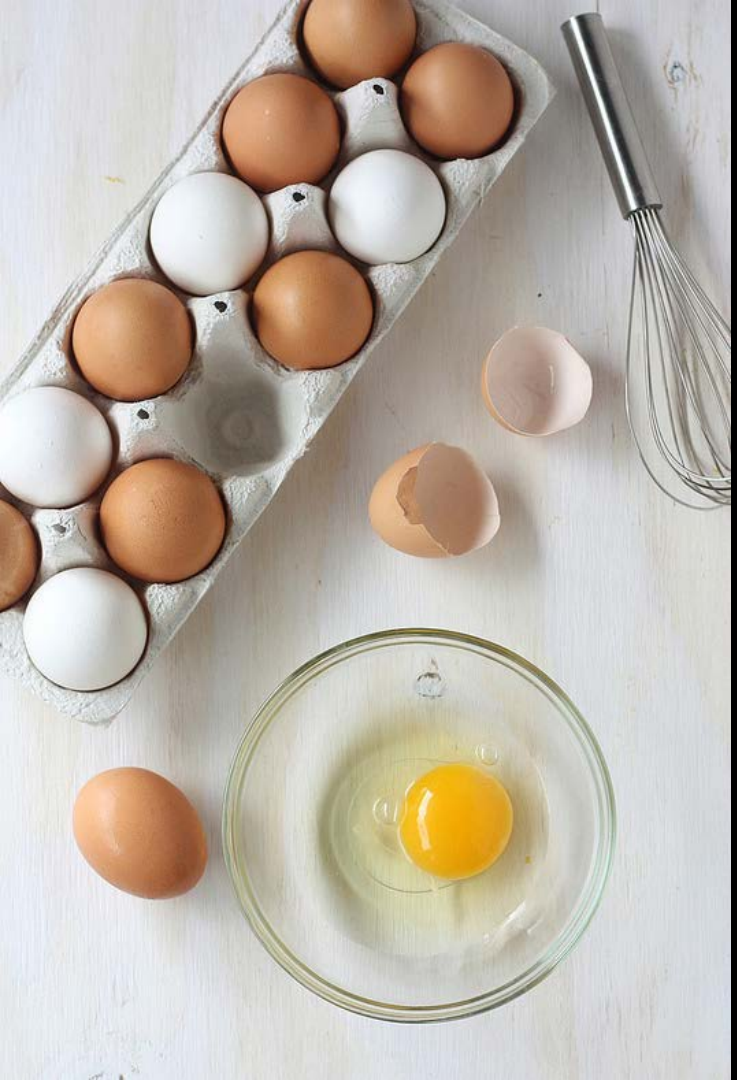


Fat - Types

- Shortening – 100% fat, no water
  - Higher melting point (110-120˚F) so…
    - Leaves film in your mouth
    - Thicker texture
    - Lacks flavor
- New “plant butters” – confirm fat content 80%
- North American butter – at least 80% butterfat
- European butter – minimum 82% butterfat
  - Smoother, creamier mouthfeel
  - Lower water content – firmer and slower to melt; effects end results in baking
- Use unsalted butter! No industry standard for how much salt is in a pound of salted butter

Tricks to Softening Butter

- Microwave – be careful!!
  - Microwave 5 second intervals while turning the stick of butter each time
- Cube
  - Cut butter into smaller pieces and let it sit until reaches cool room temperature
- Cream butter by itself before adding sugars



Eggs - Functions

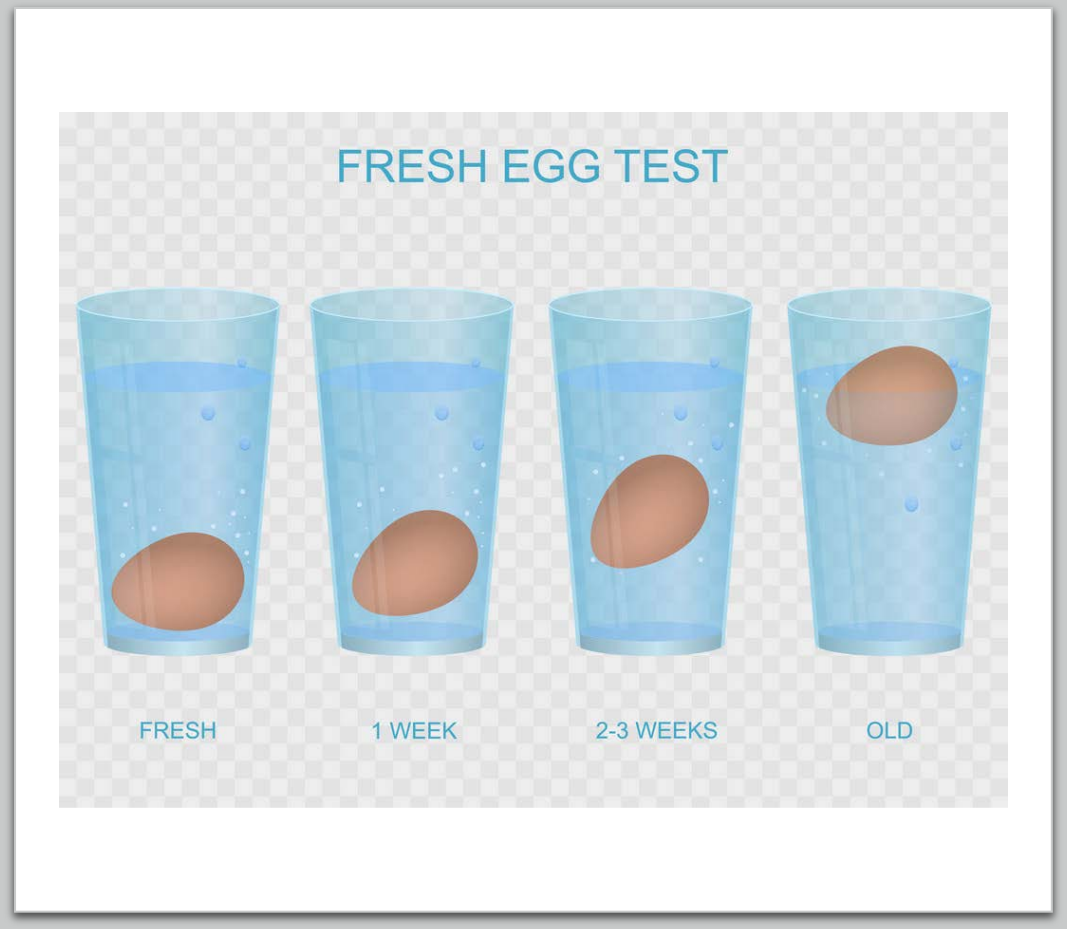
- Structure (egg white)
  - Proteins act as toughenerers
- Leavening property
- Fats and emulsifiers (egg yolk)
  - Lecithin – emulsifier found in the egg yolk
    - Retains moisture and slows staling
  - Tenderize
  - Chewier cookie
- Usually large eggs are used in baking but use what the recipes calls for

Parts of the Egg

- White
  - Mainly moisture
  - Some protein
  - No fat
  - Structure and moisture
- Yolk
  - Some protein
  - Less water
  - All of the fat content of an egg
  - Contains the emulsifier (lecithin)
  - Tenderness and richness

Fresh Egg – Test

- Place egg in bowl of water
- Lays on side at bottom – still very fresh
- Stands upright on bottom – still fine to eat but should be used soon
- Floats to top – not good for eating and should be discarded



Leavening

- Physical – air incorporation during creaming
- Chemical – baking soda, baking powder
- Flat, coarse final product – not enough leavening
- Collapsed after baking – too much leavening
- Comparison graphic, Lab Manual Appendix and online
- https://www.homebaking.org/wp-content/uploads/2019/07/bakingsodavsbakingpowder.pdf

Baking Soda

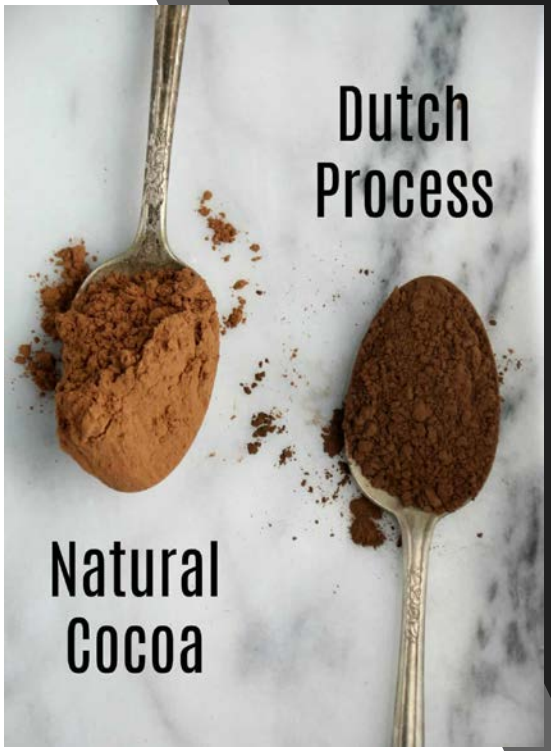
- Alkaline
- Activated by liquid and acid present
- Acid ingredients – buttermilk, sour cream, yogurt, lemon juice, vinegar, brown sugar, natural cocoa powder (not Dutch)
- Too much – metallic flavor
- Elevates pH, brown color, more spread
- 4 times stronger than baking powder

Baking Powder

- Baking soda, acid, starch
- Usually double acting
  - First reaction – when combined with liquid
  - Second (slower) reaction – heat from the oven
  - Creates lift and thickness

Other Ingredients

- Bittersweet and semisweet chocolate – no regulation to distinguish (look at packaging to determine % of chocolate), both must contain at least 35% pure chocolate
- Milk chocolate – at least 10-15% cacao
- White chocolate – no chocolate solids; cocoa butter with dry milk powder, vanilla, soy lecithin
- Coating chocolate – not real chocolate, cocoa butter has been replaced by other fats, doesn't require tempering to hold its formed shape
- Melted chocolate – do not use chocolate chips (cocoa butter is often times replaced with hydrogenated oil)! Use freshly chopped baking chocolate to ensure it melts smoothly

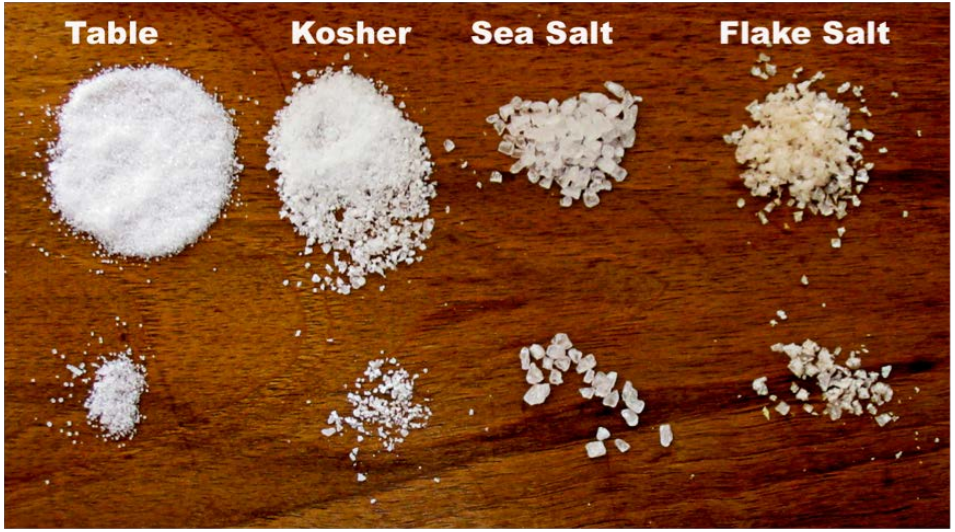


Other Ingredients

- Natural cocoa powder – highly acidic
- Dutch process cocoa powder – slightly acidic because treated with alkali to neutralize acidity; more mellow flavor
- Chocolate Tasting Sensory Lab in manual

Salt

- Enhances sweetness
- Fine sea salt best for baking
- Can also use table salt
- If use kosher, use a bit more
  - 1 tsp. table or fine salt = 1 ¼ tsp. kosher salt



Equipment

- Kitchen scale
- Portion scoop – even baking
- Oven thermometer – place in center of the middle oven rack to ensure oven temperature is accurate
- No dark pans to prevent overbrowning
- Cooling rack

Preheat

- Preheat oven – after the beep, wait 15 minutes to ensure oven has actually preheated
- Use an oven thermometer

Measuring

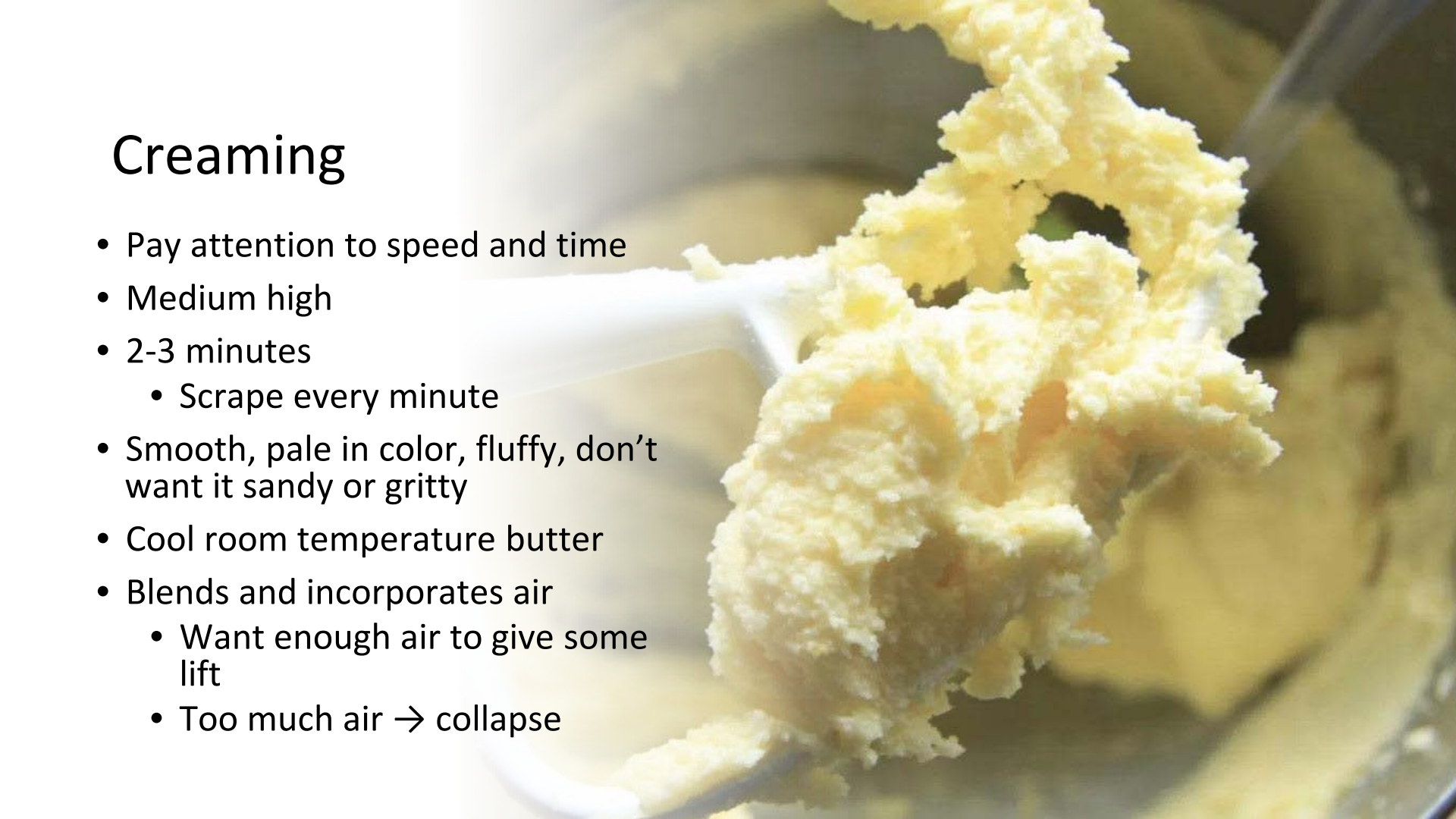
- Scale your ingredients! - ACCURACY
- Whisk dry ingredients to remove clumps and ensure leaveners are evenly distributed
- Students using volume measuring tools at home– confirm proper method for dry and liquid measurement

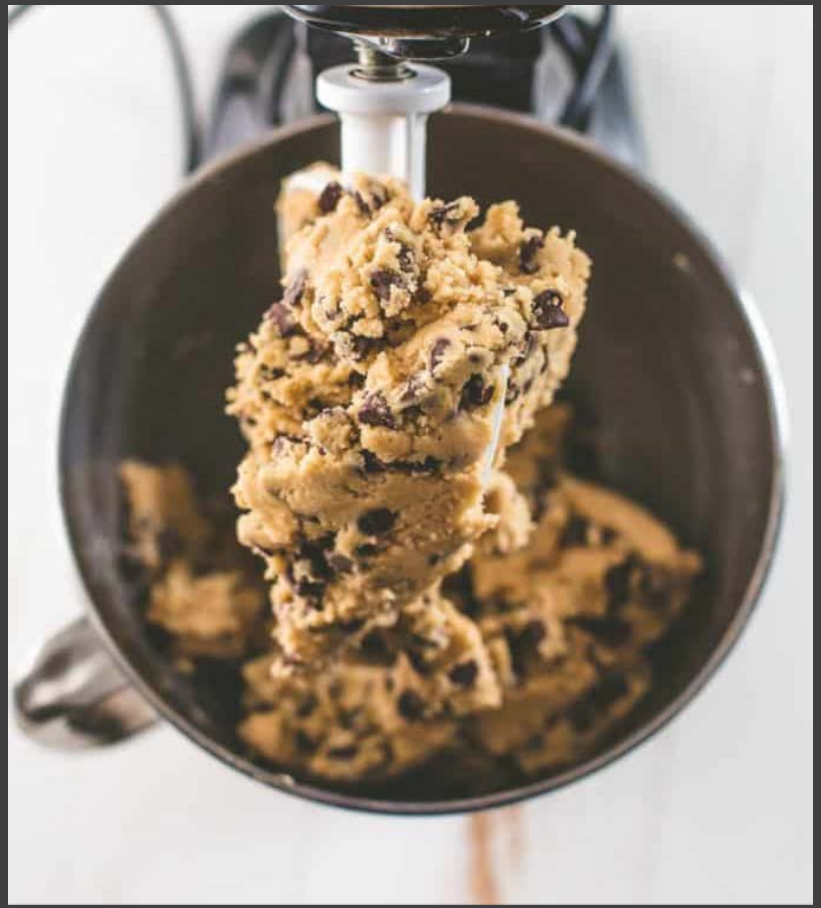
Temperature of ingredients

- Cool room temperature
  - Butter - 67°F
  - Eggs
  - Flour stored and used within a month

Creaming

- Pay attention to speed and time
- Medium high
- 2-3 minutes
  - Scrape every minute
- Smooth, pale in color, fluffy, don’t want it sandy or gritty
- Cool room temperature butter
- Blends and incorporates air
  - Want enough air to give some lift
  - Too much air → collapse



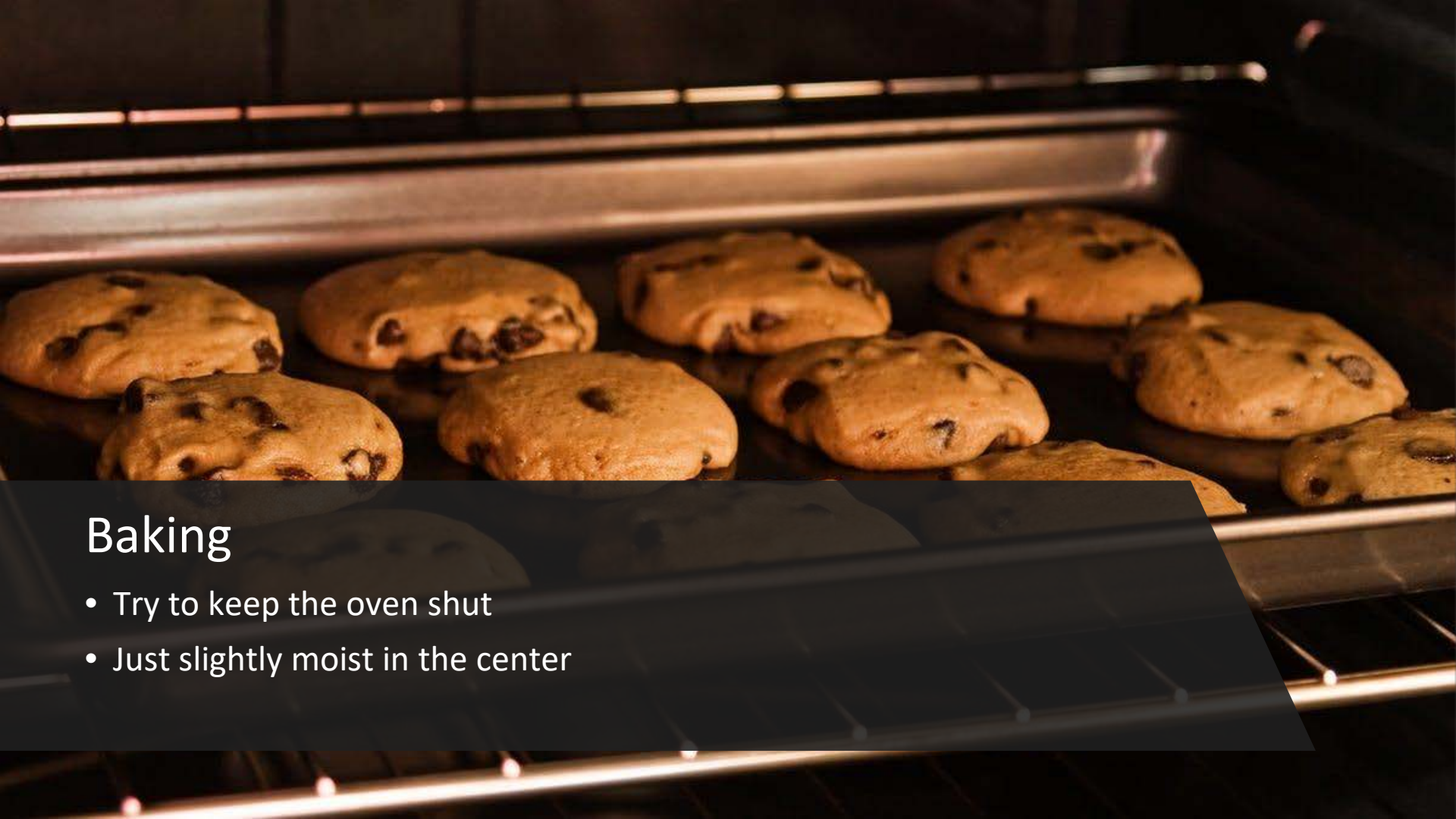


Mixing

- Eggs one at a time
  - Thoroughly combine
  - Scrape after each
- Slowly add dry ingredients, mix until just combined
- Slowly stir in mix-ins

Shaping

- Use portion scoop
- Even baking
- Parchment line pan to preserve pan; grease pan only if directed
- Don’t overcrowd the pan
- Some recipes may call for you to slightly press down



Baking

- Try to keep the oven shut
- Just slightly moist in the center

Cooling

- Cool as long as recipe says to on pan
- Then continue to cool with cooling rack
  - Cools more quickly and evenly, avoids too much carryover baking

Plating

- Portion scoop
- Roll the dough between your palms for most cookies
- Garnish – with more mix-ins
- Reshape – use a biscuit cutter to even out any misshapen edge

Freezing Drop Cookie Dough

- Scoop and freeze on cookie sheet
- Balls of dough can be placed in an airtight container and stored in freezer for up to 6 weeks
- Bake from frozen: drop temperature by 25°F and add a few minutes on baking time
- Or can bring dough to cool room temperature and bake as recipes states

Contact Information | Questions?

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