Chapter 6
Variety Grains and Flours

How Baking Works

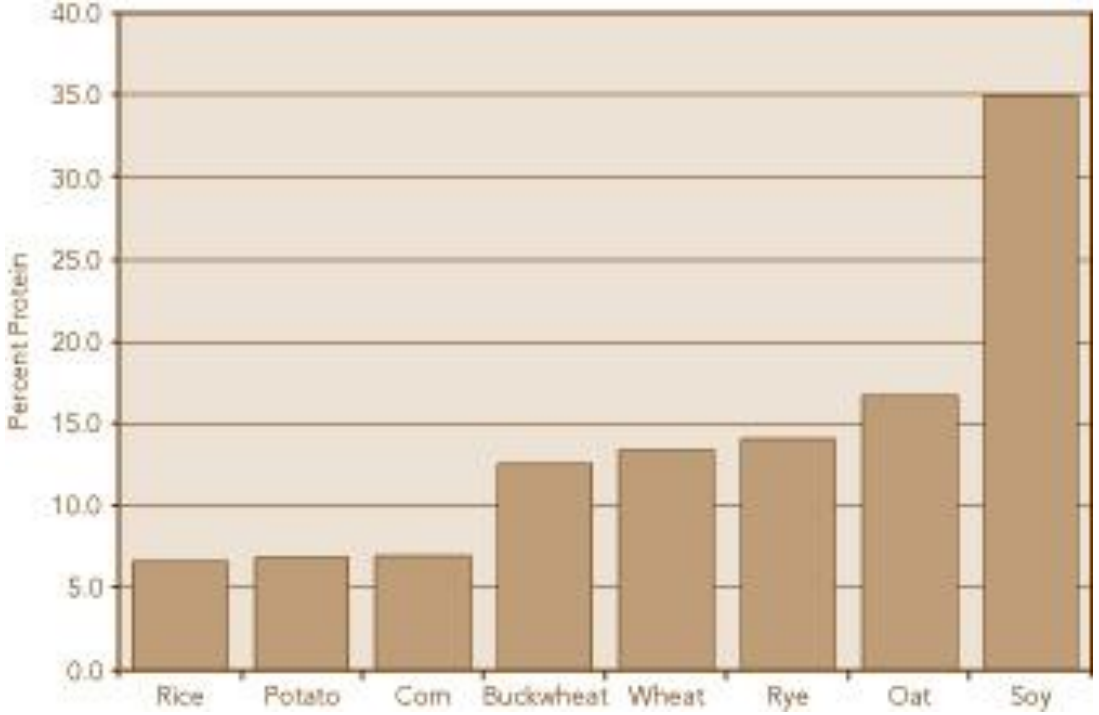
Words, Phrases, and Concepts

- Triticum grains
- Cereal-free grains
- Pumpernickel
- Fermentation tolerance
- Phytonutrients
- Degerminated
- Limewater
- Masa harina
- Groats
- Hull or husk
- Lignan
- Phytoestrogen
- ALA omega-3 fatty acid
- Mucilage

Introduction

Many variety grains are available to bakers.

- They vary in protein content.



- Most cannot form gluten.
  - Exception: triticum grains

Introduction

Classification of variety grains and flours:

- Cereal grains and flours
  - High in starch.
  - Rye, corn, oats, rice, pearl millet, and teff
- Alternative wheat (triticum) grains and flours
  - Spelt, Kamut, triticale, einkorn, emmer
- Cereal-free grains and flours
  - Amaranth, buckwheat, flaxseed, potato, quinoa, soy

Cereal Grains

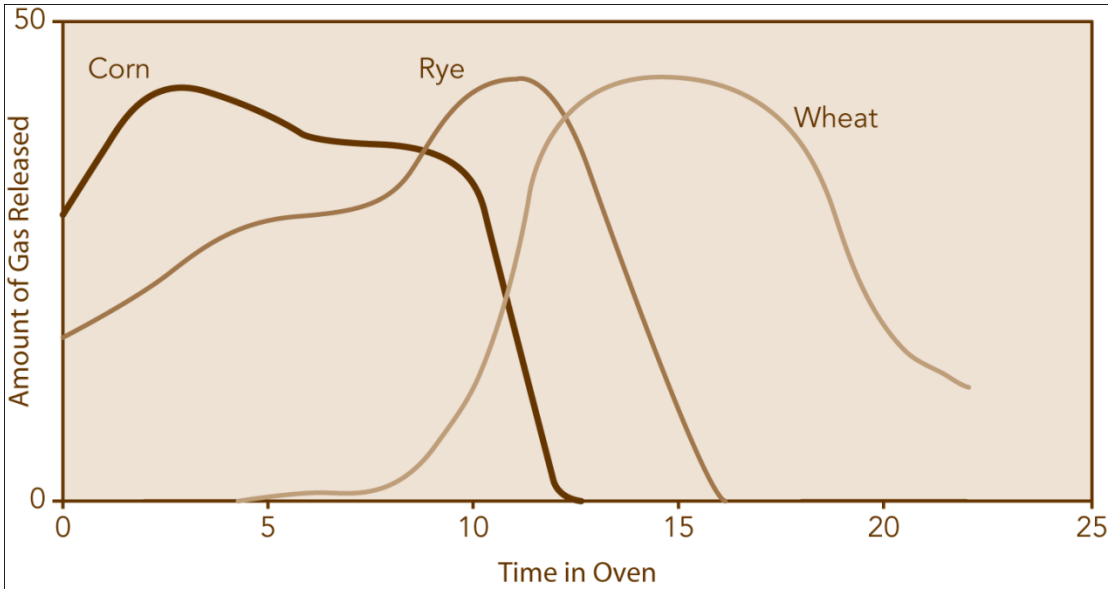
Rye

- Traditionally grown in cold climates
  - Russia, Eastern Europe, Scandinavia.
  - Rye bread consumption high in these regions.
- Characteristically strong flavor.
- Oils oxidize easily, shortening flour's shelf life.
- High in pentosan gums.
  - Increases absorption value of flour.
  - Important source of structure in rye dough.
- Rye bread formulas:
  - Traditionally are sourdoughs.
  - In North America, often include white (wheat) flour.

Cereal Grains

Rye

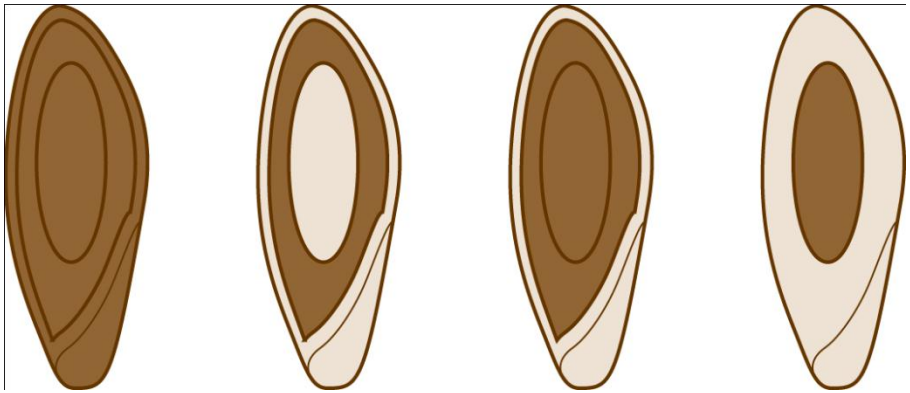
- Limited ability to form gluten.
- Bread doughs are easily overmixed and have poor fermentation tolerance.
  - Breads tend to be dense and gummy.



Cereal Grains

Rye

- Commercial grades:
  - Light (white) rye: patent flour
  - Medium rye: clear flour
  - Dark rye: straight flour
  - Pumpernickel: whole rye flour



Cereal Grains

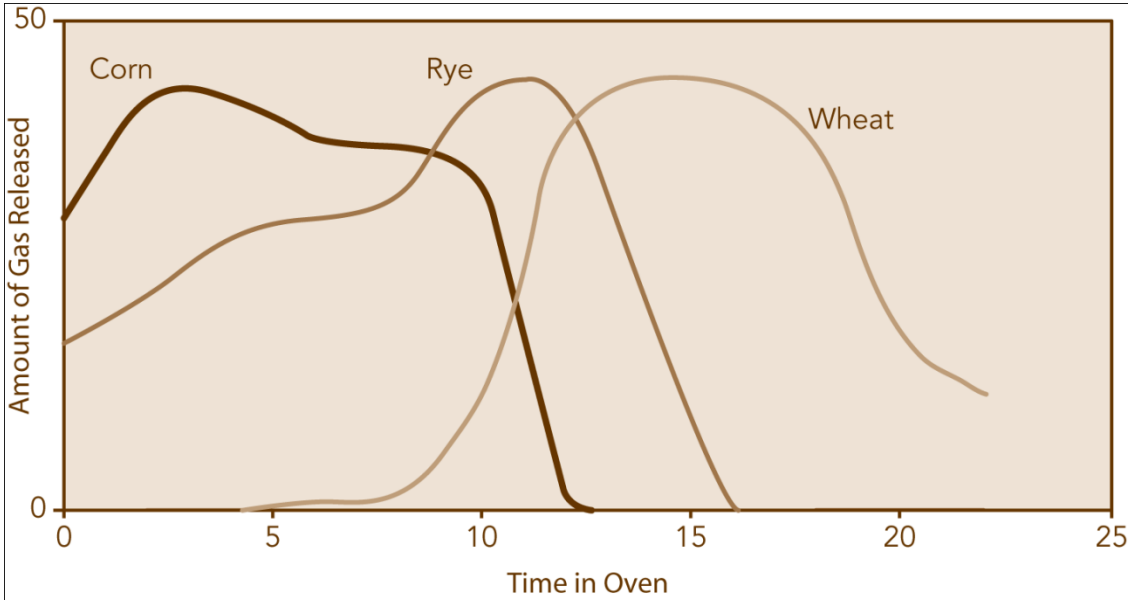
Corn

- Also called maize.
- Sold as flour, meal, or grits.
  - The coarser the grain, the denser and crumblier the baked good.
- White, yellow, or blue in color.
- Degerminated corn has oil-rich germ removed.
  - Milder flavor.
  - Longer shelf life; less likely to oxidize.
  - Enriched, to replace valuable vitamins and minerals lost in germ removal.

Cereal Grains

Corn

- Forms no gluten.
- White (wheat) flour added to baked goods, to provide structure and fermentation tolerance.



Cereal Grains

- Corn
  - Masa harina:
    - Used in making corn tortillas.
    - Dried corn is soaked in limewater (alkali).
      - Softens corn kernels; easier to grind.
      - Removes bran layer.
      - Yellows the color and changes the flavor.
      - Increases availability of nutrients.

Cereal Grains

Oats

- Several products available: all are whole grain.
  - Made from dehulled whole oat kernels (groats).
- Quick-cooking rolled oats are cut thin; regular rolled oats are coarser and chewier.

Cereal Grains

Oats

- Rolled oats are steamed, then flattened between rollers.
  - Softens and precooks oats.
  - Prevents rancid oil off-flavors from developing.
    - Inactivates lipase enzymes.
- Contain the gum beta-glucan.
  - Gluey, gummy consistency.
  - Source of soluble dietary fiber.
- Commonly used in cookies, streusel toppings, muffins, breads.

Cereal Grains

- Rice
  - Different varieties and types
    - Long-grain rice
      - Holds its shape well, especially if par-boiled.
    - Medium or short grain rice
      - Cooks into creamy, clingy texture.
    - Brown rice is a whole grain
      - Takes longer to cook; has a chewy texture.
  - Use: rice puddings, custards, pies

Cereal Grains

Rice flour

- Uses: gluten-free baked goods; Middle Eastern and Asian cakes and cookies.
- Medium and short-grain white or brown:
  - Best for gluten-free baked goods.
- Long grain:
  - Best for dry, sandy cookies, like shortbread.
- Also available: rice starch flour.
  - Purified rice starch (protein, etc. removed), pulverized into flour.

Cereal Grains

Pearl millet

- Grown in Africa and India.
- Tiny tear-shaped grains that pop like popcorn.
- Must be cooked in water to soften.
- Millet flour used in India in *roti* (flatbread).

Teff

- Grown in Ethiopia (in Eastern Africa)
- Tiniest of cereal grains.
- Teff flour used in a sour, spongy pancake called *injera* .

Alternative Wheat Grains

Spelt

- Like all triticum (wheat) grains, not appropriate for wheat-free or gluten-free diets.
- Ancestor of modern wheat.
- Has close-fitting protective inedible husk (hull).
  - Difficult to harvest: kernels do not fall out easily.
  - Easier to grow organically: kernels are protected from insects and microorganisms.
- Grown as specialty or health food.
- Forms weak gluten that is easily overworked.
- Use in place of soft wheat flour.

Alternative Wheat Grains

Kamut

- Ancestor of modern durum wheat; high in protein.
- Name is trademarked; licensed to those growing the grain organically.
- Large kernels.
  - Two-three times size of regular wheat kernels.
  - Mild-tasting.
- Uses: whole grain pasta, bread, bulgur, couscous.

Alternative Wheat Grains

Triticale

- Cross between wheat and rye
- Superior nutritional quality compared to wheat.
- Use instead of soft wheat.

Einkorn and Emmer (Farro)

- Ancient; over 10,000 years old.
- Close-fitting inedible husk; easy to grow organically.
- Einkorn: soft, sticky dough; Emmer: heavy-textured bread.

Cereal-Free Grains and Flours

Amaranth

- Small, light-brown seeds from herb grown in Central and South America.
- Unlike wheat and most cereal grains, high in lysine, an essential amino acid.
- Uses: multi-grain breads; pops like popcorn.

Cereal-Free Grains and Flours

Buckwheat

- Not wheat; forms no gluten.
- Has strong flavor and dark color; often blended with white (wheat) flour.
- Sold as:
  - Coarse grits.
  - Finely ground flour, whole grain or not.
  - Whole kernels, roasted; called kasha.
- Uses: Russian pancakes (blini), Breton crêpes from north of France, Japanese soba noodles.

Cereal-Free Grains and Flours

Flaxseed

- Small, hard, dark oval oily seeds.
- Prized for its nutritional benefits:
  - Soluble dietary fiber from gummy mucilage.
  - Lignan, an antioxidant phytoestrogen.
  - ALA omega-3 fatty acid
- Grind in blender or food processor before use.
  - Nutritional benefits available only when ground.
  - Refrigerate ground seeds, to minimize rancidity.
- Uses: add to batters and doughs for health benefits.

Cereal-Free Grains and Flours

Potato

- Tuber (root), not grain.
- Cooked and dried, then cut into flakes or milled into flour.
  - Cooked (gelatinized) starch is easily broken down into sugars by amylase.
  - Increases water absorption of doughs; improves fermentation.
- Uses: soft, moist yeast breads.
- Also available: potato starch flour.
  - Highly purified; protein, etc. removed.

Cereal-Free Grains and Flours

Quinoa

- Small, round seeds.
- High in healthful unsaturated fatty acids.
  - Oxidizes easily; refrigerate ground quinoa.
- Like amaranth,
  - Grows in South America.
  - High in lysine, an essential amino acid.
- Uses: multi-grain breads.

Cereal-Free Grains and Flours

Soy

- Oily legume; not a cereal grain or seed.
- Very high in protein and fat, low in starch.
- Defatted (fat removed) for use in baking.
- Two types:
  - Untoasted; acts as a bleaching and maturing agent from active enzymes.
  - Toasted; excellent source of nutritionally high-quality protein and other nutrients.
- Uses: yeast doughs; milk and egg substitutes in various products