

BBGA Rye Handout

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**Pentosans**- 5 carbon sugars (polysaccharides) which swell and absorb considerable amounts of water in Rye doughs.

**Arabinoxylans (AX)**- Pentosans which are key to the structure and performance of rye doughs. The main fiber in Rye.

**Water soluble Arabinoxylans (WS AX)** – are desirable because they produce softer crumb, pleasing aroma, darker crust, greater volume.

**Water insoluble Arabinoxylans (WU AX)** – less desirable because they produce a less plastic dough, lower volume, drier crumb.

**Falling Number** – A method of expressing the alpha enzyme activity in flours. A flour and water slurry is cooked until it thickens, and the amount of time it takes a plunger to descend to the bottom is expressed in seconds. Thicker mixture = more time to descend = higher falling number. Thinner mixture = less time to descend = lower falling number. In Germany falling numbers of 120 to 150 are considered ideal. In North America the numbers are usually much higher.

**Protein** – Unlike wheat, has relatively little influence on rye doughs.

**Swelling substances** – A thick gel is formed comprised of WU, WX, and water through oxidative gelation. This forms the structure of rye doughs.

**Enzymes** – ‘Chemical catalysts’. Enzymes at the dough stage transform water insoluble arabinoxylans into soluble ones, improving bread quality. During baking, alpha amylase enzymes transform starches into sugars, the “starch attack.”

**Starch attack** – Unlike wheat, rye starches gelatinise during baking at temperatures where the amylase enzymes are still active, and the enzymes turn the gelatinised starches into sugars. This is considered detrimental but contrary to popular belief is in fact necessary to a certain extent to form a moist, tender crumb in rye bread.

**Rye sourdough** – A mix of different heterofermentative lactic bacteria and wild yeasts (*L. sanfranciscensis* and *C. milleri* are considered ideal) which leaven rye doughs and keeps the amylase activity in check by lowering the pH. Wheat sourdoughs do not have sufficient effect.

**Old flour** – The gelatinisation temperature of the starches in rye flours increases over time, making them immune to the desirable effects of the ‘starch attack,’ thereby leading to drier crumb and faster staling loaves.

**Typical German Flours** – Type 997 and Type 1150 flours account for around 75% of rye flour sales, and are used for the most typical German rye loaf which contains 60% to 70% rye (the rest is wheat). Expressed in North American terms (including 14% moisture), between them, the ash content is between 0.75 to 1.08%. Ash figures I've seen for North American 'medium' ryes (there are no government standards) are between 1.11% and 1.58%, meaning that overall, they are darker. Increased ash content in rye flours is accompanied by greater greater proportions of less desirable water unextractable arabinoxylans.

**Clear flours** – comprise only a small percentage of flour sales in Germany and are not used in the typical 60% - 70% rye loaf. The addition of vital wheat gluten is not done.