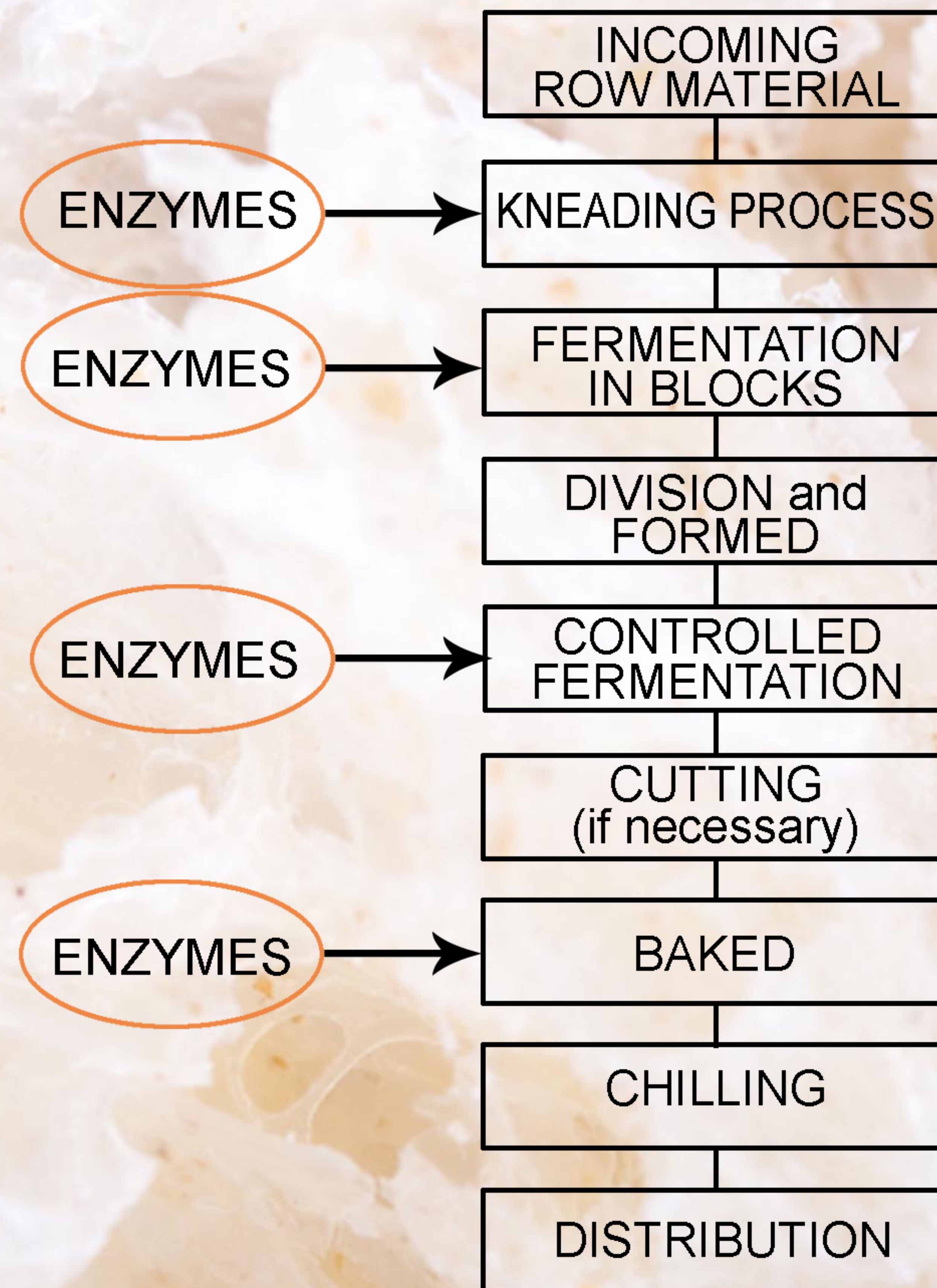


ENZYMES IN INDUSTRY OF BREAD MAKING

FLOW DIAGRAM



GOALS: COMPILED IN MEMORY TYPES AND APPLICATIONS ENZYMES USED IN INDUSTRY OF BREAD MAKING AND THE CHARACTERISTICS THEY PROVIDE.

ENZYME	SUBSTRATE	REACTION	BENEFITS IN DOUGH	BENEFITS IN BREAD
AMYLASES	Amylose and amylopectin	$\alpha \rightarrow \alpha(1 \rightarrow 4)$ -D-glycosidic, liberating α -dextrins $\beta \rightarrow \alpha(1 \rightarrow 4)$ -D-glycosidic, liberating β -dextrins and β -maltose Glucoamylase $\rightarrow$ $\alpha(1 \rightarrow 4)$ - and $\alpha(1 \rightarrow 6)$ -D-glycosidic, liberating β -glucose	Generation of fermentable compounds Improvement of viscosity and rheology	$\uparrow$ bread volume Improvement in bread texture Formation of reducing sugars and subsequent Maillard reaction products $\uparrow$ bread flavor and color
PROTEASES	Gluten proteins: Gliadin and glutenin	Hydrolysis of peptide bonds	Control of gluten strength Better retention of gas	$\uparrow$ bread volume Crispness on bread crust
HEMICELLULASES	Arabinoxylan and β -glucan	$\beta(1 \rightarrow 4)$ -D-glycosidic	$\uparrow$ viscosity, stability, with better moldable form Improvements on rheological properties	$\uparrow$ bread volume Improvement of crumb structure
LIPASES	Triacylglycerols	Liberation of free fatty acids	Better machinability $\uparrow$ strength and stability	$\uparrow$ bread volume Improvement in crumb properties Production flavor precursors
LIPOXYGENASE	Polyunsaturated fatty acids	Oxidation of fatty acids	Bleaching of fat soluble flour pigments. $\uparrow$ strength and mixing tolerance	$\uparrow$ bread volume Improvement of crumb structure Whiter crumb color Production of flavor precursors
GLUCOSEOXIDASE	β -D-glucose	Oxidation of β -D-glucose to gluconic acid	$\uparrow$ stickiness Better retention of gas	$\uparrow$ bread volume Improvement in crumb properties

CONCLUSIONS

USE OF ENZYMES--> Standardization FINAL PRODUCT
IMPROVE QUALITY

TIP --> TRY enzyme TERMS OF ITS FORMULA AND PROCESS FOR ITS USE SET

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